



Drishti IAS Presents...



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Drishti IAS, 641, Mukherjee Nagar,
Opp. Signature View Apartment,
New Delhi

Drishti IAS, 21
Pusa Road, Karol Bagh
New Delhi - 05

Drishti IAS, Tashkent Marg,
Civil Lines, Prayagraj,
Uttar Pradesh

Drishti IAS, Tonk Road,
Vasundhra Colony,
Jaipur, Rajasthan

e-mail: englishsupport@groupdrishti.com, Website: www.drishtias.com
Contact: Inquiry (English): 8010440440, Inquiry (Hindi): 8750187501

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Low-Carbon Action Plan (LCAP)

Why in News?

Bihar has initiated a **well-designed work plan to strengthen its waste management** profile by formulating a **Low-Carbon Action Plan (LCAP)** for the waste and domestic wastewater sector.

- This is part of its commitment to transform itself into a **Net Zero state by 2070**.
- The detailed assessment, done by **ICLEI (International Council for Local Environmental Initiatives)**, South Asia, of the waste and wastewater sectors constitutes a critical part of the strategy.
 - ICLEI is a network of more than 2500 local and regional governments, supported by a team of global experts, driving sustainable urban development worldwide.
 - ICLEI influences **sustainability policy and drives local action** for low emission, nature-based, equitable, resilient and circular development.

What is the Low Carbon Action Plan (LCAP)?

- **About:**
 - The LCAP is a strategic document **developed to address the challenges of Greenhouse Gas (GHG) emissions** and promote **sustainable waste management practices**.
 - Specifically tailored to Bihar, the LCAP outlines a comprehensive roadmap for reducing emissions from the waste and domestic wastewater sectors, thereby contributing to the **state's goal of becoming carbon neutral by 2070**.

What are the Initiatives Related to Waste Management in India?

- **Solid Waste Management Rules 2016:**
- **Waste to Wealth Portal:**
- **Waste to Energy:**
- **Plastic Waste Management (PWM) Rules, 2016:**
- **Project REPLAN:**
- **Plastic Waste Management Amendment) Rules, 2022:**

Black Carbon Emissions and PMUY

Why in News?

During the **UNFCCC COP26 climate talks in Glasgow in November 2021**, India committed to attaining **net-zero emissions by 2070**, positioning itself as a leading contender in the pursuit of **carbon neutrality**.

- As per the **Ministry of New and Renewable Energy**, India has established a renewable energy capacity surpassing **180 GW by 2023** and is on track to achieve its goal of reaching **500 GW by 2030**.
- **Pradhan Mantri Ujjwala Yojana (PMUY)**, a scheme of the government of India can contribute to **net zero emission** significantly by mitigating the black carbon emission.

What is Black Carbon (BC)?

- **About:**
 - **Black carbon (BC)** is the **dark, sooty material** emitted alongside other pollutants when **biomass** and **fossil fuels** are not fully combusted.
 - BC is a short-lived pollutant that is the second-largest contributor to warming the planet behind **carbon dioxide (CO₂)**.
 - Unlike other **greenhouse gas emissions**, BC is quickly washed out and can be eliminated from the atmosphere if emissions stop.
 - Unlike historical carbon emissions it is also a localised source with greater local impact.
 - Black carbon is a kind of an aerosol.
- **Impacts:**
 - Black carbon absorbs solar energy, it warms the atmosphere. When it falls to earth with precipitation, it darkens the surface of snow and ice, reducing their albedo (the reflecting power of a surface), warming the snow, and hastening melting.
 - It contributes to **global warming** and poses severe risks. Studies have found a direct link between exposure to **black carbon** and a higher risk of **heart disease, birth complications, and premature death**.

Note:

➤ Source:

- Most **black carbon emissions** in India arise from **burning biomass**, such as **cow dung** or **straw**, in traditional **cookstoves**.
- It gets emitted from **gas** and **diesel engines**, **coal-fired power plants**, and other sources that burn **fossil fuel**. It comprises a significant portion of **particulate matter (PM)**.
- According to a 2016 study, the **residential sector** contributes **47%** of India's total black carbon emissions.
- Industries contribute a further **22%**, **diesel vehicles 17%**, **open burning 12%**, and other sources **2%**.

Other Measures Taken to Mitigate Black Carbon Emission

- **Introducing Cleaner Fuels:** e.g., **ethanol blending**.
- **SATAT Scheme**
- **Managing Crop Residue**
- **National Clean Air Programme**
- **City specific Clean Air Action Plans**
- **FAME Scheme**

Challenges of Handling Nuclear Waste

Why in News?

Recently, India loaded the core of its long-delayed **prototype fast breeder reactor (PFBR) vessel**, bringing it to the cusp of stage II — powered by **uranium and plutonium** — of its three-stage nuclear programme.

- By **stage III**, India hopes to be able to **use its vast reserves of thorium** to produce nuclear power.
- Managing nuclear waste poses a significant challenge due to the widespread use of nuclear power.

Prototype Fast Breeder Reactor (PFBR)

- A breeder reactor is a nuclear reactor that **generates more fissile material than it consumes** by irradiation of fertile material, such as Uranium-238 or Thorium-232 that is loaded into the reactor along with fissile fuel.

- These are designed to extend the nuclear fuel supply for electric power generation.
- PFBR is a 500-megawatt electric (MWe) fast-breeder nuclear reactor presently being constructed at the Madras Atomic Power Station in Kalpakkam (Tamil Nadu).
 - It is fuelled by Mixed Oxide (MOX) Fuel.

What is Nuclear Waste?

- In a **fission reactor**, **neutrons bombard the nuclei of atoms of certain elements**. When one such nucleus absorbs a neutron, it destabilises and breaks up, yielding some energy and the nuclei of different elements.
 - **For example**, when the **uranium-235 (U-235)** nucleus absorbs a neutron, it can fission to **barium-144**, **krypton-89**, and **three neutrons**. If the '**debris**' (**barium-144 and krypton-89**) constitute elements that can't undergo fission, they become nuclear waste.
 - Fuel loaded into a nuclear reactor becomes irradiated and must eventually be removed, at which point it is known as **spent fuel**.
- Nuclear waste is **highly radioactive** and needs to be **stored in facilities reinforced to prevent leakage** into and/or contamination of the local environment.

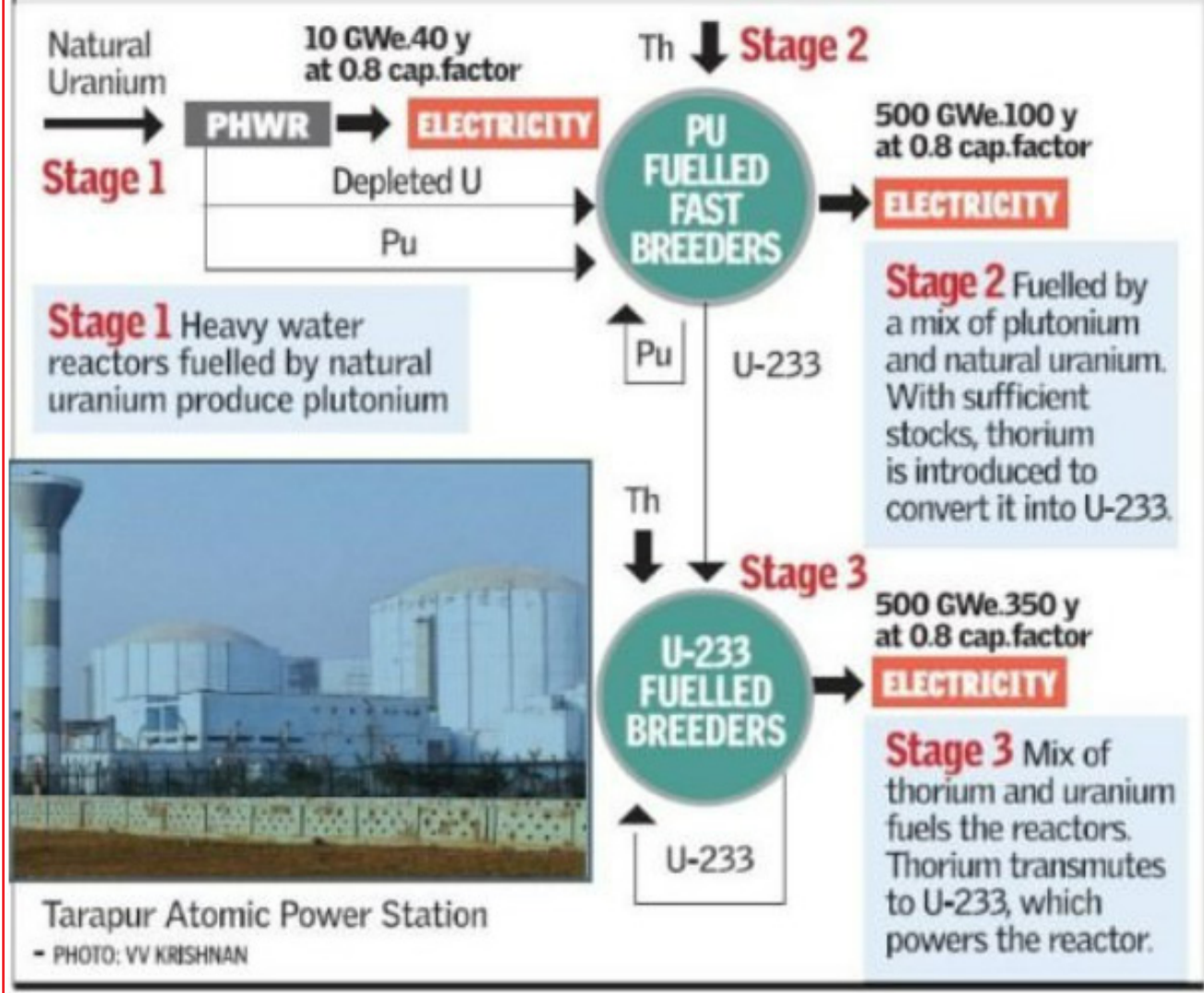
Note:

- **Fission** is a process in which the nucleus of an **atom splits into two or more smaller nuclei** and some byproducts.
 - When the **nucleus splits**, the **kinetic energy** of the fission fragments (primary nuclei) is transferred to other atoms **in the fuel as heat energy**, which is eventually used to produce steam to drive the turbines.
- **Fusion** is defined as the **combining of several small nuclei into one large nucleus** with the subsequent release of huge amounts of energy.
 - Harnessing fusion, **the process that powers the Sun** could provide a limitless, clean energy source.
 - In the sun, the extreme pressure produced by its immense gravity creates the conditions for fusion to happen.

Note:

INDIA'S THREE-STAGE NUCLEAR PROGRAMME

Homi Bhabha envisioned India's nuclear power programme in three stages to suit the country's low uranium resource profile



Global E-waste Monitor 2024

Why in News?

Recently, the **United Nations Institute for Training and Research (UNITAR)** has released the **Global E-waste Monitor 2024**, which states that the world's generation of electronic waste is rising five times faster than documented **e-waste recycling**.

Note:

- The UNITAR is a **training arm of the United Nations** that helps governments, organisations, and individuals overcome global challenges.
- UNITAR offers **learning events and solutions**, including workshops, seminars, conferences, public lectures, and online courses. It also provides organisational advisory services, conference and retreat facilitation, and online learning solutions.

Note:



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What are the Key Highlights of the Global E-waste Monitor 2024 Report?

- **E-waste Generation Trends:**
 - There is a **significant increase in global e-waste generation**, rising from 34 billion (bn) kg in 2010 to **62 bn kg in 2022**.
 - This trend is projected to continue, **reaching 82 bn kg by 2030**.
 - Of this 62 bn kg, only 13.8 bn kg is documented as **'formally collected and recycled in an environmentally sound manner'**.
 - 62 bn kg of e-waste includes 31 bn kg of metals, 17 bn kg of plastics and 14 bn kg of other materials (minerals, glass, composite materials, etc.)
- **Regional Disparities:**
 - Europe has the highest rate of documented formal collection and recycling of e-waste (42.8%), while Africa **struggles with low recycling rates** (<1%) despite generating lower amounts of e-waste.
 - Asia, including India, generates a **significant portion of global e-waste** but has made limited advances in e-waste management.
 - Countries in Asia generate **almost half of the world's e-waste (30 bn kg)** but relatively few of them have enacted legislation or established clear e-waste collection targets.
- **Per Capita E-waste Generation and Recycling Rates:**
 - Europe (17.6 kg), Oceania (16.1 kg) and the Americas (14.1 kg) generated the highest amount of e-waste per capita in 2022.
 - They also had the **highest documented per capita collection** and recycling rates (7.53 kg per capita in Europe, 6.66 kg per capita in Oceania and 4.2 kg per capita in the Americas).
 - This was because their collection and **recycling infrastructure was the most advanced**.

What is an e-Waste?

- Electronic waste (e-waste), is a generic term used to describe **all types of old, end-of-life or discarded electrical and electronic equipment**, such as household

appliances, office information and communications equipment etc.

- E-waste contains numerous toxic chemicals including metals such as lead, cadmium, **mercury, and nickel**.
- India currently ranks **third among the largest generators of e-waste globally**, behind only China and the US.
 - The volume of e-waste in India has witnessed a significant surge to 1.6 million tonnes in 2021-22.
 - The 65 cities in India generate more than 60% of the total generated e-waste, whereas 10 states generate 70% of the total e-waste.

Plastic Waste Management (Amendment) Rules, 2024

Why in News?

The Ministry of Environment, Forest and Climate Change of India has recently introduced amendments to the **Plastic Waste Management Rules, 2016**, through the **Plastic Waste Management (Amendment) Rules, 2024**.

- These changes signify a significant effort to address plastic pollution in India, particularly by **targeting microplastics and setting stricter criteria for biodegradable plastics**.

What are the Key Highlights of the Plastic Waste Management (Amendment) Rules 2024?

- **Biodegradable Plastics:**
 - Biodegradable plastics are now defined as materials **capable of degradation by biological processes** in specific environments like soil and landfill, **without leaving any microplastics**.
 - **Microplastics** are defined as any **solid plastic particle insoluble in water**, with dimensions between 1 micron and 1,000 microns (1 micron is one-thousandth of a millimetre).
 - In recent years, they have been reported as a major source of pollution affecting rivers and oceans.

Note:

- **Microplastics Testing:**
 - The rules **do not specify which chemical tests** can establish the absence of microplastics or the extent to which microplastics must be reduced for elimination.
- **Expanded Definition of “Importer”:**
 - The definition now includes **imports of various plastic-related materials** such as packaging, carry bags, sheets, raw materials, and intermediate materials used in plastic manufacturing for commercial purposes.
 - **Earlier, “importer” referred** to someone who imported plastic packaging, products with plastic packaging, carry bags, multilayered packaging, plastic sheets, or similar items.
- **Inclusive Definition of “Manufacturer”:**
 - The scope now encompasses those engaged in the **production of plastic raw materials, compostable plastics, and biodegradable plastics**, reflecting a broader range of entities covered under this term.
- **Extended Scope of “Producer”:**
 - Beyond manufacturing plastic packaging, it now includes the production of intermediate materials used in plastic packaging and contract manufacturing for brand owners.
- **Certification Requirement:**
 - Manufacturers are allowed to produce carry bags and commodities from **compostable or biodegradable plastics**, and must obtain a certificate from the **Central Pollution Control Board (CPCB)** before marketing or selling their products.
















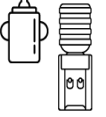
Note:



Which plastics are recyclable?

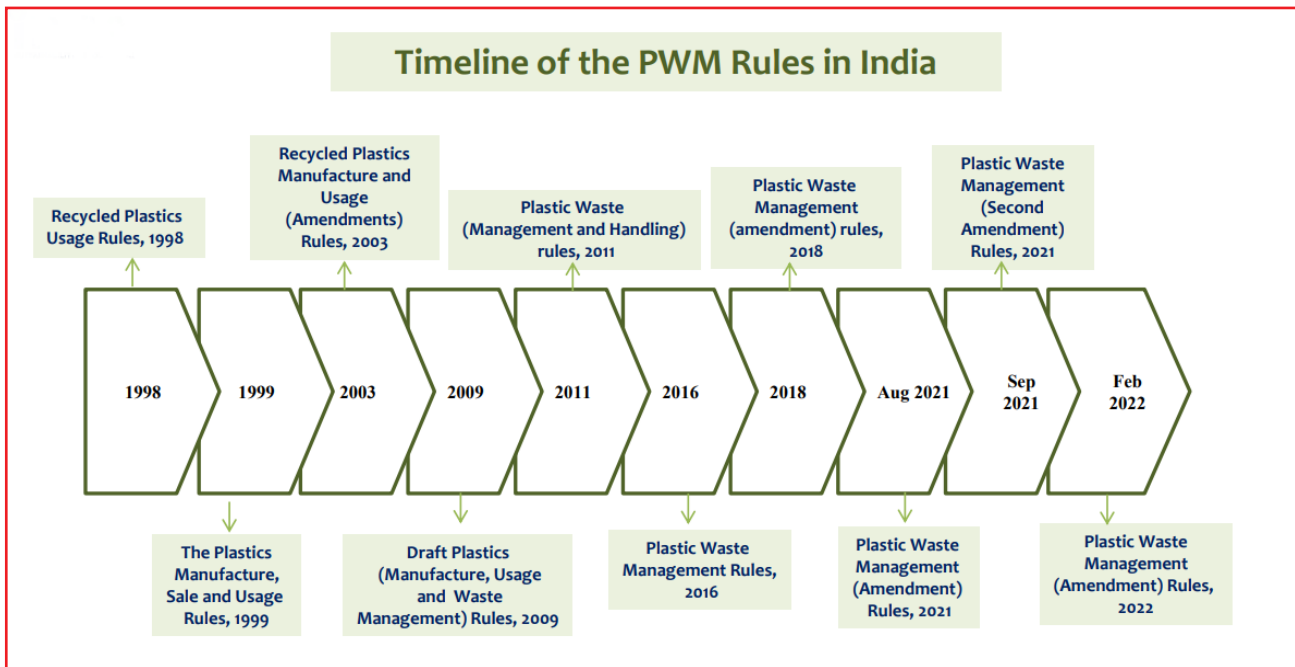
Summary of plastic polymer groups, their common uses, properties and recyclability.

Numerical coding (from 1-7) is typically provided on plastic items and gives information of their polymer grouping below. Recyclability is based on common recycling schemes but can vary between countries as well as regionally within countries; check local recycling guidelines for further clarification.

Symbol	Polymer	Common Uses	Properties	Recyclable?
 PETE	Polyethylene terephthalate	 Plastic bottles (water, soft drinks, cooking oil)	Clear, strong and lightweight	Yes; widely recycled
 HDPE	High-density polyethylene	 Milk containers, cleaning agents, shampoo bottles, bleach bottles	Stiff and hardwearing; hard to breakdown in sunlight	Yes; widely recycled
 PVC	Polyvinyl chloride	 Plastic piping, vinyl flooring, cabling insulation, roof sheeting	Can be rigid or soft via plasticizers; used in construction, healthcare, electronics	Often not recyclable due to chemical properties; check local recycling
 LDPE	Low-density polyethylene	 Plastic bags, food wrapping (e.g. bread, fruit, vegetables)	Lightweight, low-cost, versatile; fails under mechanical and thermal stress	No; failure under stress makes it hard to recycle
 PP	Polypropylene	 Bottle lids, food tubs, furniture, houseware, medical, rope, automobile parts	Tough and resistant; effective barrier against water and chemicals	Often not recyclable; available in some locations; check local recycling
 PS	Polystyrene	 Food takeaway containers, plastic cutlery, egg tray	Lightweight; structurally weak; easily dispersed	No; rarely recycled but check local recycling
 OTHER	Other plastics (e.g. acrylic, polycarbonate, polyactic fibres)	 Water cooler bottles, baby cups, fiberglass	Diverse in nature with various properties	No; diversity of materials risks contamination of recycling

Note:

What are the Recent Plastic Waste Management Rules in India?



What are the other Initiatives taken to Curb Plastic Waste?

- [Swachh Bharat Mission](#)
- [India Plastics Pact](#)
- [Project REPLAN](#)
- [Un-Plastic Collective](#)
- [GoLitter Partnerships Project](#)

Climate Finance Road to COP29

Why in News?

The [UN Climate Change Conference \(UNFCCC COP 27\)](#) convened in Sharm El-Sheikh, [Egypt](#) established a [Loss and Damage Fund](#) for climate disaster recovery in developing nations.

- The [2023 UNFCCC COP 28 \(Dubai\)](#) focused on transitioning from **fossil fuels**, pledging to **triple renewable energy capacity by 2030**.
- As preparations for COP29 in Baku intensify, attention now turns to finance discussions, particularly the **New Collective Quantitative Goal (NCQG)**.

What is the New Collective Quantitative Goal?

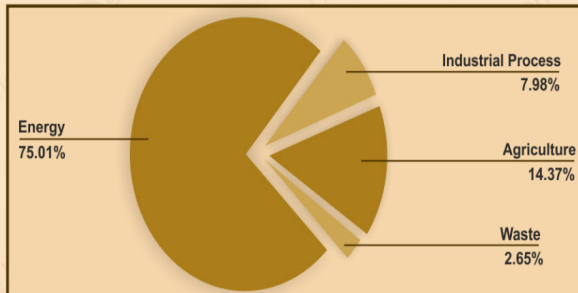
- The NCQG is a new annual **financial target** that **developed countries must meet from 2025** onward to provide climate finance to developing countries.
 - It will replace the previous commitment of **USD 100 billion per year** that developed nations had pledged in 2009 but failed to deliver.
- The final NCQG amount is expected to be a central point of negotiation at the **COP29 summit in Baku, Azerbaijan, in November 2024**.
 - The NCQG negotiations aim to set a higher collective amount that wealthy countries will need to mobilise annually for mitigation, adaptation, and other climate action efforts in poorer nations vulnerable to the impacts of climate change.
- Securing an adequate NCQG figure is extremely important for developing countries, as a **lack of sufficient climate finance has been a major barrier** to implementing effective climate plans and building resilience against global warming's effects.

Note:

INDIA'S CLIMATE PROFILE

Sector-wise Contribution

- ⤷ **Key Emitting Sectors:** Energy, Transportation, Construction



- ⤷ **Key Climate Risks:** Floods, Droughts, Heat Waves, Cold Waves and Cyclones
- ⤷ **Vulnerable Sectors:** Agriculture & Food, Water, Coastal, Health, Forests & other natural ecosystems

Key Initiatives for Tackling Climate Change

- ⤷ **National Policy Framework**
 - National Action Plan on Climate Change (NAPCC)
 - State Action Plan on Climate Change (SAPCC)
- ⤷ **India's Updated Nationally Determined Contributions (2022)**
 - Mass movement for 'LIFE'– Lifestyle for Environment
 - Adopt a climate-friendly and cleaner path for economic development
 - 45% reduction in emissions intensity of GDP by 2030 compared to 2005 levels, aiming for net-zero emissions by 2070
 - 50% cumulative electric power installed capacity from non-fossil fuel-based energy resources by 2030
 - Additional carbon sink of 2.5 to 3 billion tonnes of CO₂
 - Better adapt to climate change by enhancing investments in specific sector

- Mobilise domestic and new & additional funds
- Build capacities, create domestic framework and international architecture

International Climate Negotiations - UNFCCC (1994) Convention and Agreements

- Paris Agreement (2015)
- Kyoto Protocol (2005)

Bilateral and Multilateral Cooperation

Bilateral Projects

- ⤷ **With Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH (Germany)**
 - Climate Adaptation & Finance in Rural India (CAFRI) (2020-2023)
 - Nationally Appropriate Mitigation Actions (NAMAs) (2007)
 - Global Carbon Market (GCM) (1997)
 - Institutionalisation of Capacities on Climate Change Studies and Action (ICCC)
- ⤷ **With European Union (EU)**
 - Strategic Partnerships for the Implementation of the Paris Agreement (SPIPA) (2018-2022)
 - Clean Technologies and Energy Efficiency for Eco-Cities

Multilateral Projects

- ⤷ **UN Secretary-General (UNSG) Climate Action Summit (2019)**
- ⤷ **Global Commission on Adaptation (GCA) (2018)**
- ⤷ **UNDP:** Market Transformation and Removal of Barriers for Effective Implementation of the State-Level Climate Change Action



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Note:

Sundarbans

Why in News?

The **Sundarbans** face numerous environmental challenges including freshwater scarcity, pollution from microplastics and chemicals, and coastal erosion, making it important to look for sustainable solutions to protect it.

What is Sundarbans?

➤ About:

- The Sundarbans hosts the largest mangrove forests in the world, lying on the delta of the Ganges, Brahmaputra and Meghna rivers on the Bay of Bengal.
 - The mangrove ecosystem is a specialised environment between the land and the sea in the tropical and subtropical regions.

➤ Flora Fauna:

- Sundarban is the natural **abode of many animal groups and many species** are known to feed, breed and take shelter in this ecosystem.
 - It is home to many rare and globally threatened wildlife species such as the **estuarine crocodile**, **water monitor lizard**, **Gangetic dolphin** and **olive ridley turtle**.

➤ Protection:

- 40% of Sundarban lies in India and the rest in Bangladesh. Sundarban was designated a **UNESCO World Heritage site** in 1987 (India) and 1997 (Bangladesh).
- Sundarban Wetland, India was recognised as the 'Wetland of International Importance' under the **Ramsar Convention** in January 2019.
- **Project Tiger: Project Tiger** is one of the most important steps in conserving the Sundarbans unique ecosystem because it protected the entire forest by preserving the Royal Bengal Tiger population.
- **MOU between India and Bangladesh on Conservation of the Sundarban:** In 2011 Both India and Bangladesh signed an MoU on Conservation of the Sundarbans, recognising the need to monitor and conserve the Sundarbans.
- **Biosphere Reserve:**
 - Sundarbans is also a **Biosphere Reserve (BR)**, Within which there are several protected areas, including national parks and wildlife sanctuaries, they are,
 - **Sundarbans National Park (India)**
 - **Sundarbans East Wildlife Sanctuary (India)**
 - Sundarbans South Wildlife Sanctuary (India)
 - Sundarbans West Wildlife Sanctuary (India)
 - Sundarbans Reserve Forest (Bangladesh)



Spanning across India and Bangladesh, Sundarbans is amongst the world's largest contiguous blocks of mangrove forest. Less than 40 percent of Sundarbans is located in India and the rest is in Bangladesh. On the Indian side, forest boundaries have changed very little since 1943.

Note:

Environmental Protection Charge

Why in News?

According to a **CPCB (Central Pollution Control Board)** report submitted to the **National Green Tribunal**, a significant portion of the **Environment Protection Charge (EPC)** and Environmental Compensation (EC) collected by the CPCB remains unspent.

- As much as 80% of the EPC and EC collected by the Central Pollution Control Board remains unspent.

What is the Environment Protection Charge?

- The EPC is a fund used by the **Central Board of Pollution Control (CPCB)** to provide scientific inputs for improving air quality in **Delhi NCR**. The CPCB works with other institutions like IIT and NEERI under the EPC fund.
- The EPC is received as per an order of the **Supreme Court (M.C. Mehta Vs Union of India Case, 1985)**, and for air quality improvement and related work in Delhi-NCR such as research and development activities and vehicular pollution control health impact studies and specific projects to control pollution in Delhi-NCR and Punjab.
- The CPCB also receives 25% of the environmental compensation collected by state pollution control boards. It also collects environmental penalties directly from polluters/defaulters in various matters.
 - In 2016, the **SC (Supreme Court)** imposed an **EPC of 1% on the sale of 2000cc and above diesel cars** in Delhi and NCR.

Great Indian Bustards

Why in News?

Recently, the **Supreme Court (SC)** has constituted an **expert committee to balance the conservation and protection of the endangered Great Indian Bustard bird population with the country's international commitments to promote Renewable sources of energy.**

- The large-winged birds are on the brink of extinction, with one of the causes being frequent collisions with

high-powered power cables running adjacent to its core habitats in Gujarat and Rajasthan.

What is the Great Indian Bustard?

➤ About:

- The **Great Indian Bustard (Ardeotis nigriceps)**, the **State bird of Rajasthan**, is considered India's most **critically endangered bird**.
- It is considered the flagship grassland species, representing the health of the grassland ecology.
- Its population is confined mostly to Rajasthan and Gujarat. Small populations occur in **Maharashtra, Karnataka and Andhra Pradesh**.
- GIBs are a **slow-reproducing species**. They lay a few eggs and have almost a **year-long parental care of chicks**. The GIB achieves maturity in around 3-4 years.

➤ Protection Status:

- **IUCN Red List: Critically Endangered**
- **Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES): Appendix 1**
- **Convention on Migratory Species (CMS): Appendix I**
- **Wildlife (Protection) Act, 1972: Schedule I**

What Steps are Being Taken to Conserve the GIB?

➤ Species Recovery Programme:

- It is kept under the species recovery programme under the **Integrated Development of Wildlife Habitats** of the Ministry of Environment, Forests and Climate Change (MoEFCC).

➤ Firefly Bird Diverters:

- **Firefly bird diverters** are flaps installed on power lines. They work as **reflectors for bird species like the GIB**.
- Birds can spot them from a distance of about 50 meters and change their path of flight to avoid collision with power lines.

➤ Artificial Hatching:

- The conservation breeding programme started in 2019 by collecting eggs from the wild and **artificially hatching them**. The first chick hatched on 21st June 2019, and was **named 'Uno'**. Eight more chicks were hatched that year and raised and monitored.

Note:

- A total of **29 GIBs have been housed** in the two breeding centres in Rajasthan.
- **National Bustard Recovery Plans:**
 - It is currently being implemented by conservation agencies.
- **Conservation Breeding Facility:**
 - MoEF&CC, the Rajasthan government and the **Wildlife Institute of India (WII)** have also established a conservation breeding facility in **Desert National Park at Jaisalmer in June 2019.**
- **Project Great Indian Bustard:**
 - It has been **launched by the Rajasthan government** to construct breeding enclosures for the species and develop infrastructure to reduce human pressure on its habitats.

Desert National Park:

- It is situated on the western border of India **within the Jaisalmer & Barmer Districts of Rajasthan.**
- Great Indian Bustards, Rajasthan State animal (Chinkara), State tree (khejri) and State flower (Rohida) are found naturally at this park.
- It was declared a **UNESCO World Heritage Site in 1980** and National Park in 1992.

Kutch Bustard Sanctuary:

- The Kutch Bustard Sanctuary is **located near Nalia in the Kutch district of Gujarat, India.**
- It is the smallest sanctuary in the country, spread over just two square kilometres. The sanctuary, also known as the **Lala-Parijan sanctuary**, was declared in July 1992 primarily to **safeguard the endangered Great Indian bustard.**
- The sanctuary is home to three **species of Bustards:** the Great Indian bustard, lesser floricans, and the Macqueen bustard.

Captive Elephant (Transfer or Transport) Rules, 2024

Why in News?

The Ministry of Environment, Forest, and Climate Change (MoEF&CC) has notified the **Captive Elephant**

(Transfer or Transport) Rules, 2024, which liberalises the conditions for transferring **elephants** within or between states.

What are the Captive Elephant (Transfer or Transport) Rules, 2024?

- **Circumstances for Transfer of Captive Elephants:** Transfer may occur when:
 - The **owner is no longer capable** of adequately maintaining the elephant's welfare.
 - If it's determined that the **elephant will receive better care in the new circumstances** compared to its current situation.
 - The **Chief Wildlife Warden may deem it necessary** for the elephant's better upkeep based on the specific circumstances of the case.
- **Procedure Within the State:**
 - Before a transfer within a state, the **elephant's health must be confirmed** by a veterinarian.
 - The suitability of both the current and prospective habitats must be verified by the **Deputy Conservator of Forests.**
 - Approval or rejection of the transfer is at the discretion of the **Chief Wildlife Warden** based on these assessments.
- **Procedure Outside the State:**
 - Similar conditions apply for transferring elephants outside a state.
 - Additionally, the **elephant's genetic profile must be registered** with the MoEF&CC before the transfer.
- **Requirements for Elephant Transfer:**
 - The elephant must be accompanied by a **mahout and an elephant assistant.**
 - A health certificate from a veterinary practitioner confirming fitness for transport is mandatory.
 - Transport should occur after the quarantine period, if required for contagious diseases, is completed.
 - Proper feeding and watering arrangements must be made during transport.
 - Tranquillisers/sedatives shall be used to control nervous or temperamental elephants upon prescription by the veterinary practitioner.

Note:

Note:

- Until August 2022, the Wildlife Protection Act 1972 explicitly **prohibited the trade in wildlife including both wild and captive elephants**.
- The Captive Elephant (Transfer or Transport) Rules, 2024 stem from **amendments to the Wildlife Protection Act in 2022** exempting captive elephants from the prohibition on wildlife trade.
 - A Parliamentary Committee, recommended the deletion of this exemption clause for elephants and providing **only an exemption for elephants owned by temple trusts** and argued that a “careful balance” between traditions and conservation was needed.
 - Despite recommendations to delete this exemption, the final amended act retains it, **allowing transfers only for elephants with an existing certificate of ownership**.

Global Methane Tracker 2024

Why in News?

The **International Energy Agency's Global Methane Tracker 2024** indicates that **methane** emissions from fuel usage in 2023 were nearly at their **highest level** on record, representing a slight increase compared to 2022.

What are the Major Highlights of Global Methane Tracker 2024?

- **Methane Emissions Overview:** In 2023, methane emissions from fossil fuels totaled close to **120 million tonnes (Mt)**.
 - **Bioenergy** (largely from biomass use) contributed a further 10 Mt methane emissions. This level has stayed constant since 2019.
- **Rise of Major Methane Emissions Events:** Major methane emissions events increased by over 50% in 2023 compared to 2022.
 - These events included more than 5 million metric tons of methane emissions from significant fossil fuel leaks globally.
 - One prominent incident was a major **well blowout in Kazakhstan** that lasted **over 200 days**.

- **Top Emitting Countries:** Nearly **70% of methane emissions from fossil fuels come from the top 10 emitting countries**.
 - The **United States** is the largest emitter of methane from oil and gas operations, closely followed by **Russia**.
 - **China** is the highest emitter of methane in the coal sector.
- **Importance of Cutting Methane Emissions:** Cutting methane emissions from fossil fuels by **75% by 2030 is crucial for limiting global warming to 1.5 °C**.
 - The IEA estimated that this goal would require about **USD 170 billion in spending**. This is less than 5% of the income generated by the fossil fuel industry in 2023.
 - Around 40% of emissions from fossil fuels in 2023 could have been avoided at no net cost.

What is Methane?

- **About:** Methane is the simplest hydrocarbon, consisting of one carbon atom and four hydrogen atoms (CH₄).
 - It is the primary component of natural gas, possessing key characteristics:
 - **Odourless, colourless, and tasteless gas.**
 - Lighter than air.
 - Burns with a **blue flame in complete combustion**, yielding carbon dioxide (CO₂) and water (H₂O) in the presence of oxygen.
- **Contribution to Global Warming:** Methane ranks as the **second** most important **greenhouse gas (GHG)** after carbon dioxide (CO₂).
 - Its 20-year global warming potential (GWP) is **84**, indicating that it traps 84 times more heat per mass unit than CO₂ over a 20-year period, making it a potent GHG.
 - Despite its potency, methane has a shorter atmospheric lifetime compared to CO₂, **classifying it as a short-lived GHG**.
 - It is a significant contributor to global warming, accounting for about **30% of the rise in global temperatures since the preindustrial era**.
 - Methane also contributes to the formation of ground-level ozone.

Note:

➤ Major Sources of Methane Emission:

- Natural Sources:
 - **Wetlands**, both natural and human-made, are significant sources of methane emissions due to anaerobic decomposition of organic matter.
- Agricultural Activities:
 - Growing **paddy** fields release methane due to **anaerobic conditions in flooded rice paddies**.
 - **Excreta from cattle** and other livestock undergo enteric fermentation, producing methane as a byproduct.
- Combustion and Industrial Processes:
 - Burning of **fossil fuels**, including oil and natural gas, releases methane emissions.
 - **Biomass burning**, such as wood and agricultural residues, also contributes to methane levels.
 - Industrial activities like **landfills and wastewater treatment plants** generate methane during organic waste decomposition in anaerobic environments.
 - **Fertiliser factories** and other industrial processes can also release methane during production and transportation.

➤ Initiatives to Tackle Methane Emissions:

- India:
 - [Harit Dhara \(HD\)](#)
 - [BS VI Emission Norms](#).
 - [National Action Plan on Climate Change \(NAPCC\)](#)
- Global:
 - [Methane Alert and Response System \(MARS\)](#).
 - [Global Methane Pledge](#)
 - [Global Methane Initiative \(GMI\)](#)
 - [MethaneSAT](#)

What is the Global Methane Pledge?

- **About:** The Global Methane Pledge was launched at **UNFCCC COP26 in November 2021** to catalyse action to reduce methane emissions. Led by the US and the EU, the Pledge now has 111 country participants who together are responsible for **45% of global human-caused methane emissions**.

- It aims for a 30% reduction in global methane emissions from 2020 levels by 2030.
- India has **opted not to sign** the Global Methane Pledge.

What is the International Energy Agency?

- IEA is an independent intergovernmental organisation founded in **1974** in **Paris, France**.
- Its primary emphasis publications are the [World Energy Outlook Report](#), [World Energy Investment Report](#), and [India Energy Outlook Report](#).
 - India became a member of the IEA in 2017.

World Sparrow Day 2024

Why in News?

Every year, **World Sparrow Day** is observed on **March 20**, shedding light on the significance of sparrows in maintaining biodiversity and ecological balance.



Note:

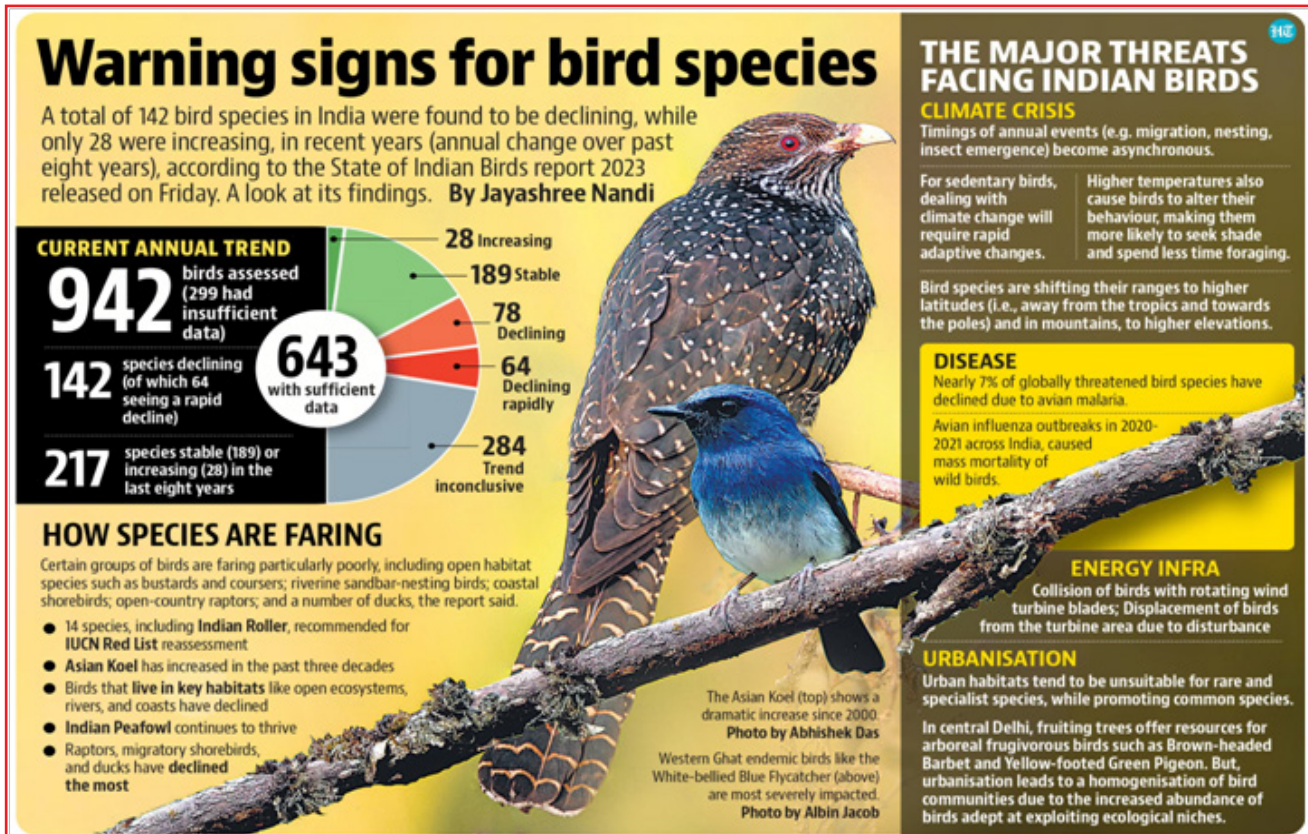
What are the Key Highlights of the World Sparrow Day 2024?

- **Theme:** In 2024, the theme for World Sparrow Day is “Sparrows: Give them a tweet-chance!”, “I Love Sparrows” and “We Love Sparrows”.
- **History:** The inaugural World Sparrow Day took place on March 20, 2010. In India, it was initiated by the Nature Forever Society.
 - Founded by Mohammed Dilawar, an Indian conservationist, the society aimed to emphasize

the importance of conserving **house sparrows** and other common birds.

Note:

- House Sparrow (*Passer domesticus*) belongs to the order Passeriformes and the family Passeridae.
 - It is the **state bird of Bihar and Delhi** and is commonly found due to its proximity to human habitations.
 - **Its conservation status is Least Concern on the IUCN Red List.**



Read more: [State of India's Birds 2023 Report](#)

State of the Global Climate 2023: WMO

Why in News?

Recently, the **World Meteorological Organization (WMO)** has released its **State of the Global Climate 2023 report**, which highlights that the heat content of the world's oceans reached a record high in 2023.

- Additionally, **weather and climate hazards** have **compounded** concerns over **food security**, **population displacements**, and impacts on vulnerable populations in 2023.

What are the Key Highlights of the Report?

- **Record-High Ocean Heat Content:**
 - The heat content of the **world's oceans** reached **a record high in 2023**, with the highest level of ocean heat content ever recorded.

Note:

- This increase in ocean heat content is **attributed to anthropogenic climate drivers** such as **greenhouse gas (GHG)** emissions and changes in land use.
- **Contrasting Heating and Cooling Patterns in the North Atlantic:**
 - While the majority of the world's oceans are experiencing warming, relatively small regions,

such as the subpolar North Atlantic Ocean, are experiencing cooling.

- This cooling is linked to the slowdown of the **Atlantic Meridional Overturning Circulation (AMOC)**, a system of ocean currents.
 - AMOC is a system of **ocean currents that circulates water within the Atlantic Ocean**, bringing warm water north and cold water south.

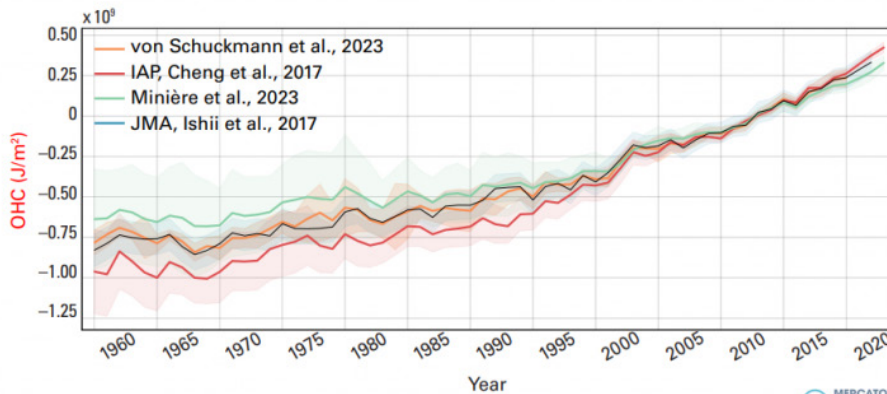


Figure 4. Global ocean heat content (OHC) anomalies relative to the 2005–2021 average for the 0–2000 m depth layer 1960–2023. Ensemble mean time series and ensemble standard deviation (2-standard deviations, shaded) updated from von Schuckmann et al. (2023) (orange). Updated from Cheng et al. (red) 2017. From Minière et al. 2023 (blue). Updated from Ishii et al. 2017 (green).

Source: Mercator Ocean international.

➤ **Global Average Sea-Surface Temperatures:**

- Global average **sea-surface temperatures (SST)** were at a record high in 2023, with several months breaking previous records by significant margins.
- Exceptional heating was observed in various regions including the eastern North Atlantic, the **Gulf of Mexico, the Caribbean, the North Pacific, and large areas of the Southern Ocean.**

➤ **Marine Heatwaves and Ocean Acidification:**

- The global ocean experienced an average daily **Marine Heatwave** coverage of 32%, well above the previous record of 23% in 2016.
- At the end of 2023, most of the global ocean **between 20° S and 20° N had been in heatwave conditions** since early November.
 - The end of 2023 saw a broad band of severe and extreme marine heatwave across the North Atlantic, with temperatures 3°C above average.
- These heat waves have negative repercussions for marine ecosystems and coral reefs. Additionally, **ocean acidification** has increased due to the absorption of carbon dioxide by the oceans.

➤ **Global Mean Near-Surface Temperature:**

- The global mean near-surface temperature in 2023 was 1.45 ± 0.12 °C above the **pre-industrial**

1850–1900 average, making it the **warmest year on record.**

- Every month from **June to December was record warm for the respective month**, and the long-term increase in global temperature is attributed to **increased concentrations of greenhouse gases** in the atmosphere.

➤ **Accelerating Glacial Retreat and Antarctic Sea Ice Loss:**

- Glaciers worldwide experienced the largest loss of ice on record, driven by extreme melt in both western North America and Europe.
- Antarctic sea ice extent reached an absolute record low for the satellite era, and Arctic sea ice extent remained well below normal.

➤ **Increased Frequency and Intensity of Extreme Weather Events:**

- Extreme weather events such as heatwaves, floods, droughts, wildfires, and tropical cyclones had major socio-economic impacts on all inhabited continents.
 - Flooding linked to extreme rainfall from **Mediterranean Cyclone Daniel affected Greece, Bulgaria, Türkiye, and Libya** with particularly heavy loss of life in Libya in September 2023.
 - **Tropical Cyclone Freddy in February and March 2023** was one of the world's longest-lived tropical

Note:



cyclones with major impacts on Madagascar, Mozambique and Malawi.

- Tropical **Cyclone Mocha** in 2023, was one of the most intense cyclones ever observed in the Bay of Bengal and triggered 1.7 million displacements across the sub-region from Sri Lanka to Myanmar and through India and Bangladesh, and worsened acute food insecurity.

➤ Renewable Energy Surge:

- Renewable energy generation surged in 2023, with renewable capacity additions increasing by almost 50% from the previous year.
- This growth indicates the potential for achieving decarbonisation targets and transitioning to clean energy sources to mitigate climate change.

➤ Climate Financing Challenges:

- In 2021/2022, global **climate-related finance flows** reached almost USD 1.3 trillion, nearly doubling compared to **2019/2020 levels**. Even so, tracked climate finance flows represent only **approximately 1% of global GDP**.
- There is a large financing gap. In an average scenario, for a 1.5°C pathway, annual climate finance investments **need to grow by more than six times, reaching almost USD 9 trillion by 2030** and a further USD 10 trillion through 2050.
- Adaptation finance continues to be insufficient. Though adaptation finance reached an all-time high of USD 63 bn in 2021-22, the global adaptation financing gap is widening, falling well short of the **estimated USD 212 bn per year needed up to 2030 in developing countries alone**.

What is the World Meteorological Organization (WMO)?

- The **World Meteorological Organization (WMO)** is an intergovernmental organisation with a membership of 192 Member States and Territories.
 - India is a member of WMO.
- It originated from the **International Meteorological Organization (IMO)**, which was established after the **1873 Vienna International Meteorological Congress**.
- Established by the ratification of the WMO Convention on 23rd March 1950, WMO became the specialised agency of the UN for meteorology (weather and climate), operational hydrology and related geophysical sciences.
- WMO is **headquartered in Geneva**, Switzerland.

World Air Quality Report 2023

Why in News?

India has been identified as the **world's third most polluted country**, as per the **World Air Quality Report 2023** by Swiss organisation IQAir.

What are the Key Highlights of the World Air Quality Report 2023?

➤ India's Air Quality Ranking:

- Ranked as the **world's third most polluted country**, with an average annual **PM2.5 concentration of 54.4 micrograms per cubic meter**.
 - **Bangladesh and Pakistan** surpassed India in **pollution** levels, becoming the most and second most polluted countries, respectively.
 - 9 out of the top 10 most polluted cities in the world are from India.
- **India's air quality** deteriorated compared to the previous year, with Delhi emerging as the world's most polluted capital city for the fourth consecutive time.
- **Begusarai in Bihar is labelled as the world's most polluted metropolitan area**, with an average PM2.5 concentration of 118.9 micrograms per cubic meter.
- **Health Impacts and WHO Guidelines:**
 - Around **136 million Indians (96% of the Indian population)** face PM2.5 concentrations (seven times) higher than the **World Health Organization's** recommended levels of **5 micrograms per cubic meter**.
 - Over 66% of Indian cities have reported **annual averages higher than 35 micrograms per cubic metre (µg/m3)**.
 - PM2.5 pollution, primarily from burning **fossil fuels**, is linked to increased rates of heart attack, stroke, and oxidative stress, with severe health implications.

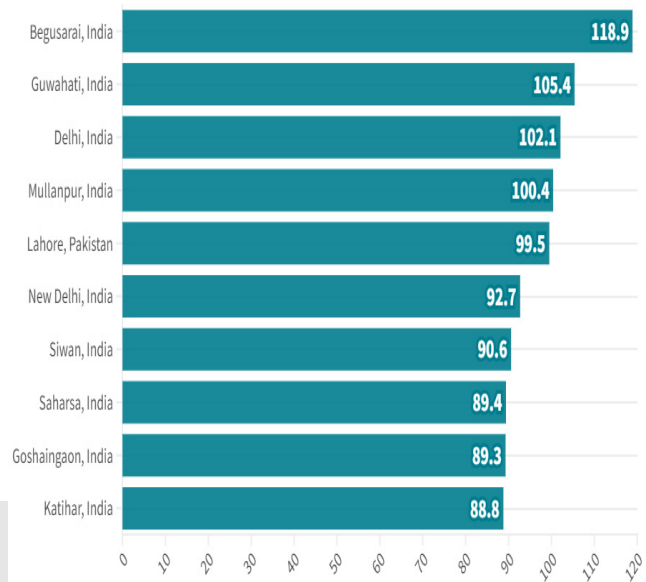
➤ Global Air Quality:

- Seven countries that met the WHO annual PM2.5 guideline (annual average of 5 µg/m3 or less) included **Australia, Estonia, Finland, Grenada, Iceland, Mauritius, and New Zealand**.
- The report states that **Africa continues to be the most underrepresented continent**, with a third of its population lacking access to air quality data.

Note:

World's most polluted countriesMost polluted country ranking based on annual average PM_{2.5} concentration ($\mu\text{g}/\text{m}^3$)

Rank	Country	2023	2022	2021	2020	2019
1	Bangladesh	79.9	65.8	76.9	77.1	83.3
2	Pakistan	73.7	70.9	66.8	59	65.8
3	India	54.4	53.3	58.1	51.9	58.1
4	Tajikistan	49	46	59.4	30.9	--
5	Burkina Faso	46.6	63	--	--	--
6	Iraq	43.8	80.1	49.7	--	39.6
7	United Arab Emirates	43	45.9	36	29.2	38.9
8	Nepal	42.4	40.1	46	39.2	44.5
9	Egypt	42.4	46.5	29.1	--	18
10	Democratic Republic of the Congo	40.8	15.5	--	--	32.1

World's most polluted citiesMost polluted city ranking based on annual average PM_{2.5} concentration ($\mu\text{g}/\text{m}^3$)**What are the WHO Air Quality Guidelines?****➤ Pollutants Covered:**

- The World Health Organization (WHO) regularly updates its evidence-based air quality guidelines to safeguard public health from the ongoing threat of air pollution. The most recent update occurred

in 2021, revising the guidelines that were originally published in 2005.

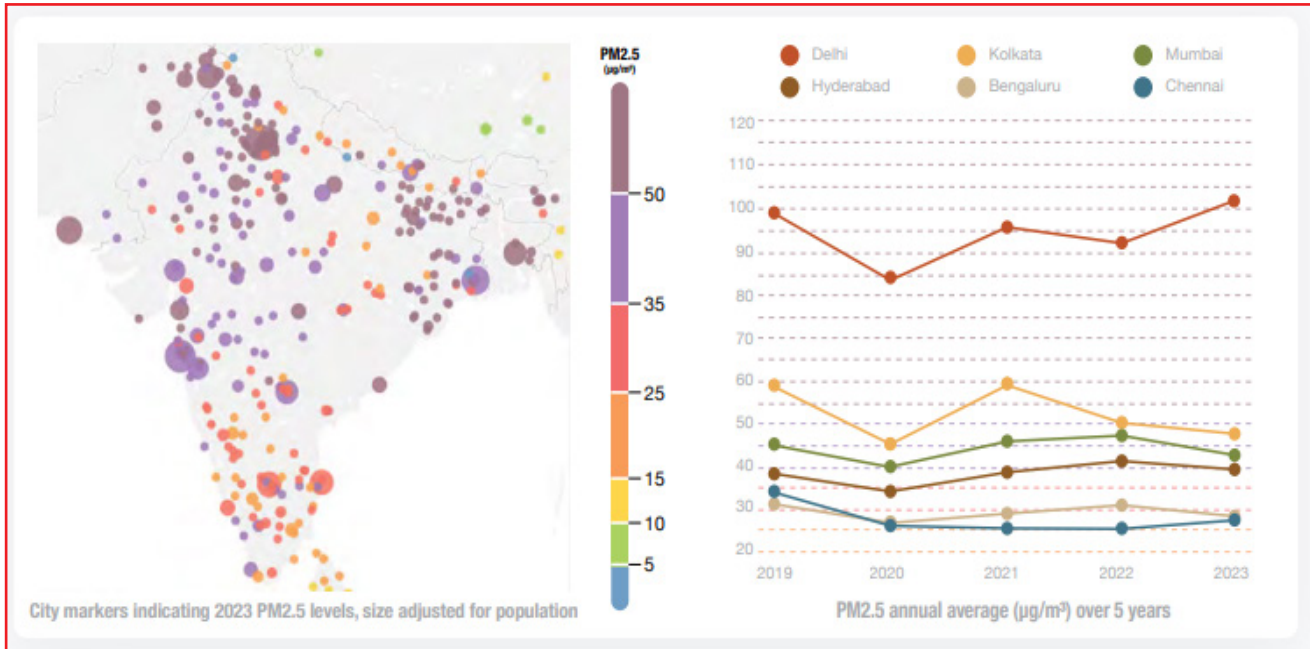
- The guidelines cover both **particulate matter (PM)** and gaseous pollutants, including PM_{2.5}, PM₁₀, **ozone (O₃)**, **nitrogen dioxide (NO₂)**, **sulfur dioxide (SO₂)**, and **carbon monoxide (CO)**.

Recommended 2021 AQG levels compared to 2005 air quality guidelines

Pollutant	Averaging Time	2005 AQGs	2021 AQGs
PM _{2.5} , $\mu\text{g}/\text{m}^3$	Annual	10	5
	24-hour ^a	25	15
PM ₁₀ , $\mu\text{g}/\text{m}^3$	Annual	20	15
	24-hour ^a	50	45
O ₃ , $\mu\text{g}/\text{m}^3$	Peak season ^b	-	60
	8-hour ^a	100	100
NO ₂ , $\mu\text{g}/\text{m}^3$	Annual	40	10
	24-hour ^a	-	25
SO ₂ , $\mu\text{g}/\text{m}^3$	24-hour ^a	20	40
CO, mg/m^3	24-hour ^a	-	4

Note:





Particulate Matter (PM)

➤ Particulate matter, or PM, refers to a complex mixture of extremely **small particles and liquid droplets** suspended in the air. These particles come in a wide range of sizes and can be made up of hundreds of different compounds.

- **PM10 (coarse particles)** - Particles with a diameter of 10 micrometres or less.
- **PM2.5 (fine particles)** - Particles with a diameter of 2.5 micrometres or less.

Particulate Size Matters: Comparing sizes

Small particles pose the greatest risk to human health. While the nose can filter most coarse particles, fine and ultrafine particles are inhaled deeper into the lungs where they can be deposited or even pass into the bloodstream.

Measurement indicate microns in diameter (µm).

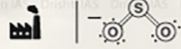
Particle Type	Examples
PM10 (≤ 10 µm) Coarse Particles	Pollen, Mold spores, Dust
PM2.5 (≤ 2.5 µm) Fine Particles	Bacterium, T4 Bacteriophage, Dust mite allergens, Pet dander
UF (< 0.1 µm) Ultrafine Fine Particles	Influenza A, Smoke, Soot/ Black Carbon, SARS-CoV-2

Human hair
50-180 µm

Note:

Air Pollutants

Sulphur Dioxide (SO₂)



It comes from the consumption of fossil fuels (oil, coal and natural gas). Reacts with water to form acid rain.

Impact: Causes respiratory problems.

Ozone (O₃)



Secondary pollutant formed from other pollutants (NO_x and VOC) under the action of the sun.

Impact: Irritation of the eye and respiratory mucous membranes, asthma attacks.

Nitrogen Dioxide (NO₂)



Emissions from road transport, industry and energy production sectors. Contributes to Ozone and PM formation.

Impact: Chronic lung disease.

Carbon Monoxide (CO)



It is a product of the incomplete combustion of carbon-containing compounds.

Impact: Fatigue, confusion, and dizziness due to inadequate oxygen delivery to the brain.

Ammonia (NH₃)



Produced by the metabolism of amino acids and other compounds which contain nitrogen.

Impact: Immediate burning of the eyes, nose, throat and respiratory tract and can result in blindness, lung damage.

Lead (Pb)



Released as a waste product from extraction of metals such as silver, platinum, and iron from their respective ores.

Impact: Anemia, weakness, and kidney and brain damage.

Particulate Matter (PM)



PM10: Inhalable particles, with diameters that are generally 10 micrometers and smaller.

PM2.5: Fine inhalable particles, with diameters that are generally 2.5 micrometers and smaller.

Source: Emitted from construction sites, unpaved roads, fields, fires.

Impact: Irregular heartbeat, aggravated asthma, decreased lung function.

Note: These major air pollutants are included in the Air quality index for which short-term National Ambient Air Quality Standards are prescribed.



Note:

What are the Initiatives Taken for Controlling Air Pollution?

- [National Clean Air Programme \(NCAP\).](#)
- [Bharat Stage Emission Standards.](#)
- [Solid Waste Management Rules, 2016.](#)
- [System of Air Quality and Weather Forecasting and Research \(SAFAR\) Portal.](#)
- [Air Quality Index.](#)
- [Graded Response Action Plan.](#)
- [National Air Quality Monitoring Programme \(NAMP\).](#)
- [Commission for Air Quality Management.](#)
- [Turbo Happy Seeder \(THS\) Machine.](#)

Forest Fires

Why in News?

Recently, **Forest Fires** have been raging in the **Coonor forest range in the Nilgiris in Tamil Nadu.**

- The **Indian Air Force** joined the ongoing firefighting efforts of the state forest department, deploying a Mi-17 V5 helicopter to conduct multiple “**Bambi Bucket**” operations.

Note: The Bambi Bucket, also called a helicopter bucket or a helibucket, is a specialised container that is suspended by cable under a chopper, and which can be filled by lowering into a river or pond before being flown **above a fire and discharged aerielly by opening a valve at the bottom of the bucket.**

- The Bambi Bucket is especially helpful in fighting wildfires that are difficult or impossible to reach from the ground. Around the world, helicopters are frequently commissioned to fight forest fires.

Government Initiatives:

- **National Action Plan for Forest Fires (NAPFF)**, was started in 2018 with the goal of reducing forest fires by informing, enabling, and empowering forest fringe communities and incentivizing them to collaborate with state forest departments.
- **The Forest Fire Prevention and Management Scheme (FPM)** is the only government-sponsored programme dedicated to assisting states in dealing with forest fires.

How does fire impact forests and wildlife?

Wildfires are inevitable, but not all fire is harmful to forests. Low-intensity fires can naturally “clean” and thin the forest by removing flammable and thick vegetation on the forest floor. The result is improved habitat for wildlife, healthier soil and new growth of native plants.

It also helps reduce the risk of large-scale high-severity fires that burn through the forest—from the floor to the canopy—with intense heat. High-severity fires across large landscapes can be devastating for wildlife, habitat and surrounding communities.

High-Severity Fire



Low-Intensity Fire

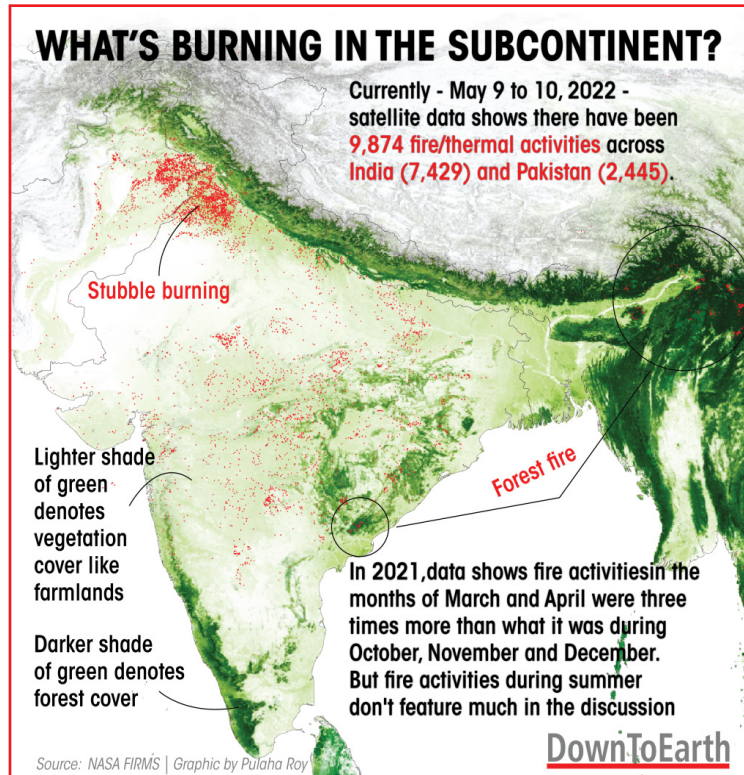


Note:

- **Present Scenario (2024):**
 - The highest number of forest fires have been reported from **Mizoram (3,738), Manipur (1,702), Assam (1,652), Meghalaya (1,252)**, and Maharashtra (1,215), as per FSI data.
 - Satellite data of **Indian Space Research Organisation (ISRO)** tools, showed that forest fires **have been on an uptick since early March 2024** along the Konkan

belt in Maharashtra, south-coastal Gujarat along Gir Somnath and Porbandar, southern Rajasthan and adjoining south-western districts of Madhya Pradesh, coastal and interior Odisha, and adjoining Jharkhand.

- In South India, most forest-covered areas of Andhra Pradesh, Karnataka and Tamil Nadu have seen fire incidents over the past week.



IPCC Reports and Equity in Climate Change Mitigation

Why in News?

Recently, a study delved into over 500 future emissions scenarios evaluated by the **UN Intergovernmental Panel on Climate Change (IPCC)**. These scenarios offer projections for the world's climate trajectory.

- The findings of the study shed light on the **significant inequities** within the projected pathways of climate action of the IPCC Reports.

What are IPCC Assessment Reports?

- **About:**

- The IPCC regularly releases **comprehensive assessment reports** that synthesise scientific literature on climate change.
- These reports encompass three working group assessments focusing on physical science, climate adaptation, and mitigation actions, along with a **synthesis report consolidating their findings**.

What are the Findings of the New Study?

- Researchers analyzed 556 scenarios in the **IPCC's AR6 report** and found troubling projections. They predict that by 2050, regions **encompassing 60% of the world's population**, including Sub-Saharan Africa and South, West, and East Asia (except China), will still have **below the global average per-capita GDP**.

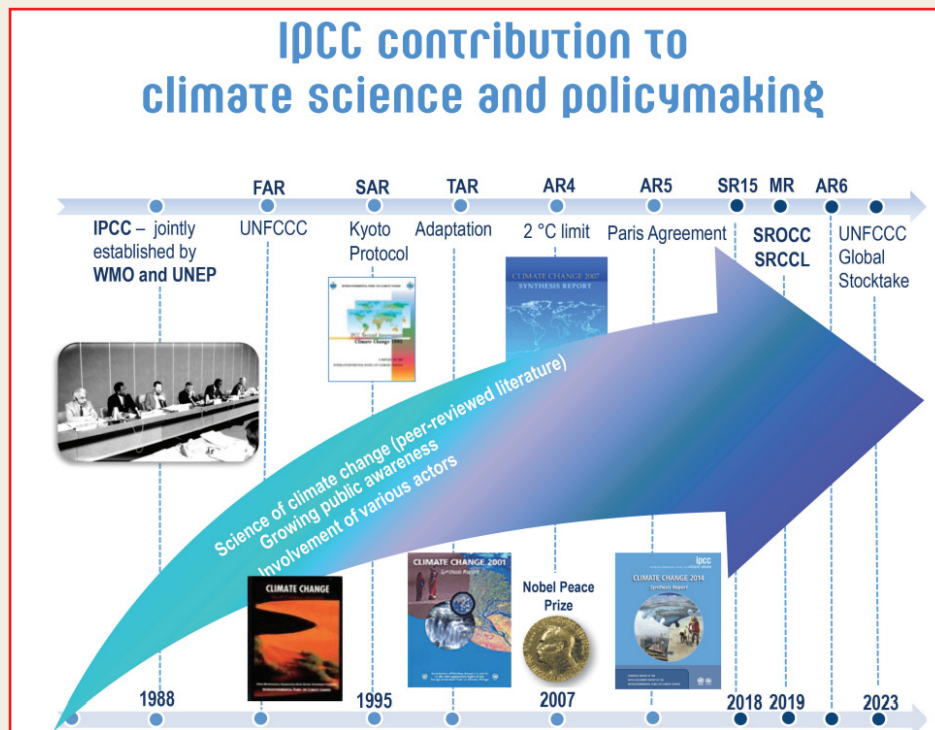
Note:

- Similar disparities in consumption of goods, energy, and fossil fuels **exist between the Global North and South**.
- Moreover, these scenarios indicate that **developing nations will shoulder a heavier burden** in terms of **carbon sequestration** and **Carbon Capture and Storage (CCS)** technologies.
 - This unfairly places the responsibility for mitigation and carbon dioxide removal on poorer countries.
 - The researchers criticise the scenarios for **ignoring the historical responsibility of wealthier nations** and failing to address the energy needs of the **Global South** to achieve development goals.
 - This highlights **significant inequities within the projected pathways** of climate action.

Intergovernmental Panel on Climate Change (IPCC)

➤ About:

- The Intergovernmental Panel on Climate Change (IPCC) is the **international body for assessing** the science related to climate change.
- It was **set up in 1988** by the **World Meteorological Organization (WMO)** and **United Nations Environment Programme (UNEP)** to provide policymakers with regular assessments of the scientific basis of climate change, its impacts and future risks, and options for adaptation and mitigation.
- IPCC assessments provide a **scientific basis for governments at all levels to develop climate-related policies**, and they underlie negotiations at the UN Climate Conference – the **United Nations Framework Convention on Climate Change (UNFCCC)**.

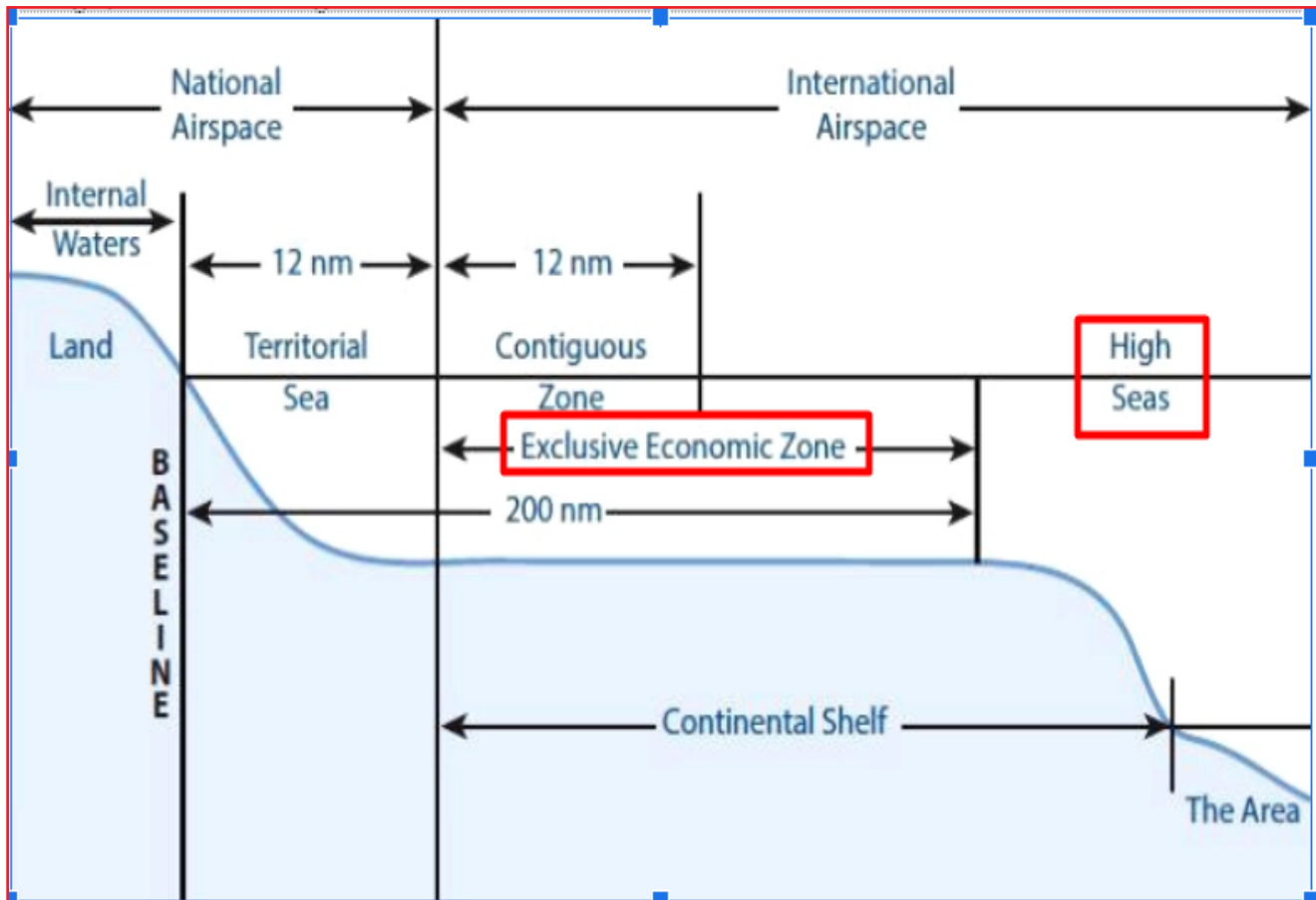


BBNJ Treaty

Why in News?

The **Blue Leaders High-Level Event on Biodiversity Beyond National Jurisdiction** took place in Belgium, encouraging nations to ratify the **Marine Biodiversity of Areas Beyond National Jurisdiction (BBNJ) treaty** aimed at protecting the high seas from pollution, climate change, and overfishing.

Note:



What is the BBNJ Treaty?

➤ About:

- The BBNJ treaty commonly referred to as the **Treaty of the High Seas** was agreed upon in March 2023 for the conservation and sustainable use of marine biological diversity in areas **beyond national jurisdiction**.
 - It represents a crucial step towards conserving and sustainably managing **marine biological diversity in areas beyond national jurisdiction**.

➤ Ratification Progress:

- The treaty aims to address the challenges faced by the high seas, which constitute areas beyond **200 nautical miles from the exclusive economic zones** of coastal countries.
 - So far, 88 countries have signed the treaty, with **Chile and Palau** being the only two to have ratified it.
 - However, at least 60 ratifications are necessary for it to come into force.

➤ Objectives:

- The treaty seeks to increase the **percentage of protected areas on the high seas**, which **currently stands at a mere 1.44%**, despite covering more than **two-thirds of the global ocean**.
- Additionally, it aims to **ensure fair and equitable sharing of profits from marine genetic resources (MGR)** and establish rules for conducting **Environmental Impact Assessments (EIA)**, which deal with identifying and evaluating the potential impacts an activity could have on the ocean.
- This aligns with **the 30x30 target**, it is a global commitment to protect at least **30% of the planet for nature by 2030**. It was agreed upon at the **Convention on Biological Diversity (CBD)** at the **Conference of Parties (COP15) to the UN Convention on Biological Diversity** in 2022 and is included in the **Kunming-Montreal Global Biodiversity Framework**.

Note:

UN HIGH SEAS TREATY

aka BBNJ (Biodiversity Beyond National Jurisdiction) Agreement

For the first time, UN members have agreed on a unified (legally-binding) treaty to protect biodiversity in the high seas

High Seas (HS)	All the saltwater bodies across Earth that aren't part of territorial sea/internal waters of a state	Need to Protect HS	• Only 1.2% of HSs are currently protected
Background of Treaty	Demand for an updated framework to protect marine life in the High Seas, is about 20 years-old		• 10% of global marine species at risk of extinction
			• High exploitation due to commercial fishing, mining, acidification, pollution

The last int'l agreement on ocean protection was UNCLOS signed in 1982

This treaty is the 3rd "implementing agreement" under UNCLOS

KEY FEATURES

- Create a new body to manage conservation of ocean life and establish marine protected areas in the high seas
- Estd. ground rules for conducting EIAs for commercial activities in oceans

KEY PLAYERS

EU, US, UK and China (in brokering the deal)

SIGNIFICANCE

- Achieving the 30x30 Target set at UN CBD COP15
- Legal protection of 2/3rd of the ocean (+ livelihoods of coastal communities)
- Comprehensive protection of endangered species/habitats on >40% of Earth's surface

ROADBLOCK

How to fairly share marine genetic resources (MGR) & eventual profits among developed/developing nations



Ocean ecosystems produce half the oxygen we breathe, represent 95% of the planet's biosphere and soak up CO₂ (world's largest carbon sink)

Tiger Safari in Tiger Reserve

Why in News?

The **Supreme Court** expressed inclination towards approving the establishment of a **Tiger Safari at Pakhrau, Uttarakhand** in the **buffer area of Corbett Tiger Reserve (CTR)**.

- The court emphasised that safari parks are intended only for local tigers that are injured, conflicted, or orphaned, and not those sourced from zoos.
- The court gave the **Central Bureau of Investigation (CBI)** a three-month deadline to conclude its investigation into alleged irregularities within CTR.
- **Establishment:**
 - The concept of a tiger safari was introduced in the **2012 Guidelines for Tourism** by the **National**

Tiger Conservation Authority (NTCA), allowing for such establishments in the **buffer areas of tiger reserves**.

- **NTCA guidelines of 2016** permitted the establishment of "Tiger Safaris" in **buffer and fringe areas** of tiger reserves for **injured, conflicted, or orphaned tigers**, stipulating that no tigers should be obtained from zoos.
- **In 2019, the NTCA permitted** animals to be sourced from zoos for tiger safari, granting the **Central Zoo Authority (CZA)** the authority to select these animals.

Note:

- In its interim order related to the case challenging the **Forest (Conservation) Amendment Act, 2023**, the **Supreme Court** stated that the **creation of zoos or safaris by any government or authority must receive final approval from the apex court**.

Note:

TIGER


Royal Bengal Tiger (*Panthera Tigris*) is the National animal of India.

Subspecies of Tiger

- * The continental (*Panthera tigris tigris*)
- * The Sunda (*Panthera tigris sondaica*)

Habitat

Tropical rainforests, evergreen forests, temperate forests, mangrove swamps, grasslands, and savannas



Countries Where Tiger Population Is Found

- Found only in 13 Tiger Range countries- India, Nepal, Bhutan, Bangladesh, Myanmar, Russia, China, Thailand, Malaysia, Indonesia, Cambodia, Laos, and Vietnam
- As per the latest report by IUCN, tiger has gone extinct in Cambodia, Laos, and Vietnam

Protection Status

- IUCN Red List: Endangered
- CITES: Appendix I
- WPA 1972: Schedule I

Threats


- Habitat loss
- Poaching and illegal trade
- Human-Wildlife conflict

Conservation Efforts

- International Big Cats Alliance (IBCA): For conservation of seven big cats namely Tiger, Lion, Leopard, Snow Leopard, Cheetah, Jaguar and Puma (launched by India)
- Tx2 campaign: Launched by WWF, stands for 'Tiger times 2' signaling the goal to double the tiger population by 2022
- National Tiger Conservation authority (NTCA): Constituted under the WPA, 1972
- Project Tiger: Launched in 1973
- Tiger Census: Every 4 years

Tigers In India

- India has the largest population
 - ◆ As of 2022, India has 3167 tigers
 - ◆ Largest population has been found in Central Indian Highlands & Eastern Ghats Landscape
- Tiger Reserves: India now has 53 tiger reserves
 - ◆ Ranipur in UP is the latest
 - ◆ Nagarjun Sagar (Andhra Pradesh) is the largest while Orang (Assam) is the smallest (Core area)



Human-Animal Conflict

Why in News?

Amid repeated deaths from animal attacks and rising anger over them, Kerala has declared the **Human-Animal Conflict** as a **state-specific disaster**.

- This declaration signals a significant shift in how the government addresses this pressing issue, altering the responsibilities and authorities involved.

How State Handle Human-Animal Conflict as a State-Specific Disaster?

Aspect	Current Management	Proposed Change (State Specific Disaster)
Responsibility	Forest department under the Wildlife Protection Act, 1972 .	State disaster management authority under the Disaster Management Act
Decision Making Authority	Chief Wildlife Warden	State Disaster Management Authority (Chief Minister at State Level)
District Level Authority	District Collector as the executive magistrate	District Collector as a Chairperson of District Disaster Management Authority
Intervention Capability	Limited by Wildlife Protection Act	Enhanced powers to take decisive actions under Disaster Management Act 2005
Judicial Oversight	Decisions may be questioned in court under wildlife laws	Limited judicial interference due to provisions of Disaster Management Act
Jurisdiction of Courts	Courts can entertain suits under relevant wildlife laws	Only the Supreme Court or High Court can entertain suits related to actions under Disaster Management Act, 2025 (Section 71) .
Norms Override Capability	Limited under Wildlife Protection Act	Authority to override other norms, including wildlife laws, during the declared disaster period (Under Section 72)

Note:

➤ Other State-Specific Disasters:

- In 2015, Odisha declared **snakebite a state-specific disaster**.
- In 2020, Kerala declared **Covid-19 as a state specific disaster**.
 - Besides, **heat waves, sunburn and sunstroke** have been declared so in 2019, the phenomenon of **soil pipping** in 2017, and **lightning** and **coastal erosion** in 2015.

HUMAN-WILDLIFE CONFLICT



When encounters between humans and wildlife lead to negative results, such as loss of property, livelihoods, and even life

Causes of HWC

- Agricultural Expansion
- Urbanization
- Infrastructure Development
- Climate Change
- Wildlife Populations Growth and Range Expansion

Impacts of HWC

- Grave injuries, Loss of life
- Damage to farms and crops
- ↑ violence against animals

WWF India during 2003-2004 developed the **Sonitpur Model** by which community members were connected with Assam Forest Dept and given training on how to drive elephants away from crop fields and human habitations safely.

In 2020, the SC upheld Madras HC's decision on the Nilgiris elephant corridor, affirming the right of passage of the animals and closure of resorts in the area.

Data on HWC

- Tigers killed 125 humans between 2019 and 2021
- Death of 329 tigers due to poaching, natural and unnatural causes.
- Elephants killed 1,579 humans in three years
- Death of 307 elephants due to poaching, electrocution, poisoning and train accidents

Advisory for HWC Management

(Standing Committee of the National Board of Wildlife)

- Gram Panchayats empowered to deal with problematic wild animals (WPA 1972)
- Compensation against crop damage due to HWC (PM Fasal Bima Yojna)
- Local/State depts. to adopt early warning systems and create barriers
- Paying a part of ex-gratia as interim relief within 24 hours of the incident to the victim/family

State - Specific Initiatives

- **UP** - Man-animal conflict under **listed disasters** (in State Disaster Response Fund)
- **Uttarakhand** - **Bio-fencing** carried out by growing various species of plants in areas
- **Odisha** - Casting **seed balls** inside different forests to **enrich food stock for wild elephants**



Note:

Coral Bleaching in Great Barrier Reef

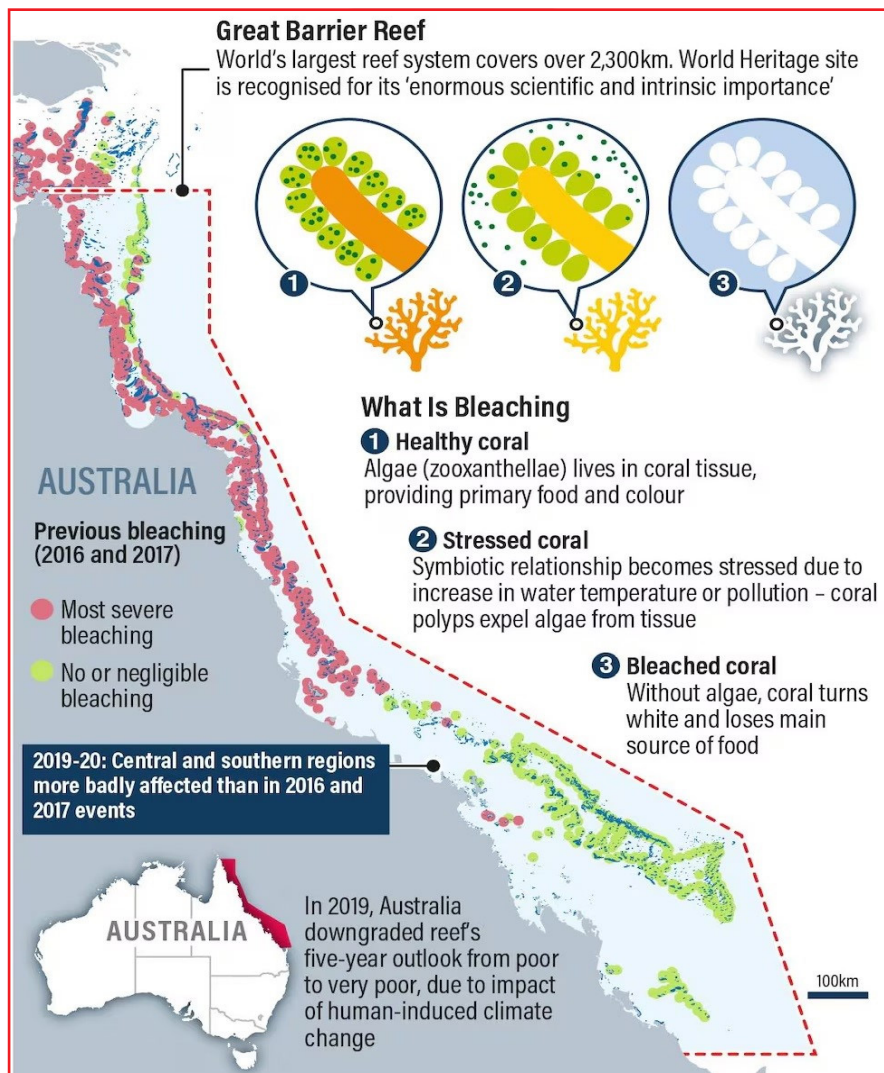
Why in News?

Recent aerial surveys conducted by Australian authorities confirm widespread **coral bleaching** across **two-thirds of the Great Barrier Reef (GBR)**, signalling a dire threat exacerbated by **climate change**. Urgent action is needed to mitigate the impacts and protect this vital marine ecosystem.

Great Barrier Reef (GBR)

- The GBR is the **world's largest coral reef system**. It's located in the Coral Sea off the coast of Queensland, Australia.

- The GBR stretches across 2,300 km and is made up of around 3,000 individual reefs and 900 islands.
- The GBR is home to 400 types of coral, and 1,500 species of fish. It's also home to endangered species such as the **dugong** and the large green turtle. The **GBR is a UNESCO World Heritage site** and was inscribed in 1981.
- In 2023, the UNESCO Heritage Committee **refrained from listing Australia's Great Barrier Reef as a site "in danger"** but warned that the world's biggest coral reef ecosystem remained under **"serious threat" from pollution and the warming of oceans**.
- Widespread mass bleaching of the Great Barrier Reef was first seen in 1998 and happened again in 2002, 2016, 2017, 2020, 2022 and now in 2024.



Note:


What Factors are Contributing to the Coral Bleaching in GBR?

➤ Temperature Stress:

- Warmer water temperatures can trigger coral bleaching, causing corals to expel the **algae (zooxanthellae)** living in their tissues and turn white.
 - Above-average sea surface temperatures over an extended period have led to significant **heat stress on the reef**, exacerbating the bleaching phenomenon.
- Bleached coral isn't dead, but weakened and susceptible to starvation and disease. Persistent stress can lead to coral death.

➤ Climate Change Impact:

- Rising ocean temperatures, exacerbated by **climate change**, increase coral **susceptibility to stress and mortality**, leading to widespread bleaching events globally due to **El Niño conditions**.
- **Other Environmental Stressors:**
 - Cold water temperatures, pollution, runoff, and extreme low tides can also induce coral bleaching, highlighting the **multifaceted nature of this phenomenon**.
- **Algae Relationship:**
 - Coral bleaching occurs when the **symbiotic relationship between corals and algae is disrupted**, impacting the corals' food source and making them vulnerable to disease.



Coral Reefs

(Rainforests of the seas)

About


- ✦ **Large underwater structures** – made of skeletons of **colonial marine invertebrates** 'coral' – individually called **polyp**
- ✦ **Symbiotic Relationship with algae** 'zooxanthellae' (responsible for beautiful colours of corals)
- ✦ Support over 25% of marine biodiversity

Hard Corals vs Soft Corals

- ✦ **Hard Corals** - Rigid skeleton made of CaCO_3 - reef-building corals
- ✦ **Soft Corals** - Non reef-building

Great Barrier Reef (Australia)

- ✦ Largest Coral Reef in the World
- ✦ World Heritage Site (1981)
- ✦ Endures Mass Coral Bleaching



Corals in India

- ✦ Present in the areas of Gulf of Kutch, Gulf of Mannar, Andaman & Nicobar, Lakshadweep Islands and Malvan

Significance


- ✦ Coral reefs **protect coastlines from storms/erosion**, provide jobs, offer opportunities for recreation
- ✦ Source of **food/medicines**

Threats

- ✦ **Natural:** Temperature, Sediment Deposition, Salinity, pH, etc.
- ✦ **Anthropogenic:** Mining, Bottom Fishing, Tourism, pollution, etc.

Coral Bleaching

- ✦ Corals under stress - expel algae – thus turning white (bleached)
- ✦ Bleached corals - not dead – but, more risk of starvation/disease



Initiatives to Protect Corals

Technology

- ✦ **Cyromesh:** Storage of the coral larvae at (-196°C) - Can be later reintroduced to the wild
- ✦ **Biorock:** Creating artificial reefs on which coral can grow rapidly

Global

- ✦ International Coral Reef Initiative
- ✦ The Global Coral Reef R&D Accelerator Platform

Indian

National Coastal Mission Programme

Note:

The Unjust Climate: FAO

Why in News?

Recently, the **Food and Agriculture Organization of the United Nations (FAO)**, has released a report titled- **The Unjust Climate**, shows how the effects of **Climate Change** on income and adaptation in rural areas vary with gender, wealth and age.

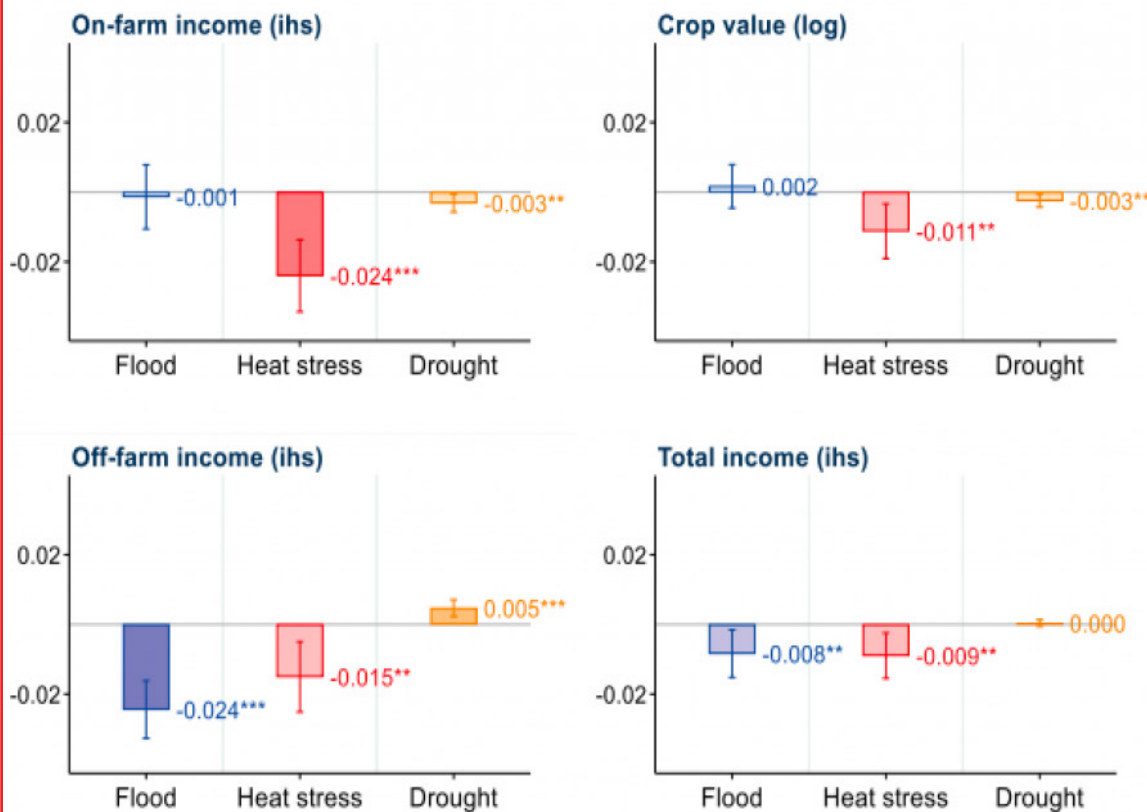
- FAO analyzed **socioeconomic data from over 100,000 rural households** representing more than 950 million people across 24 **LMICs (Lower Middle Income Countries)**.
- The study integrated this information with **70 years of georeferenced daily precipitation and temperature data** to examine the impacts of climate stressors on incomes, labour, and adaptation

strategies, differentiating based on wealth, gender, and age.

What are the Key Findings of the Report?

- Impact of Extreme Weather on Poor Rural Households:
 - Every day of extreme heat results in **poor rural households losing 2.4% of on-farm incomes**, 1.1% of crop value, and 1.5% of off-farm income compared to non-poor households across India and 23 other LMICs (Lower Middle Income Countries).
 - A 1°C increase in long-term temperatures would **push rural poor households to rely more on climate-dependent agriculture**, leading to a **33% decrease in off-farm incomes**.
 - Similarly, every day of **extreme Precipitation** causes poor households to lose 0.8% of their incomes **relative to non-poor households**, mainly driven by **losses in off-farm incomes**.

Extreme weather events significantly reduce the incomes of the poor relative to the non-poor



Note:

Measuring climate stressors

■ Floods

The number of extreme precipitation days. Extreme precipitation occurs when precipitation exceeds the 95th percentile of daily precipitation.

■ Heat stress

The number of extreme temperature days. Extreme temperature occurs when the maximum temperature exceeds the 99th percentile of daily maximum temperatures.

■ Drought

The number of days exceeding an extreme dry spell. An extreme dry spell is an event with a length that exceeds the 95th percentile of consecutive dry days.

■ Climate change

Long-term change in average temperature between two periods of time: 1951–1980 and the 30 years prior to the survey.

Note:



drishti

What is the Food and Agriculture Organization?

- **About:**
 - FAO is a specialised agency of the **United Nations** that leads international efforts to defeat hunger.
 - **World Food Day** is celebrated every year around the world on 16th October. The day is celebrated to mark the anniversary of the founding of the FAO in 1945.
 - It is one of the UN food aid organisations based in Rome (Italy). Its sister bodies are the **World Food Programme** and the **International Fund for Agricultural Development (IFAD)**.
- **Flagship Publications:**
 - The State of World Fisheries and Aquaculture (SOFIA).
 - The State of the World's Forests (SOFO).
 - **The State of Food Security and Nutrition in the World (SOFI)**.
 - The State of Food and Agriculture (SOFA).
 - The State of Agricultural Commodity Markets (SOCO).

Groundwater Contamination in India

Why in News?

The **National Green Tribunal (NGT)** recently expressed dissatisfaction over the **Central Groundwater Authority's (CGWA)** response to the widespread issue of **toxic arsenic and fluoride** in **groundwater** across India.

- Groundwater contamination due to arsenic is prevalent in **230 districts across 25 states of India** while that caused due to **fluoride** is prevalent in **469 districts across 27 states**.

Note:

- India is one of the **world's largest users of groundwater**, where groundwater contributes to more than **60% of the country's irrigation resources**.
- This **over-extraction of groundwater is non-renewable** since recharge rates are less than extraction rates and replenishing this resource can take thousands of years.

What is the Central Ground Water Authority?

- **About:** The authority has been constituted under **Section 3 (3) of the Environment (Protection) Act, 1986** to regulate and control the development and management of groundwater resources in the country.
- **Major Functions:**
 - To regulate, control, manage and development of groundwater in the country and to issue necessary regulatory directions for the purpose.
 - Exercise of powers under **section 4 of the Environment (Protection) Act, 1986** for the appointment of officers.

What are the Primary Agents Responsible for Contaminating Groundwater?


- **Arsenic:** Seepage from industrial and mining discharges, as well as from **fly ash ponds** in thermal power plants, can introduce arsenic into groundwater.
 - Chronic exposure to arsenic can cause **black foot disease**.
- **Fluoride:**
 - Excessive fluoride intake can result in neuromuscular disorders, gastrointestinal problems, dental deformities, and skeletal fluorosis, characterised by painful and stiff joints.
 - **Knock-knee syndrome**, marked by outward bending of the legs from the knees, can also occur.
- **Nitrates:** Excessive nitrate levels in drinking water react with haemoglobin, forming non-functional **methaemoglobin** and hindering oxygen transport, leading to methemoglobinemia and **blue baby syndrome**.
 - High nitrate levels can also contribute to the formation of **carcinogens** and accelerate eutrophication.
 - **Blue Baby Syndrome** cause a bluish discolouration of the skin in babies, **not just methemoglobinemia**, due to excessive nitrate levels in drinking water.
 - **Methemoglobinemia** is a condition where an **abnormal form of haemoglobin** (methemoglobin) is present in the blood, reducing its ability to carry oxygen.
- **Uranium:** **Uranium**, weakly radioactive with a **long physical half-life**, is found in concentrations above WHO guidelines in localised pockets in India.
 - In regions like **Rajasthan and northwestern states**, uranium is primarily present in alluvial aquifers,

Note:

while in southern states like **Telangana**, it originates from crystalline rocks such as granite.


- Elevated uranium levels in drinking water can cause kidney toxicity.
- **Radon:** Recently, in some areas of Bengaluru, groundwater used for drinking has been found to contain significantly high levels of **radioactive radon**.
- Radon originates from **radioactive granites and uranium**, which undergoes decay to radium and radon.

- The presence of radon in air and water can **damage lung tissues, increasing the risk of lung cancer**.
- **Other Trace Metals:** Water may also be contaminated by trace metals such as **lead, mercury, cadmium, copper, chromium, and nickel**, which possess carcinogenic properties.
- Water contaminated with cadmium can cause **Itai Itai disease**, also called **ouch-ouch disease**.
- Mercury in water causes **Minamata (a neurological syndrome)** in humans.




What are the impacts of water pollution?

Urban and domestic use




Increased water treatment and inspection costs, maintenance costs from scouring and premature ageing of infrastructure, increased wastewater treatment costs with implementation of more strict regulations. Emergency and clean-up costs from spills/accidents.

Ecosystem health




Damage to freshwater and marine ecosystems (e.g. fish kill, invertebrates, benthic fauna, flora, habitat degradation) and loss of ecosystem services, which may require investment in additional or different grey infrastructure alternatives to replicate these services.

Human health




Polluted water is the world's largest health risk, and continues to threaten both quality of life and public health. Associated with this are health service costs, loss life expectancy, and emergency health costs associated with major pollution events.

Industrial productivity




Exclusion of contaminated water for industrial use results in increasing water scarcity. Scouring of infrastructure, and clean-up costs from spills/accidents.

Social values and tourism




Prohibition from recreational use (e.g. swimming, fishing, seafood gathering), beach closure, impacts on aesthetics, cultural and spiritual values. Losses in fishing, boating, rafting and swimming activities to other tourism activities or to other ventures with superior water quality.

Agricultural productivity




Exclusion of contaminated water for irrigation results in increasing water scarcity. Irrigation with contaminated water causes damage to, and reduced productivity of, pasture and crops, soil contamination, impacts to livestock health and production, and scouring of infrastructure.

Commercial fisheries



Direct and indirect fish kill, contamination of shellfish.

Property values



Waterfront property values can decline because of unsightly pollution and odour.

Diffuse Pollution, Degraded Waters: Emerging Policy Solutions
<http://oe.cd/diffusepollution>

Note:

What are the Current Government Initiatives Related to Groundwater Management?

- [Atal Bhujal Yojana](#)
- [Jal Shakti Abhiyan](#)
- [Aquifer Mapping and Management Programme \(NAQUIM\)](#)
- [Pradhan Mantri Krishi Sinchayee Yojana \(PMKSY\)](#)
- [Water \(Prevention and Control of Pollution\) Amendment Bill, 2024](#)
- [National Green Tribunal](#)
- [Central Pollution Control Board \(CPCB\)](#)
- [Environment \(Protection\) Act, 1986](#)

India's Battle Against Single-Use Plastics

Why in News?

India had committed to phase out Single-Use Plastics (SUP) by 2022, three years later, while some progress

has been made with the ban on selected SUP items, challenges persist.

- According to a report launched during the 6th [United Nations Environmental Assembly \(UNEA-6\)](#), the thriving street food sector across India depends heavily on single-use plastics.

What is Single-Use plastic?

- It refers to a “plastic item intended to be used once for the same purpose before being disposed of or recycled.”
 - Single-use plastic has among the highest shares of plastic manufactured and used — from packaging of items to bottles (shampoo, detergents, cosmetics), polythene bags, face masks, coffee cups, cling film, trash bags, food packaging etc.
- On the current trajectory of production, it has been projected that **single-use plastic could account for 5-10% of greenhouse gas emissions by 2050.**

PARAMETERS FOR THE BAN ON SINGLE-USE PLASTIC IN INDIA

Utility Index—parameters (100)	Environmental Impact—parameters (100)
Hygiene (20)	Collectability (20)
Product safety (20)	Recyclability (20)
Essentiality (20)	Possibility of end-of-life solutions (20)
Social Impact (20)	Environmental Impact of alternative products (20)
Economic Impact (20)	Littering propensity (20)

- India's share in Plastic Production:
 - According to the report **Plastic Waste Makers Index 2019**, India was the 13th largest investor in **single-use plastic polymer production** globally.
 - India ranked 3rd globally, contributing 5.5 million tonnes of single-use plastic (SUP) waste, and ranked 94th with **per capita single-use plastic waste of 4 kg per year**, indicating that the SUP ban in India addresses roughly 11% of the entire gamut of single-use plastic waste.

Note:



- India's Mismanagement in Plastic Waste:
 - The UNEP's country-wise plastic data revealed that **India mismanages 85% of its plastic waste**.
 - This waste, **predominantly single-use in nature**, is dumped or even burnt at roadsides, choking drains and flowing into the rivers from where it disperses into the ocean, **harming marine life directly or indirectly as it degrades into micro- and nano-sized particles** over months, years and decades.

Status of Leopards in India 2022

Why in News?

The Ministry of Environment, Forest and Climate Change has released a report on the **Status of Leopards in India 2022**. The survey covered 20 States of India, and focussed on about 70% of the animals' expected habitat.

- Recently, the Union Government, while commemorating the 50th anniversary of **Project Tiger**, has approved the establishment of the **International Big Cat Alliance (IBCA)** with headquarters in India with a one-time budgetary support of Rs.150 crore for a period of five years from **2023-24 to 2027-28**.

What are the Key Highlights of the Report on the Status of Leopards in India 2022?

- Overall population:
 - India's leopard population **rose by 8% from 12,852 in 2018 to 13,874 in 2022**.
 - About 65% of the leopard population is **present outside protected areas** in the Shivalik landscape. Only about a third of the leopards are within protected areas.
 - The Shivalik landscape refers to the **outermost range of the Himalayas, known as the Shivalik Hills** or the Shivalik Range. This range extends across several states in northern India, including Uttarakhand, Himachal Pradesh, Haryana,

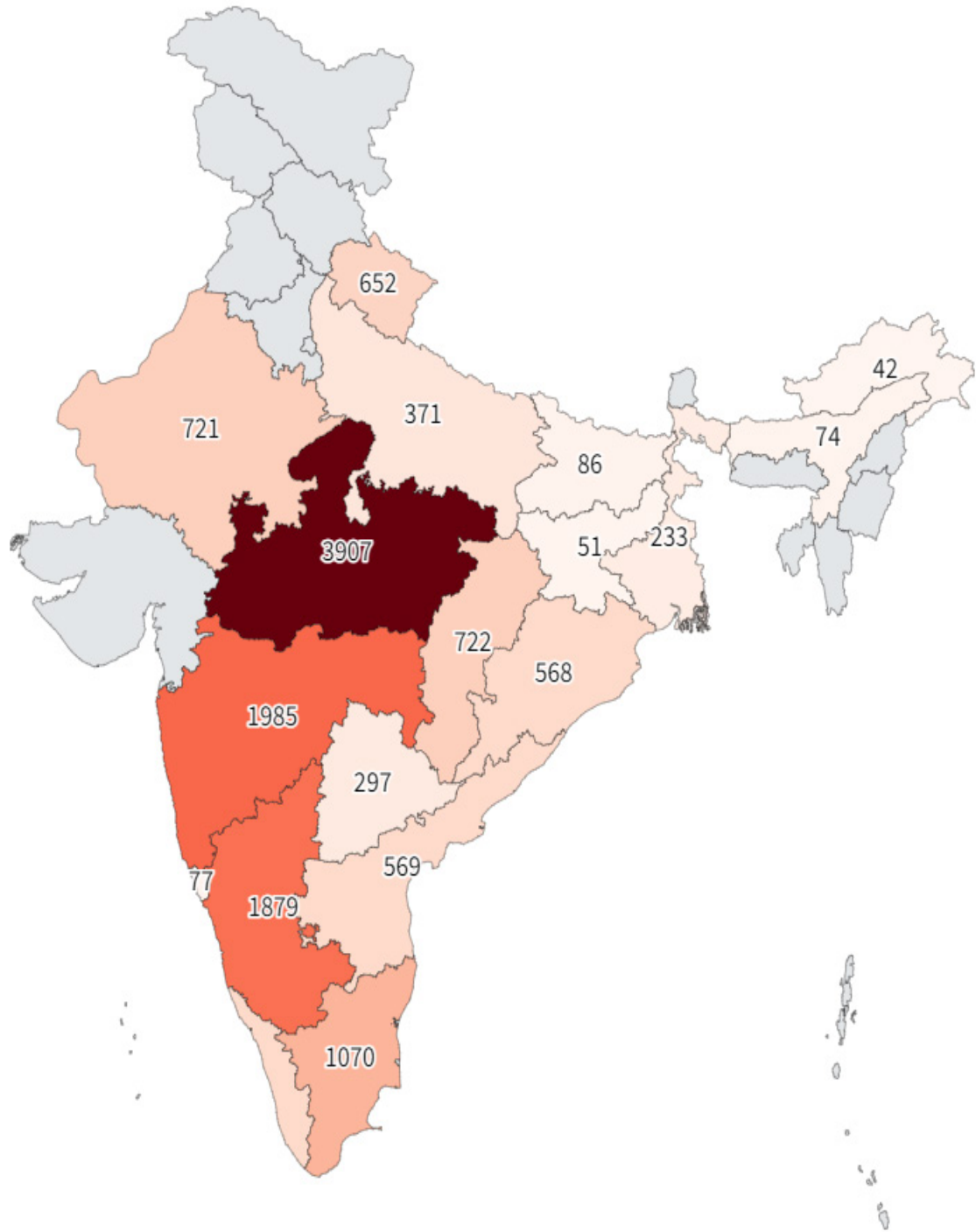
Punjab, and parts of Jammu and Kashmir and Uttar Pradesh.

- Regional variation:
 - Central India shows a stable or **slightly growing population** of leopards (2018: 8071, 2022: 8820), **Shivalik hills and Gangetic plains** experienced decline (2018: 1253, 2022: 1109).
 - In Shivalik hills and Gangetic plains, there is a 3.4% decline per annum, while the largest growth rate was in **Central India and Eastern Ghats of 1.5%**.
- State-level distribution:
 - Madhya Pradesh has the **highest number of leopards (3,907)**, followed by Maharashtra, Karnataka, and Tamil Nadu.
 - In Odisha the number of leopards dropped from 760 in 2018 to 562 in 2022, and in Uttarakhand, the population declined from 839 in 2018 to 652 in 2022.
 - Kerala, Telangana, Chhattisgarh, Bihar, and Goa too reported population declines.
- Benefits From Tiger Conservation Efforts:
 - The Central India and Eastern Ghats landscape is home to the largest population of leopards, which is growing due to protective measures within the framework of tiger conservation.
 - The report highlights that **leopard densities are higher in Tiger Reserves compared to areas outside Protected Areas**, despite the regulatory pressure exerted by tigers on leopards.
- Common Threats:
 - Common threats are **poaching of prey for bush meat**, targeted poaching for tiger and leopard skins and body parts and habitat loss due to mining and other human activities.
 - In Odisha, as many as **59 leopard skins were seized from wildlife smugglers** between 2018 and 2023.
 - Additionally, **road accidents** are a significant cause of leopard fatalities.

Note:

Leopard count in states

The estimated leopard population in 2022 is 13,874



Note:

What is the International Big Cat Alliance (IBCA)?

➤ About:

- The IBCA is a multi-country, multi-agency coalition aimed at conserving big cat species and their habitats.
- It brings together **96 big cat range countries**, non-range countries interested in big cat conservation, conservation partners, scientific organizations, and businesses.

➤ Objective:

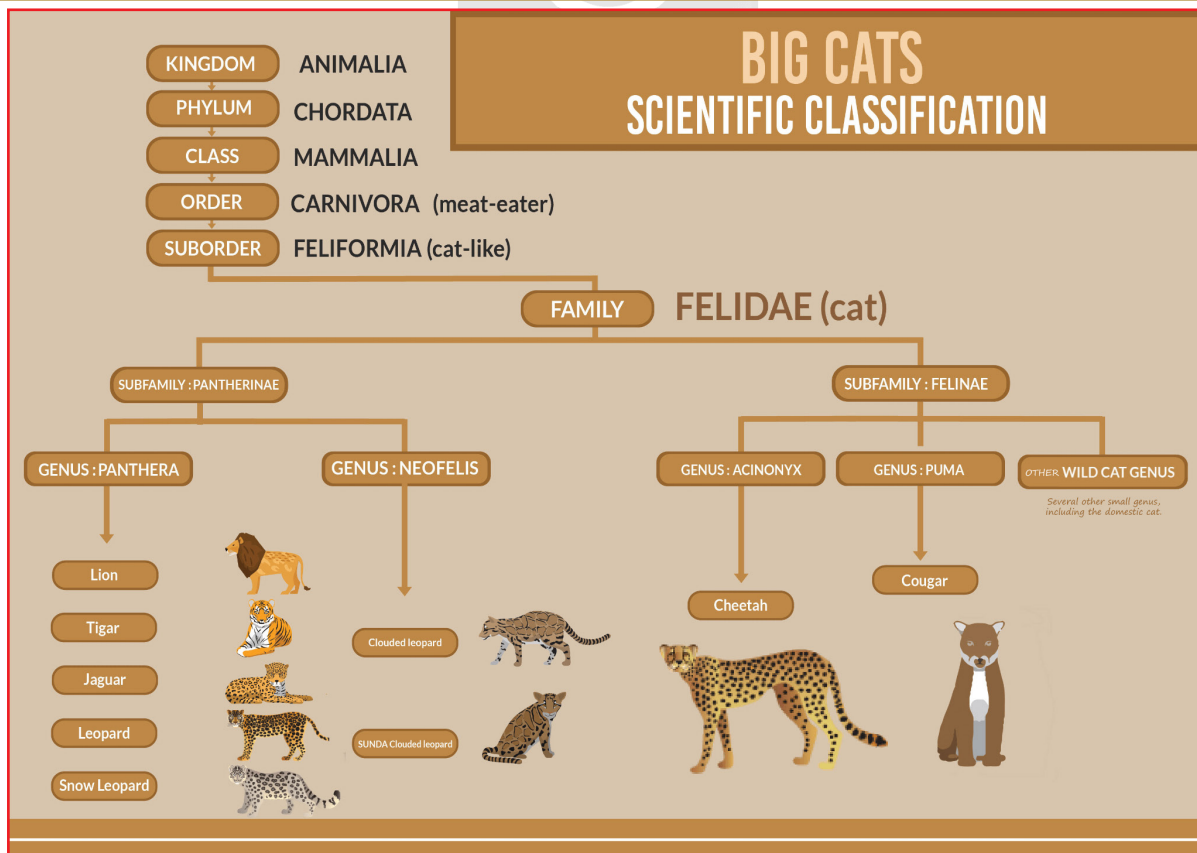
- The primary goal of the alliance is to collaborate on efforts to secure the future of **big cats, including Tigers, Lions, Leopards, Snow Leopards, pumas, jaguars, and cheetahs**, and the landscapes they inhabit.
- IBCA would work towards **mitigating the adverse effects of climate change**. It will advocate for policy initiatives that **align biodiversity conservation efforts** with local needs and contribute towards the attainment of **United Nations**-mandated **Sustainable Development Goals** within member countries.

➤ Structure:

- The grouping's structure will consist of an Assembly of Members, a Standing Committee and a Secretariat, **with its headquarters in India**.

➤ Conservation Efforts of India:

- [Project Lion](#)
- [Project Leopard](#)
- [Cheetah Reintroduction Project](#)
- [Wildlife Protection Act, 1972](#)
- [Snow Leopard](#) Conservation:
 - Conservation efforts **include habitat protection**, community engagement, research, and anti-poaching measures.
 - Collaboration with neighbouring countries and international organizations helps in safeguarding this high-altitude predator.



Note:

What are the Key Points Related to Leopards?

- **Scientific Name:** *Panthera pardus*
- **About:**
 - The leopard is the smallest of the Big Cat family (of genus *Panthera* namely the **Tiger, Lion** (*Panthera*

leo), Jaguar, Leopard, and Snow Leopard), and is known for its ability to adapt in a variety of habitats.

- **Conservation Status:**
 - **IUCN Red List:** Vulnerable
 - **CITES:** Appendix-I
 - **Indian Wildlife (Protection) Act, 1972:** Schedule-I

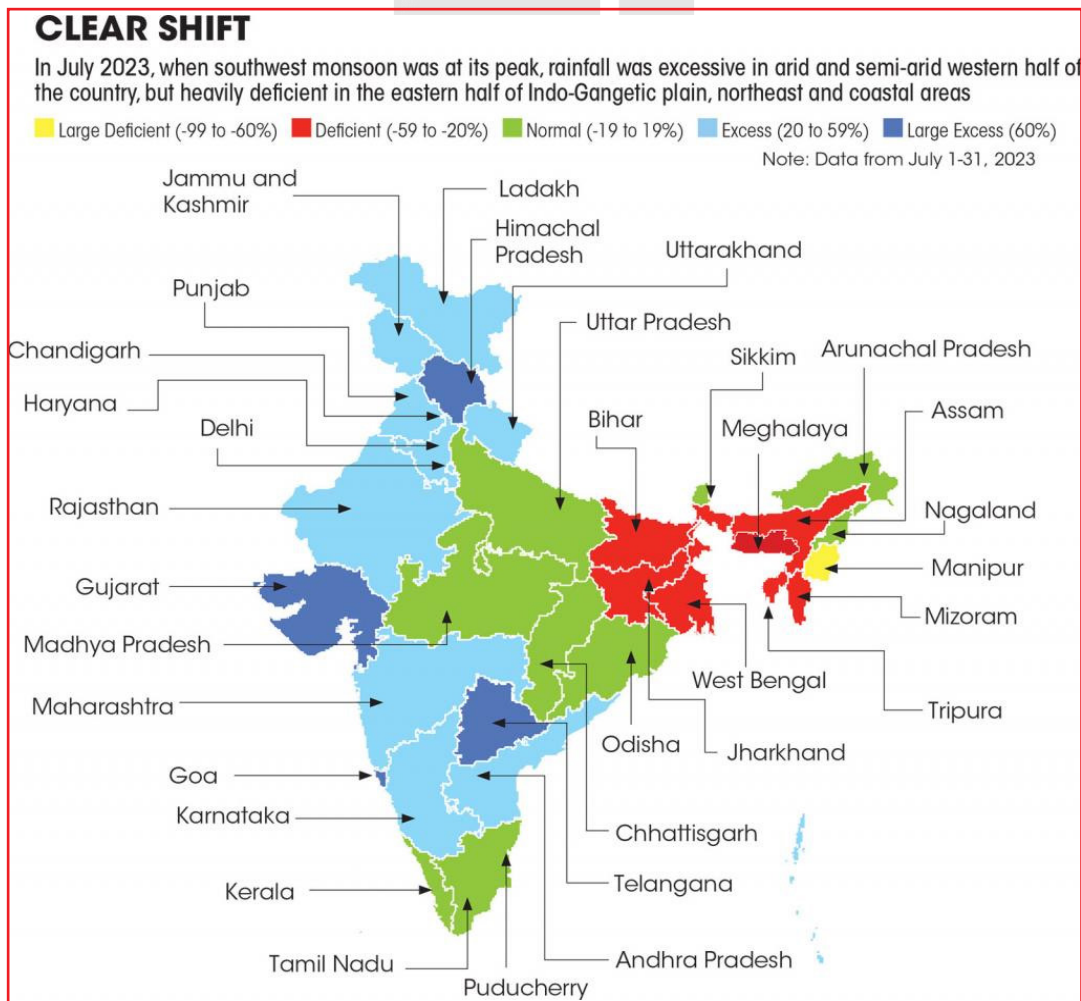
Himalayas More Prone to Extreme Weather Events

Why in News?

The **Himalayan Region**, prone to cloudbursts and extreme weather events, is experiencing accelerated impacts of **Global Warming**.

How are the Shifts in Weather Patterns Increasing the Frequency of Extreme Events?

- **Shift in Monsoon Patterns:**
 - There is evidence suggesting a **shift in southwest monsoon patterns**, with deviations occurring more frequently in the **Indo-Gangetic plain** rather than the **southern half of the sub-continent**.
 - This **includes excessive rainfall** in the arid and **semi-arid western half of India** and deficient rainfall in the eastern half and coastal areas, indicating a reversal of historical precipitation patterns.



Note:



- Temperature Rise in the Arabian Sea:
 - The uppermost layer of the Arabian Sea has experienced abnormal warming, leading to **increased evaporation and potentially** altering the behaviour of the southwest monsoon.
 - This warming trend has also contributed to **more Cyclonic storms in the Arabian Sea**, including some making landfall on the west coast of India.
 - Between 2001 and 2019, there has been a **50% increase in the frequency of cyclones in the Arabian Sea**. About half of these dissipate before they land.
- Extreme Rainfall and Cloudbursts:
 - Cloudbursts are not just intense rain showers, but a **genetically different form of rain**. Even in heavy showers, the raindrops are usually about 2 mm in diameter.
 - Their size grows to between 4-6 mm during severe thunderstorms and cloudbursts. Being heavier, these raindrops fall faster, thus they trigger **landslides with their tremendous pounding power**.
 - Number of thunderstorms, cloudbursts and hailstorms has increased from between two and 4 per annum during the four decades between **1970-2010, to 53 in Himachal Pradesh alone in 2023**.
- Glacial Melting and Glacier Lake Outbursts:
 - Rising temperatures in the Himalayas have caused glaciers to melt rapidly, **leading to the formation of glacial lakes**.
 - The **increasing frequency and ferocity of cloudbursts** are causing these lakes to overflow or burst their banks, resulting in floods and loss of lives and property downstream.
 - The number of such lakes in Uttarakhand and east of Himachal Pradesh, has increased from 127 in 2005 to 365 in 2015.
- Loss of Glacial Ice:
 - The Himalayas have **already lost more than 40% of their ice**, and this trend is expected to continue, with projections indicating a **potential loss of up to 75% by the end of the century**.
 - This loss of ice is affecting the vegetation line, agricultural practices, and water resources in the region.

What are the Government Initiatives Related to the Himalaya?

- National Mission on Sustaining Himalayan Ecosystem (2010):
 - **Covers 11 states** (Himachal Pradesh, Uttarakhand, Sikkim, all northeast states, and West Bengal) and **2 UTs** (Jammu & Kashmir and Ladakh).
 - Part of the **National Action Plan on Climate Change (NAPCC)**, comprising eight missions.
- Indian Himalayas Climate Adaptation Programme (IHCAP):
 - It aims to enhance the **resilience of vulnerable communities in the Indian Himalayas** by strengthening the capacities of Indian institutions in climate science, with a specific focus on glaciology and related areas
- SECURE Himalaya Project:
 - Integral to the **“Global Partnership on Wildlife Conservation and Crime Prevention for Sustainable Development”** (Global Wildlife Program), funded by the **Global Environment Facility (GEF)**.
 - Focuses on promoting sustainable management of alpine pastures and forests in the high-range Himalayan ecosystems.

SHARP RISE

Himachal Pradesh now records more cloudbursts, more often

Year	Number of cloudbursts (per annum)
1972-2012	3 to 4
2018	21
2019	16
2020	NA
2021	30
2022	39
2023	53

Note:

- **Mishra Committee Report 1976:**
 - Named after MC Mishra, the then **Garhwal commissioner in erstwhile Uttar Pradesh**. It provided findings on **land subsidence in Joshimath**.
 - Recommendations included **imposing restrictions on heavy construction work**, blasting, excavation for road repairs and other construction activities, and **tree felling in the region**.

Nitrogen Pollution

Why in News?

Recent research has stated that by 2050, one-third of **global river sub-basins** are projected to face severe **scarcity of clean water due to nitrogen pollution**.

What is Nitrogen Pollution?

- **About:** Nitrogen pollution refers to the **excessive presence of nitrogen compounds in the environment**, primarily in water bodies like rivers and lakes.
 - One of the main drivers of nitrogen pollution has been the rising consumption of **nitrogen-based fertiliser**, which doubled between **1978 and 2014 globally**.
 - The amount of reactive **nitrogen produced by humans is now greater than the amount created through natural processes**.
- **Sources of Nitrogen Pollution:**
 - **Agricultural Activities:** One of the main drivers of nitrogen pollution has been the rising consumption of **nitrogen-based fertilizer**, which can leach into groundwater or runoff into surface water bodies.
 - **Industrial Processes:** Manufacturing processes, particularly those involved in the **production of nitrogen-based chemicals and fertilisers**, release nitrogen compounds into the environment.
 - **Combustion of fossil fuels in industries** also emits nitrogen oxides (NOx) into the atmosphere.
 - **Livestock Farming:** Livestock waste, primarily from **manure and urine**, contains nitrogen compounds such as **ammonia**.
 - Improper storage and management of livestock waste can lead to nitrogen runoff, contaminating water bodies and contributing to eutrophication.
 - The livestock sector currently emits **65 teragrams (Tg) of nitrogen per year**, equivalent to one-third of current human-induced nitrogen emissions.

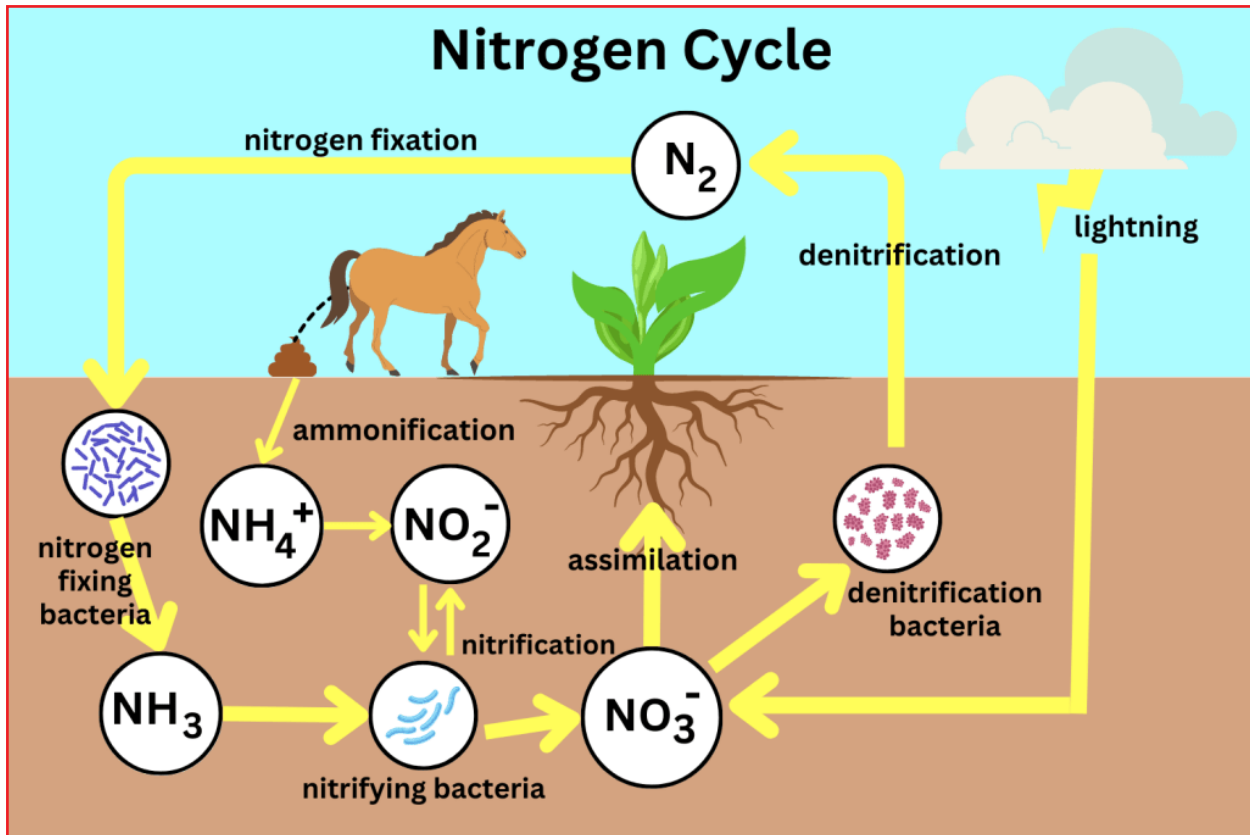
- **Biomass Burning:** Wildfires and burning of **cow dung cake as a fuel** release nitrogen oxides (NOx) and nitrous oxide (N2O) into the atmosphere.
 - These emissions contribute to **air pollution** and can have regional and global impacts on atmospheric chemistry and **climate**.
- **Major Impacts of Nitrogen Pollution:**
 - **Eutrophication:** Excess nitrogen acts as a **nutrient fertiliser for aquatic plants**, leading to excessive growth of **algae** and other aquatic vegetation. This phenomenon is known as **eutrophication** and leads to algal blooming.
 - This **creates oxygen-depleted zones (dead zones)**, where aquatic life suffocates and dies.
 - **Human Health Impacts:** Nitrogen pollution can have direct and indirect effects on human health.
 - High levels of nitrogen dioxide (NO2) in the air can exacerbate respiratory conditions such as **asthma and increase the risk of respiratory infections**.
 - An estimated 77% of people breathe annual average concentrations of nitrogen dioxide beyond safe levels.
 - Nitrate contamination of drinking water can also pose health risks, particularly to infants, by causing **methemoglobinemia** or **“blue baby syndrome.”**
 - **Ozone Depletion:** Nitrous oxide (N2O) released into the atmosphere can lead to the depletion of the **stratospheric ozone layer**, which protects the Earth from harmful ultraviolet (UV) radiation.
 - Depletion of the ozone layer can increase the **risk of skin cancer, cataracts, and other health problems in humans**, as well as harm marine ecosystems and agricultural crops.
 - It also leads to the **creation of tropospheric ozone** which creates respiratory illnesses.
- **Related Government Initiatives:**
 - **Bharat Stage (BS VI) Emission Standards:** Stricter emission standards for vehicles and industries aim to **curb the release of nitrogen oxides and particulate matter**, which are precursors to air and water pollution.
 - **Nutrient-Based Subsidy (NBS):** This policy incentivizes the use of **controlled-release fertilisers**, encouraging more efficient nutrient management.

Note:

- **Soil Health Cards:** Issued to farmers, these cards provide soil nutrient status and customised fertiliser recommendations, **promoting balanced nutrient application.**
- **Nano Urea:** It is a fertiliser patented and sold by the **Indian Farmers Fertiliser Cooperative Limited**

(IFFCO), and has been approved by the government for commercial use.

- **Nano urea reduces the unbalanced and indiscriminate use of conventional urea and increases crop productivity.**



Note: In March 2019, the **United Nations Environment Assembly** adopted a resolution calling for sustainable nitrogen management.

Article 371A and Its Impact on Coal Mining in Nagaland

Why in News?

In Nagaland, **Article 371A of the Indian Constitution** poses a major obstacle to regulating **coal mining**. This provision, upholding Naga customary law, complicates government efforts to **oversee small-scale mining**, especially after recent fatalities in a **rat-hole mine explosion**.

What is Article 371A of the Indian Constitution?

- Article 371A was introduced into the Constitution (Part XXI) as part of the **13th Amendment in 1962**, granting **special provisions to Nagaland (then Naga Hills and Tuensang Area)**.
- Article 371A states that **no act of Parliament shall apply to Nagaland in respect of the religious or social practices of the Nagas, the Naga customary law and procedure, the administration of civil and criminal justice** involving decisions according to the Naga customary law, and the **ownership and transfer of land** and its resources, unless the Nagaland Legislative Assembly decides otherwise by a resolution.
- This means that the state government has limited authority and jurisdiction over the land and its resources, which are **owned and controlled by the local communities** and governed by their customary laws and practices.

Note:

Articles Related to Special Provisions for some States at a Glance

Article No.	Subject-matter
371.	Special provision with respect to the states of Maharashtra and Gujarat
371A.	Special provision with respect to the state of Nagaland
371B.	Special provision with respect to the state of Assam
371C.	Special provision with respect to the state of Manipur
371D.	Special provisions with respect to the state of Andhra Pradesh or the state of Telangana
371E.	Establishment of Central University in Andhra Pradesh
371F.	Special provisions with respect to the state of Sikkim
371G.	Special provision with respect to the state of Mizoram
371H.	Special provision with respect to the state of Arunachal Pradesh
371-I.	Special provision with respect to the state of Goa
371J.	Special provisions with respect to the state of Karnataka

How is Rat-Hole Mining Regulated in Nagaland?

- Coal Mining in Nagaland:
 - Nagaland possesses significant coal reserves totalling 492.68 million tonnes, but **dispersed erratically and inconsistently** in small pockets spread over a large area.
 - The **Nagaland Coal mining policy, established in 2006**, permits **rat-hole mining due to the scattered nature** of coal deposits, making large-scale operations unfeasible.
 - Rat-hole mining is a method of **extracting coal from narrow horizontal tunnels or rat-holes**, which are often dug by hand and are prone to accidents and environmental hazards.
 - Rat-hole mining licences, known as **small pocket deposit licences**, are exclusively granted to **individual landowners for limited durations and specific conditions**.
 - According to Section 6.4(ii) of the **Nagaland Coal Policy (First Amendment) of 2014**, these licences are restricted to mining areas not exceeding **2 hectares**, with an annual coal production cap of **1,000 tonnes** and a prohibition on heavy machinery usage.
- Article 371A and Controlling Rat-Hole Mining in Nagaland:
 - This Article 371A grants Nagaland special rights over its land and resources, **making it difficult for the governments** to impose regulations that might be perceived as infringing on these rights.
 - The Nagaland government struggles to effectively regulate small-scale mining operations, particularly those practised by **individual landowners due to the limitations posed by Article 371A**.
 - The recent deaths in a **rat-hole mine highlight the safety risks associated with unregulated mining practices**. These incidents raise concerns about the lack of proper safety measures and highlight the urgency for effective regulations.

Note:

Note:


- The **Supreme Court** and **National Green Tribunal (NGT)**, banned **rat hole mining in 2014** as it causes environmental degradation and is a threat to the life of miners. The Tribunal termed it as **unscientific**.

Reviving Coral Reefs with 'Good Sounds'

A study was presented that examined the **use of "healthy reef sounds"** to potentially aid in the

resettlement of coral polyps and the restoration of degraded reefs.

- **Coral polyps use sound to communicate**, and the study found that **playing healthy reef sounds increased the settlement rate of coral polyps** on degraded reefs.
- The settlement rate was higher closer to the underwater speakers playing the sounds, indicating the impact of the sounds.
- **Climate change** due to the burning of fossil fuels and deforestation is **causing global warming** and rising sea levels, **leading to the destruction of coral reefs** through bleaching events.



Coral Reefs

(Rainforests of the seas)

About


- ✦ **Large underwater structures** – made of skeletons of **colonial marine invertebrates 'coral'** – individually called **polyp**
- ✦ **Symbiotic Relationship with algae 'zooxanthellae'** (responsible for beautiful colours of corals)
- ✦ Support over 25% of marine biodiversity

Hard Corals vs Soft Corals

- ✦ **Hard Corals** - Rigid skeleton made of **CaCO₃** - reef-building corals
- ✦ **Soft Corals** - Non reef-building


Great Barrier Reef (Australia)

- ✦ Largest Coral Reef in the World
- ✦ World Heritage Site (1981)
- ✦ Endures Mass Coral Bleaching



Corals in India

- ✦ Present in the areas of Gulf of Kutch, Gulf of Mannar, Andaman & Nicobar, Lakshadweep Islands and Malvan



Significance


- ✦ Coral reefs **protect coastlines from storms/erosion**, provide jobs, offer opportunities for recreation
- ✦ Source of **food/medicines**

Threats

- ✦ **Natural:** Temperature, Sediment Deposition, Salinity, pH, etc.
- ✦ **Anthropogenic:** Mining, Bottom Fishing, Tourism, pollution, etc.

Coral Bleaching


- ✦ Corals under stress - expel algae – thus turning white (bleached)
- ✦ Bleached corals - not dead – but, more risk of starvation/disease



Initiatives to Protect Corals

Technology

- ✦ **Cyromesh:** Storage of the coral larvae at (-196°C) - Can be later reintroduced to the wild
- ✦ **Biorock:** Creating artificial reefs on which coral can grow rapidly



Global

- ✦ International Coral Reef Initiative
- ✦ The Global Coral Reef R&D Accelerator Platform

Indian

National Coastal Mission Programme

Read More- [Coral Bleaching in Great Barrier Reef](#), [Coral reefs](#)

Note:

Heat Wave Conditions in Coastal Regions of Kerala

Recently, the [Indian Meteorological Department \(IMD\)](#) issued an alert warning of heatwave for 40°C in Thrissur and 39°C in Kollam and Palakkad districts of Kerala.

- Heatwaves are prolonged periods of excessively hot weather that can cause adverse impacts on human health, the environment, and the economy.

- India, being a tropical country, is particularly vulnerable to heat waves.
- IMD Criteria for Declaring Heat Wave in India:
 - Heat Wave is considered when the maximum temperature of a station reaches at least 40°C for Plains and at least 30°C for Hilly regions.
 - The criteria for the coastal station maximum temperature should be greater than or equal to 37°C.
 - If the normal maximum temperature of a station is less than or equal to 40°C, then an increase of 5°C to 6°C from the normal temperature is considered to be a heat wave condition.

Heat wave Scenario	40°C	30°C
Maximum Temperature	Plains	Hills
Heat wave conditions prevail when...	Severe heat wave conditions prevail when....	
Normal maximum temperature	Normal maximum temperature	Normal maximum temperature
Deviation from normal	Deviation from normal	Deviation from normal
Above	Above	Above
40°C	4-5°C or more	40°C
At or below	At or below	At or below
40°C	5-6°C or more	40°C
		6°C or more
		7°C or more

Read More: [Heat Waves and Heat Dome](#)

International Day of Forests

National Zoological Park, New Delhi, recently observed the [International Day of Forests](#) on 21st March 2024, under the theme “Forests and innovation: new solutions for a better world.”

- The event aimed to raise awareness among visitors about the importance of forests and their role in our lives.
- The United Nations Forum on Forests, the [Food and Agriculture Organization \(FAO\)](#), and other relevant organisations collaborate with governments to organise these efforts.
- As per the latest [India State of Forest Report \(ISFR\) 2021](#), India’s total forest and tree cover was **80.9 million hectares**, which accounted for **24.62% of the geographical area of the country**.
 - Madhya Pradesh had the largest forest cover, followed by Arunachal Pradesh, Chhattisgarh, Odisha and Maharashtra.

- India’s [National Forest Policy, 1988](#) aims for at least **33% of the total geographical area to be under forest to maintain ecological stability**.

Read more: [International Day of Forests](#)

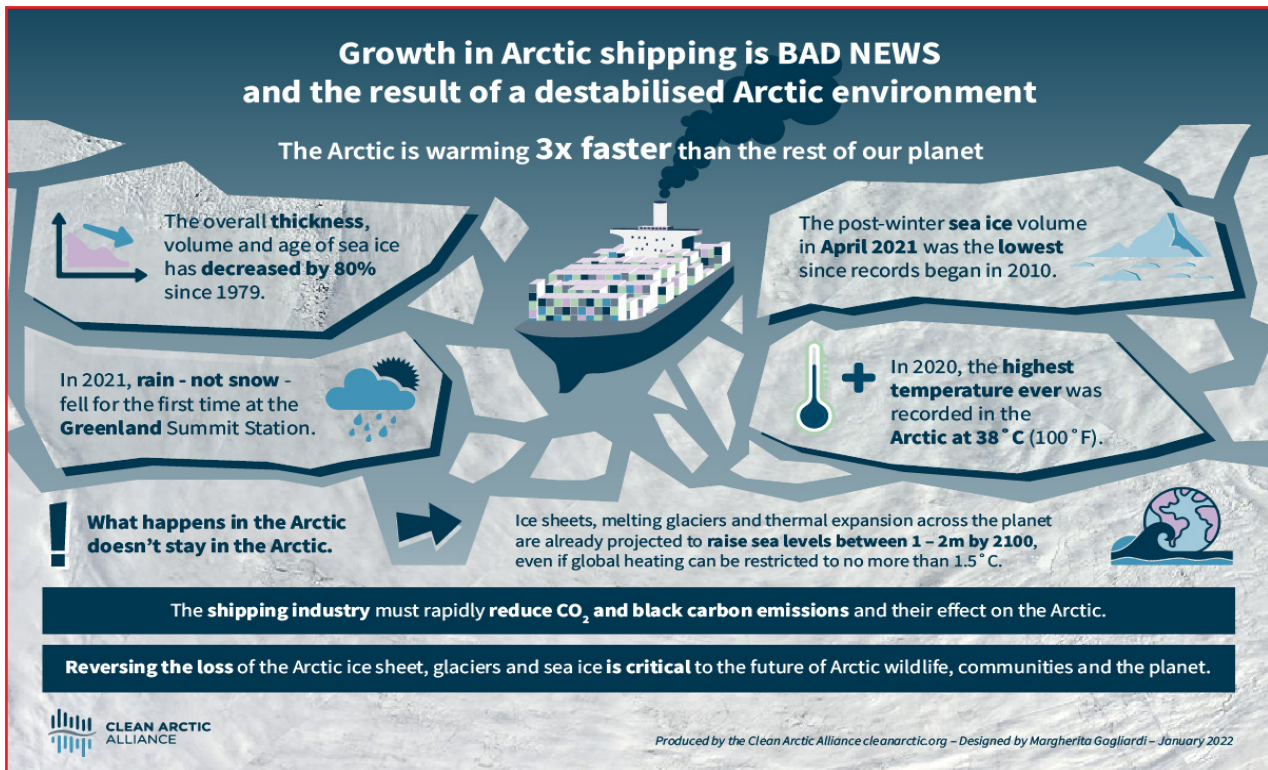
Arctic and Great Lakes Ice Trends

Source: DTE

A recent study forecasts the [Arctic’s initial ice-free conditions by August or September of 2030](#), regardless of emission scenarios, with the possibility of recurring occurrences by mid-century (2035–2067).

- In recent years, the Arctic Ocean had around **3.3 million km² of sea ice** at its minimum in September 2023.
 - Arctic sea ice reaches its minimum extent in September every year.

Note:



- Concurrently, the **Great Lakes**, comprising **Superior, Michigan, Huron, Erie, and Ontario** have witnessed notably reduced ice cover for 2 consecutive years.
 - They are renowned as Earth's '**freshwater tower**,' and are now witnessing unprecedented declines in ice cover, attributed to **global warming and the El Nino phenomenon.**
 - The year 2023 was designated as the hottest on record, largely influenced by **El Nino.**



Note:

World Wildlife Day

Source: [WWD](#)

United Nations World Wildlife Day (WWD) is celebrated every year on **3rd March** to celebrate the vast array of wild animals and plants on our planet and raise awareness about the threats they face.

- The **2024** theme is: **Connecting People and Planet: Exploring Digital Innovation in Wildlife Conservation.**
 - It highlights the growing role of technology in protecting wildlife. From tracking endangered species to monitoring illegal wildlife trade, digital tools are offering new hope for safeguarding biodiversity.
- On **20th December 2013**, during the **68th Session of the United Nations General Assembly (UNGA)**, 3rd March was established as **WWD**.
 - This date commemorates the signing of the **Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)** in 1973.

Read more: [World Wildlife Day](#)

India's First Dolphin Research Centre

Source: [DTE](#)

India's inaugural **National Dolphin Research Centre (NDRC)** marks a significant milestone in the conservation efforts for the endangered **Gangetic dolphin (*Platanista gangetica*)**.

- Located strategically near the **Ganga river in Patna, Bihar**, the NDRC aims to be a hub for comprehensive research on various aspects of Gangetic dolphins, including behaviour, survival skills, and causes of mortality.
 - Bihar is home to around half of the estimated 3,000 Gangetic dolphins in India.
- The Ganges river dolphin, discovered in 1801, historically inhabits the **Ganges-Brahmaputra-Meghna and Karnaphuli-Sangu river systems in India, Nepal, and Bangladesh.**
 - Recent studies in the Ganga River Basin show their presence in the mainstream and tributaries like **Ghagra, Kosi, Gandak, Chambal, Rupnarayan, and Yamuna.**

GANGES RIVER DOLPHIN

(*Platanista gangetica gangetica*)

National aquatic animal of India

Facts

- ✦ Can only live in freshwater; prefer deep water
- ✦ Essentially blind; hunts by emitting ultrasonic sound
- ✦ Can't breathe in water; must surface every 30-120 seconds for air
- ✦ Also called 'susu' because of sound they make while breathing

Habitat & Distribution

- ✦ Distributed in Ganges and Brahmaputra River basins of India, Nepal and Bangladesh.
- ✦ Distribution range in India covers 7 states namely, Assam, Uttar Pradesh, Madhya Pradesh, Rajasthan, Bihar, Jharkhand and West Bengal.

Protection Status


- ✦ IUCN Red List: Endangered
- ✦ CITES: Appendix I
- ✦ Wildlife Protection Act 1972: Schedule I

Threats

- ✦ Habitat destruction
- ✦ Pollution
- ✦ Bycatch
- ✦ Climate Change
- ✦ Hunting

Conservation Efforts

- ✦ **Project Dolphin (2021):** On lines of project Tiger
- ✦ **National Dolphin Research Centre (2021):** India's and Asia's First; in Patna University (Bihar)
- ✦ **Dedicated Dolphin Sanctuary:**
 - ▢ Vikramshila sanctuary (Bihar) – 1991
 - ▢ Hastinapur sanctuary (UP) – Proposed



Drishti IAS

Read more: [Gangetic River Dolphin](#)

Note:

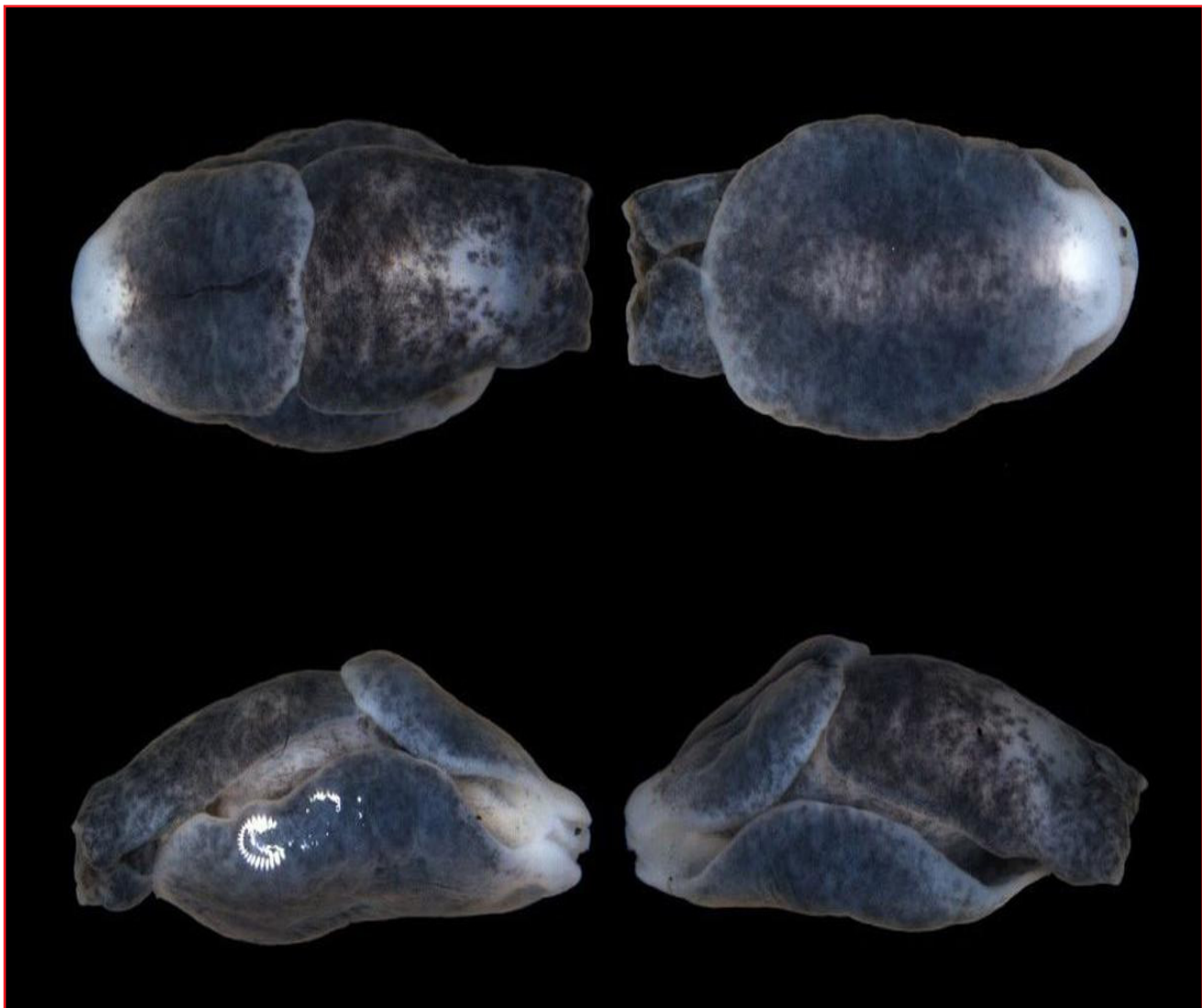
Melanochlamys Droupadi

Source: *TH*

The [Zoological Survey of India \(ZSI\)](#) has named a new marine species **ofhead-shield sea slug with ruby red spot** which was discovered along the coasts of West Bengal and Odisha, after President Droupadi Murmu, named *Melanochlamys droupadi*.

- Species of the genus *Melanochlamys* are characterised **morphologically by a short, blunt and cylindrical body** and a **smooth dorsal surface** with two dorsal equal or unequal shields, named the anterior cephalic and posterior shield.

- The species is small, brownish-black, with a ruby red spot at the hind end, and is a hermaphrodite.
- Reproduction of the species is observed between **November and January**.
- *Melanochlamys droupadi* **secrete transparent mucus, shielding them from sand grains** while crawling beneath smooth sand, making its body rarely visible.
- The ZSI states that while species in this group are **typically found in temperate regions of the Indo-Pacific Oceanic** realm, three species are truly tropical: *Melanochlamys papillata* from the Gulf of Thailand, *Melanochlamys bengalensis* from West Bengal and Odisha coast, and the *Melanochlamys droupadi*.



Note:



drishti

Odisha's 'Drink from Tap' Mission

In 2017, the Odisha government launched its pioneering 'drink from tap' mission, making it the **first and only state in India to ensure drinking water quality on household tap connections**.

- The initiative aimed to transform urban drinking water supply, **combat waterborne diseases, and relieve the financial strain**. It provides 24x7 access to high-quality drinking water directly from taps, cutting **costs and time, eliminating filtration or boiling needs**.
- Currently **covering 2.55 million people in eight cities**, the mission aims to reach **4.1 million people across urban Odisha** by the end of 2024.
- Real-time surveillance enforces **Indian Standard (IS) for drinking water**, maintaining permissible limits for soluble and insoluble components, ensuring safe consumption.
- Community engagement initiatives like the 'jal sathi' program enlist women from **self-help groups**

to facilitate service delivery and behavioural change.

- Third-party evaluation by the National Institute of Urban Affairs highlights the project's significance and potential for replication.

Read more: Compendium of Best Practices in Water Management – 3.0

Human-Wildlife Conflict

Why in News?

Amid repeated deaths from animal attacks and rising anger over them, Kerala has declared the **Human-Animal Conflict** as a **state-specific disaster**.

- This declaration signals a significant shift in how the government addresses this pressing issue, altering the responsibilities and authorities involved.

How State Handle Human-Animal Conflict as a State-Specific Disaster?

Aspect	Current Management	Proposed Change (State Specific Disaster)
Responsibility	Forest department under the <u>Wildlife Protection Act, 1972</u> .	State disaster management authority under the Disaster Management Act
Decision Making Authority	Chief Wildlife Warden	State Disaster Management Authority (Chief Minister at State Level)
District Level Authority	District Collector as the executive magistrate	District Collector as a Chairperson of District Disaster Management Authority
Intervention Capability	Limited by Wildlife Protection Act	Enhanced powers to take decisive actions under Disaster Management Act 2005
Judicial Oversight	Decisions may be questioned in court under wildlife laws	Limited judicial interference due to provisions of Disaster Management Act
Jurisdiction of Courts	Courts can entertain suits under relevant wildlife laws	Only the Supreme Court or High Court can entertain suits related to actions under Disaster Management Act, 2005 (Section 71) .
Norms Override Capability	Limited under Wildlife Protection Act	Authority to override other norms, including wildlife laws, during the declared disaster period (Under Section 72)

Note:



- As per **section 71 of the Disaster Management Act, no court** (except the Supreme Court or a High Court) **shall have jurisdiction to entertain any suit** or proceeding in respect of anything done by relevant authorities in pursuance of any power conferred by this Act.
 - Section 72 of the Act says that the provisions of **this Act will have an overriding effect on any other law during the specific period** that a disaster has been declared.
- Other State-Specific Disasters:
 - In 2015, Odisha declared **snakebite a state-specific disaster**.
 - In 2020, Kerala declared **Covid-19 as a state specific disaster**.
 - Besides, **heat waves, sunburn and sunstroke** have been declared so in 2019, the phenomenon of **soil pipping** in 2017, and **lightning** and **coastal erosion** in 2015.

Endangered wildlife and their habitats, on controlling trade in wildlife products and on research, education, and training.

- **Project Tiger: Project Tiger** is a **Centrally Sponsored Scheme**, launched in 1973. It provides havens for tigers in the country's national parks.
- **Project Elephant:** It is a centrally sponsored scheme and was launched in February 1992 for the protection of elephants, their habitats and corridors.
- **National Disaster Management Authority (NDMA):** It lays down guidelines to be followed by different Ministries or Departments of Central Government for the purpose of integrating **measures for disaster prevention or mitigation of its effects** in their development plans and projects

What are the Government Measures to Tackle Human-Animal Conflict?

- **The Wildlife Protection Act, 1972:** The act provides the legal framework for the activities, Prohibition of hunting, Protection and management of wildlife habitats, and establishment of protected areas etc.
- **The Biological Diversity Act, 2002:** India is a part of the **United Nations Convention on Biological Diversity**. It ensures that the Biological Diversity Act **complements rather than contradicts** existing laws concerning forests and wildlife.
- **National Wildlife Action Plan (2002-2016):** It focuses on strengthening and enhancing the protected area network, on the conservation of

HUMAN-WILDLIFE CONFLICT



When encounters between humans and wildlife lead to negative results, such as loss of property, livelihoods, and even life

Causes of HWC

- Agricultural Expansion
- Urbanization
- Infrastructure Development
- Climate Change
- Wildlife Populations Growth and Range Expansion

Impacts of HWC

- Grave injuries, Loss of life
- Damage to farms and crops
- ↑ violence against animals

WWF India during 2003-2004 developed the **Sonitpur Model** by which community members were connected with Assam Forest Dept and given training on how to drive elephants away from crop fields and human habitations safely.

In 2020, the SC upheld Madras HC's decision on the Nilgiris elephant corridor, affirming the right of passage of the animals and closure of resorts in the area.

Data on HWC

- Tigers killed 125 humans between 2019 and 2021
- Death of 329 tigers due to poaching, natural and unnatural causes.
- Elephants killed 1,579 humans in three years
- Death of 307 elephants due to poaching, electrocution, poisoning and train accidents

Advisory for HWC Management

(Standing Committee of the National Board of Wildlife)

- Gram Panchayats empowered to deal with problematic wild animals (WPA 1972)
- Compensation against crop damage due to HWC (PM Fasal Bima Yojna)
- Local/State depts. to adopt early warning systems and create barriers
- Paying a part of ex-gratia as interim relief within 24 hours of the incident to the victim/family

State - Specific Initiatives

- **UP** - Man-animal conflict under **listed disasters** (in State Disaster Response Fund)
- **Uttarakhand** - **Bio-fencing** carried out by growing various species of plants in areas
- **Odisha** - Casting **seed balls** inside different forests to **enrich food stock for wild elephants**



Note:

Coral Bleaching in Great Barrier Reef

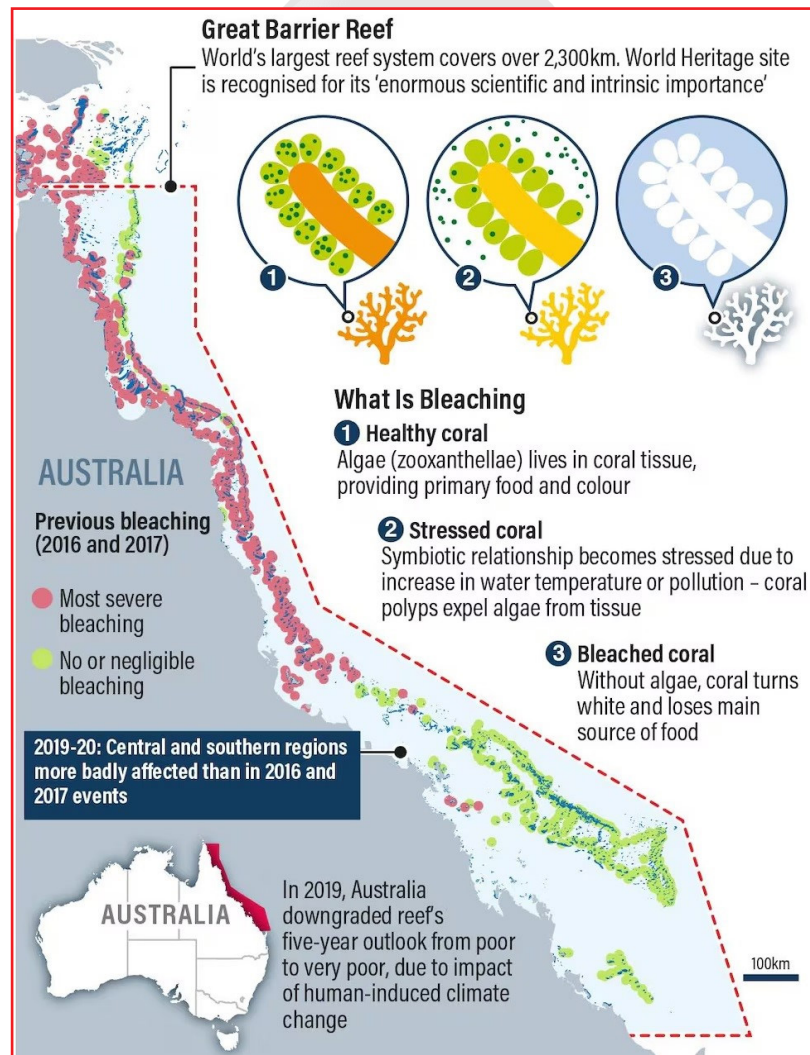
Why in News?

Recent aerial surveys conducted by Australian authorities confirm widespread **coral bleaching** across **two-thirds of the Great Barrier Reef (GBR)**, signalling a dire threat exacerbated by **climate change**. Urgent action is needed to mitigate the impacts and protect this vital marine ecosystem.

Great Barrier Reef (GBR)

- The GBR is the **world's largest coral reef system**. It's located in the Coral Sea off the coast of Queensland, Australia.


- The GBR stretches across 2,300 km and is made up of around 3,000 individual reefs and 900 islands.
- The GBR is home to 400 types of coral, and 1,500 species of fish. It's also home to endangered species such as the **dugong** and the large green turtle. The **GBR is a UNESCO World Heritage site** and was inscribed in 1981.
- In 2023, the UNESCO Heritage Committee **refrained from listing Australia's Great Barrier Reef as a site "in danger"** but warned that the world's biggest coral reef ecosystem remained under **"serious threat" from pollution and the warming of oceans**.
- Widespread mass bleaching of the Great Barrier Reef was first seen in 1998 and happened again in 2002, 2016, 2017, 2020, 2022 and now in 2024.



Note:

What Factors are Contributing to the Coral Bleaching in GBR?

- **Temperature Stress:**
 - Warmer water temperatures can trigger coral bleaching, causing corals to expel the **algae (zooxanthellae)** living in their tissues and turn white.
 - Above-average sea surface temperatures over an extended period have led to significant **heat stress on the reef**, exacerbating the bleaching phenomenon.
 - Bleached coral isn't dead, but weakened and susceptible to starvation and disease. Persistent stress can lead to coral death.
- **Climate Change Impact:**
 - Rising ocean temperatures, exacerbated by **climate change**, increase coral **susceptibility to stress and mortality**, leading to widespread bleaching events globally due to **El Niño conditions**.
- **Other Environmental Stressors:**
 - Cold water temperatures, pollution, runoff, and extreme low tides can also induce coral bleaching, highlighting the **multifaceted nature of this phenomenon**.
- **Algae Relationship:**
 - Coral bleaching occurs when the **symbiotic relationship between corals and algae is disrupted**, impacting the corals' food source and making them vulnerable to disease.



Coral Reefs


(Rainforests of the seas)

About

- ✦ **Large underwater structures** – made of skeletons of **colonial marine invertebrates 'coral'** – individually called **polyp**
- ✦ **Symbiotic Relationship with algae 'zooxanthellae'** (responsible for beautiful colours of corals)
- ✦ Support over 25% of marine biodiversity


Hard Corals vs Soft Corals

- ✦ **Hard Corals** - Rigid skeleton made of **CaCO₃** - reef-building corals
- ✦ **Soft Corals** - Non reef-building




Great Barrier Reef (Australia)

- ✦ Largest Coral Reef in the World
- ✦ World Heritage Site (1981)
- ✦ Endures Mass Coral Bleaching



Corals in India

- ✦ Present in the areas of Gulf of Kutch, Gulf of Mannar, Andaman & Nicobar, Lakshadweep Islands and Malvan



Significance


- ✦ Coral reefs **protect coastlines from storms/erosion**, provide jobs, offer opportunities for recreation
- ✦ Source of **food/medicines**

Threats

- ✦ **Natural:** Temperature, Sediment Deposition, Salinity, pH, etc.
- ✦ **Anthropogenic:** Mining, Bottom Fishing, Tourism, pollution, etc.

Coral Bleaching


- ✦ Corals under stress - expel algae – thus turning white (bleached)
- ✦ Bleached corals - not dead – but, more risk of starvation/disease



Initiatives to Protect Corals

Technology

- ✦ Cyromesh: Storage of the coral larvae at (-196°C) - Can be later reintroduced to the wild
- ✦ Biorock: Creating artificial reefs on which coral can grow rapidly



Global

- ✦ International Coral Reef Initiative
- ✦ The Global Coral Reef R&D Accelerator Platform

Indian

National Coastal Mission Programme

Note:

The Unjust Climate: FAO

Why in News?

Recently, the **Food and Agriculture Organization of the United Nations (FAO)**, has released a report titled- **The Unjust Climate**, shows how the effects of **Climate Change** on income and adaptation in rural areas vary with gender, wealth and age.

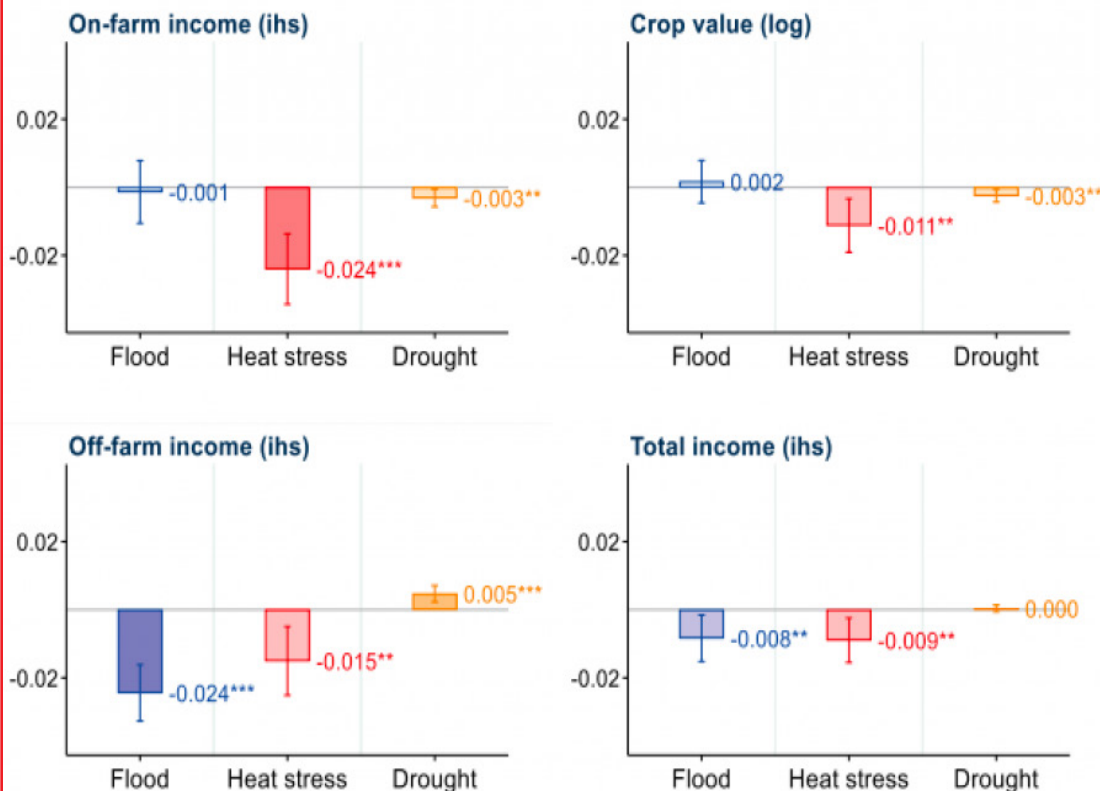
- FAO analyzed **socioeconomic data from over 100,000 rural households** representing more than 950 million people across 24 **LMICs (Lower Middle Income Countries)**.
- The study integrated this information with **70 years of georeferenced daily precipitation and temperature data** to examine the impacts of climate stressors on incomes, labour, and adaptation

strategies, differentiating based on wealth, gender, and age.

What are the Key Findings of the Report?

- Impact of Extreme Weather on Poor Rural Households:
 - Every day of extreme heat results in **poor rural households losing 2.4% of on-farm incomes**, 1.1% of crop value, and 1.5% of off-farm income compared to non-poor households across India and 23 other LMICs (Lower Middle Income Countries).
 - A 1°C increase in long-term temperatures would **push rural poor households to rely more on climate-dependent agriculture**, leading to a **33% decrease in off-farm incomes**.
 - Similarly, every day of **extreme Precipitation** causes poor households to lose 0.8% of their incomes **relative to non-poor households**, mainly driven by **losses in off-farm incomes**.

Extreme weather events significantly reduce the incomes of the poor relative to the non-poor



Note:

- Income Inequality Widening Due to Climate Stressors:
 - In an average year, poor households **lose 5% of their total income** due to **Heat Stress** and **4.4% due to floods** compared to better-off households.
 - **Floods** and heat stress widen the income gap between poor and non-poor households in rural areas by approximately USD 21 billion and USD 20 billion a year, respectively.
- Maladaptive Coping Strategies:
 - Extreme weather events **push poor rural households to adopt maladaptive coping strategies**, including distress sale of livestock and redirecting expenditures away from their farms.
 - Poor households **reduce their investments in agriculture relative to non-poor households** when faced with floods and droughts, as they redirect their scarce resources away from agricultural production **towards immediate consumption needs**.
 - These maladaptive **coping strategies are likely to make them more vulnerable** to future climate stressors than non-poor rural households.
- Inadequate Inclusion in National Climate Policies:
 - Rural people and their climate vulnerabilities are largely absent in national climate policies.
 - Less than 1% of **Nationally Determined Contributions (NDC)** and national adaptation plans (NAP) of the 24 analysed countries mention poor people, and only about 6% **refer to farmers in rural communities**.
 - **Only 7.5% of tracked climate finance** in 2017-18 went towards climate change adaptation, with less than **3% allocated to agriculture**, forestry, and other land uses.
 - **Agricultural policies also miss** the opportunity to address gender equality and women's empowerment and intersecting vulnerabilities such as climate change.
 - An analysis of agricultural policies from 68 low- and middle-income countries done by FAO in 2023 showed that about **80% of policies did not consider women and climate change**.

What are the FAO's Initiatives to Tackle the Impact of Climate Change?

- Inclusive climate actions are embedded in **FAO's Strategy and Action Plan on Climate Change** and in the **FAO Strategic Framework 2022–2031**, where tackling

the impact of climate change is mainstreamed in efforts to achieve the four betters: better production, better nutrition, better environment and better life for all.

- **FAO's Global Roadmap for Achieving SDG (Sustainable Development Goal) 2** without breaching the 1.5 °C threshold, establishes that gender inequalities, climate actions and nutrition are simultaneous considerations, and actions must encompass these dimensions and promote inclusivity for women, youth and Indigenous Peoples.

What is the Food and Agriculture Organization?

➤ About:

- FAO is a specialised agency of the **United Nations that leads international efforts to defeat hunger**.
 - **World Food Day** is celebrated every year around the world on 16th October. The day is celebrated to mark the anniversary of the founding of the FAO in 1945.
- It is one of the UN food aid organisations based in Rome (Italy). Its sister bodies are the **World Food Programme** and the **International Fund for Agricultural Development (IFAD)**.

➤ Initiatives Taken:

- **Globally Important Agricultural Heritage Systems (GIAHS)**.
- Monitors the **Desert Locust** situation throughout the world.
- The **Codex Alimentarius Commission (CAC)** is the body responsible for all matters regarding the implementation of the Joint FAO/WHO Food Standards Programme.
- The **International Treaty on Plant Genetic Resources for Food and Agriculture** was adopted by the Thirty-First Session of the Conference of the FAO in 2001.

➤ Flagship Publications:

- The State of World Fisheries and Aquaculture (SOFIA).
- The State of the World's Forests (SOFO).
- **The State of Food Security and Nutrition in the World (SOFI)**.
- The State of Food and Agriculture (SOFA).
- The State of Agricultural Commodity Markets (SOCO).

Note:

India's Battle Against Single-Use Plastics

Why in News?

India had committed to phase out Single-Use Plastics (SUP) by 2022, three years later, while some progress has been made with the ban on selected SUP items, challenges persist.

- According to a report launched during the 6th **United Nations Environmental Assembly (UNEA-6)**, the thriving street food sector across India depends heavily on single-use plastics.

What are the Key Highlights of the Report Released at UNEA-6 Regarding SUP?

- Street Food Sector's Reliance on SUP:
 - Single-use plastics such as plates, bowls, cups, and containers are extensively **used in India's street food sector**. Despite their affordability, these items contribute significantly to the country's waste management challenge.
- **Benefits of Reuse System:** The findings reveal the reuse system offers a compelling business case with various benefits:
 - **Reduced costs:** Both vendors and customers experience cost savings.
 - **Waste reduction:** The system significantly reduces the amount of packaging material needed.
 - **Financial viability:** The report highlights a potential 21% return on investment with a payback period of 2-3 years.
 - **Additional considerations:** Material choice, retention time, return rate, deposit amounts, and government incentives are crucial factors for optimizing the system's effectiveness.
- Recommendation:
 - Adopting a reusable packaging system in India's street food sector presents a win-win solution.
 - It is both economically viable and environmentally sustainable, benefiting all stakeholders and paving the way for a more resilient and sustainable future for Indian cities.

What is Single-Use plastic?

- It refers to a "plastic item intended to be used once for the same purpose before being disposed of or recycled."
 - Single-use plastic has among the highest shares of plastic manufactured and used — from packaging of items to bottles (shampoo, detergents, cosmetics), polythene bags, face masks, coffee cups, cling film, trash bags, food packaging etc.
- On the current trajectory of production, it has been projected that **single-use plastic could account for 5-10% of greenhouse gas emissions by 2050.**

Status of Leopards in India 2022

Why in News?

The Ministry of Environment, Forest and Climate Change has released a report on the **Status of Leopards in India 2022**. The survey covered 20 States of India, and focussed on about 70% of the animals' expected habitat.

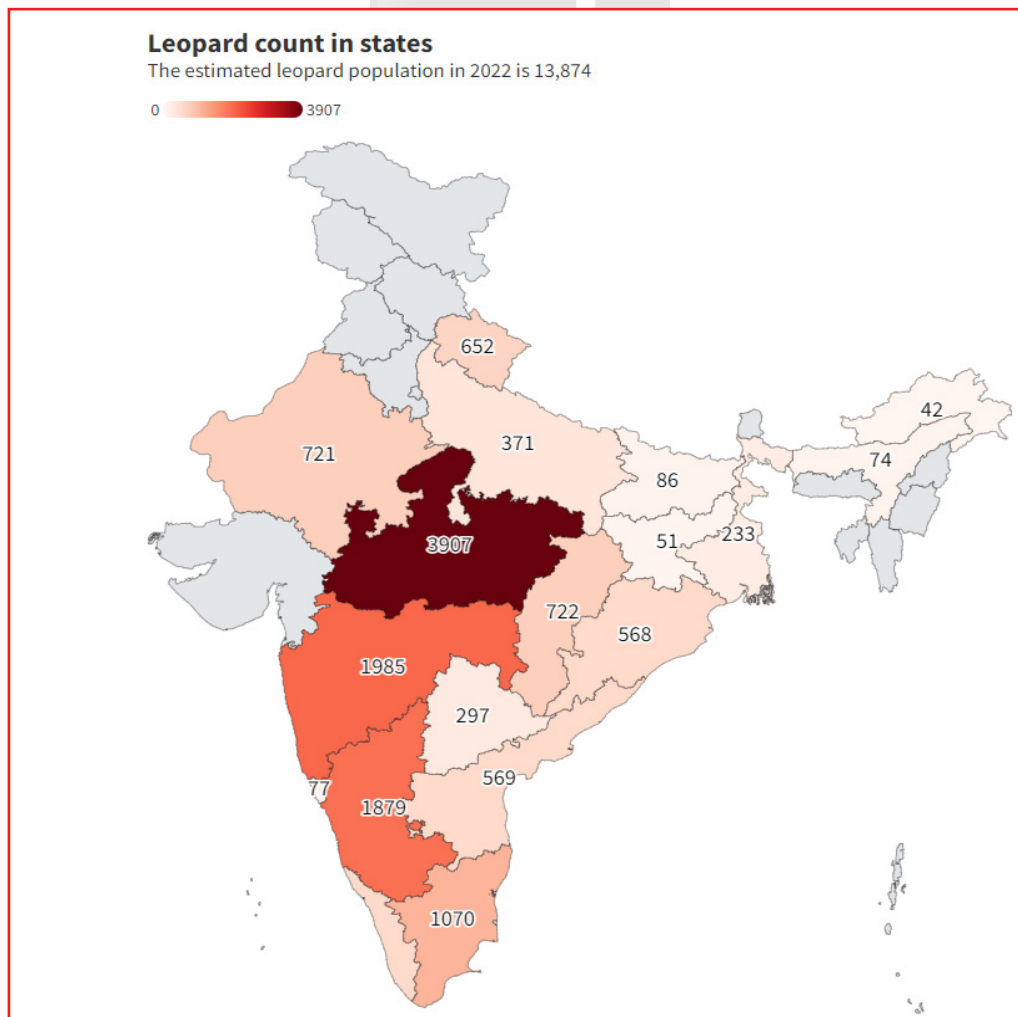
- Recently, the Union Government, while commemorating the 50th anniversary of **Project Tiger**, has approved the establishment of the **International Big Cat Alliance (IBCA)** with headquarters in India with a one-time budgetary support of Rs.150 crore for a period of five years from **2023-24 to 2027-28**.

What are the Key Highlights of the Report on the Status of Leopards in India 2022?

- Overall population:
 - India's leopard population **rose by 8% from 12,852 in 2018 to 13,874 in 2022**.
 - About 65% of the leopard population is **present outside protected areas** in the Shivalik landscape. Only about a third of the leopards are within protected areas.
 - The Shivalik landscape refers to the **outermost range of the Himalayas, known as the Shivalik Hills** or the Shivalik Range. This range extends across several states in northern India, including Uttarakhand, Himachal Pradesh, Haryana, Punjab, and parts of Jammu and Kashmir and Uttar Pradesh.
- Regional variation:

Note:

- Central India shows a stable or **slightly growing population** of leopards (2018: 8071, 2022: 8820), **Shivalik hills and Gangetic plains** experienced decline (2018: 1253, 2022: 1109).
 - In Shivalik hills and Gangetic plains, there is a 3.4% decline per annum, while the largest growth rate was in **Central India and Eastern Ghats of 1.5%**.
- State-level distribution:
 - Madhya Pradesh has the **highest number of leopards (3,907)**, followed by Maharashtra, Karnataka, and Tamil Nadu.
 - In Odisha the number of leopards dropped from 760 in 2018 to 562 in 2022, and in Uttarakhand, the population declined from 839 in 2018 to 652 in 2022.
 - Kerala, Telangana, Chhattisgarh, Bihar, and Goa too reported population declines.
 - Benefits From Tiger Conservation Efforts:
 - The Central India and Eastern Ghats landscape is home to the largest population of leopards, which is growing due to protective measures within the framework of tiger conservation.
 - The report highlights that **leopard densities are higher in Tiger Reserves compared to areas outside Protected Areas**, despite the regulatory pressure exerted by tigers on leopards.
- Common Threats:
 - Common threats are **poaching of prey for bush meat**, targeted poaching for tiger and leopard skins and body parts and habitat loss due to mining and other human activities.
 - In Odisha, as many as **59 leopard skins were seized from wildlife smugglers** between 2018 and 2023.
 - Additionally, **road accidents** are a significant cause of leopard fatalities.



Note:

What is the International Big Cat Alliance (IBCA)?

➤ About:

- The IBCA is a multi-country, multi-agency coalition aimed at conserving big cat species and their habitats.
- It brings together **96 big cat range countries**, non-range countries interested in big cat conservation, conservation partners, scientific organizations, and businesses.

➤ Objective:

- The primary goal of the alliance is to collaborate on efforts to secure the future of **big cats, including Tigers, Lions, Leopards, Snow Leopards, pumas, jaguars, and cheetahs**, and the landscapes they inhabit.
- IBCA would work towards **mitigating the adverse effects of climate change**. It will advocate for policy initiatives that **align biodiversity conservation efforts** with local needs and contribute towards

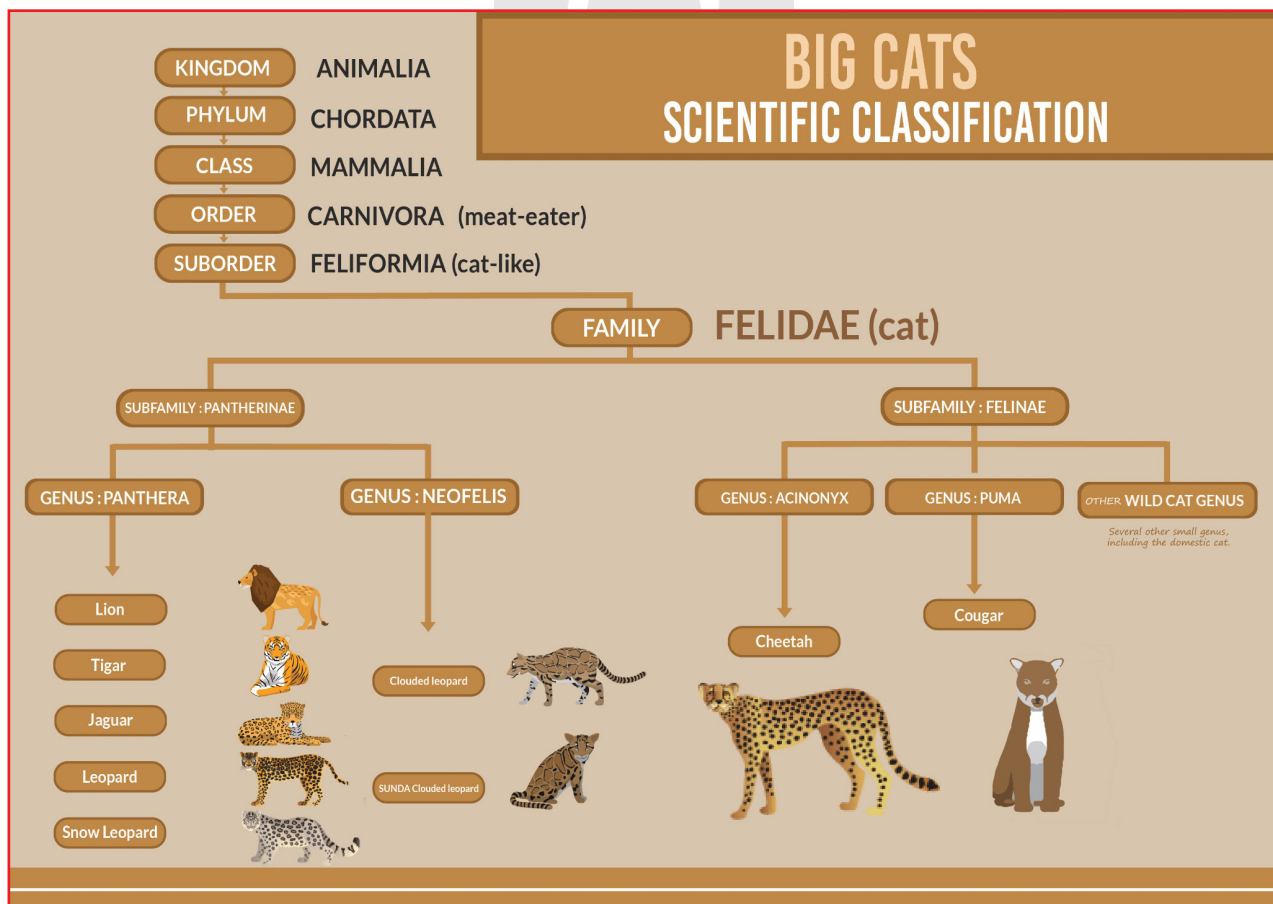
the attainment of **United Nations**-mandated **Sustainable Development Goals** within member countries.

➤ Structure:

- The grouping's structure will consist of an Assembly of Members, a Standing Committee and a Secretariat, **with its headquarters in India**.

➤ Conservation Efforts of India:

- [Project Lion](#)
- [Project Leopard](#)
- [Cheetah Reintroduction Project](#)
- [Wildlife Protection Act, 1972](#)
- [Snow Leopard Conservation](#):
 - Conservation efforts **include habitat protection**, community engagement, research, and anti-poaching measures.
 - Collaboration with neighbouring countries and international organizations helps in safeguarding this high-altitude predator.



Note:

What are the Key Points Related to Leopards?

- **Scientific Name:** *Panthera pardus*
- **About:**
 - The leopard is the smallest of the Big Cat family (of genus *Panthera* namely the **Tiger, Lion (*Panthera leo*), Jaguar, Leopard, and Snow Leopard**), and is known for its ability to adapt in a variety of habitats.
 - A **nocturnal animal**, feeds on smaller species of herbivores found in its range, such as the chital, hog deer and wild boar.
 - Melanism is a common occurrence in leopards, wherein the entire skin of the animal is black in colour, including its spots.
 - A melanistic leopard is often called a **black panther** and is mistakenly thought to be a different species.
- **Habitat:**
 - It occurs in a wide range in **sub-Saharan Africa**, in small parts of Western and Central Asia, on the Indian subcontinent to Southeast and East Asia.
 - The **Indian leopard (*Panthera pardus fusca*)** is a leopard widely distributed on the Indian subcontinent.
- **Threats:**
 - Poaching for the illegal trade of skins and body parts.
 - Habitat loss and fragmentation
 - Human-Leopard conflict
- **Conservation Status:**
 - **IUCN Red List:** Vulnerable
 - **CITES:** Appendix-I
 - **Indian Wildlife (Protection) Act, 1972:** Schedule-I

Climate Finance Road to COP29

Why in News?

The **UN Climate Change Conference (UNFCCC COP 27)** convened in Sharm El-Sheikh, **Egypt** established a **Loss and Damage Fund** for climate disaster recovery in developing nations.

- The **2023 UNFCCC COP 28 (Dubai)** focused on transitioning from fossil

fuels, pledging to **triple renewable energy capacity by 2030**.

- As preparations for COP29 in Baku intensify, attention now turns to finance discussions, particularly the **New Collective Quantitative Goal (NCQG)**.

What is the New Collective Quantitative Goal?

- The NCQG is a new annual **financial target that developed countries must meet from 2025** onward to provide climate finance to developing countries.
 - It will replace the previous commitment of **USD 100 billion per year** that developed nations had pledged in 2009 but failed to deliver.
- The final NCQG amount is expected to be a central point of negotiation at the **COP29 summit in Baku, Azerbaijan, in November 2024**.
 - The NCQG negotiations aim to set a higher collective amount that wealthy countries will need to mobilise annually for mitigation, adaptation, and other climate action efforts in poorer nations vulnerable to the impacts of climate change.
- Securing an adequate NCQG figure is extremely important for developing countries, as a **lack of sufficient climate finance has been a major barrier** to implementing effective climate plans and building resilience against global warming's effects.

CLIMATE FINANCE

Climate finance refers to local, national or transnational financing—drawn from public/private/alternative sources of financing—to support mitigation and adaptation actions against climate change.

PRINCIPLES OF CLIMATE FINANCE

- ⊖ Polluter Pays
- ⊖ Common but Differentiated Responsibility and Respective Capability (CBDR-RC)

Multilateral Climate Funds Coordinated by UNFCCC

- ⊖ **Global Environment Facility (GEF):** Operating entity of financial mechanism (1994)
- ⊖ **Kyoto Protocol (2001):**
 - **Adaptation Fund (AF):** Gives developing countries full ownership of adaptation projects
 - **Clean Development Mechanism (CDM):** To carry out emission-reduction projects in developing nations
- ⊖ **Green Climate Fund (GCF):** estd. - 2010 (COP 16)
 - Funds under it - **Least Developed Countries Fund (LDCF)** and **Special Climate Change Fund (SCCF)**
- ⊖ **Long-Term Climate Finance:**
 - **Cancun Agreements (2010):** Mobilize and provide scaled-up funds in short and long term
 - **Paris Agreement (2015):** Developed nations agreed to establish new collective goal of at least \$100 billion/year by 2025
- ⊖ **Loss and Damage Fund (2023) (COP27 & COP28):** Financial assistance to nations most vulnerable and impacted by effects of climate change

Climate Investment Funds (CIFs) under World Bank

- ⊖ Clean Technology Fund
- ⊖ Strategic Climate Fund

INDIA'S INITIATIVES REGARDING CLIMATE FINANCE

Fund	Objective
<ul style="list-style-type: none"> ■ National Adaptation Fund for Climate Change (NAFCC) (2015) ■ National Clean Energy Fund (2010-11) ■ National Adaptation Fund (2014) ■ Intended Nationally Determined Contributions (INDCs) (2015) ■ Climate Change Finance Unit (2011) 	<ul style="list-style-type: none"> ■ For vulnerable Indian states ■ Advancing clean energy (started with initial carbon tax on industrial coal use) ■ Bridging gap between required and available funds ■ Nationally binding targets adopted under UNFCCC ■ Leads on global climate finance issues

Challenges to Climate Finance

- ⊖ Gap between national needs and climate finance under NDCs
- ⊖ Least Developed Countries receive much less approved funding in per-capita terms from the multilateral climate funds
- ⊖ Slow rate of approvals
- ⊖ Failure in securing viability-gap funding



Drishti IAS

Note:

Plastic Waste Management (Amendment) Rules, 2024

Why in News?

The Ministry of Environment, Forest and Climate Change of India has recently introduced amendments to the [Plastic Waste Management Rules, 2016](#), through the [Plastic Waste Management \(Amendment\) Rules, 2024](#).

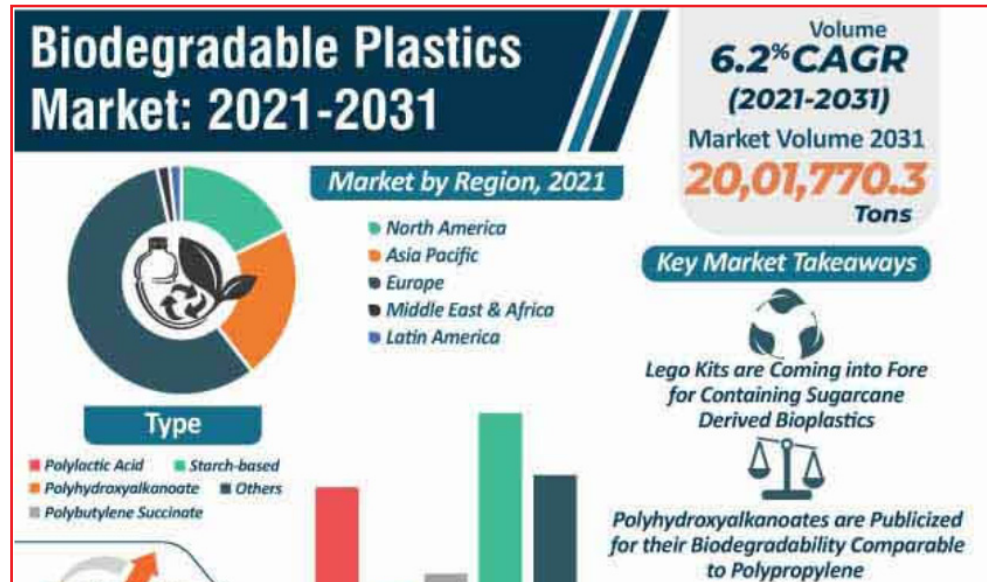
- These changes signify a significant effort to address plastic pollution in India, particularly by **targeting microplastics** and **setting stricter criteria for biodegradable plastics**.

What are the Key Highlights of the Plastic Waste Management (Amendment) Rules 2024?

- **Biodegradable Plastics:**
 - Biodegradable plastics are now defined as materials **capable of degradation by biological processes** in specific environments like soil and landfill, **without leaving any microplastics**.
 - **Microplastics** are defined as any **solid plastic particle insoluble in water**, with dimensions between 1 micron and 1,000 microns (1 micron is one-thousandth of a millimetre).
 - In recent years, they have been reported as a major source of pollution affecting rivers and oceans.
- **Microplastics Testing:**
 - The rules **do not specify which chemical tests** can establish the absence of microplastics or the

extent to which microplastics must be reduced for elimination.

- **Expanded Definition of “Importer”:**
 - The definition now includes **imports of various plastic-related materials** such as packaging, carry bags, sheets, raw materials, and intermediate materials used in plastic manufacturing for commercial purposes.



- Earlier, “importer” referred to someone who imported plastic packaging, products with plastic packaging, carry bags, multilayered packaging, plastic sheets, or similar items.

- **Inclusive Definition of “Manufacturer”:**
 - The scope now encompasses those engaged in the **production of plastic raw materials, compostable plastics, and biodegradable plastics**, reflecting a broader range of entities covered under this term.
- **Extended Scope of “Producer”:**
 - Beyond manufacturing plastic packaging, it now includes the production of intermediate materials used in plastic packaging and contract manufacturing for brand owners.
- **Certification Requirement:**
 - Manufacturers are allowed to produce carry bags and commodities from **compostable or biodegradable plastics**, and must obtain a certificate from the [Central Pollution Control Board \(CPCB\)](#) before marketing or selling their products.

Note:

Note:

- There are two categories of microplastics: **primary and secondary**.
 - **Primary microplastics** are tiny particles designed for commercial use and microfibers shed from clothing and textiles, such as **microbeads** found in personal care products, plastic pellets, and plastic fibres.
 - **Secondary microplastics** are formed from the **breakdown of larger plastics**, such as water bottles, caused by exposure to environmental factors like the sun's radiation and ocean waves.
- Microplastics act as carriers for **various chemicals, antibiotic-resistant bacteria, and pathogens**, posing risks to **aquatic life and human health** if they bypass the water treatment process.

populations occur in **Maharashtra, Karnataka and Andhra Pradesh**.

- Vulnerability:
 - The bird is under constant threats due to collision/ electrocution with power transmission lines, hunting (still prevalent in Pakistan), habitat loss and alteration as a result of widespread agricultural expansion, etc.
 - GIBs are a **slow-reproducing species**. They lay a few eggs and have almost a **year-long parental care of chicks**. The GIB achieves maturity in around 3-4 years.
- Protection Status:
 - **IUCN Red List: Critically Endangered**
 - **Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES): Appendix 1**
 - **Convention on Migratory Species (CMS): Appendix I**
 - **Wildlife (Protection) Act, 1972: Schedule I**

Great Indian Bustards

Why in News?

Recently, the **Supreme Court (SC)** has constituted an **expert committee to balance the conservation and protection** of the endangered **Great Indian Bustard bird** population with the country's international commitments to promote **Renewable** sources of energy.

- The large-winged birds are on the brink of extinction, with one of the causes being frequent collisions with **high-powered power cables running adjacent** to its core habitats in Gujarat and Rajasthan.

What is the Great Indian Bustard?

- **About:**
 - The **Great Indian Bustard (*Ardeotis nigriceps*)**, the **State bird of Rajasthan**, is considered India's most **critically endangered bird**.
 - It is considered the flagship grassland species, representing the health of the grassland ecology.
 - Its population is confined mostly to Rajasthan and Gujarat. Small



Note:

What Steps are Being Taken to Conserve the GIB?

- Species Recovery Programme:
 - It is kept under the species recovery programme under the **Integrated Development of Wildlife Habitats** of the Ministry of Environment, Forests and Climate Change (MoEFCC).
- Firefly Bird Diverters:
 - **Firefly bird diverters** are flaps installed on power lines. They work as **reflectors for bird species like the GIB**.
 - Birds can spot them from a distance of about 50 meters and change their path of flight to avoid collision with power lines.
- Artificial Hatching:
 - The conservation breeding programme started in 2019 by collecting eggs from the wild and **artificially hatching them**. The first chick hatched on 21st June 2019, and was **named 'Uno'**. Eight more chicks were hatched that year and raised and monitored.
 - A total of **29 GIBs have been housed** in the two breeding centres in Rajasthan.
- National Bustard Recovery Plans:
 - It is currently being implemented by conservation agencies.
- Conservation Breeding Facility:
 - MoEF&CC, the Rajasthan government and the **Wildlife Institute of India (WII)** have also established a conservation breeding facility in **Desert National Park at Jaisalmer in June 2019**.
- Project Great Indian Bustard:
 - It has been **launched by the Rajasthan government** to construct breeding enclosures for the species and develop infrastructure to reduce human pressure on its habitats.

Desert National Park:

- It is situated on the western border of India **within the Jaisalmer & Barmer Districts of Rajasthan**.
- Great Indian Bustards, Rajasthan State animal (Chinkara), State tree (khejri) and State flower (Rohida) are found naturally at this park.
- It was declared a **UNESCO World Heritage Site in 1980** and National Park in 1992.

Kutch Bustard Sanctuary:

- The Kutch Bustard Sanctuary is **located near Nalia in the Kutch district of Gujarat, India**.
- It is the smallest sanctuary in the country, spread over just two square kilometres. The sanctuary, also known as the **Lala-Parijan sanctuary**, was declared in July 1992 primarily to **safeguard the endangered Great Indian bustard**.
- The sanctuary is home to three **species of Bustards**: the Great Indian bustard, lesser floricans, and the Macqueen bustard.

Captive Elephant (Transfer or Transport) Rules, 2024

Why in News?

The Ministry of Environment, Forest, and Climate Change (MoEF&CC) has notified the **Captive Elephant (Transfer or Transport) Rules, 2024**, which liberalises the conditions for transferring **elephants** within or between states.

What are the Captive Elephant (Transfer or Transport) Rules, 2024?

- **Circumstances for Transfer of Captive Elephants:** Transfer may occur when:
 - The **owner is no longer capable** of adequately maintaining the elephant's welfare.
 - If it's determined that the **elephant will receive better care in the new circumstances** compared to its current situation.
 - The **Chief Wildlife Warden may deem it necessary** for the elephant's better upkeep based on the specific circumstances of the case.
- **Procedure Within the State:**
 - Before a transfer within a state, the **elephant's health must be confirmed** by a veterinarian.
 - The suitability of both the current and prospective habitats must be verified by the **Deputy Conservator of Forests**.
 - Approval or rejection of the transfer is at the discretion of the **Chief Wildlife Warden** based on these assessments.

Note:

- Procedure Outside the State:
 - Similar conditions apply for transferring elephants outside a state.
 - Additionally, the **elephant's genetic profile must be registered** with the MoEF&CC before the transfer.
- Requirements for Elephant Transfer:
 - The elephant must be accompanied by a **mahout and an elephant assistant**.
 - A health certificate from a veterinary practitioner confirming fitness for transport is mandatory.
 - Transport should occur after the quarantine period, if required for contagious diseases, is completed.
 - Proper feeding and watering arrangements must be made during transport.
 - Tranquillisers/sedatives shall be used to control nervous or temperamental elephants upon prescription by the veterinary practitioner.

Note:

- Until August 2022, the Wildlife Protection Act 1972 explicitly **prohibited the trade in wildlife including both wild and captive elephants**.
- The Captive Elephant (Transfer or Transport) Rules, 2024 stem from **amendments to the Wildlife Protection Act in 2022** exempting captive elephants from the prohibition on wildlife trade.
 - A Parliamentary Committee, recommended the deletion of this exemption clause for elephants and providing **only an exemption for elephants owned by temple trusts** and argued that a "careful balance" between traditions and conservation was needed.
 - Despite recommendations to delete this exemption, the final amended act retains it, **allowing transfers only for elephants with an existing certificate of ownership**.

ELEPHANT



4 Main Species of Elephant

Species	Found in	IUCN Red List Status	Habitat
Indian	Asia	EN (CITES - Appendix I, WPA - Schedule I)	Subtropical broadleaf forest, tropical broadleaf moist forest, dry forest, grassland
Sumatran	Asia	CR	Broadleaf moist tropical forests
Savanna (Bush)	Africa	EN	All sub-Saharan Africa except for Central Africa's dense tropical forest
Forest	Africa	CR	Dense Tropical Forests

Indian Elephant (*Elephas maximus*)

Largest Land Mammal on Asian Continent
National Heritage Animal of India

Top 5 Indian States by Maximum Elephant Population: (As per elephant census 2017)

- Karnataka > Assam > Kerala > Tamil Nadu > Odisha

Social Structure:

- Female elephants are more social than males; form herd (generally 5-7)
- Led by the oldest female, the 'matriarch'
- Males usually live alone

Threats:

- Habitat Fragmentation
- Poaching for Ivory
- Human-Elephant Conflict
- Mistreatment in Captivity

Conservation Efforts:

- Gaj Sookhna App (2022)
- Gaj Yatra (2017)
- Hathi Mere Sathi campaign (2011)
- National Elephant Corridor project (2005)
- Monitoring the Illegal Killing of Elephants (MIKE) Programme (2003)
- Project Elephant (1992)

Note:

Global E-waste Monitor 2024

Why in News?

Recently, the **United Nations Institute for Training and Research (UNITAR)** has released the **Global E-waste Monitor 2024**, which states that the world's generation of electronic waste is rising five times faster than documented **e-waste recycling**.

Note:

- The UNITAR is a **training arm of the United Nations** that helps governments, organisations, and individuals overcome global challenges.
- UNITAR offers **learning events and solutions**, including workshops, seminars, conferences, public lectures, and online courses. It also provides organisational advisory services, conference and retreat facilitation, and online learning solutions.

What are the Key Highlights of the Global E-waste Monitor 2024 Report?

- E-waste Generation Trends:
 - There is a **significant increase in global e-waste generation**, rising from 34 billion (bn) kg in **2010 to 62 bn kg in 2022**.
 - This trend is projected to continue, **reaching 82 bn kg by 2030**.
 - Of this 62 bn kg, only 13.8 bn kg is documented as **'formally collected and recycled in an environmentally sound manner'**.
 - 62 bn kg of e-waste includes 31 bn kg of metals, 17 bn kg of plastics and 14 bn kg of other materials (minerals, glass, composite materials, etc.)
- Drivers of E-waste Generation:
 - Factors driving the increase in e-waste generation include **technological progress**, higher consumption rates, limited repair options, short product life cycles, growing electronification, and inadequate e-waste management infrastructure.
- **Informal Recycling Sector:**
 - A significant portion of e-waste (both in high- and upper-middle-income countries as well as low- and lower-middle-income countries) is handled by the **informal sector due to inadequate formal e-waste management infrastructure**.
- Environmental and Health Impacts:
 - The improper management of e-waste, including informal recycling practices, leads to the release of

hazardous substances such as mercury and plastics containing **brominated flame retardants into the environment**, posing direct and severe impacts on both the environment and public health.

- A brominated flame retardant is a chemical compound containing bromine that is added to materials to inhibit or suppress the ignition and spread of fires.
- They work by interfering with the combustion process, **reducing the flammability of materials** and slowing down the rate at which flames spread.
- A whopping 58,000 kg of mercury and **45 million kg of plastics containing brominated flame retardants** are released into the environment every year.
- **Regional Disparities:**
 - Europe has the highest rate of documented formal collection and recycling of e-waste (42.8%), while Africa **struggles with low recycling rates** (<1%) despite generating lower amounts of e-waste.
 - Asia, including India, generates a **significant portion of global e-waste** but has made limited advances in e-waste management.
 - Countries in Asia generate **almost half of the world's e-waste (30 bn kg)** but relatively few of them have enacted legislation or established clear e-waste collection targets.
- Per Capita E-waste Generation and Recycling Rates:
 - Europe (17.6 kg), Oceania (16.1 kg) and the Americas (14.1 kg) generated the highest amount of e-waste per capita in 2022.
 - They also had the **highest documented per capita collection** and recycling rates (7.53 kg per capita in Europe, 6.66 kg per capita in Oceania and 4.2 kg per capita in the Americas).
 - This was because their collection and **recycling infrastructure was the most advanced**.
- Recycling Rates by Equipment Type:
 - Collection and recycling rates are highest for heavier and bulkier equipment like **temperature exchange equipment** and screens and monitors.
 - Thus, while toys, microwave ovens, vacuum cleaners and e-cigarettes comprise a third (20 bn kg) of the world's e-waste, **recycling rates for them are very low 12% globally**.
 - Small IT and telecommunication equipment — laptops, mobile phones, GPS devices and routers — constitute 5 bn kg of e-waste.
 - But just 22% of this is **documented as formally collected and recycled**.

Note:

➤ Policy Adoption:

- 81 countries have adopted e-waste policy, legislation or regulation.
- Sixty-seven countries have legal provisions on **Extended Producer Responsibility (EPR) for e-waste**.
- Another 46 have provisions on e-waste collection rate targets. Finally, 36 countries have provisions on e-waste recycling rate targets.

What are the Provisions regarding E-waste Management in India?

- In 2011, a significant notice pertaining to the E-waste (Management and Handling) Regulations of 2010, governed by the Environment (Protection) Act of 1986, was issued.
 - **Extended producer's responsibility (EPR)** was its main feature.
- **E-waste (Management) Rules, 2016** were introduced with over 21 products (Schedule-I) included under the purview of the rule.
 - It included Compact Fluorescent Lamp (CFL) and other mercury containing lamps, as well as other such equipment.
- Government of India notified **E-Waste (Management) Rules, 2022** with a major aim to digitise the e-waste management process and enhance visibility.
 - It also restricts the use of hazardous substances (such as lead, mercury, and cadmium) in manufacturing electrical and electronic equipment that have an adverse impact on human health and the environment.
- A **Deposit Refund Scheme** has also been introduced as an additional economic instrument wherein the producer charges an additional amount as a deposit at the time of sale of the electrical and electronic equipment and returns it to the consumer along with interest when the end-of-life electrical and electronic equipment is returned.

Global Methane Tracker 2024

Why in News?

The **International Energy Agency's Global Methane Tracker 2024** indicates that **methane** emissions from fuel usage in 2023 were nearly at their **highest level** on record, representing a slight increase compared to 2022.

What are the Major Highlights of Global Methane Tracker 2024?

- **Methane Emissions Overview:** In 2023, methane emissions from fossil fuels totaled close to **120 million tonnes (Mt)**.
 - **Bioenergy** (largely from biomass use) contributed a further 10 Mt methane emissions. This level has stayed constant since 2019.
- **Rise of Major Methane Emissions Events:** Major methane emissions events increased by over 50% in 2023 compared to 2022.
 - These events included more than 5 million metric tons of methane emissions from significant fossil fuel leaks globally.
 - One prominent incident was a major **well blowout in Kazakhstan** that lasted **over 200 days**.
- **Top Emitting Countries:** Nearly **70% of methane emissions from fossil fuels come from the top 10 emitting countries**.
 - The **United States** is the largest emitter of methane from oil and gas operations, closely followed by **Russia**.
 - **China** is the highest emitter of methane in the coal sector.
- **Importance of Cutting Methane Emissions:** Cutting methane emissions from fossil fuels by **75% by 2030 is crucial for limiting global warming to 1.5 °C**.
 - The IEA estimated that this goal would require about **USD 170 billion in spending**. This is less than 5% of the income generated by the fossil fuel industry in 2023.
 - Around 40% of emissions from fossil fuels in 2023 could have been avoided at no net cost.

World Air Quality Report 2023

Why in News?

India has been identified as the **world's third most polluted country**, as per the **World Air Quality Report 2023** by Swiss organisation IQAir.

What are the Key Highlights of the World Air Quality Report 2023?

- **India's Air Quality Ranking:**
 - Ranked as the **world's third most polluted country**, with an average annual **PM2.5 concentration of 54.4 micrograms per cubic meter**.

Note:

- **Bangladesh and Pakistan** surpassed India in **pollution** levels, becoming the most and second most polluted countries, respectively.
- 9 out of the top 10 most polluted cities in the world are from India.
- **India's air quality** deteriorated compared to the previous year, with Delhi emerging as the world's most polluted capital city for the fourth consecutive time.
- **Begusarai in Bihar is labelled as the world's most polluted metropolitan area**, with an average PM2.5 concentration of 118.9 micrograms per cubic meter.
- **Health Impacts and WHO Guidelines:**
 - Around **136 million Indians (96% of the Indian population)** face PM2.5 concentrations (seven times) higher than the **World Health Organization's** recommended levels of **5 micrograms per cubic meter**.
 - Over 66% of Indian cities have reported **annual averages higher than 35 micrograms per cubic metre (µg/m³)**.
 - PM2.5 pollution, primarily from burning **fossil fuels**, is linked to increased rates of heart attack, stroke, and oxidative stress, with severe health implications.

➤ Global Air Quality:

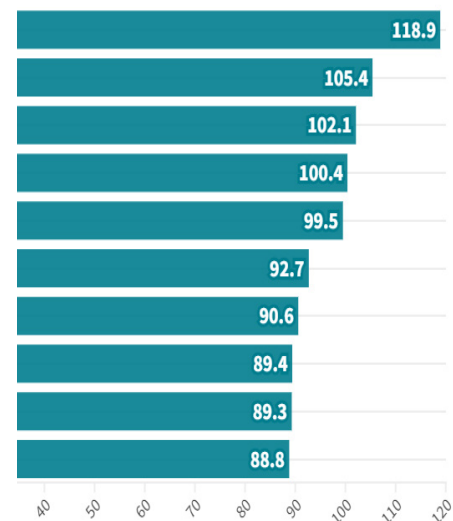
- Seven countries that met the WHO annual PM2.5 guideline (annual average of 5 µg/m³ or less) included **Australia, Estonia, Finland, Grenada, Iceland, Mauritius, and New Zealand**.
- The report states that **Africa continues to be the most underrepresented continent**, with a third of its population lacking access to air quality data.
- Some countries, including **China and Chile**, reported decreases in PM2.5 pollution levels, indicating progress in combating air pollution.
- Pollution does not stay confined to its source, with prevailing winds distributing it across regions, emphasising the need for international cooperation in addressing air quality issues.
- **Global Impact of Air Pollution:**
 - Air pollution causes approximately **seven million premature deaths worldwide annually**. It contributes to approximately **one in every nine deaths worldwide**.
 - PM2.5 exposure leads to health issues like **asthma, cancer, stroke, and mental health complications**.
 - Exposure to elevated levels of fine particles can **impair cognitive development in children**, lead to mental health issues, and complicate existing illnesses, including diabetes.

World's most polluted countries

Most polluted country ranking based on annual average PM2.5 concentration (µg/m³)

Rank	Country	2023	2022	2021	2020	2019
1	Bangladesh	79.9	65.8	76.9	77.1	83.3
2	Pakistan	73.7	70.9	66.8	59	65.8
3	India	54.4	53.3	58.1	51.9	58.1
4	Tajikistan	49	46	59.4	30.9	--
5	Burkina Faso	46.6	63	--	--	--
6	Iraq	43.8	80.1	49.7	--	39.6
7	United Arab Emirates	43	45.9	36	29.2	38.9
8	Nepal	42.4	40.1	46	39.2	44.5
9	Egypt	42.4	46.5	29.1	--	18
10	Democratic Republic of the Congo	40.8	15.5	--	--	32.1

Annual average PM2.5 concentration (µg/m³)



Note:

UN World Restoration Flagships

Why in News?

The **United Nations** has recognized **seven initiatives** from regions spanning Africa, and Latin America, the Mediterranean, and Southeast Asia as **World Restoration Flagships**.

- These initiatives, aimed at **reviving ecosystems on the brink of degradation**, hold promise for environmental conservation and socio-economic development.
- The combined efforts of these initiatives are projected to restore approximately **40 million hectares of land** and generate around **500,000 employment opportunities**.

What are the 7 World Restoration Flagships recently Recognized by the UN?

- **The Restoring Mediterranean Forests Initiative:**
 - Involves the countries of Lebanon, Morocco, Tunisia, and Türkiye.
 - It consists of a novel approach said to have protected and restored natural habitats and vulnerable ecosystems.
 - Around **2 million hectares of forests have been restored since 2017**; aims for over 8 million by 2030.
- The Living Indus initiative:
 - Approved by Pakistan parliament post-2022 **climate change-induced floods**. Its official launch took place at the **27th Conference of Parties to the UN Framework Convention on Climate Change** in **Sharm el-Sheikh**.
 - Aims to restore 25 million hectares of the **Indus river basin by 2030**.
 - It designates the **Indus River as a living entity with rights**, a measure taken to protect rivers elsewhere as well.
 - It involves Australia, Bangladesh, Bolivia, Brazil, Canada, Ecuador, **India**, New Zealand, Peru and Sri Lanka.
- The Acción Andina Social Movement:
 - It is led by the non-profit Andean Ecosystems Association (ECOAN) and aims to protect and **restore one million hectares of Andean forests**.
 - Andean forests are a type of **tropical and subtropical forest** that grow along the slopes of the Andes mountains in **South America**.
 - The initiative also works to **secure land titles for local communities** and protect the forest from mining and timber exploitation.

- **Sri Lanka Mangrove Regeneration Initiative:**
 - It is a science-driven programme co-led by **local communities**. It focuses on the **restoration of natural balance in the ecosystem**.
 - Since its launch in **2015**, **efforts have led to 500 hectares of restored mangroves**, according to the UN statement.
 - Targets restoration of **10,000 hectares of mangroves by 2030**.
- **Terai Arc Landscape(TAL) Initiative:**
 - Aimed to restore the forests of critical corridors of the **TAL in collaboration with local communities** working as citizen scientists, community-based anti-poaching units, and forest guards, among others.
 - TAL spans an 810 km stretch between the **river Yamuna in the west and the river Bhagmati in the east**.
 - It comprises the **Shivalik hills**, the adjoining **bhabhar areas**, and the **Terai floodplains**, covering parts of the **Indian states of Uttarakhand, Uttar Pradesh, Bihar, and the low-lying hills of Nepal**.
 - Initiative covers measures like the **restoration of 66,800 hectares of Nepal's forests**, which is said to improve the livelihoods of about 500,000 households in the country.
 - It also supported the **tiger population in the landscape** shared by India and Nepal, which increased to 1,174.
 - Aims to restore 350,000 hectares of forests by 2030.
- Regreening Africa's Agriculture:
 - It increases **carbon storage**, boosts crop and grass yields, makes soil more resilient (by preventing floods) and treats it with fixed nitrogen that acts as a natural fertiliser.
- Growing Forests in Africa's Drylands Initiative:
 - Expands **restoration from 41,000 to 229,000 hectares by 2030**.
 - Involves African farmers, planting tens of millions of trees annually.
 - Creates over 230,000 jobs, supporting sustainable development.

Cameroon Adopts Nagoya Protocol

Why in News?

Cameroon, located in central Africa and boasting a rich biodiversity with around 11,000 species of plants,

Note:

animals, and microorganisms, has recently adopted the **Nagoya Protocol on Access and Benefit Sharing**, an agreement under the **United Nations Convention on Biological Diversity (UNCBD)**.

- The **Nagoya Protocol** aims to **promote the fair and equitable sharing of benefits arising from the utilization of genetic resources**.

What was the Need for Cameroon to Adopt Nagoya Protocol?

- Preserving Traditional Knowledge:
 - Many of plants, animals and microorganisms contain useful genetic information or **genetic resources, such as genes for producing medicines or crops**. The knowledge, **innovations and practices of indigenous and local communities** related to these resources are called **traditional knowledge**.
- Preventing Biopiracy and Equal Sharing of Resources:
 - Both genetic resources and traditional knowledge are valuable for bioprospecting, **which is the**

exploration of biological material for new sources of drugs, food or other products. Bioprospecting can also help to conserve and sustainably use biodiversity. For Example:

- **Prunus Africana**, a plant endemic to Cameroon, is used to **make drugs for prostate cancer** but foreign companies buy a kilogramme of it USD 2.11 and sell the drugs made from it for USD 405.
 - **Cameroon's Bush Mango** is a wealth of medical properties. The leaves, roots and bark are used to treat scabs and skin pain. The fruit has attracted the interest of European pharmaceutical and cosmetic companies.
- Benefiting Local Communities:
 - **None of the companies' profits benefited the communities** where the plants were harvested.
 - Adopting the **Nagoya Protocol aids in safeguarding the rights and interests of indigenous and local communities** while fostering innovation and development based on biodiversity.



Note:

CBD COP15

The UN Convention on Biological Diversity (CBD) 1993 - a legally binding treaty to conserve biodiversity

CBD Conference of Parties is the Governing body of the Convention



MEETINGS OF THE CONFERENCE OF THE PARTIES

COP 1 (1994)

- Nassau, Bahamas
- Proposed 29 December as International Day for Biological Diversity

EXCOP 1

- 1st extraordinary meeting of UN CBD COP
- At Cartagena, Colombia (Feb 1999) & Montreal, Canada (Jan 2000)
- Adoption of Cartagena Protocol on Biosafety

COP 6 (2002)

- The Hague, Netherlands
- Global Taxonomy Initiative, Global Strategy for Plant Conservation adopted

COP 5 (2000)

- Nairobi, Kenya
- UNGA adopted 22 May as International Day for Biological Diversity

COP 10 (2010)

- Nagoya, Japan
- Nagoya Protocol (Access to Genetic Resources and Fair & Equitable Sharing of Benefits) adopted
- Strategic Plan for Biodiversity 2011-20 and Aichi Biodiversity Targets
- GBO 3

COP 8 (2006)

- Curitiba, Brazil
- Global Biodiversity Outlook (GBO) Report 2 (GBO 1 in 2001)

COP 11 (2012)

- Hyderabad, India

COP 14

- Sharm El-Sheikh, Egypt

PHASE-I

- Theme - Ecological Civilization: Building a Shared Future for All Life on Earth
- Held in Kunming, China (October 2021)
- Kunming Biodiversity Fund

COP 15

PHASE-II

- Held in Montreal, Canada
- Adopted Post 2020 Global Biodiversity Framework - 4 goals & 23 targets to be achieved by 2030.
- 30 by 30 Target - restore 30% degraded ecosystems and protect at least 30% of the world's lands, oceans and coastal areas by 2030
- No single country met all 20 Aichi targets (expired in 2020) within its own borders



Drishti IAS

Note:



drishti

World's First Melanistic Tiger Safari in Odisha

Why in News?

Odisha is set to unveil the **world's first melanistic tiger safari** near the **Similipal Tiger Reserve (STR)**.

What is Odisha's Vision for the Melanistic Tiger Safari?

- **Melanism and Melanistic Tiger:** Melanism is a genetic condition that results in increased melanin production, leading to **black or nearly black skin, feathers, or hair** in animals.
 - The **Royal Bengal Tigers of Similipal** boast a distinctive lineage with elevated melanin levels, giving rise to black and yellow interspersed stripes, making them pseudo-melanistic.
 - According to the **All India Tiger Estimation, 2022**, Similipal Tiger Reserve houses 16 tigers, with 10 of them displaying melanistic traits.
- **Location of Safari:** Spanning approximately 200 hectares near **Dhanbad-Balasore National Highway-18**, the safari site lies in close proximity to STR, providing a landscape akin to Simlipal.
 - In the beginning, three melanistic tigers from **Nandankanan Zoo**, along with rescued or orphaned tigers, will **occupy the open enclosures of the safari**.

- **Objective:** It aims to raise awareness about the conservation needs of melanistic tigers, providing a platform for researchers and enthusiasts to engage with these rare big cats.
- **Approval:** The project necessitates approvals from the **Central Zoo Authority** and other regulatory bodies overseeing wildlife initiatives in the country.
 - A **National Tiger Conservation Authority** committee will also conduct a feasibility study of the proposed site before granting final clearance.

What are the Other Colour Variations in Tigers?

- **Orange with Black or Brown Stripes:** This is the most common and widely recognized tiger coloration, e.g., the **Royal Bengal Tiger**.
 - Each tiger's stripe pattern is unique, serving as a form of camouflage, in their natural habitat.

TIGER


Royal Bengal Tiger (*Panthera tigris*) is the National animal of India.

Subspecies of Tiger

- * The continental (*Panthera tigris tigris*)
- * The Sunda (*Panthera tigris sondaica*)

Habitat

Tropical rainforests, evergreen forests, temperate forests, mangrove swamps, grasslands, and savannas



Countries Where Tiger Population Is Found

- ▣ Found only in 13 Tiger Range countries- India, Nepal, Bhutan, Bangladesh, Myanmar, Russia, China, Thailand, Malaysia, Indonesia, Cambodia, Laos, and Vietnam
- ◆ As per the latest report by IUCN, tiger has gone extinct in Cambodia, Laos, and Vietnam

Protection Status

- ▣ IUCN Red List: Endangered
- ▣ CITES: Appendix I
- ▣ WPA 1972: Schedule I

Threats



- ▣ Habitat loss
- ▣ Poaching and illegal trade
- ▣ Human-Wildlife conflict

Conservation Efforts

- ▣ **International Big Cats Alliance (IBCA):** For conservation of seven big cats namely Tiger, Lion, Leopard, Snow Leopard, Cheetah, Jaguar and Puma (launched by India)
- ▣ **Tx2 campaign:** Launched by WWF; stands for 'Tiger times 2' signaling the goal to double the tiger population by 2022
- ▣ **National Tiger Conservation authority (NTCA):** Constituted under the WPA, 1972
- ▣ **Project Tiger:** Launched in 1973
- ▣ **Tiger Census:** Every 4 years

Tigers In India

- ▣ India has the largest population
 - ◆ As of 2022, India has 3167 tigers
 - ◆ Largest population has been found in Central Indian Highlands & Eastern Ghats Landscape
- ▣ **Tiger Reserves:** India now has 53 tiger reserves
 - ◆ Ranipur in UP is the latest
 - ◆ Nagarjun Sagar (Andhra Pradesh) is the largest while Orang (Assam) is the smallest (Core area)

Drishti IAS

Note:

- **White Tigers:** They are not considered a separate subspecies. The colour of the white tiger's fur is the result of a genetic mutation called **leucism**.
 - **Leucism** is a genetic condition that results in **reduced pigmentation in animals**, causing them to have **white or pale-colored skin, feathers, fur, or scales**.
- **Golden Tigers:** They are also not considered a subspecies of tigers because their golden colour variation is caused by the presence of a recessive gene called "**wideband**".
 - The **wideband gene reduces melanin production** during the cycle of hair growth.
 - Recently, it was spotted in **Kaziranga National Park**.

Similipal Tiger Reserve

- **Location:** Similipal is situated in the **Deccan Peninsula Biogeographic Zone**. **Vegetation:** Predominantly **moist mixed deciduous forest** with tropical semi-evergreen patches and sporadic dry deciduous forests and grasslands.
- **Floral Richness:** Holds 7% of India's flowering plants and 8% of its orchid species.
- **Faunal Diversity:** Home to 55 mammal species, 361 bird species, 62 reptile species, 21 amphibian species, and numerous insects and microfauna.
 - Major species other than tigers include **sambar, chital, barking deer, gaur, and mouse deer, leopards, fishing cat** etc.
 - Management efforts have revived **mugger crocodile populations** along rivers Khairi and Deo.
- It has also been designated as a **Global Network of Biospheres** site since 2009.

Ramsar Sites in India

Why in News?

Recently, the **Ministry of Environment, Forest and Climate Change** announced that on the eve of **World Wetlands Day, 2024**, India has increased its tally of **Ramsar sites** to **80 from the existing 75** by designating five more wetlands as **Ramsar sites**.

- Three of these sites, **Ankasamudra Bird Conservation Reserve, Aghanashini Estuary** and **Magadi Kere Conservation Reserve** are located in **Karnataka**

whereas two, **Karaivetti Bird Sanctuary** and **Longwood Shola Reserve Forest** are in **Tamilnadu**.

- **Tamil Nadu** continues to have the maximum number of **Ramsar Sites** (16 sites) followed by **Uttar Pradesh** (10 sites).

What is the Ramsar Convention?

- It is an intergovernmental treaty, adopted on **2nd February 1971**, in the **Iranian city of Ramsar**, on the southern shore of the **Caspian Sea**.
 - In India, it came into force on **1st February 1982**, under which **wetlands of international importance** are declared as **Ramsar sites**.
- **World Wetlands Day (WWD):**
 - It is celebrated across the globe to commemorate the adoption of this international agreement on wetlands on **2nd February 1971**.
 - The theme of **World Wetland Day, 2024** is '**Wetlands and Human Wellbeing**' which underscores the critical role wetlands play in enhancing our lives.
 - It highlights how wetlands contribute to **flood protection, clean water, biodiversity** and **recreational opportunities**, all of which are essential for human health and prosperity.

What are the Characteristics of the Newly Designated Ramsar Sites?

- **Ankasamudra Bird Conservation Reserve (Karnataka):**
 - It is a **human-made village irrigation tank** built centuries back and is spread over an area of **244.04 acres** adjoining the **Ankasamudra village**.
- **Aghanashini Estuary (Karnataka):**
 - It is spread over an area of **4801 ha**, and is formed at the confluence of the **Aghanashini River** with the **Arabian Sea**.
 - The **brackish water** of the estuary provides diverse ecosystem services including **flood** and **erosion risk mitigation, biodiversity conservation** and **livelihood support**.
 - The wetland also provides livelihoods by supporting **fishing, agriculture, collection of edible bivalves** and **crabs, shrimp aquaculture, traditional fish farming** in the **estuarine rice fields (locally known as Gazni rice fields)** and salt production.
 - The **mangroves** bordering the estuary help to protect the shores against **storms** and **cyclones**.

Note:

- **Magadi Kere Conservation Reserve (Karnataka):**
 - It is a **human-made wetland** with an area of nearly **50 hectares** which was constructed to **store rainwater** for irrigation purposes.
 - The wetland harbors two vulnerable species, namely **Common pochard** (*Aythya ferina*) and **River tern** (*Sterna aurantia*) and **four near-threatened species** namely **Oriental Darter** (*Anhinga melanogaster*), **Black-headed Ibis** (*Threskiornis melanocephalus*), **Woolly-necked Stork** (*Ciconia episcopus*) and **Painted Stork** (*Mycteria leucocephala*).
 - It is also one of the largest wintering grounds for the **Bar-headed goose** (*Anser indicus*) in Southern India. It has been declared globally as an **Important Bird and Biodiversity Area (IBA)**.
- **Karaivetti Bird Sanctuary (Tamil Nadu):**
 - Water from the wetland is utilized by the villagers for cultivating agricultural crops such as **paddy, sugar cane, cotton, corn**, and **split red gram**.
- About 198 species of birds have been recorded here; some of the important visitors being the **Bar headed Goose, Pin-tailed duck, Garganey, Northern Shoveler, Common Pochard, Eurasian Wigeon, Common teal and Cotton teal**.
- **Longwood Shola Reserve Forest (Tamil Nadu):**
 - It derives its name from the Tamil word, “**Solai**”, which means a **‘tropical rainforest’**.
 - The ‘Sholas’ are found in the upper reaches of the **Nilgiris, Anamalais, Palni hills, Kalakadu, Mundanthurai** and **Kanyakumari** in **Tamil Nadu**.
 - These forested wetlands serve as habitats for the globally endangered **Black-chinned Nilgiri Laughing thrush** (*Strophocincla cachinnans*), **Nilgiri Blue Robin** (*Myiomela major*), and **vulnerable Nilgiri Wood-pigeon** (*Columba elphinstonii*).

RAMSAR CONVENTION

About

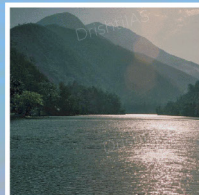
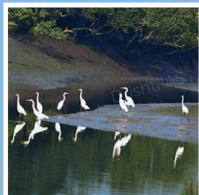
- Also known as the Convention on Wetlands.
- An intergovernmental treaty, adopted in 1971, in Ramsar, Iran.
 - Entered into force in 1975.
- Wetlands that are of international importance are declared as Ramsar sites.
- Largest Ramsar Site in World: Pantanal: South America

Montreux Record

- Adopted in Montreux (Switzerland) in 1990.
- Identifies Ramsar sites that need priority conservation attention at national or international level.

Wetlands

- A place in which the land is covered by water – salt, fresh, or somewhere in between – either seasonally or permanently.
- Take many forms including rivers, marshes, bogs, mangroves, mudflats, ponds, swamps, billabongs, lagoons, lakes, and floodplains.
- World Wetlands Day: **2nd February**



India & Ramsar Convention

- Came into force in India: **1982**
- Total Number of Ramsar Sites: **75**
 - Chilika Lake (Odisha), Keoladeo National Park (Rajasthan), Harike Lake (Punjab), Loktak Lake (Manipur), Wular Lake (Jammu and Kashmir), etc.
- Related Framework in India
 - The Ministry of Environment, Forest and Climate Change (MoEF&CC) has notified Wetlands (Conservation and Management) Rules, 2017 under the provisions of the Environment (Protection) Act, 1986 as regulatory framework for conservation and management of wetlands.
 - The 2017 Rules decentralise wetlands management and provide for the constitution of the State Wetlands Authority or Union Territory Wetlands Authority.

Key Facts

- Largest Ramsar Site: Sunderbans, West Bengal
- Smallest Ramsar Site: Vembannur Wetland Complex, Tamil Nadu
- State with the maximum number of Ramsar Sites: Tamil Nadu (14)
- Wetlands in Montreux Record:
 - Keoladeo National Park: Rajasthan
 - Loktak Lake: Manipur



Note:

Gentoo Penguins

Why in News?

Recently, over 200 **Gentoo penguins** have been found dead in the **Falkland Islands, Antarctica** due to the spread of the **H5N1 Avian Influenza Virus**.

- Falkland Islands is an archipelago in the South Atlantic Ocean.

What is Avian Influenza?

➤ About:

- Avian influenza, often referred to as **bird flu**, is a **highly contagious viral infection** that primarily affects birds, particularly wild birds and domestic poultry.
- In 1996, highly pathogenic avian influenza H5N1 virus was first identified in domestic waterfowl in Southern China. The virus is named A/goose/Guangdong/1/1996.

➤ Transmission to Humans and Related Symptoms:

- Human cases of H5N1 avian influenza occur occasionally, but it is difficult to transmit the infection from person to person. As per **World Health Organisation (WHO)**, when people do become infected, the mortality rate is about 60%.
 - It can range from **mild flu-like symptoms**, including fever, cough, and muscle aches, to **severe respiratory issues**

like pneumonia, difficulty breathing, and even cognitive problems such as altered mental status and seizures.

➤ Avian Influenza and India:

- Initial Outbreak:
 - The initial outbreak of Highly Pathogenic Avian Influenza (HPAI) H5N1 in India occurred in 2006 in Navapur, Nandurbar district, Maharashtra, and was followed by annual outbreaks.

- H5N8 was first observed in India in November 2016, mainly affecting wild birds across five states, with **Kerala reporting the most cases**.
- The disease has been reported in 24 states and union territories, resulting in the culling of over 9 million birds to control its spread.

○ Related Initiative:

- India's approach to **controlling Highly Pathogenic Avian Influenza (HPAI)** follows a "**detect and cull**" policy as outlined in the **National Action Plan for Prevention, Control, and Containment of Avian Influenza (revised - 2021)**.

➤ Treatment:

- Antivirals have demonstrated effectiveness in the treatment of avian influenza virus infections in humans, lowering severity and the risk of death.
- **HPAI stands for Highly Pathogenic Avian Influenza** and **LPAI stands for Low Pathogenic Avian Influenza**.

What are the Key Facts About Gentoo Penguins?

➤ Scientific Name: *Pygoscelis papua*

➤ About:

- They are characterized by a **band of white feathers extending across** the top of the head from just above each eye.
- Other **distinguishing features include a black throat, a brush tail** that is large in comparison with other penguin species, and a bill that is mostly deep orange or red.

Types	A Subtypes	HPAI vs LPAI
Influenza A (Infects a wide range of animals including birds)	Avian (Can infect humans) H5N1 H7N3 H7N7 H7N9 H9N2 H10N8	HPAI H5N1 LPAI H5N1 HPAI H5N8 LPAI H5N8
Influenza B (Mainly infects humans)	Swine (Can infect humans) H1N1 H1N2 H3N2	Subtypes can be classified as high path or low path based on the ability of the specific virus strain to kill chickens in the lab setting.
Influenza C (Infects humans and pigs but more rare than types A and B)	Most common human H1N1 H3N2	
Influenza D (Infects cattle)		

Note:



- **Distribution:**
 - They are exclusively **located in the Southern Hemisphere**, primarily found on the Antarctic Peninsula and numerous sub-Antarctic islands, with a notable concentration in the **Falkland Islands in the South Atlantic Ocean**.
- **Habitat:**
 - These penguins are typically **situated along shorelines**, allowing for quick **access to food sources while staying in proximity to their nests**. This strategic positioning facilitates efficient foraging and nesting activities.
- **Threats:**
 - **Predators:** Vulnerable to predation by South American **sea lions, Weddell seals, leopard seals, killer whales**, skuas, sheathbills, caracaras, and giant fulmars.
 - **Human Impact:** Historical practices such as **egg collection** for supplementation, and harvesting of skins and blubber.
 - **Environmental Changes:** Changing environmental conditions and competition with humans for prey, potentially impact population sizes.
- **Conservation Status:**
 - **IUCN Red List:** Least Concern.

What are the Key Facts About the Falkland Islands?

- **Location:** The Falkland Islands are a **British Overseas Territory located in the South Atlantic Ocean**. They are about 500 km east of the coast of Argentina.
 - Stanley is the capital and largest city of the Falkland Islands.
- **Territorial Status:** The Falkland Islands are a British Overseas Territory, but **Argentina also claims sovereignty over the islands**, leading to a historical conflict between the two countries. E.g. **1982 War between Argentina and British forces** over the territory of the Falkland Islands.
 - English is the official language.
- **Wildlife:** The Falkland Islands are **home to diverse wildlife**, including various species of **birds, seals, and penguins**. The islands are known for their large colonies of penguins, such as the King Penguin and the Magellanic Penguin.



Snow Leopard Population Assessment in India

Why in News?

The **National Board for Wildlife** meeting in New Delhi witnessed the release of the **report on the Status of Snow Leopards** in India by the **Union Minister of Environment, Forest, and Climate Change (MoEFCC)**.

- This report is a result of the **Snow Leopard Population Assessment in India (SPAI) Program**, a significant scientific exercise that provides crucial insights into the snow leopard population in India.

What is the Snow Leopard Population Assessment in India (SPAI) Program?

- The SPAI Program is the **first-ever comprehensive scientific exercise** aimed at assessing the population of snow leopards in India.
 - The **Wildlife Institute of India (WII)** served as the National Coordinator for the SPAI, with support from snow leopard range states and conservation partners, the **Nature Conservation**

Note:



Foundation (NCF), Mysuru and World Wildlife Fund(WWF)-India.

- The SPAI systematically covered over **70% of the potential snow leopard habitat across the trans-Himalayan region**, including UTs of Ladakh and Jammu and Kashmir, and states such as Himachal Pradesh, Uttarakhand, Sikkim, and Arunachal Pradesh.
- The assessment was conducted from 2019 to 2023 using a meticulous two-step framework, including **evaluating snow leopard spatial distribution and estimating snow leopard abundance using camera traps.**

Note:

- The **Nature Conservation Foundation (NCF)**, Mysore is a non-governmental organisation that focuses on the conservation of India's wildlife and ecosystems.
- WWF-India, established as a Charitable Trust on 27th November 1969. It is a science-based organization which addresses issues such as the **conservation of species and its habitats, climate change, water and environmental education**, among many others.
 - WWF-India Secretariat is an autonomous office based in New Delhi. It is part of **WWF International.**

What are the Key Highlights of the Report?

- Findings:
 - The SPAI exercise recorded a **snow leopard population of 718 individuals** in India, providing crucial data for conservation efforts.
 - The report detailed the estimated presence of snow leopards in different states: **Ladakh (477), Uttarakhand (124), Himachal Pradesh (51), Arunachal Pradesh (36), Sikkim (21), and Jammu and Kashmir (9).**
- Conservation Efforts and Recommendations:
 - The report emphasises the need for establishing a **dedicated Snow Leopard Cell at WII** under the **MoEFCC** to focus on **long-term population monitoring.**

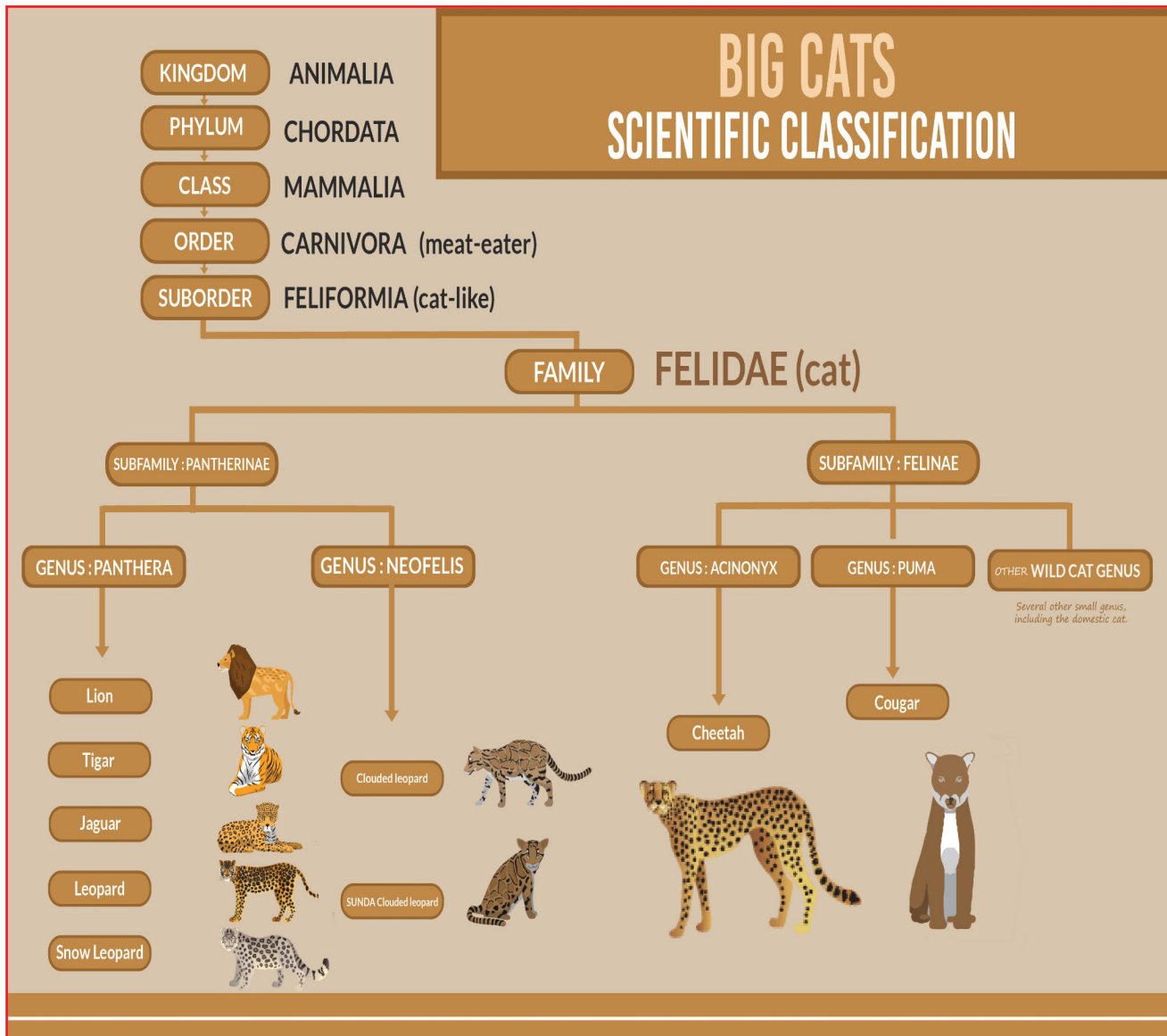
- Consistent monitoring through periodic population estimation is proposed to ensure the long-term survival of snow leopards and to identify challenges, address threats, and formulate effective conservation strategies.



National Board for Wildlife

- The National Board for Wildlife (NBWL) is the **apex body in India for all wildlife-related matters.**
- It is a **statutory body constituted under Section 5A of the Wildlife (Protection) Act, 1972.**
- It advises the government on policy matters concerned with wildlife conservation and preservation, and approves projects in and around national parks and other protected areas.
 - The NBWL is **chaired by the Prime Minister** and comprises 47 members, including three Members of Parliament, five NGOs, and 10 eminent ecologists, conservationists, and environmentalists.

Note:



Acid Rain

Why in News?

Acid Rain is a complex environmental issue with multiple causes and widespread consequences, and it has its origins in **Fossil Fuels**.

What is Acid Rain?

➤ About:

- **Acid rain or acid deposition** is a broad term that includes **any form of precipitation with acidic components**, such as sulfuric or nitric acid that

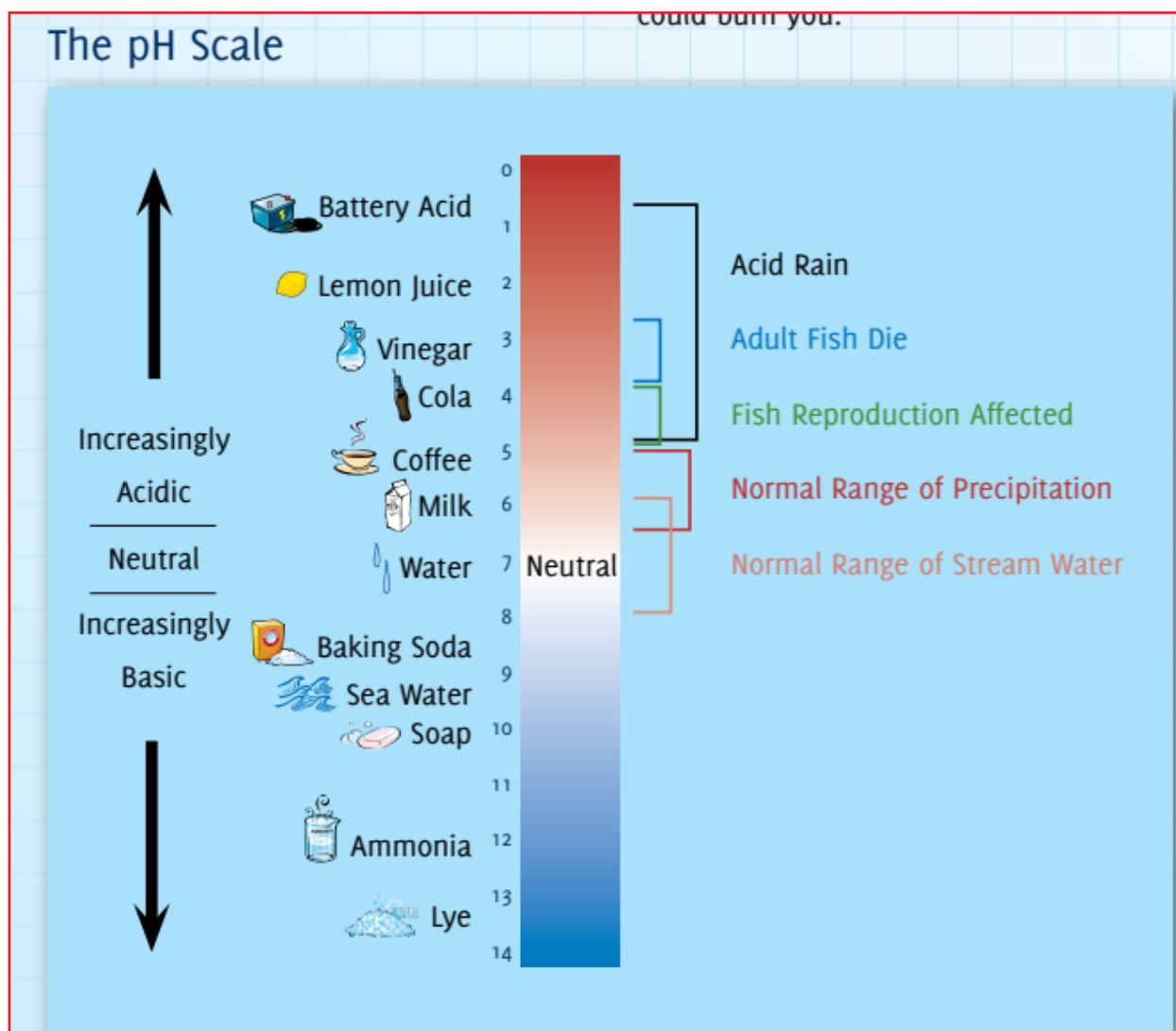
fall to the ground from the atmosphere in wet or dry forms.

- This can include **rain, snow, fog, hail** or even dust that is acidic.

➤ Formation of Acid Rain:

- When SO₂ (Sulphur Dioxide) and NO_x (Nitrogen Oxide) **combine with water and oxygen** in the atmosphere, they form sulfuric acid (H₂SO₄) and nitric acid (HNO₃), respectively.
- These acids then **dissolve in water droplets**, leading to the creation of acid rain, snow, or fog.
 - The typical **pH (Potential of Hydrogen)** of acid rain is around 4.2-4.4, making it more acidic than normal rain (which has a pH of around 5.6).

Note:



➤ Causes of Acid Rain:

- **Fossil Fuel Combustion:** Burning **Fossil Fuels**, particularly those containing sulfur, release sulfur dioxide (SO₂) and, at higher temperatures, nitrogen oxides (NO_x).
 - Fossil fuel combustion is prevalent in **vehicles such as automobiles**, and is a primary source of environmental pollutants.
 - The **combustion of coal in power plants** and industrial processes also releases these substances.
- **Natural Sources:** **Volcanic Eruptions** and **Lightning** also contribute to the presence of **sulfur dioxide and nitrogen oxides in the atmosphere**.

- **Air Pollution:** In the atmosphere, the pollutants SO₂ and NO_x undergo chemical reactions, forming sulfuric and nitric acids.

- When combined with water vapor, **they create acid rain during precipitation**.

➤ Forms of Acid Rain/Deposition:

- **Wet Deposition:** The sulfuric and nitric acids formed in the atmosphere fall to the **ground mixed with rain, snow, fog, or hail**.
- **Dry Deposition:** Acidic particles and gases can also deposit from the atmosphere in the absence of moisture as dry deposition.
 - The acidic particles and gases may deposit to surfaces (water bodies, vegetation, buildings) quickly or may react during atmospheric transport to form larger particles that can be harmful to human health.

Note:

African Union Banned Donkey Skin Trade

Why in News?

Recently, during the 37th African Union Summit, 2024 in Ethiopia, African heads of state unanimously agreed to a historic ban on the trade of donkey skin, thereby prohibiting the killing of donkeys across the continent for their hides.

- This is a significant outcome following the Dar es Salaam declaration adopted at the first African Union-Interafrican Bureau for Animal Resource (AU-IBAR) Pan-African Donkey Conference in December 2022.

What is the Dar es Salaam Declaration?

- **About:**
 - The Dar es Salaam declaration was signed in Tanzania during the Pan African Donkey Skin Conference, organised by the AU-IBAR, where government ministers gathered to understand the harmful effects of the donkey skin trade on animals and communities in Africa.
 - It underscores the rapid decrease in Africa's donkey population and advocates for increased

investment in research, policies, and legislation to safeguard the species.

- It advocates for an African Union Commission resolution proposing a **15-year halt** on the commercial slaughter of donkeys for their skins, alongside the creation of an **African donkey strategy** addressing **exploitation, production, and productivity**, to integrate these concerns into the global development agenda.

Key Facts about Indian Wild Ass

- Sub-species of Asian Wild Ass (*Equus hemionus*)
- Distinguished by **unique white markings** on the front of the rump and back of the shoulder, along with a stripe down the back outlined in white.
- **Distribution:** The World's last population of Indian Wild Ass is restricted to **Rann of Kachchh, Gujarat**.
- **Habitat:** Desert and grassland ecosystems.
- **Conservation Status:**
 - **IUCN:** Near threatened
 - **CITES:** Appendix II
 - **Wildlife Protection Act (1972):** Schedule-I

SHOW OF STRENGTH

Donkey breeds found in India are primarily used to carry heavy loads

Breed	Native region; characteristics	Use
Kachchhi	Kutch region of Gujarat; grey, white, brown or black in colour	For weed removal in farms and as pack animal during pastoralist migration. It can carry 80-100 kg and pull 200-300 kg on carts.
Halari	Saurashtra region of Gujarat; white in colour, docile temperament	As pack animal during pastoralist migration and to pull carts. It can walk around 30-40 km in a day
Sindhi	Barmer and Jaisalmer districts of Rajasthan; brown in colour	As pack animal to transport water, soil, earthenware, construction material, fodder and to pull carts and for ploughing by small and marginal farmers. They can carry 1,000-1,500 kg.
Spiti	Cold desert areas of Himachal Pradesh; dark brown, brown or black in colour	For immediate transport of highly perishable cash crops and fruits, food grains and other items to far flung areas; to fetch wood, logs and other minor forest produce; and to bring dung or manure from pastures to villages or fields.

Source: Indian Council of Agricultural Research-National Bureau of Animal Genetic Resources

Note:



Concerns Raised on Plastic Waste Pollution

Why in News?

Recently, A parliamentary panel raised concerns over the ineffective handling of plastic waste in the country, citing a report from the **Comptroller and Auditor General (CAG)**.

- The panel criticised the **Central Pollution Control Board (CPCB)** for its lax approach to addressing the issue and urged the **Ministry of Environment Forest and Climate Change** to improve coordination and take concrete steps to combat plastic pollution.

What is the Finding of the PAC Report?

- **Acknowledgment of Ministry's Efforts:** The **Public Accounts Committee (PAC)** acknowledged the Ministry's efforts on **plastic waste** since May 2021 but stressed the need for more effective measures to protect people from plastic pollution hazards.
- **Increasing Plastic Waste Generation:** Plastic waste generation has increased substantially from 15.9 lakh tonnes per annum (TPA) in 2015-16 to 41.2 lakh TPA in 2020-21.
- **Unutilized Plastic Waste and Environmental Impact:** Data from 2019-20 shows that **50% of the total plastic waste** in the country (34.7 lakh TPA) **remained unutilised**, leading it to pollute air, water and soil, and ultimately affecting human health.
- **Data Gap and Inconsistencies:** The **PAC** noted a big data gap, observing from **CAG's 2022 audit findings** that many **State Pollution Control Boards (SPCBs)** did not provide data on plastic waste generation for the period 2016-18 to the **Central Pollution Control Board (CPCB)**.
 - It also noted that data received from **SPCBs** was not validated by **CPCB** and in certain cases, there were inconsistencies in data shared by **Urban Local Bodies (ULBs)** with SPCBs.

- **Importance of Finding Alternatives to Plastic:** It observed that "finding a cost-effective and dependable alternative to plastic" was a prerequisite for its elimination.

What are the Measures Taken to Curb Plastic Pollution?

Measures Taken at Global Level:

- Resolution to End Plastic Pollution:
 - In 2022, 124 countries, parties to the **United Nations Environment Assembly**, including India, signed a resolution to draw up a **legally binding agreement for an end to plastic pollution**.
- **Closing the loop:**
 - It is a project of the **United Nations Economic and Social Commission for Asia and the Pacific** to assist cities in developing more inventive policy solutions to tackle the problem.
- The Global Tourism Plastics initiative:
 - It aims to reduce plastic pollution from the tourism sector through a set of actionable commitments by **2025**.
- European Union:
 - In July 2021, the **Directive on Single-Use Plastics** took effect in the **European Union (EU)**.

Measures taken by Indian Government:

- **Ban on Hard-to-Collect/Recycle Single-Use Plastics (SUP):** The Ministry of Environment, Forest and Climate Change had banned hard-to-collect/recycle, **Single-Use Plastic (SUP)** items.
 - The manufacturing, importation, sale, and **usage of plastic carry bags thinner than 120 microns** were prohibited.
- The **Plastic Waste Management (Amendment) Rules, 2022**, introduce guidelines on **Extended Producer Responsibility (EPR)** for plastic packaging.
 - These guidelines set mandatory targets for **EPR**, recycling of plastic packaging waste, reuse of rigid plastic packaging, and the use of recycled plastic content.

Note:

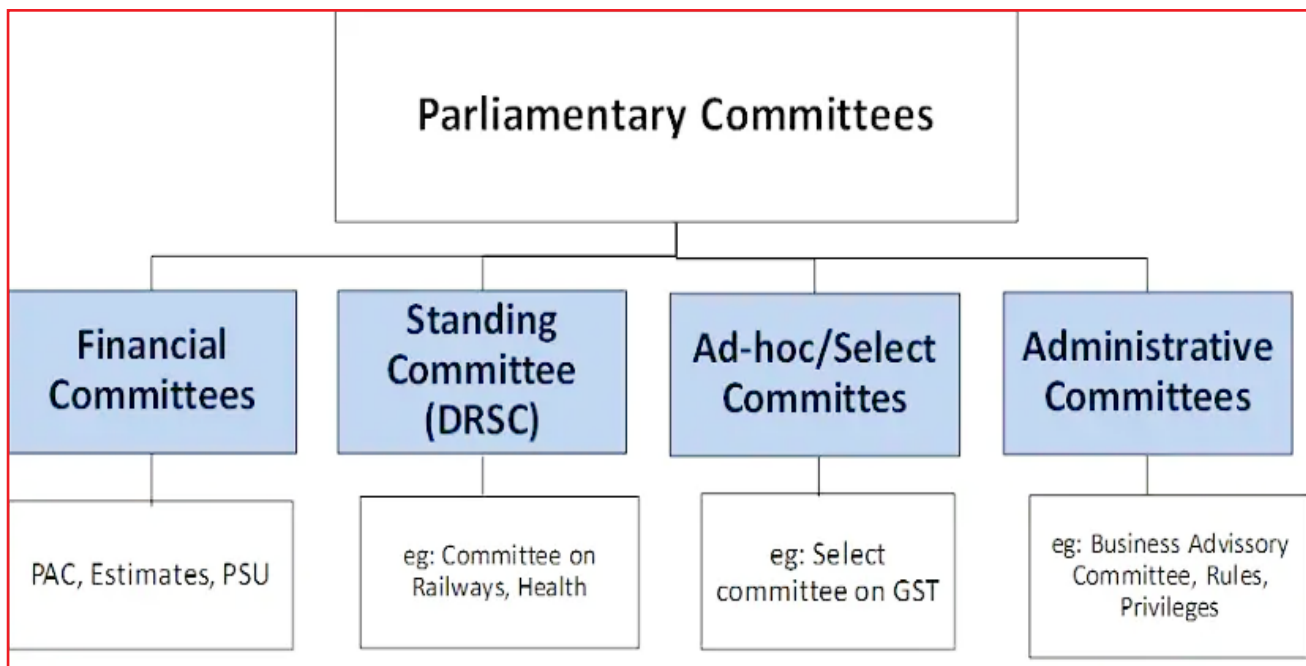
- **Local Body Responsibility:** Plastic Waste Management Rules, 2016 state that every local body has to be responsible for setting up infrastructure for segregation, collection, processing, and disposal of plastic waste.
- Other Important Initiatives:
 - National Dashboard on Elimination of Single-Use Plastic and Plastic Waste Management
 - India Plastics Pact
 - Project REPLAN
 - National Green Tribunal (NGT)

CPCB

- The Central Pollution Control Board (CPCB), is a statutory organisation, was constituted in **1974** under the Water (Prevention and Control of Pollution) Act, 1974.
- **CPCB** was also entrusted with the powers and functions under the Air (Prevention and Control of Pollution) Act, 1981.
- It serves as a field formation and also provides technical services to the **Ministry of Environment and Forests and Climate change** of the provisions of the Environment (Protection) Act, 1986.

Public Accounts Committee (PAC)

- **PAC** is one of the three Financial Parliamentary committees, the other two are the **Estimates Committee** and the **Committee on Public Undertakings**.
- Parliamentary committees draw their authority from **Article 105** (on privileges of Parliament members) and **Article 118** (on Parliament’s authority to make rules for regulating its procedure and conduct of business).
- **Establishment:**
 - The Public Accounts Committee was introduced in **1921** after its first mention in the **Government of India Act, 1919** also called Montford Reforms.
 - The Public Accounts Committee is now constituted every year under Rule 308 of the Rules of Procedure and Conduct of Business in **Lok Sabha**.
- **Appointment:**
 - The **Chairman** of the Committee is appointed by the **Speaker of Lok Sabha**.
 - It is to be noted that the Committee, not being an executive body, can only make decisions that are advisory by nature.
- **Members:**
 - It presently comprises **22 members** (15 members elected by the **Lok Sabha Speaker**, and **7 members** elected by the **Rajya Sabha Chairman** with a term of **one year only**).



Note:

What is EPR?

- It makes **producers responsible for the environmental impacts** of their products throughout their life cycle.
- EPR aims to promote better waste management and reduce the burden on municipalities.
- It integrates environmental costs into product prices and encourages the design of environmentally sound products.
- EPR applies to various types of waste, including **plastic waste, e-waste, and battery waste.**

Gupteswar Forest as Biodiversity Heritage Site

Why in News?

The pristine Gupteswar Forest, adjacent to Gupteswar Shiva temple in Odisha's Koraput district has been declared as the **4th Biodiversity Heritage Site (BHS)** of the state.

What are the Key Points Related to Gupteswar Forest?

- Area and Importance:
 - The forest covers **350 hectares of demarcated area** and holds immense cultural significance with its sacred groves, traditionally revered by the local community.
- Flora and Fauna Diversity:
 - It harbours a **remarkable diversity of flora and fauna**. The forest is home to at least 608 faunal species, including 28 species of mammals.
 - Significant Species:
 - Notable faunal species documented in the forest include the mugger crocodile, **kanger valley rock gecko, sacred Grove Bush Frog**, and various avifauna such as black baza, Jerdon's baza, Malabar trogon, common hill myna, white-bellied woodpecker, and banded bay cuckoo.
 - The limestone caves within the forest are **home to eight species of bats**, two of which are under the near-threatened category.

- ***Hipposideros galeritus* and *Rhinolophus rouxii*** are under the near-threatened category of the **IUCN**.

○ Floral Diversity:

- The forest also boasts a rich floral diversity. It includes threatened medicinal plants like the Indian **trumpet tree and Indian snakeroot**.

What is a Biodiversity Heritage Site?

➤ About:

- **Biodiversity Heritage sites (BHS)** are well-defined areas that are unique, ecologically fragile ecosystems with a high diversity of wild and domesticated species, the presence of rare and threatened species, and keystone species.

➤ Legal Provision:

- As per provision under **Section 37(1) of 'The Biological Diversity Act, 2002'** State Governments are empowered to notify in the official gazette, in consultation with **'local bodies'**, areas of biodiversity importance as Biodiversity Heritage Sites.

➤ Restrictions:

- Creation of BHS may not put any restriction on the prevailing practices and usages of the local communities, other than those voluntarily decided by them. The purpose is **to enhance the quality of life of the local communities** through conservation measures.

➤ First BHS of India:

- **Nallur Tamarind Grove in Bengaluru**, Karnataka was the first Biodiversity Heritage Site of India, declared in 2007.
- According to the **National Biodiversity Authority**, India has a **total of 45 Biodiversity Heritage Sites** as of **February 2024**.

➤ Last Five Additions to BHS:

- Haldir Char Island West Bengal (May 2023)
- Birampur-Baguran Jalpai West Bengal (May 2023)
- Tungkyong Dho Sikkim (June 2023)
- Gandhamardan Hill Odisha (March 2023)
- Gupteswar Forest Odisha (Feb 2024)

Note:

Biodiversity heritage sites in India



Sacred Grove at Sural Bhattori Monastery,
Himachal Pradesh

High Altitude Meadow,
Himachal Pradesh

Birch-pine Forest Patch, Himachal Pradesh

Naro Hills,
Madhya Pradesh

Amarkantak,
Madhya Pradesh

Patalkot,
Madhya Pradesh

Landorkhori,
Maharashtra

Ganeshkhind Garden,
Maharashtra

Schistura Hiranyakeshi,
Maharashtra

Bambarde Myristica Swamps,
Maharashtra

Purvatali Rai,
Goa

University of Agricultural Sciences, GKVK Campus,
Bengaluru

Nallur Tamarind Grove, Bengaluru

Hogrekan,
Chikmagalur

Ambaraguda,
Shimoga

Asramam,
Kerala

Ghariyal Rehabilitation Centre, Uttar Pradesh

Dhotrey BHS,
West Bengal

Tonglu BHS,
West Bengal

Baneswar Shiva Dighi, West Bengal

Khlaw Kur Syiem Kmielng, Meghalaya

Borjuli Wild Rice Site, Assam

Hajong Tortoise Lake, Assam

Majuli, Assam

Dialong Village, Manipur

Unakoti, Tripura

Chilkigarh Kanak Durga, West Bengal

Mandasaru, Odisha

Mahendragiri hill Biodiversity Heritage Site, Odisha

Glory of Allapalli, Maharashtra

Ameenpur lake, Telangana

Arittapatti Biodiversity Heritage Site, TamilNadu

Baramura waterfall, Tripura

Silachari Caves, Tripura

Debbari or Chabimura, Tripura

Betlingshib, Tripura

Source: nbaindia.org

Graphic: Abhishek Mitra

Note:



CMS COP14

Why in News?

The Fourteenth Meeting of the Conference of the Parties (CoP) to the **Convention on the Conservation of Migratory Species of Wild Animals** (CMS 14) has been concluded in Samarkand, Uzbekistan.

What are the Key Highlights of CMS COP 14?

- Adoption of Listing Proposals:
 - Parties agreed to **adopt listing proposals for 14 migratory species**, including the Eurasian lynx, Peruvian pelican, Pallas's cat, guanaco, Lahille's bottlenose dolphin, harbour porpoise, Magellanic plover, bearded vulture, Blackchin guitarfish, Bull ray, Lusitanian cownose ray, Gilded catfish, and Laulao catfish.
 - These listings aim to **enhance protection and conservation efforts for these species**.
- Cooperation and Conservation Efforts:
 - The proposals emphasised the importance of cooperation between **range states to address threats to migratory species**, conduct research, and implement conservation activities.
 - **Range states** refer to countries or territories that are within the geographical range where a particular species occurs naturally. These countries or territories are directly involved in the management, conservation, and protection of the species and its habitat.
 - Efforts were focused on maintaining existing populations, improving connectivity, safeguarding **habitats, and restoring populations**.
- Focus on Threats:
 - Various threats to **migratory species were highlighted**, including habitat degradation, fragmentation, illegal trade, bycatch, contaminants, and human activities such as fencing, oil and gas development, mining, and underwater noise.
 - The inclusion of these species in the CMS appendices aims to address **these threats and promote their conservation**.
- International Collaboration:
 - Range states collaborated to propose listing amendments and adoption of conservation measures.

- Countries like North Macedonia, Kazakhstan, Uzbekistan, Chile, Argentina, Peru, Brazil, Uruguay, Ecuador, Panama, and others supported listing proposals and urged for **joint efforts to protect migratory species and their habitats**.
- Recognition of Endangered Status:
 - Several species, such as the Lahille's bottlenose dolphin, Peruvian pelican, and Magellanic plover, were recognized as **'Vulnerable,' 'Endangered,' or 'Critically Endangered'** in **IUCN Red List**, due to population decline and various threats.
 - **Listing these species in CMS appendices** aims to improve their conservation status and provide support for habitat protection.
- Regional and Global Conservation Initiatives:
 - The adoption of proposals reflected efforts to address conservation issues at regional and global levels.
 - Measures were recommended to protect specific populations, such as the Baltic Proper population of the harbour porpoise and the Mediterranean Sea populations of various species, while also considering broader conservation strategies.

What is CMS?

- **About:**
 - It is an intergovernmental treaty under the **UNEP (United Nations Environment Programme)**-popularly known as **Bonn Convention**.
 - It was signed in 1979 and in force since 1983.
 - **As of 1st March 2022, the CMS has 133 Parties.**
 - India has also been a party to CMS since 1983.
- Aim:
 - It aims to conserve terrestrial, marine and avian migratory species throughout their range.
 - It lays the legal foundation to conduct conservation measures on a global scale.
 - The legal instruments under CMS may range from legally binding Agreements to less formal MoU.
- Two appendices under CMS:
 - **Appendix I** lists 'Threatened Migratory Species'.
 - **Appendix II** lists 'Migratory Species requiring international cooperation'.
- India and the CMS:
 - India has signed a non-legally binding Memorandum of Understanding (MoU) with CMS on conservation and management of Siberian Cranes (1998), Marine Turtles (2007), Dugongs (2008), and Raptors (2016).

Note:

- With 2.4% of the world's land area, India contributes to around 8% of the known global biodiversity.
 - India also provides temporary shelter to several migratory species including **Amur Falcons**, **Bar-headed Geese**, **Black-necked Cranes**, **Marine Turtles**, **Dugongs**, Humpback Whales, etc.

Tripling Renewables by 2030

Why in News?

Recently, a report has been published by **Think-Tank Climate Analytics** titled-**Tripling renewables by 2030: Interpreting the global goal at the regional level**, which breaks down what a **1.5°C-aligned Renewables rollout would look like** at the regional level and calculates the associated investment needs.

- At **COP (Conference of Parties) 28**, governments agreed to triple global renewable capacity by 2030. This, alongside **doubling energy efficiency**, is possibly the most powerful action the world can take in the transition away from fossil fuels this critical decade.

What are the Key Highlights of the Report?

- Tripling Renewables for 1.5°C Target:
 - To align with the 1.5°C target set in the **Paris Agreement**, global renewable capacity needs to grow to **11.5 TW by 2030**, which is 3.4 times higher than 2022 levels.
 - To achieve this, different regions scale at different rates relative to their current renewable capacity, driven by the pace of fossil **phase-out needed and future electricity demand growth**.

A regional breakdown of 1.5°C compatible renewables deployment

	Renewable capacity in 2030 (GW)	Capacity additions needed over 2023–2030 (GW)	Renewable capacity in 2030 (relative to 2022)	Renewable capacity growth from 2014–2022
Sub-Saharan Africa	300	260	x 6.6	x 1.9
Middle East and North Africa	500	460	x 11.8	x 1.8
Latin America	730	420	x 2.3	x 1.6
Eurasia	340	240	x 3.6	x 1.2
Asia	5350	3850	x 3.6	x 2.7
OECD	4290	2910	x 3.1	x 1.7
World	11510	8130	x 3.4	x 2.0

Note:



- Regional Contributions:
 - **Asian Region:** Asia makes the biggest **overall contribution**, providing around half (47%) of the 8.1 TW of renewable capacity additions needed globally by 2030.
 - Asia is the only region that is broadly on track to triple renewables in line with 1.5°C by 2030.
 - This is primarily driven by growth in China and India which compensates for laggards like South Korea, where renewable capacity is set to grow at half the rate of the region as a whole.
 - However, the spree of coal-fired power plant construction in China and India is a huge concern. If this continues, it will either **jeopardise a 1.5°C-aligned power sector transition** or create large-scale stranded assets.
 - **OECD:** The **OECD (Organisation for Economic Co-operation and Development)** provides the next biggest share of global capacity additions at around a third (36%).
 - Renewables in the region scale at a slower rate of 3.1x due to **lower electricity demand growth** and a higher level of existing renewable capacity installed in 2022.
 - **Sub-Saharan Africa:** Sub-Saharan Africa scales **relatively quickly at 6.6x due to low levels of existing renewable capacity** and high energy access needs.
 - Electricity demand is forecast to grow 66% per capita between 2020-2030 in the region, resulting in a renewables scale up rate that is double the global average.
 - Achieving such a rapid renewables rollout in Sub-Saharan Africa would require significantly upscaled international climate finance.
 - Investment Requirements:
 - Achieving the 1.5°C-aligned target requires USD 12 trillion of investment in the power system by 2030, with an average of USD 2 trillion per year from 2024 onwards.
 - Two-thirds of this investment would be allocated to renewable installations, while the remainder would be for grid and storage infrastructure.
 - Investment Gap and Potential Solutions:
 - There exists a considerable investment gap, with the world set to invest USD 5 trillion less than required over 2024-2030.
 - Shifting investments from fossil fuels to renewables and grids could cover this gap entirely, **aligning the power sector with the 1.5°C target.**
 - Challenges and Urgency:
 - Sub-Saharan Africa faces significant challenges due to a lack of investment and international support, risking millions missing out on the benefits of renewable energy.
 - Urgent action is needed to mobilise finance and support renewables deployment in less wealthy regions to ensure the COP28 pledge is fulfilled.
 - Policy Recommendations:
 - In addition to scaling up renewables, governments must end public support and subsidies for fossil fuels to effectively reduce emissions.
 - To guide efforts towards the goal, governments need a clear roadmap and information on investment and climate finance needs, while civil society needs benchmarks to hold governments to account.
- What are the Indian Initiatives towards Clean Energy Transition?**
- **India has signalled a commitment to clean energy** with ambitious targets like 500GW of non-fossil, including 450 GW **Renewable Energy (RE)** capacity addition and 43% RE purchase obligation by 2030.
 - These targets are supported through complementary policy and legislative mandates (**Energy Conservation (Amendment) Act**), missions (**National Green Hydrogen Mission**), fiscal incentives (**production-linked incentives**) and market mechanisms (upcoming **national carbon market**).
 - Net Zero Target:
 - India has set itself an ambitious long-term goal of reaching net zero **emissions by 2070.**
 - In August 2022, India updated its **Nationally Determined Contributions (NDC)** under the Paris Agreement to reflect its aim of achieving 50% cumulative electric power installed capacity from non-fossil fuel based energy sources by 2030.
 - **Energy Conservation Amendment Bill, 2022:**
 - In August 2022, the Lok Sabha passed the Energy Conservation Amendment Bill, 2022 which aims to **mandate the use of non-fossil fuel sources** including green hydrogen, green ammonia, biomass and ethanol for energy and feedstock in industries.
 - The Bill also gives the power to the Central Government to establish carbon markets.

Note:

INDIA'S CLIMATE TARGETS: EXISTING AND NEW

Target (for 2030)	Existing: First NDC (2015)	New: Updated NDC (2022)	Progress
Emission intensity reduction	33-35 per cent from 2005 levels	45 per cent from 2005 levels	24 per cent reduction achieved in 2016 itself. Estimated to have reached 30 per cent
Share of non-fossil fuels in installed electricity capacity	40 per cent	50 per cent	41.5 per cent achieved by the end of June this year
Carbon sink	Creation of 2.5 to 3 billion tonnes of additional sink through afforestation	Same as earlier	Not clear.

Project Tiger

Why in News?

Over time, the tiger conservation initiative has evolved, establishing Tiger Reserves (55) and implementing crucial wildlife protection laws.

- However, conflicts in Tiger Reserves between the forest bureaucracy and forest dwellers have intensified due to violations of the [Wildlife \(Protection\) Act, 1972](#), and the [Forest Rights Act, 2006](#).
- The **Ministry of Environment, Forest and Climate Change** announced the merger of the two flagship programmes [Project Tiger \(PT\)](#) and [Project Elephant](#) as **Project Tiger and Elephant (PTE)**.

What are the Shortcomings in Tiger Conservation?

- The [Wildlife Protection \(Amendment\) Act, 2006](#) didn't prohibit the diversion of a "tiger's forest" for development projects and allowed wildlife to be killed as a last resort if they threatened human lives.
- The government planned to notify the FRA Rules in 2009 and operationalise the Act.
 - But in November 2007, the [National Tiger Conservation Authority \(NTCA\)](#) passed an order

that gave the Chief Wildlife Wardens 13 days' time to submit a proposal to delineate Critical Tiger Habitats (CTHs), each with an area of 800-1,000 sq. km.

- As a result, the government ended up notifying 26 Tiger Reserves in 12 States Section 38 (V) of WLPA, and without complying with its provisions.
- Tiger Reserves in **Similipal, Odisha**, the **Critical Tiger Habitats (CTHs)** lacked a **Buffer Area**.
 - It was only in **2012** that they were included following a directive from the Supreme Court, which gave the **National Tiger Conservation Authority (NTCA)** a three-month ultimatum.
- The **Tiger Task Force** found the approach of using guns, guards, and fences wasn't protecting tigers, and that the increasing conflict between the **forest/wildlife bureaucracy** and those who coexist with the **tigers** was a recipe for disaster.

What are Initiatives Taken for Tiger Conservation?

Project Tiger:

- **About:**
 - **Project Tiger** is a **wildlife conservation initiative** in India that was launched in 1973.

Note:



- The primary objective of Project Tiger is to ensure the survival and maintenance of the tiger population in their natural habitats by creating dedicated **Tiger Reserves**.
- Starting with only **nine reserves** covering **9,115 sq. km**, the project marked a paradigm shift in wildlife conservation efforts.
- **Method of Tiger Census:**
 - The unreliable **pug-mark method** of the **first tiger census** in **1972** gave way to more accurate techniques like the **camera-trap method**.
- **Growth Rate in Tiger Population:**
 - The first tiger census, in **1972**, used the unreliable pug-mark method to count **1,827** tigers.
 - As of **2022**, the tiger population is estimated at **3,167-3,925**, showcasing a growth rate of **6.1%** per year.
 - India is now home to **three-quarters** of the **world's tigers**.
- Tiger Reserve:
 - In 1973, **Project Tiger** began with **nine reserves** covering **9,115 sq. km**. By **2018**, it had grown to **55 reserves** in different states, totalling **78,135.956 sq. km** or **2.38%** of India's land area.

Wildlife (Protection) Act, 1972:

- The **Wild Life (Protection) Act, 1972** provides a legal framework for the protection of various species of wild animals and plants, management of their habitats, regulation, and control of trade in wild animals, plants, and products made from them.
- The **Wildlife (Protection) Act (WLPA), 1972** laid the groundwork for tiger conservation. It established **National Parks** and **Wildlife Sanctuaries**, segregating rights in favour of State governments and introducing the concept of **Critical Tiger Habitats (CTH)**.
- The amendment to **WLPA** in **2006** led to the creation of the **National Tiger Conservation Authority (NTCA)** and a comprehensive tiger conservation plan.
- This marked a departure from the **earlier fortress conservation approach**, acknowledging the **inseparable link between tiger protection, forest conservation, and the well-being of local communities**.

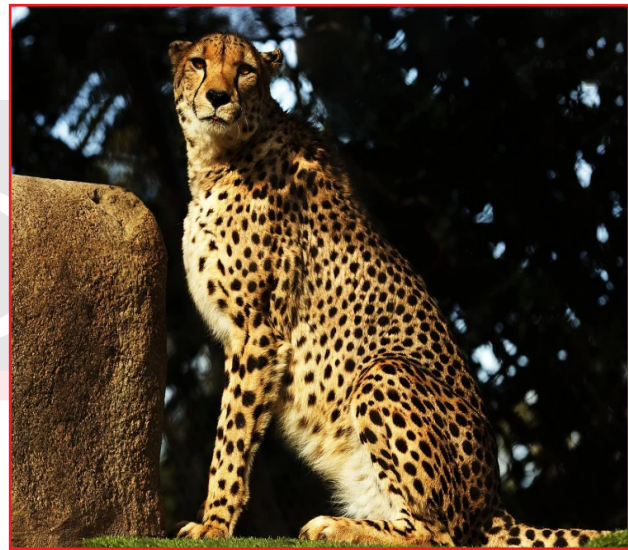
Tiger Task Force:

- In 2005, the formation of the **Tiger Task Force**, prompted by concerns about tiger conservation, emphasized the necessity for a reassessment. The task force pointed out flaws in the existing strategy that heavily depended on **weapons, guards, and fences**.

Northeast African Cheetah

Why in News?

Northeast African Cheetah is facing decline in genetic diversity due to illegal trade in cubs to Arab countries.



What are the Key Facts About Northeast African Cheetahs?

- **Scientific Name:** *Acinonyx jubatus soemmeringii*
- **About:**
 - It is a Cheetah subspecies and was first described under the scientific name *Cynailurus soemmeringii* by the **Austrian zoologist Leopold Fitzinger** in **1855** on the basis of a specimen from Sudan's Bayuda Desert brought to the Tiergarten Schönbrunn in Vienna.
 - It is also known as the **Sudan cheetah**. This subspecies is more closely related to the **Southern African cheetah** than to Saharan cheetah populations.

Note:

- **Distribution:**
 - They are found in Northeast Africa, Ethiopia and In South Sudan.
 - They **live in wide open lands**, grasslands, semi-arid areas, and other open habitats where **prey is abundant such as in the East Sudanian Savanna**.
- **Habitat:**
 - Their habitats typically encompassed **a range of environments such as savannas**, grasslands, and semi-arid areas, often with sparse vegetation that allowed for their hunting strategy of high-speed pursuits.
- **Threat:**
 - They are being heavily trafficked across the **Red Sea to Arab countries** like Saudi Arabia, the United Arab Emirates and Yemen.
 - Due to habitat loss, human encroachment, and hunting, their numbers have significantly dwindled, with only a few scattered populations remaining, primarily in protected areas.
- **Conservation Status:**
 - **IUCN Red List:** Endangered.

Wetland City Accreditation

Why in News?

The Ministry of Environment, Forest and Climate Change (MoEF&CC) has recently submitted three nominations from India for the **Wetland City Accreditation (WCA)**.

- The nominated cities include **Indore (Madhya Pradesh), Bhopal (Madhya Pradesh), and Udaipur (Rajasthan)**.
- The ongoing **Amrit Dharohar initiative** by MoEF&CC aligns with WCA goals, promoting the conservation values of **Ramsar Sites**.

Note:

- Amrit Dharohar, part of the 2023-24 budget announcement, promotes the unique **conservation values of the Ramsar Sites** in the country while generating employment opportunities and supporting local livelihoods.

What is Wetland City Accreditation (WCA)?

- **About:**
 - The WCA is a voluntary accreditation system established by the **Ramsar Convention** during the **Conference of the Contracting Parties (COP) 12, 2015** to recognize cities that have taken exceptional steps to safeguard their urban wetlands.
 - The scheme aims to promote the **conservation and wise use of urban and peri-urban wetlands**, as well as sustainable socio-economic benefits for local populations.
 - The WCA is valid for 6 years.
- **Significance:**
 - Encourages cities to develop positive relationships with valuable ecosystems like Wetlands of International Importance.
 - Aims to **gain international recognition for cities** valuing their natural or human-made wetlands.

What are the Key Highlights of the Cities Nominated for WCA?

- **Indore:**
 - Founded by Holkars, **Indore is the cleanest city in India** and was awarded India's Smart City 2023 for sanitation and urban environment.
 - **Sirpur Lake, a Ramsar Site** in the city, has been recognised as an **important site for water bird congregation** and is being developed as a Bird Sanctuary.
 - Over 200 wetland mitras actively engage in bird conservation and raising awareness to protect the **Sarus Crane**.
- **Bhopal:**
 - **One of the cleanest cities in India** that has proposed conservation zones around the wetlands in its draft City Development Plan 2031.
 - **Bhoj Wetland, Ramsar Site** is the city's lifeline, equipped with the world-class wetlands interpretation centre, Jal Tarang.
 - Additionally, the Bhopal Municipal Corporation has a dedicated **Lake Conservation Cell**.

Note:

- **Udaipur:**
 - The city is surrounded by **five major wetlands**, namely, Pichola, Fateh Sagar, Rang Sagar, Swaroop Sagar, and Doodh Talai.
 - These wetlands are an integral part of the city's culture and identity, help maintain the city's microclimate, and provide a buffer from extreme events.

Buxa Tiger Reserve

Why in News?

Buxa Tiger Reserve (BTR) in West Bengal witnessed the return of a **tiger** for the second time in two years after a 23-year absence, sparking hope for a flourishing ecosystem and a potential resurgence of tiger populations.

What are the Key Facts About Buxa Tiger Reserve?

- **About:**
 - **Buxa Tiger Reserve and National Park** covers 760 square kilometers and is located in North Bengal's Alipurduar district.
 - Buxa is a "**low density**" reserve and part of a larger tiger territory that stretches to Bhutan.
 - The rivers Sankosh, Raidak, Jayanti, Churnia, Turturi, Phashkhawa, Dima, and Nonani flow through Buxa National Park.
- **Corridor Connectivity:**
 - According to the **National Tiger Conservation Authority (NTCA)**, the Reserve has corridor connectivity across the border with the **forests of Bhutan in the North**; linkages with the **Kochugaon forests (Assam) and Manas Tiger Reserve (Assam) in the East**; and with the **Jaldapara National Park in the West**.
 - The reserve's connectivity serves as a vital link in promoting the migration and genetic diversity of Bengal tigers.
- **Flora:**
 - Prominent tree species include **Sal, Champ, Gamar, Simul, and Chikrasi**, contributing to the reserve's diverse and vibrant ecosystem.

- **Fauna:**
 - The primary wildlife species include the **Asian Elephant, Tiger, gaur (Indian bison), Wild boar, Sambar, and Wild dog (Dhole)**.
 - **Endangered species** in Buxa Tiger Reserve encompass the Leopard cat, Bengal florican, Regal python, Chinese **Pangolin**, Hispid hare, and Hog deer.
- **Conservation Initiatives:**
 - Introduced **chitals (spotted deer)** to enhance the tiger's prey base, fostering favorable conditions for their return, and showcasing successful conservation efforts.
 - Proactive measures have been taken to **expand the grassland**, creating an ideal habitat for tigers and other wildlife.
 - Initiatives focus on **reducing human interference**, curbing infiltration, and controlling trespassing to create a harmonious coexistence between humans and wildlife.
 - **Tiger Augmentation Project** was launched in 2018, this collaborative project involves the state forest department, the **Wildlife Institute of India**, and the NTCA, focusing on monitoring and enhancing the tiger population.

Other Protected Areas in West Bengal

- Gorumara National Park
- **Sundarbans National Park**
- Neora Valley National Park
- **Singalila National Park**
- Jaldapara National Park
- Sundarban Tiger Reserve
- Mayurjharna Elephant Reserve
- Eastern Dooars Elephant Reserve

Biodiversity Credits

Why in News?

Biodiversity Credits or biocredits are increasingly being pushed as a means for financing work on the various targets set under the **Kunming-Montreal Global Biodiversity Framework (KMGBF)**.

Note:



- The KMGBF, established at the **15th Conference of Parties (CoP15)** of the **Convention on Biological Diversity (CBD)**, sets forth ambitious targets for biodiversity conservation, sustainable utilization, and equitable benefit sharing.

What is Biodiversity Credit?

- **About:**
 - Biodiversity credits are a **financial instrument designed to generate funding for the conservation, restoration, and sustainable use of biodiversity-rich areas.**
 - They operate on a concept **similar to Carbon Credits but with a distinct focus on biodiversity preservation** rather than offsetting negative impacts.
 - The core purpose of biodiversity credits is to attract private investments toward initiatives aligned with the goals of conserving and restoring biodiversity, as outlined by international agreements such as the **KMGBF under the CBD.**
- Biodiversity Credit Alliance:
 - To promote Bio credits, the **Biodiversity Credit Alliance** was launched at CoP15 of CBD.
 - Through 2023, efforts were made to promote them at different fora. They were discussed at **CoP28 of the UNFCCC in Dubai** in December 2023.
 - Its aim is to mobilize support and generate awareness among various stakeholders, including governmental bodies, non-profits, and private enterprises.
- Implementation and Initiatives:
 - **Ocean Conservation Commitments (OCCs):** Launched in September 2023, OCCs are tied to Niue's Moana Mahu Marine Protected Area, covering 127,000 square kilometers.
 - OCCs are available for purchase by interested buyers, each representing a commitment to support conservation efforts for 20 years.
 - Priced at USD 148 per OCC, these commitments have attracted investments from non-governmental organizations like the Blue

Nature Alliance, Conservation International, and private donors.

- **Wallacea Trust:** This UK-based organization focused on biodiversity and climate research has made **substantial financial commitments**, amounting to 5 million biodiversity credits. Their engagement signals a significant interest from research-oriented entities in utilizing biodiversity credits to support conservation efforts.
- Challenges and Uncertainties:
 - Despite their potential, the success of biodiversity credits remains uncertain. Challenges encompass **regulatory frameworks, pricing structures** that ensure fairness for both buyers and sellers, and ensuring that these mechanisms genuinely serve biodiversity conservation rather than corporate interests.

What are the Initiatives Related to Biodiversity Conservation?

- **India:**
 - [India Business & Biodiversity Initiative \(IBBI\)](#)
 - [Wetland \(Conservation and Management\) Rules 2010](#)
 - [National Plan for Conservation of Aquatic Ecosystem](#)
 - [Wildlife Crime Control Bureau](#)
 - [Biological Diversity Act, 2002](#)
- **Global:**
 - [Nagoya Protocol](#)
 - [Convention on International Trade in Endangered Species of Wild Fauna and Flora](#)
 - [World Wide Fund for Nature](#)

Captive-bred Wolves into the Wild in Gujarat

Why in News?

Gujarat's ambitious project to **reintroduce wolves bred in captivity to the wild** shows early signs of success.

Note:



- This initiative is the **first of its kind outside the United States**, aiming to restock wolf populations and they can perform their role as **biocontrol agents** that keep the population of wild herbivores, like **nilgai (blue bulls) and wild boars** under control.

What are the Major Points Related to Wolves?

- **About:**
 - Wolves are the largest members of the dog family (**Canidae**), known for their **majestic physique, thick fur, sharp eyes, strong jaws, pointed ears**, and a long bushy tail add to their formidable presence.
- Ecology and Behavior:
 - **Social Animals:** They live in packs typically consisting of a breeding pair and their offspring, working together to hunt and raise pups.
 - **Apex Predators:** Primarily hunting large ungulates like **deer, elk and moose**, they play a crucial role in maintaining ecosystem balance.
 - **Communicative Masters:** Their famous howls are not just eerie calls, they serve to **strengthen pack bonds, defend territory, and communicate with other packs**.
- **Subspecies Found in India:**
 - India boasts two wolf subspecies: the **grey wolf** (*Canis lupus pallipes*) in the peninsular region and the **Himalayan or Tibetan wolf** (*Canis lupus chanco*) in the north.
- Distribution Range in India:
 - The range of grey wolf stretches across several states, including **Gujarat, Rajasthan, Uttar Pradesh, Madhya Pradesh, Maharashtra** among others.
 - The Himalayan wolf is primarily found in the **Ladakh region** and the **Lahaul and Spiti region of northeastern Himachal Pradesh** among others.
- Protection Status:
 - Grey Wolf:
 - **IUCN Red List:** Least Concern
 - **Wildlife Protection Act (India):** Schedule I
 - **CITES Appendix:** I
 - Himalayan Wolf
 - **IUCN Red List:** Vulnerable

Genetically Modified Mustard

Why in News?

Recently, the Government of India told the Supreme Court that **Genetically Modified (GM) crops** such as **mustard** will make quality edible oil cheaper for the common man and benefit national interest by reducing foreign dependency.

- The Genetic Engineering Appraisal Committee (GEAC) has approved the environmental release of Dhara Mustard Hybrid-11 (DMH-11), a genetically-engineered variant of mustard.
- If approved for commercial cultivation it would be the first genetically modified food crop available to Indian farmers.

India's Demand for Edible oil

- The total edible oil demand of India was **24.6 million tonnes (2020-21)** with domestic availability of **11.1 million tonnes (2020-21)**.
- In **2020-21**, 13.45 million tonnes (**54%**) of the total edible oil demand was met through import worth about **₹1,15,000 crore**, which included **palm oil (57%), soybean oil (22%), sunflower oil (15%)** and small quantity of canola quality mustard oil.
- In **2022-23**, **155.33 lakh tonnes (55.76%)** of the total edible oil demand was met through import.
- India is the **biggest importer** of palm oil, which makes up **40%** of its vegetable oil consumption.
 - India meets half of its annual need for **8.3 MT of palm oil** from **Indonesia**.
- In 2021, India unveiled the **National Mission on Edible Oil-Oil Palm** to boost India's domestic palm oil production.

What are Genetically Modified (GM) Crops?

- **GM crops** are derived from plants whose genes are artificially modified, usually by inserting genetic material from another organism, in order to give it new properties, such as increased yield, tolerance to a **herbicide, resistance** to disease or **drought**, or improved nutritional value.
 - Earlier, India approved the commercial cultivation of only one GM crop, **Bt cotton**, but **Genetic Engineering Appraisal Committee (GEAC)** has recommended GM Mustard for commercial use.

Note:

What is GM Mustard?

- **Dhara Mustard Hybrid-11 (DMH-11)** is an indigenously developed transgenic mustard. It is a genetically modified variant of **Herbicide Tolerant (HT) mustard**.
- **DMH-11** is a result of a cross between **Indian mustard** variety 'Varuna' and **East European 'Early Heera-2' mustard**.
- It contains two alien genes ('barnase' and 'barstar') isolated from a soil bacterium called **Bacillus amyloliquefaciens** that enable breeding of high-yielding commercial mustard hybrids.
- **DMH-11** has shown approximately **28%** more yield than the national check and **37 %** more than the zonal checks and its use has been claimed and approved by the **GEAC**.
 - "Bar gene" maintains the genetic purity of hybrid seed.

What is the Genetic Engineering Appraisal Committee (GEAC)?

- The **Genetic Engineering Appraisal Committee (GEAC)** functions in the **Ministry of Environment, Forest and Climate Change (MoEF&CC)**.
- It is responsible for **appraisal of activities involving large scale use of hazardous**

Genetically Modified Crops

About

- Genetic modification of plants involves **adding a specific stretch of DNA into the plant's genome**, giving it new or different characteristics
- Also called **Transgenic crops**

Global Cultivation

- Top 5 GM growing countries - **USA, Brazil, Argentina, India and Canada**
- Major GM Crops - **Soybean, maize, cotton and canola**

Concerns

- Manipulation of GM Seed Cost
- Seeds don't create viable offsprings
- Insect-resistant plants harm non-targeted species too
- Intermixing violates natural plants' intrinsic values

Objective

- Increase yield
- Increase tolerance to herbicides
- Improve nutritional value
- Provide resistance to disease/drought

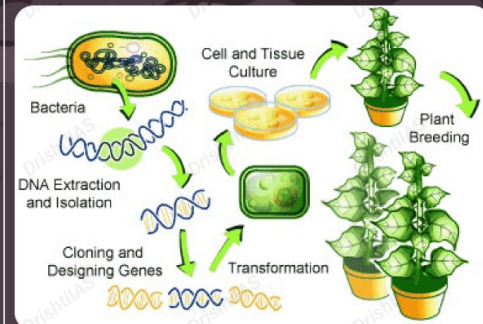
GM Crops in India

- **Bt cotton** - **only one GM crop approved**, (90% of India's total cotton acreage) (resistance against pink bollworm)
- **Ht Bt cotton** - resistance against **glyphosate** (herbicide)
- **DMH-11 mustard** - **recommended for commercial use** (high yield)
- **Golden rice** - probably the best variety of GM rice (**Vitamin A**)



GM Crop Regulation

- **Statutory Provision:**
 - Rules for Manufacture, Use, Import, Export and Storage of Hazardous Microorganisms (HM) Genetically Engineered Organisms or Cells, 1989 under the Environment Protection Act (1986).
- **Statutory Bodies:**
 - Genetic Engineering Appraisal Committee (GEAC) (under MoEF&CC) - administers commercial release of GMC
 - Recombinant DNA Advisory Committee (RDAC)
 - Institutional Biosafety Committee (IBSC)
 - Review Committee on Genetic Manipulation (RCGM)
 - State Biotechnology Coordination Committee (SBCC)



Cartagena Protocol on Biosafety (2000)

- It seeks to protect biological diversity from the potential risks posed by **Living Modified Organisms** resulting from **modern biotechnology**.
- **India is a signatory** to this protocol.

microorganisms and recombinants in research and industrial production from the environmental angle.

- The committee is also **responsible for appraisal of proposals relating to release of genetically engineered (GE) organisms** and products into the environment including experimental field trials.
- **GEAC is chaired by the Special Secretary/Additional Secretary of MoEF&CC** and co-chaired by a representative from the Department of Biotechnology (DBT).
 - Presently, it has 24 members and meets every month to review the applications in the areas indicated above.

Amrit Dharohar Capacity Building Scheme

Why in News?

The Central government is spearheading a significant transformation in the realm of **wetland tourism** with the 'Amrit Dharohar Capacity Building Scheme'.

- This initiative, launched in June 2023, aims to revolutionize tourism practices at **ecologically-sensitive wetlands**, particularly **Ramsar sites** like **Odisha's Chilika Lake** and **Haryana's Sultanpur Bird Sanctuary**.

What is Amrit Dharohar Capacity Building Scheme?

- **About:**
 - The 'Amrit Dharohar Capacity Building Scheme' is a collaborative effort between the **Ministry of Tourism** and the **Ministry of Environment, Forest, and Climate Change**.
 - The scheme will be implemented over the next three years (2023 onwards) to encourage optimal use of wetlands, and **enhance biodiversity, carbon stock, eco-tourism opportunities** and **income generation** for local communities.
 - The primary focus of the Scheme is to strategically transition from **high-volume tourism to high-value nature tourism** at ecologically-sensitive wetlands.

- **Aim:**
 - The aim is to **enhance livelihood opportunities for local communities** through harnessing the **nature-tourism potential** of the **Ramsar Sites across the country**.
- **Implementation:**
 - The scheme is being implemented in **convergence with various Central Government ministries and agencies**, State wetland authorities, and a network of formal and informal institutions and individuals, working together for a common cause.
- **Pilot Projects and Skill Development:**
 - Out of 16 identified Ramsar sites, five have been selected for pilot projects under the scheme.
 - These pilot sites include **Sultanpur National Park (Haryana)**, **Bhitarkanika Mangroves (Odisha)**, **Chilika Lake (Odisha)**, **Sirpur (Madhya Pradesh)**, and **Yashwant Sagar (Madhya Pradesh)**.
 - Training programs for participants are carried under the **Alternative Livelihood Programme (ALP)** (a **30 hours/15 days training programme**) and **Paryatan Navik Certificate (boatman certification for tourism)**.

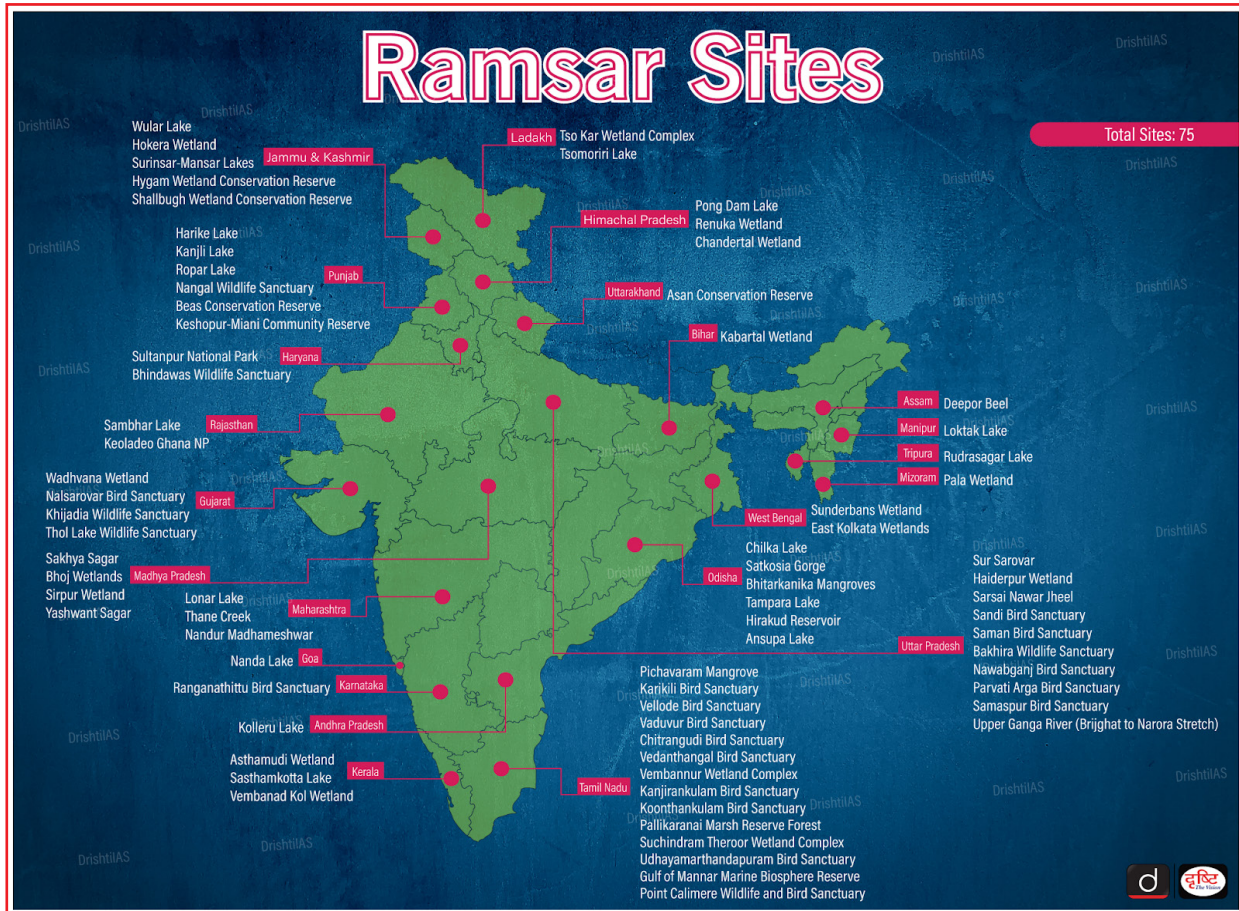
Note: High-value travellers as those who are **likely to spend more, stay longer**, and disperse beyond tourist hotspots.

- Nature tourism is based on the **natural attractions of an area** like birdwatching, photography, stargazing, camping, hiking, hunting, fishing, and visiting parks.
 - Nature tourists are experiential tourists who are interested in a diversity of natural and cultural resources.

What is a Ramsar Site?

- A Ramsar site is a wetland designated to be of **international importance under an environmental treaty** signed in February 1971 at Ramsar, Iran under the auspices of **UNESCO**.
- Ramsar provides for national action and international cooperation regarding the conservation of wetlands, and wise sustainable use of their resources.
- **India has 75 Ramsar sites.**

Note:



Golden Tiger in Kaziranga National Park

Why in News?

Recently, a wildlife photographer captured a rare golden tiger in **Kaziranga National Park (KNP)**.



What are the Key Facts About the Golden Tiger?

- Golden tigers (also known as golden tabby tigers) are a **colour form**, not a separate subspecies, like white and **black tigers**.
 - They are exceptionally rare in the wild and even rarer in captivity.
- Golden tiger spotted in KNP are a **colour variation of Bengal tigers** caused by a presence of recessive gene called **“wideband”**.
 - The wideband gene reduces melanin production during the cycle of hair growth. Thus, the **agouti mutation (production of a protein that is usually expressed in the skin) is responsible for the blond or golden skin**, while the orange stripes appear due to the **‘tabby’ mutation**.
 - The Tabby gene responsible for most tabby patterns (coat pattern) in domestic cats.
- Black and golden tigers basically exist as they **both possess a recessive gene** which is expressed due to

Note:

the **absence of a dominant gene to suppress it**. When two individuals with dominant traits breed, recessive genes are masked, but **when two individuals with recessive genes breed, the recessive gene is expressed** and such is the case for these two tiger (Black and golden) mutants.

Kaziranga National Park

- Formed in 1908 KNP is located in the edge of the **north eastern part of the country in the district of Golaghat and Nagoan in the state of Assam**. It was declared as a National Park in 1974.
 - In the year 1985, the park was declared as a **World Heritage Site by UNESCO** and was declared as **Tiger Reserve in 2006**.

- It is the single **largest undisturbed and representative** area in the **Brahmaputra** Valley floodplain.
- KNP has mainly four types of vegetation' like **alluvial inundated grasslands**, alluvial **savanna woodlands**, **tropical moist mixed deciduous forests**, and **tropical semi-evergreen forests**.
- It is the home to more than 2200 **Indian one-horned rhinoceros**, approximately **2/3rd** of their total world population.
- KNP harbours significant populations of other threatened species **including tigers, elephants, wild water buffalo and bears** as well as aquatic species including the **Ganges River dolphin**. It is an important area for migratory birds.



Forest Fires in the Himalayas

Why in News?

There have been several instances of **Forest Fires** in the **Himalayan Region** especially in **Himachal and Uttarakhand** this winter because of a lack of precipitation.

- As per the **Forest Survey of India (FSI)**, there have been **2,050 incidents of forest fires** between 16th

October 2023 and 16th January 2024, but there were just **296 incidents of forest fires** during the same period last year.

What is Forest Fire?

- **About:**
 - Also called **bush or vegetation fire or wildfire**, it can be described as any **uncontrolled and non-prescribed combustion** or burning of plants in a

Note:

natural setting such as a forest, grassland, brush land or tundra, which consumes the natural fuels and spreads based on environmental conditions (e.g., wind, topography).

- There are three conditions that need to be present in order for a **wildfire to burn: Fuel, Oxygen, and a Heat source.**
- Classification:
 - **Surface Fire:** A forest fire may burn **primarily as a surface fire, spreading along the ground** as the surface litter (senescent leaves and twigs and dry grasses etc) on the forest floor and is engulfed by the spreading flames.
 - **Underground Fire:** The fires of low intensity, **consuming the organic matter** beneath and the surface litter of forest floor are sub-grouped as underground fire. In most of the **dense forests a thick mantle of organic matter is found** on top of the mineral soil.
 - These fires **usually spread entirely underground** and burn for some meters below the surface.
 - This fire spreads very slowly and in most of the cases it becomes very hard to detect and control such types of fires.
 - They may continue to burn for months and destroy vegetative cover of the soil.
 - **Ground Fire:** These fires are fires in the subsurface organic fuels, such as duff layers under **forest stands, Arctic tundra or taiga**, and organic soils of swamps or bogs.
 - There is **no clear distinction between underground and ground fires.**
 - The smoldering underground fires sometimes change into Ground fire.
 - This fire burns root and other material on or beneath the surface i.e., burns the herbaceous growth on forest floor together with the layer of organic matter in various stages of decay.
 - They are **more damaging than surface fires**, as they can destroy vegetation completely. Ground fires burn underneath the surface by smoldering combustion and are more often ignited by surface fires.

What Factors Contributed to Forest Fires in Himalayan Region?

- Lack of Snowfall and Precipitation:
 - The absence of snowfall and rainfall in the winter months **has left the region dry.** Snowfall and **Precipitation** are crucial for **maintaining soil moisture** and preventing the forest floor from becoming excessively dry.
- Dry Conditions:
 - The lack of moisture in the soil and vegetation **creates favorable conditions for forest fires.** Dry leaves, combined with dry soil, act as potential fuel for fires.
 - Rising temperatures, possibly linked to climate change, contribute to the drying of forests. Higher temperatures **increase evaporation rates, further depleting soil moisture.**
- Human Activities:
 - Human activities, **such as carelessly discarding cigarettes** or engaging in uncontrolled burning, can trigger forest fires.
 - Controlled burning by the forest department may also contribute to the issue if not properly managed.
- Vulnerable Tree Species:
 - Presence of fire-prone and flammable tree species like **Chir pine increases the risk of forest fires.**
 - About 15% of Himachal's forest area is covered with chir pine.
- Long Dry Spell:
 - Extended periods without rainfall or snowfall over several months create a long dry spell, making the region more susceptible to fires.

What are the Government Initiatives to Cope With Forest Fires?

- **National Action Plan for Forest Fires (NAPFF)**, was started in 2018 with the goal of reducing forest fires by informing, enabling, and empowering forest fringe communities and incentivizing them to collaborate with state forest departments.
- **The Forest Fire Prevention and Management Scheme (FPM)** is the only government-sponsored programme dedicated to assisting states in dealing with forest fires.

Note:

Marginal Rise in Saltwater Crocodile Population in Bhitarkanika

Why in News?

Bhitarkanika National Park in Odisha, renowned for its diverse ecosystem, has observed a slight increase in the population of **saltwater crocodiles** (*Crocodylus porosus*) during the annual census in 2024.

What are the Key Points Related to Salt-water Crocodiles?

- **About:** The saltwater crocodile is the **largest of all crocodilians**, and the **largest reptile in the world**.
 - Female saltwater crocodiles are smaller in size than their male counterparts, normally reaching a maximum length of 2.5 to 3 m.
 - They **tolerate salinity** and are found mostly in coastal waters or near rivers. They are also found in freshwater near rivers and swamps.

- **Communication:** Saltwater crocodiles communicate using several sounds, including **barking, hissing, growling and chirps**.
- **Distribution:** Tropical to warm temperate latitudes in the **eastern Indian and western Pacific oceans**.
- **Habitat:** **Mangrove forests** and other coastal habitats
- **Prey:** Saltwater crocodiles have a variety of prey. Juveniles are restricted to **small insects, amphibians, reptiles, crustaceans, and small fish**.
 - Adults feed on **crabs, turtles, snakes, birds, buffalo, wild boar, and monkeys**.
 - Saltwater crocodiles hide in the water exposing only their eyes and nose. They **lunge at prey, often killing it with a single snap of the jaws**, then drag the prey under water where it is more easily consumed.
- **Conservation Status:**
 - **IUCN Red list** : Least Concern
 - **WPA, 1972**: Schedule I
 - **CITES** : Appendix I/II



Note:



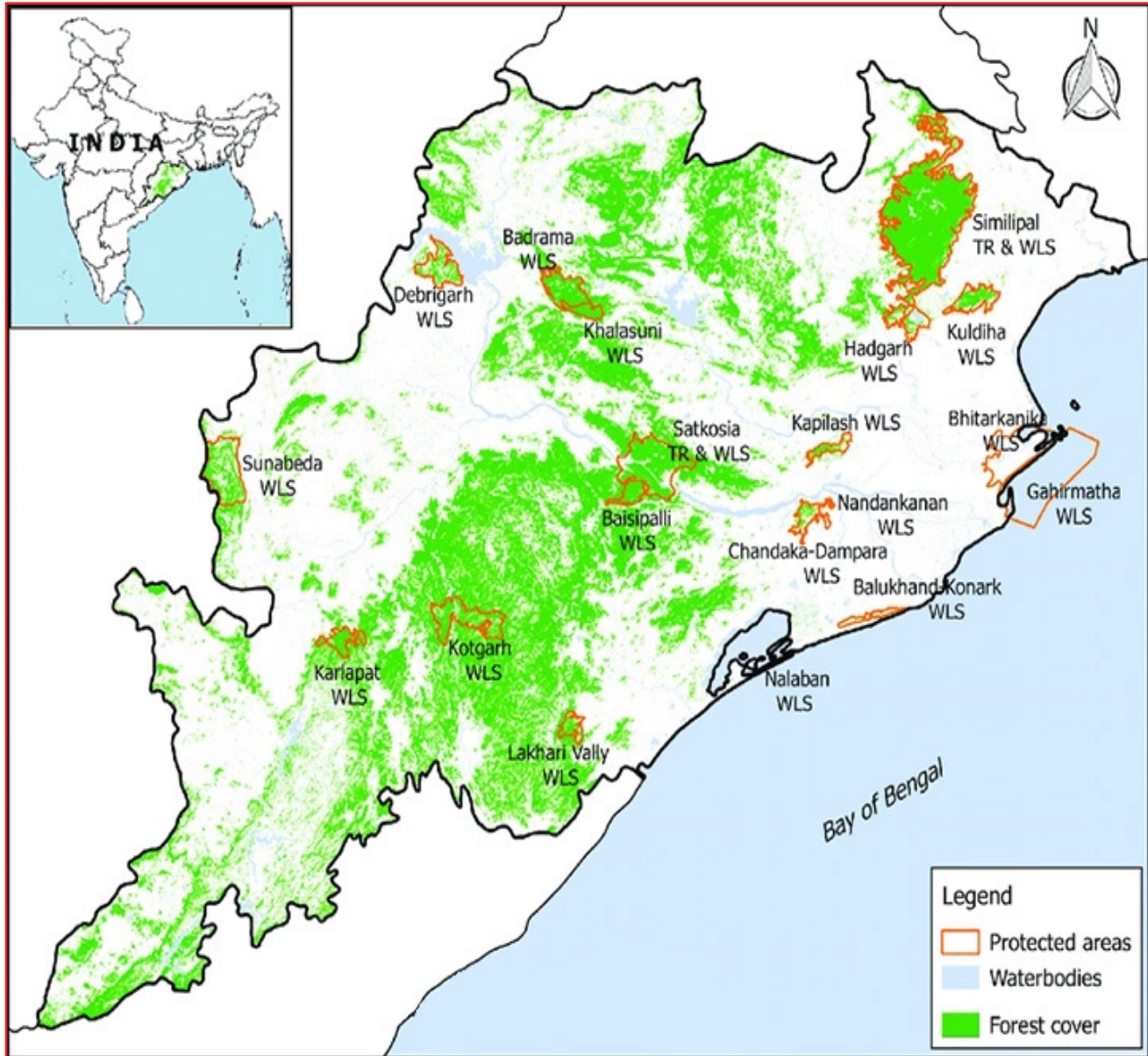
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Note: Bhitarkanika is the second-largest mangrove forest in India after the Sundarbans in West Bengal. Both areas are among the three strongholds of saltwater crocodiles, the third being the **Andaman and Nicobar Islands**.

What are the Key Facts about Bhitarkanika National Park (NP)?

- The Bhitarkanika NP is essentially a network of creeks and canals which are inundated with waters from rivers **Brahmani, Baitarani, Dhamra and Patasala** forming a unique ecosystem.

- The Gahirmatha Beach which forms the **boundary of the sanctuary in the east** is the largest colony of the **Olive Ridley Sea Turtles**.
- A unique phenomenon observed in this NP is the **Bagagahana or the heronry near Surajpore creek**.
 - Thousands of birds colonise the creek for nesting and the aerial acrobatics performed prior to the mating makes for an impressive sight.
- Bhitarkanika is also home to **eight varieties of Kingfisher birds** which is also a rarity.



Note:



IUCN Assessment of the Himalayan Wolf

Why in News?

The Himalayan Wolf (*Canis lupus chanco*), a prominent lupine predator found across the Himalayas has been assessed for the first time in the **International Union for Conservation of Nature (IUCN)**'s Red List.

What Are the Key Facts About Himalayan Wolf?

➤ About:

- The Himalayan Wolf is a mysterious lupine predator that **inhabits the high elevations of the Himalayas**.
- Characterized by distinctive genetic markers, its mitochondrial DNA suggests a genetic foundation predating the Holarctic grey wolf.

➤ Habitat:

- It is found in parts of **China, Nepal, India, and Bhutan** and typically lives in alpine meadows and grasslands at elevations of 10,000 to 18,000 feet.
- They usually travel in small packs and hunt wild sheep and goats, sometimes even preying on marmots, hares, and birds.

➤ Population Status:

- Population estimate of **2,275-3,792 mature individuals**, all within a subpopulation across the Himalayan range of Nepal, India, and the Tibetan Plateau.
- Indian section has 227-378 mature individuals, **primarily in Ladakh and Spiti Valley**.

➤ Conservation Status:

- **IUCN Status:** Vulnerable
- **Wildlife Protection Act, 1972:** Schedule I

HIMALAYAN WOLF

CANIS LUPUS HIMALAYENSIS



Specially adapted to high-altitude life in the Trans-Himalayan regions of Uttarakhand, Himachal Pradesh, Sikkim, Jammu and Kashmir, Ladakh, and Nepal.



SCIENTIFIC DEBATE
An ongoing debate seeks to establish whether the Himalayan wolf is a genetically unique and distinct wolf species, different from the grey wolf, as some research scientists argue. A separate species status will help improve its conservation status.

HOWL SHORTER AND LOWER PITCHED HOWL THAN GRAY WOLVES	PREYS ON MEDIUM-SIZED MOUNTAIN GOATS AND SHEEP, MARMOTS, HARE, AND DOMESTIC LIVESTOCK	COAT THICKER COAT AND SHORTER LEGS THAN THE INDIAN WOLF
350 APPROXIMATE NUMBERS IN THE WILD		
3,900-5,600 M ALTITUDE AT WHICH THEY LIVE IN MOUNTAINS AND COLD DESERTS, WELL ABOVE THE TREE LINE		
35 KG AVERAGE WEIGHT		

THREATS

- Persecution by livestock herders.
- Hybridization with dogs

WHO HELPS PROTECT THEM?
The Himalayan Wolves Project | Wild CRU
State Forest Departments in India

TEXT: NISARG PRAKASH; PHOTO: DRISHTI MANI MUKHERJEE (HIMALAYAN WOLF, HEMACHAL PRADESH); TERRESTRIAL GREY WOLF; DESIGN: DIVYA NISHA

Note:

What is the IUCN Red List?

- The IUCN Red List is the foremost global resource for assessing the risk of extinction among animals, fungi, and plant species.
- Accessible to all, it serves as a crucial indicator of global biodiversity health, it offers comprehensive insights into species' characteristics, threats, and conservation measures, playing a pivotal role in shaping informed conservation decisions and policies.
- The IUCN Red List Categories define the extinction risk of species assessed. **Nine categories** extend from NE (Not Evaluated) to EX (Extinct). Critically Endangered (CR), Endangered (EN) and Vulnerable (VU) species are considered to be threatened with extinction.
 - It is also a key indicator for the **Sustainable Development Goals** and **Aichi Targets**.
- The IUCN Red List includes the **IUCN Green Status of Species**, which assesses the recovery of species' populations and measures their conservation success.
 - There are **eight Green Status Categories**: Extinct in the Wild, Critically Depleted, Largely Depleted, Moderately Depleted, Slightly Depleted, Fully Recovered, Non-Depleted and Indeterminate.
 - A Green Status assessment examines how conservation actions have affected the current Red List status.

Green Hydrogen: Enabling Measures Roadmap for Adoption in India

Why in News?

Recently, the World Economic Forum along with Bain & Company has released a report titled- **Green Hydrogen: Enabling Measures Roadmap for Adoption in India**, highlighting that **Green Hydrogen** production cost needs to be reduced **to less than or equal to USD 2 per kg**.

What are the Key Highlights of the Report?

- India's Demand for Energy is Set to Surge:
 - India is currently the **third-largest economy in the world in terms of energy needs**, and the country's demand for energy is set to surge – demand is estimated to **grow 35% by 2030**.
 - In 2022, India's energy import bill reached USD 185 billion, which is likely to increase if the country continues to meet its growing energy demand through traditional methods.

- At the same time, India has set a commitment to achieve **Net Zero by 2070** at the **United Nations Climate Change Conference in Glasgow (COP26)**, held in 2021.

- Criticality of Green Hydrogen:
 - **Green Hydrogen** is critical to help meet India's energy security needs while reducing emissions in hard-to-abate sectors on the path to net zero.
 - Recognizing this, the Indian government launched the **National Green Hydrogen Mission** in 2022.
 - The aim is to spur green hydrogen production and consumption through roughly USD 2.3 billion in incentive funding, to be distributed between 2022 and 2030.
- Current status of Hydrogen Production in India:
 - Currently, India produces **6.5 million Metric Tonnes Per Annum (MMTPA)** of hydrogen, predominantly for **use in crude-oil refineries** and fertilizer production.
 - Most of India's current hydrogen supply is **Gray Hydrogen**, which is produced using **Fossil Fuels** in a process that creates **CO₂ Gas Emissions**.
 - Green Hydrogen production requires an ample supply of **Renewable Energy** for the electrolysis process.
 - India's renewable energy potential can support its goals for green hydrogen growth but needs rapid capacity addition – additional capacity is required to generate green hydrogen as well as to meet the country's electricity needs.
 - There is **limited on-the-ground traction** for green hydrogen in the country; most are in a "wait-and-watch" phase. Many expect sizable production of green hydrogen to take effect beginning in 2027 and after.
- Constraints in Green Hydrogen:
 - Important constraints for the expansion of green hydrogen in India include, on the supply side, the cost of production and delivery, and, on the demand side, Indian players' readiness to consume green hydrogen in traditional industrial processes.

India's Coal Plants: SO₂ Emission Control

Why in News?

Recently, an analysis by the **Centre for Research on Energy and Clean Air (CREA)** has found less than 8% of

Note:



India's coal-based power plants have installed the SO₂ emission reduction technology recommended by the Union Ministry of Environment, Forest and Climate Change (MoEF&CC) to keep Sulfur Dioxide (SO₂) emissions in check.

- According to a 2019 Greenpeace study, India is the largest emitter of SO₂ in the world.

What are the Technologies to Reduce SO₂ Emissions?

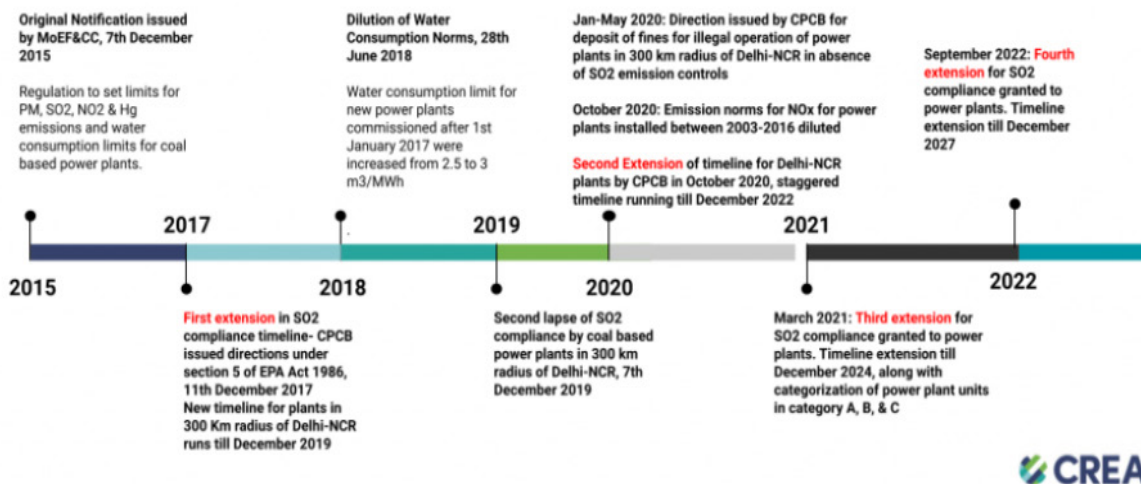
- Flue Gas Desulfurization (FGD):
 - **FGD** is the process of removing sulphur compounds from the exhaust emissions of fossil-fueled power stations.
 - This is done through the addition of absorbents, which can remove up to **95%** of the **sulphur dioxide** from the **flue gas**.
 - Flue gas is the material emitted when fossil fuels such as **coal, oil, natural gas, or wood** are burned for heat or power.
- **Circulating Fluidized Bed Combustion (CFBC):**
 - CFBC Boiler is an **environment-friendly** power facility to reduce the discharge of pollutants such as **nitrogen oxide** and **sulphur oxide** by injecting **air** and **lime** at the same time for burning.
 - A **bed of solid particles** is said to be **fluidized** when the **pressurised fluid** (liquid or gas) is passed through the medium and causes the **solid particles**

to behave like a **fluid** under certain conditions. **Fluidization** causes the transformation of the state of solid particles from **static** to **dynamic**.

What are the Key Findings of the Study?

- Only a combined capacity of **16.5 Gigawatts (GW)** of coal plants have installed **FGDs** and **Circulating Fluidised Bed Combustion (CFBC)** boilers equivalent to **5.9 GW** across India.
- The **CREA analysis** found that **92 %** of the country's coal power plants function without FGDs.
- Blanket extension of the deadline for all **coal power plants** without checking on their progress by **MoEF&CC** and **Central Pollution Control Board (CPCB)** played a major role in derailment of emission controls from coal-based electricity generation units.
 - The **MoEF&CC** introduced emission standards in **2015** for regulating **PM, SO₂, NOx, and Hg (Mercury)** emissions.
 - The deadline has been extended four times for units in Delhi and the National Capital Region (NCR) and three times for most other units across the country.
- India's energy generation installed capacity stands at **425 GW**. The thermal sector holds a predominant position within the overall installed capacity, encompassing **coal (48.6%), gas (5.9%), lignite (1.6%)** and a minimal share (**<0.2%**) from diesel.

Timeline of Emission Standard notification, its dilutions, and extensions for coal-based power stations over the past seven years



Note:

Centre for Research on Energy and Clean Air (CREA)

- CREA is an independent research organisation focused on revealing the **trends, causes, and health impacts**, as well as the solutions to air pollution.
- It uses **scientific data, research and evidence** to support the efforts of governments, companies and campaigning organisations worldwide in their efforts to move towards **clean energy and clean air**.

Saiga Antelope

Why in News?

The **International Union for Conservation of Nature (IUCN) Red List** has recently reclassified the status of the **Saiga Antelope (*Saiga tatarica*)** from **Critically Endangered** to **Near Threatened**.

- This significant update reflects positive conservation efforts and offers a hopeful outlook for the survival of the Saiga antelope species.

What are the Key Facts about Saiga Antelope?

- **About:**
 - The saiga antelope is a **large, nomadic, migratory herbivore** that lives across the Eurasian Steppe.
 - It's found in Kazakhstan, Mongolia, the Russian Federation, Turkmenistan, and Uzbekistan.
 - It belongs to the family of Bovidae (order Artiodactyla).
 - The Saiga has two subspecies: ***Saiga tatarica tatarica*** (found in most of the range) and ***Saiga tatarica mongolica*** (found only in Mongolia).
 - Typical habitat consists of **flat open areas** covered with low-growing vegetation, allowing animals to run quickly.
 - They have an **unusual hanging nose**, which makes them look like a camel, although they are goat-sized, and male saigas have horns.



- **Decline in Saiga Population:**
 - The Saiga, which has roamed the earth since the last **Ice Age**, faced a drastic decline in its population by more than 95% within a decade after the collapse of the **Soviet Union in 1991**.
 - The decline was primarily **due to poaching for the species' meat and horn**. The horn is used in **Chinese Traditional Medicine**.
 - In 2015, a major epidemic killed more than 200,000 animals, which was a blow to the species' promising recovery.

Note:



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- Conservation:
 - Conservation efforts have led to a **positive change in the global Red List status of the Saiga antelope**.
 - **Kazakhstan** has shown commendable leadership in species recovery, implementing **anti-poaching initiatives**, law enforcement measures, and establishing State Protected Areas.
 - The Convention on the **Conservation of Migratory Species of Wild Animals (CMS)** has facilitated cooperation among governments and civil society organizations for the conservation of the Saiga antelope.
 - The Saiga antelope population has soared to **over 1.9 million**, with the Mongolian subspecies witnessing a notable increase, reaching 15,540 individuals in the 2023 census.
- Ongoing Challenges:
 - **Poaching**, illegal trade, disease, **climate change**, disturbance, and infrastructure development continue to pose challenges.

28th Conference of Parties to the UNFCCC

Why in News?

Recently, the **28th Conference of Parties (COP28)** to the **United Nations Framework Convention on Climate Change (UNFCCC)** was held in **Dubai, United Arab Emirates**.

What are the Key Highlights of the COP28?

- Loss and Damage (L&D) Fund:
 - COP28, member countries reached an agreement to operationalize the **Loss and Damage (L&D)** fund aimed at compensating countries grappling with climate change impacts.
 - The **World Bank** will be the “interim host” of the fund for four years, aligning with UNFCCC and the **Paris Agreement**.
 - All developing countries are eligible to apply, and every country is “invited” to contribute voluntarily.
 - A specific percentage is earmarked for **Least Developed Countries and Small Island Developing States**.
- Global Stocktake Text:
 - The **Global Stocktake (GST)** is a periodic review mechanism established under the **Paris Agreement in 2015**.

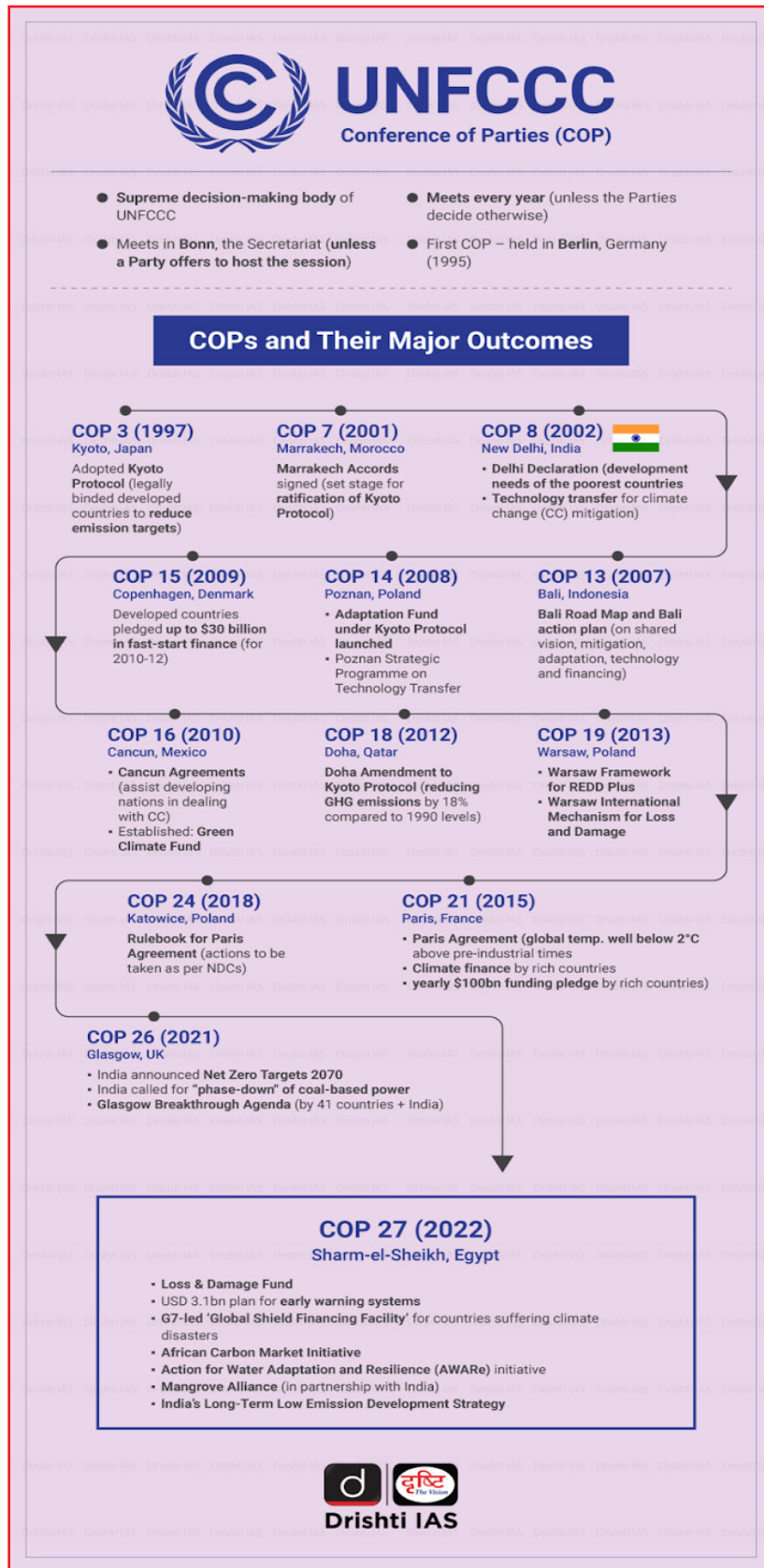
- The fifth iteration of the **Global Stocktake (GST) text** was released at COP28 and adopted with no objection.
 - The text proposes eight steps to keep the global temperature rise within the ambit of 1.5 degrees Celsius:
 - **Tripling renewable energy capacity** globally and doubling the global average annual rate of energy efficiency improvements by 2030;
 - Accelerating efforts towards the **phase-down of unabated coal power**;
 - Accelerating efforts globally towards **net zero emissions energy** systems, utilizing zero and low carbon fuels well before or by around mid-century;
 - Accelerating **zero and low emissions technologies**, including, inter alia, renewables, nuclear, abatement and removal technologies, including such as **carbon capture** and utilization and storage, and low carbon **hydrogen production**, to enhance efforts towards substitution of unabated fossil fuels in energy systems;
 - Transitioning away from **fossil fuels** in energy systems, in a just, **orderly and equitable manner**, accelerating action in this critical decade, so as to achieve **net zero by 2050 in keeping with the science**;
 - Accelerating and substantially **reducing non-CO₂ emissions**, including, in particular, methane emissions globally by 2030;
 - Accelerating **emissions reductions from road transport** through a range of pathways, including development of infrastructure and rapid deployment of zero and low emission vehicles;
 - **Phasing out of inefficient fossil fuel** subsidies that encourage wasteful consumption and do not address energy poverty or just transitions, as soon as possible.
- The fifth iteration text maintains continuity with **COP26 in Glasgow**, balancing global aspirations of countries like India with diverse energy needs.
 - India argues that it needs to **continue using coal to meet its developmental needs** and emphasizes the importance of adhering to **nationally determined contributions (NDCs)**.
- Nearly 200 countries agreed to “**transition away from fossil fuels in energy systems**” at the COP28.

Note:

- The agreement is the first time countries have made this pledge. The deal aims to signal to **policy makers and investors** that the world is **committed to breaking away from fossil fuels**.
- Developing and poor countries are **expressing dissatisfaction with the latest draft of the Global Stocktake (GST) at COP28**, calling for significant changes.
- Several countries, including India, are extremely opposed to any mandate to cut **methane emissions**, mainly because one of the major sources happens to be **agriculture and livestock**.
 - Cutting methane emissions could involve tweaking agricultural patterns which could be **extremely sensitive in a country like India**.
 - Possibly in deference to the concerns of such countries, the **agreement does not mention any targets for methane emission** cuts for the year 2030, although a group of about 100 countries had made a voluntary commitment, in **Glasgow in 2021**, to reduce their methane emissions by **30% by 2030**.
 - This pledge is known as the **Global Methane Pledge**. However, **India is not a part of the Global Methane Pledge**.
- Developing countries call on rich nations to achieve negative carbon emissions, not just reaching net zero by 2050. They emphasize principles of **common but differentiated responsibilities and respective capabilities (CBDR-RC)** in combating climate change.
- Developing countries argue that rich nations, having consumed over **80% of the global carbon budget**, should allow developing nations their fair share of future emissions.
- Global Renewables and Energy Efficiency Pledge:
 - The Pledge stipulates that signatories commit to work together to **triple the world's installed renewable energy generation** capacity to at least **11,000 GW by 2030** and to collectively double the **global average annual rate of energy efficiency** improvements from around 2% to over 4% every year until 2030.
- The Global Cooling Pledge for COP 28:
 - It includes 66 national government signatories committed to working together to reduce **cooling-related emissions** across all sectors by at least 68% globally relative to 2022 levels by 2050.
- Climate Finance:
 - **The United Nations Conference on Trade and Development (UNCTAD)** estimates that wealthy nations owe developing countries USD 500 billion in 2025 under the **New Collective Quantified Goal (NCQG) for climate finance**.
 - The NCQG was confirmed by developed countries under the **Paris Agreement in 2015**.
 - The goal is to set a new collective quantified goal before 2025. The goal will start from a floor of USD 100 billion per year.
 - This includes USD 250 billion for mitigation, USD 100 billion for adaptation, and USD 150 billion for loss and damage.
 - The figure is expected to increase to USD 1.55 trillion by 2030.
 - The current climate finance goal of USD 100 billion per year has not been met, and developing countries are facing debt distress.
 - Experts call for reform of the global financial architecture to address structural issues and promote sustainable development.
- Global Goal on Adaptation (GGA):
 - The draft text on the Global Goal on Adaptation (GGA) was introduced. It was established under the **Paris Agreement to enhance climate change adaptation** by increasing awareness of and funding towards countries' adaptation needs in the context of the **1.5/2°C goal** of the Paris Agreement.
 - The draft text addresses critical issues:
 - Climate-Induced Water Scarcity Reduction.
 - Climate-resilient food and Agriculture Production.
 - Strengthening Resilience Against Climate-Related Health Impacts.
- Declaration to Triple Nuclear Energy:
 - The declaration launched at COP28 aims to **triple global nuclear energy capacity by 2050**.
 - Endorsed by 22 national governments, the declaration calls for support from shareholders of international financial institutions. It encourages shareholders to **advocate for the incorporation of nuclear energy in energy lending policies**.
- Powering Past Coal Alliance (PPCA):
 - PPCA is a coalition of national and sub-national governments, businesses and organizations working to advance the transition from **unabated coal power generation to clean energy**.
 - PPCA at COP28 welcomed new national and subnational governments, and called for cleaner energy alternatives.

Note:

- Coal Transition Accelerator:
 - France, in collaboration with various countries and organizations, introduced the Coal Transition Accelerator.
 - Objectives include **knowledge-sharing, policy design**, and financial support to facilitate just transitions from coal to clean energy.
 - The initiative aims to leverage best practices and lessons learned for effective coal transition policies.
- Coalition for High Ambition Multilevel Partnership (CHAMP) for Climate Action:
 - A total of 65 national governments signed CHAMP commitments to enhance cooperation, where applicable and appropriate, with subnational governments in the planning, financing, implementation, and monitoring of climate strategies.
- India Led Initiatives at COP28:
 - Global River Cities Alliance (GRCA):
 - It was launched at COP 28, led by the **National Mission for Clean Ganga (NMCG)** under the **Ministry of Jal Shakti**, Government of India.
 - The GRCA is a unique alliance covering 275+ global river-cities in 11 countries.
 - Partner countries include Egypt, Netherlands, Denmark, Ghana, Australia, Bhutan, Cambodia, Japan and river-cities of The Hague (Den Haag) from the Netherlands, Adelaide from Australia, and Szolnok of Hungary.
 - GRCA highlights **India's role in sustainable river-centric development** and climate resilience.
 - The GRCA platform will facilitate knowledge exchange, river-city twinning, and dissemination of best practices.



Note:

- **Green Credit Initiative:**
 - India launched the Green Credit Initiative here at COP28, to create a participatory **global platform for exchange of innovative environmental programs and instruments.**
 - There are two main priorities of the initiative are **water conservation** and **afforestation.**
 - The main purpose of this initiative is to **boost voluntary environmental activities** like tree plantation, water conservation, **sustainable agriculture,** and **waste management** by **incentivizing** it for big corporations and private companies, bringing about a change in the **climate issues** faced by the country.

Second Phase of LeadIT

Why in News?

Recently, at the **Leadership Group for Industry Transition (LeadIT) Summit 2023** hosted by India and Sweden at the **Conference of Parties (COP 28)** in the United Arab Emirates, the Ministry of Environment, Forest and Climate Change announced the **three pillars of the second phase of LeadIT (2.0).**

What is the Leadership Group for Industry Transition (LeadIT)?

- **About:**
 - LeadIT is a global initiative that aims to accelerate the transition of challenging sectors such as steel, cement, chemicals, aviation, and shipping to **low-carbon pathways.**
 - The LeadIT gathers countries and companies that are committed to action to achieve the **Paris Agreement.**
 - It was launched by the governments of Sweden and India at the **United Nations Climate Action Summit in 2019** and is supported by the **World Economic Forum.**
 - The LeadIT Secretariat is responsible for managing the work of the Leadership Group.
- **Members:**
 - LeadIT, boasting **38 members,** encompasses countries and companies. Notably, **India is an active participant.**
 - LeadIT members subscribe to the notion that energy-intensive industries can and must progress on low-carbon pathways, aiming to **achieve net-zero carbon emissions by 2050.**

What are the Key Highlights of the Second Phase of LeadIT?

- **Mission:**
 - Facilitate the creation of policies and regulations backing an inclusive industry transition through **public-private partnerships.** Mobilise resources, support knowledge-sharing, and accelerate pathways to achieve net-zero industry emissions by 2050.
- **LeadIT Pillars:**
 - **Global Forum for a Just and Equitable Industry Transition:**
 - Ensuring continuous dialogue and engagement between governments and industry.
 - This pillar is dedicated to sustaining LeadIT's engagement with multilateral groups (e.g., **UN Climate Action, United Nations Framework Convention on Climate Change (UNFCCC) COP** presidencies), facilitating knowledge sharing among members, and vigilantly monitoring the transition's pace.
 - **Technology Transfer and Co-development:**
 - This pillar is dedicated to facilitating business-to-business technology transfer and building national institutional capacity for innovation.
 - **Industry Transition Partnerships:**
 - The LeadIT Secretariat aids members in creating industry transition partnerships, supporting emerging markets and developing economies in their pursuit of green industrial transitions.
 - These partnerships involve mapping, coordinating, and strengthening technical and financial international assistance to enhance effectiveness.
 - The ultimate goal is to establish enabling conditions for a pipeline of bankable low-carbon industrial projects.

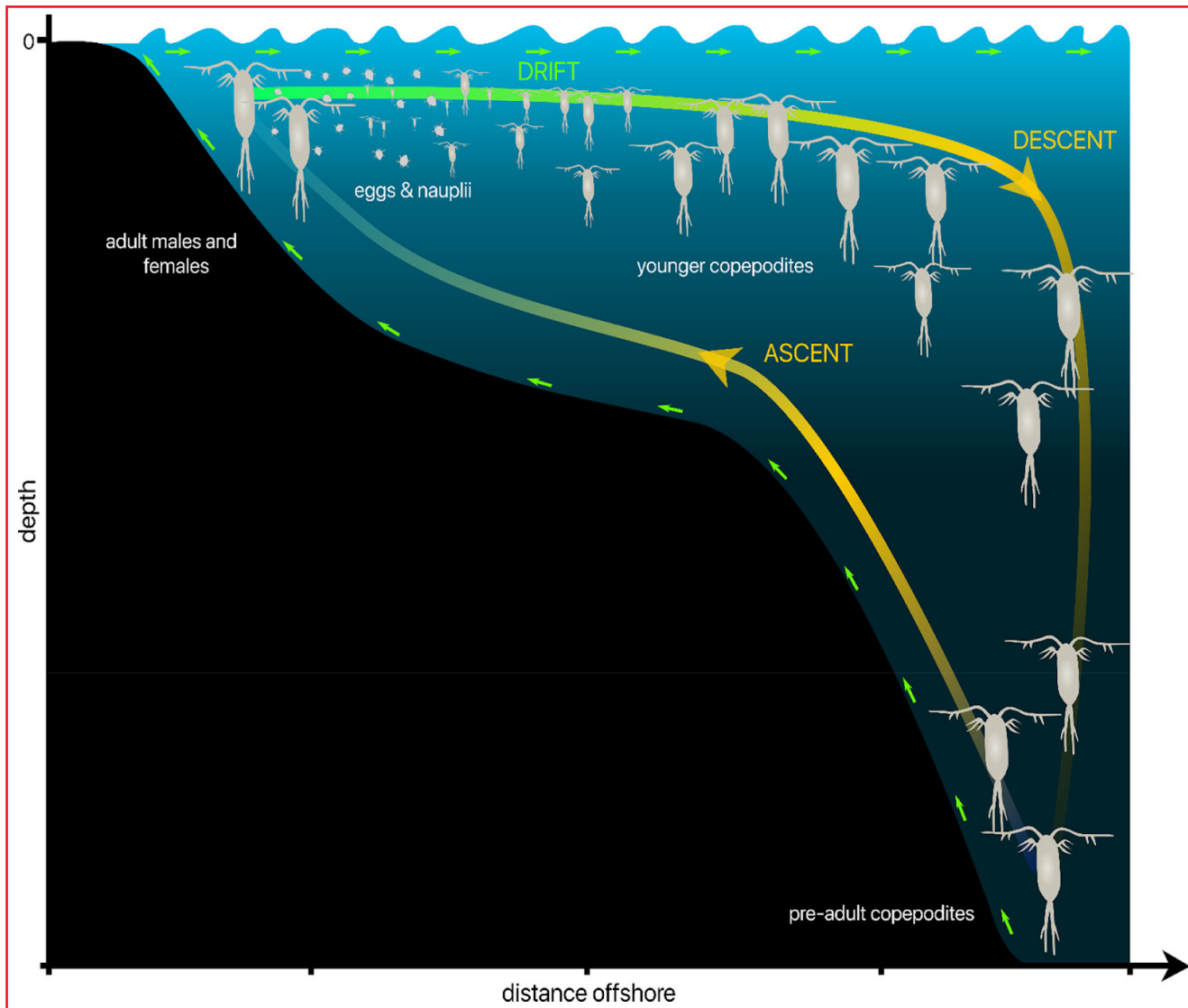
Diel Vertical Migration and Carbon Sequestration

Why in News?

Deep-sea creatures, like zooplankton, ascend at night in **Diel Vertical Migration (DVM)** for nourishment and safety. This synchronised journey showcases nature's marvels and significantly influences **Earth's Carbon Cycle.**

Note:





What is Diel Vertical Migration (DVM)?

- DVM is a synchronised movement of marine organisms, often seen in deep-sea creatures like zooplankton, as they migrate vertically in the water column, ascending towards the **surface at night and descending to deeper levels during the day.**
 - This pattern helps these organisms **find food while avoiding predators**, showcasing a strategic survival tactic.
- At dusk, organisms from the **mesopelagic layer (Deeper Layer or Twilight Zone)** rise to the safety of the **epipelagic zone (Upper Layer)**, capitalising on darkness to feed on microscopic phytoplankton while evading diurnal predators.

- This synchronised migration, finely attuned to natural light cycles, **stands as the planet's largest biomass migration**, occurring daily across all oceans.

How DVM's help in Carbon Sequestration?

- Organisms inhabiting the mesopelagic layer actively extract substantial carbon from upper ocean layers while **feeding on surface plankton**, transporting it to deeper waters.
- Within the twilight zone, migratory animals contribute to the food chain, passing on consumed carbon to their predators. The resultant carbon-rich waste sinks to the ocean floor, becoming a crucial carbon sink, **trapping carbon dioxide and aiding in atmospheric carbon concentration regulation.**

Note:

What is Carbon Sequestration?

What is Carbon Sequestration?

- **About:**
 - Carbon sequestration is the **long-term storage of carbon in plants, soils, geologic formations, and the ocean.**
 - Carbon sequestration occurs both naturally and as a result of anthropogenic activities and typically refers to the storage of carbon.
- **Types:**
 - **Terrestrial Carbon Sequestration:** Terrestrial carbon sequestration is the process **through which CO₂ from the atmosphere is absorbed by trees and plants through photosynthesis** and stored as carbon in soils and biomass (tree trunks, branches, foliage, and roots)
 - **Geologic Carbon Sequestration:** CO₂ can be stored, **in oil reservoirs, gas reservoirs, unmineable coal seams, saline formations and shale formations with high organic content.**
 - **Ocean Carbon Sequestration:** Oceans absorb, release and store large amounts of **CO₂ from the atmosphere.** This can be done in two ways—enhancing the productivity of ocean biological systems through Iron fertilization, and injecting CO₂ into the deep ocean.
 - The dumping of iron stimulates phytoplankton production, **which in turn leads to enhanced photosynthesis** from these microorganisms, helping in CO₂ absorption.

UNEP's Action Plan for Cooling Sector

Why in News?

The **United Nations Environment Programme (UNEP)** has proposed an action plan aimed at significantly **reducing emissions from the global cooling sector** in its recent report titled **“Keeping it Chill: How to meet cooling demands while cutting emissions.”**

- This initiative carries the potential to make a substantial impact on the predicted 2050 **greenhouse gas emissions**, reducing them by 60%.

- The report is released in support of the **Global Cooling Pledge**, a joint initiative between the United Arab Emirates as host of the **Conference of Parties(COP28)** and the **Cool Coalition**.

Note:

- The Cool Coalition is a global network of partners working to provide efficient, climate-friendly cooling for all.
- The UNEP launched the Cool Coalition at the First Global Conference on Synergies between the **2030 Agenda for Sustainable Development Goals** and the **Paris Agreement**.
 - India is a member of the Cool Coalition.

What is UNEP's Proposed Action Plan for Sustainable Cooling?

➤ Nature-Based Solutions:

- Recommendations include **passive cooling measures** like shading, ventilation, insulation, green roofs, and reflective surfaces, and reintroducing nature to urban areas.
- Passive cooling can reduce the need for **mechanical cooling and save energy and emissions.**
- **Efficiency Standards:**
 - Emphasizes the importance of **higher energy efficiency technologies and practices** for cooling equipment, such as air conditioners, refrigerators, and fans.
 - Higher-energy efficiency cooling can **reduce the energy consumption and emissions of cooling devices** and lower the costs for users and utilities.

➤ Phasedown of Refrigerants:

- This refers to the use of alternative substances to cool devices, such as **hydrocarbons, ammonia, or carbon dioxide**, instead of **hydrofluorocarbons (HFCs)**, which are potent greenhouse gases.
 - HFCs are a group of **synthetic gases** primarily used for cooling and refrigeration. HFCs, classified as **“super-pollutants,”** possess potent greenhouse gas properties, **capable of trapping heat hundreds to thousands of times more than carbon dioxide.**
 - Despite their significant impact, they are short-lived climate pollutants, with an average **atmospheric lifespan of 15 years.**

Note:



- Low-global warming potential refrigerants can reduce the direct emissions of cooling devices and contribute to the phase-down of HFCs under the **Kigali Amendment to the Montreal Protocol**.
- Urges a **faster phasedown of climate-warming refrigerants** and **air conditioning**.

Why Address the Cooling Sector?

- The cooling sector plays a crucial role in **combating rising temperatures**, ensuring **food safety**, **industrial cooling** processes, and driving productive economies.
- However, without intervention, the growing demand for cooling equipment could lead to a substantial increase in electricity consumption and emissions.
 - The cooling sector accounts for a **substantial 20% of global electricity consumption**.
- If current policies continue, the installed capacity of cooling equipment globally will triple, resulting in a **more than doubling of electricity consumption by 2050**.
 - This could lead to **emissions between 4.4 billion and 6.1 billion tonnes of carbon dioxide equivalent (CO₂e) in 2050**, accounting for over **10% of global projected emissions that year**.

What are the Benefits of Sustainable Cooling?

- Passive cooling techniques and efficient cooling equipment can save consumers **USD 17 trillion between 2022 and 2050**.
 - It is projected to reduce peak power requirements by **1.5-2 terawatts (TW)**, **avoiding substantial power generation investments**.
- Increasing the adoption of **low-global warming potential technologies** in new equipment and effectively managing refrigerant life cycles can reduce **HFC emissions by 50% in 2050**.
 - **Decarbonizing** the power grid can further **reduce sectoral emissions by 96%**.

What are the Initiatives Related to Sustainable Cooling?

- **Global:**
 - National Cooling Action Plans (NCAPs):
 - Presently, **more than 40 countries, including India, have developed NCAPs**, and 25 others are at various stages of preparing theirs as well.
 - Though India and China have included implementation mechanisms in their NCAPs, the rollout has been slow.

Global Cooling Pledge:

- At the **28th Conference of Parties (COP28)** the United Nations Framework Convention on Climate Change, the host country United Arab Emirates and the Cool Coalition launched the Global Cooling Pledge.
 - Over 60 countries signed up to the Pledge with commitments to reduce the climate impact of the cooling sector.
- **Kigali Amendment Acceleration:**
 - The Kigali Amendment is an international agreement to reduce the production and consumption of HFCs.
 - The amendment is part of the Montreal Protocol on Substances that Deplete the **Ozone Layer**.
 - The Kigali Amendment aims to reduce HFC production and consumption by 80–85% by 2047.
 - This is expected to prevent the emissions of up to 105 billion tonnes of CO₂ of greenhouse gases, avoiding up to 0.5 degree Celsius of global temperature rise by 2100.

India:

- [India Cooling Action Plan \(ICAP\)](#).
- [Bureau of Energy Efficiency \(BEE\) Star Rating Programme](#).

The Global Climate 2011-2020: WMO

Why in News?

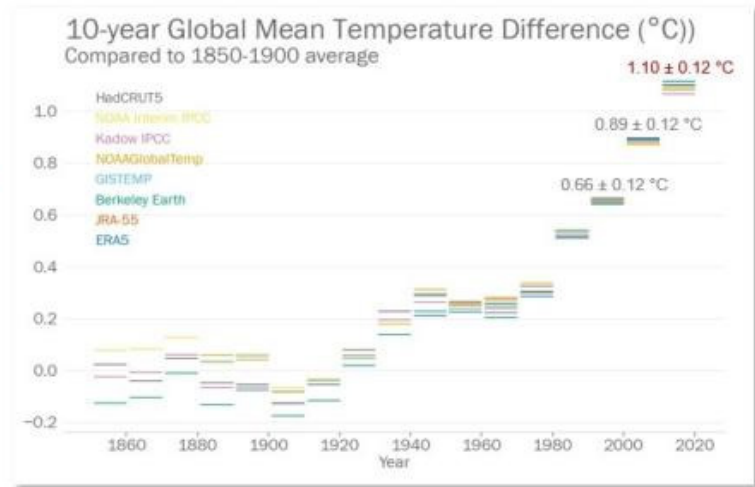
Recently, the [World Meteorological Organisation \(WMO\)](#) has published a report titled- *The Global Climate 2011-2020: A Decade of Acceleration*, concerning the alarming acceleration of climate change and its multifaceted impacts across the planet.

What are the Key Highlights of the Report?

- **Temperature Trends:**
 - The decade 2011-2020 emerged as the warmest on record for both land and ocean.
 - Global mean temperature soared to **1.10 ± 0.12 °C above the 1850-1900 average**, with each decade since the 1990s surpassing previous ones in warmth.
 - Record high temperatures were reported in numerous countries, with 2016 (due to an [El Niño event](#)) and 2020 standing out as the warmest years.

Note:

2011-2020 warmest decade on record for both the land and ocean by a clear margin.



- Greenhouse Gas Emissions:
 - Atmospheric concentrations of major **greenhouse gases (GHG)** continued to rise, **especially CO₂**, **reaching 413.2 ppm in 2020**, primarily due to fossil fuel combustion and land-use changes.
 - The decade witnessed an **increase in average growth rates of CO₂**, highlighting the pressing need for sustainable emissions reduction to stabilize the climate.
- Oceanic Changes:
 - Ocean warming rates accelerated **significantly, with 90% of accumulated heat stored in the ocean**. Warming rates doubled in the **upper 2000m depth from 2006-2020**, impacting marine ecosystems.
 - Ocean acidification due to CO₂ absorption posed challenges for marine organisms, affecting their shell and skeleton formation.
- Marine Heatwaves and Sea Level Rise:
 - **Marine Heatwaves** increased in frequency and intensity, **affecting about 60% of the ocean's surface** between 2011 and 2020.
 - Global mean sea level rise **accelerated to 4.5mm/yr from 2011-2020**, mainly due to ocean warming and ice mass loss.
- Glacier and Ice Sheet Loss:
 - **Glaciers** globally thinned by **about 1 meter/year between 2011 and 2020**, with unprecedented mass loss, affecting water supplies.
- Greenland and Antarctic ice sheets **lost 38% more ice compared to 2001-2010**, contributing significantly to rising sea levels.
- Arctic Sea Ice Decline:
 - Arctic sea ice continued its decline during the summer melt season, with a mean seasonal minimum extent 30% below the 1981-2010 average.
- Ozone Hole and Successes:
 - The Antarctic ozone hole diminished in the **2011-2020 period, credited to successful international action** under the **Montreal Protocol**.
 - Efforts led to reduced chlorine entering the stratosphere from ozone-depleting substances.
- Impact on Sustainable Development Goals (SDGs):
 - Extreme weather events hindered progress toward SDGs, impacting food security, human mobility, and socioeconomic development.
 - Improved early warning systems reduced casualties but **economic losses from extreme events escalated**.
 - The 2011-2020 decade was the first since 1950 when there was not a single **short-term event with 10,000 deaths or more**.

What are the WMO's Recommendations for Mainstreaming Action on Climate and Development Goals?

- Enhancing collective resilience against **current and future global crises through collaboration and**

Note:



cooperation with international organizations and their partners

- Strengthening **science-policy-society** interaction to advance synergistic action
- **Promoting institutional capacity-building** and cross-sectoral and international collaboration at national, institutional, and individual levels, especially for the global South.
- **Ensuring policy coherence** and coordination among policymakers across sectors and departments for **enhancing climate and development synergies** at the national, sub-national, and multi-national levels.

What is WMO?

- **About:**
 - It is an **intergovernmental organization** with a membership of 192 Member States and Territories. India is a member.
 - It originated from the International Meteorological Organization (IMO), which was established after the 1873 Vienna International Meteorological Congress.
- **Establishment:**
 - Established by the ratification of the **WMO Convention on 23rd March 1950**, WMO became the **specialized agency of the United Nations** for meteorology (weather and climate), operational hydrology and related geophysical sciences.
- **Headquarters:**
 - Geneva, Switzerland.

Coastal Erosion

Why in News?

The Union Minister of State for Environment, Forest, and Climate Change, in a written reply to Lok Sabha, shared insights on **shoreline changes across the entire Indian coastline** from multi-spectral satellite images and field-surveyed data from 1990 to 2016 conducted by the **National Centre for Coastal Research (NCCR)**.

- **NCCR**, an attached office of the **Ministry of Earth Sciences, Government of India**, has been mandated

to carry out all **multidisciplinary research** under the central domain: **Marine Pollutions, Coastal processes** and **Hazards, Coastal Habitats and Ecosystem** and **Capacity Building and Training**.

What are the Key Observations of NCCR Regarding Coastal Erosion?

- Some stretches of **India's shoreline** are subject to varying degrees of **erosion** due to **natural causes** or **anthropogenic activities**.
- The **shoreline analysis** suggests that **34%** of the coast is eroding, **28%** is accreting and **38%** is in a stable state.
- The **state-wise analysis** suggests that in the **West Bengal (63%)** and **Pondicherry (57%)** coasts, erosion exceeds more than **50%**, followed by **Kerala (45%)** and **Tamil Nadu (41%)**.
- **Odisha (51%)** is the only coastal state which is having more than **50%** of accretion.
- The receding coastline will cause **loss of land/habitat** and the **livelihood of fishermen** in terms of losing the space for **parking boats, mending nets** and **fishing operations**.

World Bank's Plan to Combat Methane Emissions

Why in News?

In an initiative to combat the rising threat of **methane emissions**, the **World Bank** has announced plans to launch a series of country-led programs, **to reduce up to 10 million tons** of methane over the course of their investment lifespans.

What is the Plan Unveiled by World Bank?

- **Need For the Plan:**
 - Methane accounts for approximately **19% of global greenhouse gas emissions (GHGs)**, making it a substantial contributor to climate change.
 - **Rice production accounts for 8%, livestock 32%, and waste 18% of all human-driven methane emissions**, making targeted efforts in these areas crucial.

Note:

- Methane has a much higher global warming potential (GWP) than carbon dioxide.
- Despite **methane being 80 times more potent than carbon dioxide** in terms of **warming the planet**, it has received less attention and funding.
- **World Bank's Planning:**
 - The World Bank is set to roll out a **minimum of 15 country-led programs** within the next 18 months.
 - According to the World Bank, the move is a **step in addressing the alarming increase in global temperatures** and supporting communities most vulnerable to the impacts of climate change.
 - These programs will specifically target methane emissions, **employing strategic interventions to curb environmental degradation** and promote sustainable practices.
 - World Bank's Triple Win Approach:
 - The ambitious programs will focus on slashing methane emissions from various sources, **including rice production, livestock operations, and waste management.**
 - The comprehensive approach to methane reduction outlined by the World Bank **emphasizes triple wins** - reducing emissions, enhancing resilience, and empowering livelihoods.
- **Funding Mechanism:**
 - Currently, finance for methane abatement constitutes **less than 2%** of global climate finance.
 - The World Bank envisions a substantial increase in financing for methane reduction through public and private sector channels **between 2024 and 2030.**
 - The institution is set to collaborate with Germany, Norway, the United States, the UAE, and the private sector to implement effective solutions and reduce methane emissions across the entire energy value chain.
- **Partnership Platforms:**
 - Complementing its efforts, the World Bank is launching **two partnership platforms:**
 - The **Global Methane Reduction Platform for Development (CH4D)** focusing on methane abatement in agriculture and waste.
 - **Global Flaring and Methane Reduction Partnership (GFMR)** concentrating on reducing methane leaks in the oil and gas sector.

Global Warming Potential (GWP)

- GWP is a measure of how much heat a greenhouse gas traps in the atmosphere over a specific time period, **usually 100 years**, compared to carbon dioxide (CO₂).
- It is used to evaluate the potential impact of different greenhouse gases on global warming. The GWP allows for the comparison of the warming effects of various gases based on their ability to absorb and retain heat in the atmosphere.
- **Carbon dioxide is the reference gas with a GWP of 1.** Other greenhouse gases, **such as methane (CH₄) and nitrous oxide (N₂O), have higher GWPs because they are more effective at trapping heat.**
- **The Intergovernmental Panel on Climate Change (IPCC)** provides GWP values for different gases. It's important to note that GWP values can vary depending on the time horizon chosen for the comparison.

What are the Initiatives to Tackle Methane Emissions?

- **Indian:**
 - **'Harit Dhara' (HD):** Indian Council of Agricultural Research (ICAR) has developed an anti-methanogenic feed supplement **'Harit Dhara' (HD)**, which can cut down cattle methane emissions by 17-20% and can also result in higher milk production.
 - **India Greenhouse Gas Program:** The India GHG Program led by WRI India (non-profit organization), Confederation of Indian Industry (CII) and **The Energy and Resources Institute (TERI)** is an industry-led voluntary framework to measure and manage greenhouse gas emissions.
 - **National Action Plan on Climate Change (NAPCC):** **NAPCC** was launched in 2008 which aims at creating awareness among the representatives of the public, different agencies of the government, scientists, industry and the communities on the threat posed by climate change and the steps to counter it.
 - **Bharat Stage-VI Norms:** India shifted from **Bharat Stage-IV (BS-IV)** to **Bharat Stage-VI (BS-VI)** emission norms.
- **Global:**
 - Methane Alert and Response System (MARS):
 - MARS will integrate data from a large number of existing and future satellites that have the ability to detect methane emission events anywhere

Note:



in the world, and send out notifications to the relevant stakeholders to act on it.

- Global Methane Pledge:
 - At the **Glasgow climate conference** (UNFCCC COP 26) in 2021, nearly 100 countries had come together in a voluntary pledge, referred to as the Global Methane Pledge, to cut methane emissions by at least 30% by 2030 from the 2020 levels.
- Global Methane Initiative (GMI):
 - It is an international public-private partnership focused on reducing barriers to the recovery and use of methane as a clean energy source.

Field Pansy's Evolution

Why in News?

Recently, scientists have uncovered evidence of **rapid evolution in a flowering plant** found in Paris, France. The plant, identified as **Field Pansy (*Viola arvensis*)** is showing signs of **self-pollination**, a behaviour contradicting the conventional reliance on external pollinators.

What are the Key Facts about Field Pansy?

- The **Field Pansy (*Viola arvensis*)**, is a common wildflower that can be found in many parts of **Europe, Asia, and North America**.
- It belongs to the group of plants called **angiosperms**, which produce seeds inside a protective structure called a fruit.
 - Angiosperms rely on insects and other animals to pollinate them and help them reproduce.



Pollination

- **Pollination** is the process by which **pollen grains**, which contain the male **reproductive cells of plants**, are transferred from one flower to another, usually by insects that visit the flowers for nectar.
 - Nectar is a **sugary liquid that plants produce to attract pollinators**.
- Pollination is essential for the genetic diversity and survival of many plant species, and it has evolved over 100 million years of coevolution between plants and animals.
- Pollination is carried through pollinators (vectors that move pollen within the flower and from flower to flower).
- However, some plants can also **pollinate themselves**, without the help of any external agent. This is called **self-pollination**, and it is a way for plants to ensure their reproduction in case there are no suitable pollinators around.
 - Self-pollination can also save energy and resources for plants, as they do not need to produce as much nectar and flowers to attract pollinators.

What are the Key Highlights of the Study?

- Rapid Evolution:
 - The study marks the **first evidence of rapid evolution in plants**, with the field pansy, showing significant changes in nectar production and flower size over a relatively short period.
 - The study found that flowers of the wild **pansy variety produced 20% less nectar and were 10% smaller**.
- Self-Pollination:
 - The field pansy has evolved to self-pollinate, reducing its **reliance on pollinators** due to a decreasing availability of insects.
 - This behaviour is contrary to the conventional reliance on insects for pollination in **angiosperms**, marking a significant departure from **established plant reproductive strategies**.

Note:

- **Convergent Evolution:**
 - The study reveals convergent evolution across populations, with a reduction in rewarding traits and attractiveness to pollinators.
 - This convergence suggests a consistent evolutionary response to environmental pressures across different plant populations.
- **Resurrection Ecology Method:**
 - The researchers used the “resurrection ecology” method, planting seeds from the 1990s and 2000s against their contemporary descendants from 2021 to observe changes over time.
 - This method allowed them to track and compare changes in plant traits and behaviour across different periods.
- **Environmental Impact:**
 - The move towards selfing **may benefit plants in the short term** but poses a threat to their long-term survival, especially in the **face of climate change and other environmental changes**.
 - Self-pollination reduces the genetic diversity and adaptability of the plant, making it more susceptible to diseases and environmental stresses.
- **Pollinator Decline:**
 - The study warns of a potential feedback loop that could lead to further **declines in pollinators as a result of plant trait evolution**, impacting the plant-pollinator network.
- **Urgent Analysis:**
 - The study emphasizes the need to analyze whether these results are symptomatic of broader behavioral changes in the relationship between angiosperms and their pollinators.
 - Researchers call for a thorough understanding of the possibility of reversing the process and breaking the eco-evolutionary-positive feedback loop to preserve plant-pollinator networks.

Increase Tiger Numbers in Valmiki Tiger Reserve

Why In News?

Recently, the **National Tiger Conservation Authority (NTCA)** had officially announced the increase in **tiger population** in **Valmiki Tiger Reserve (VTR)**.

- It witnessed the growth in the number of big cats from **31 (2018)** to **54 (2023)**.
- The **Bihar government** is waiting to obtain **NTCA** approval for declaring **Kaimur Wildlife Sanctuary** as the **state’s second tiger reserve** after VTR.

Why Has the Number of Tigers in VTR Increased?

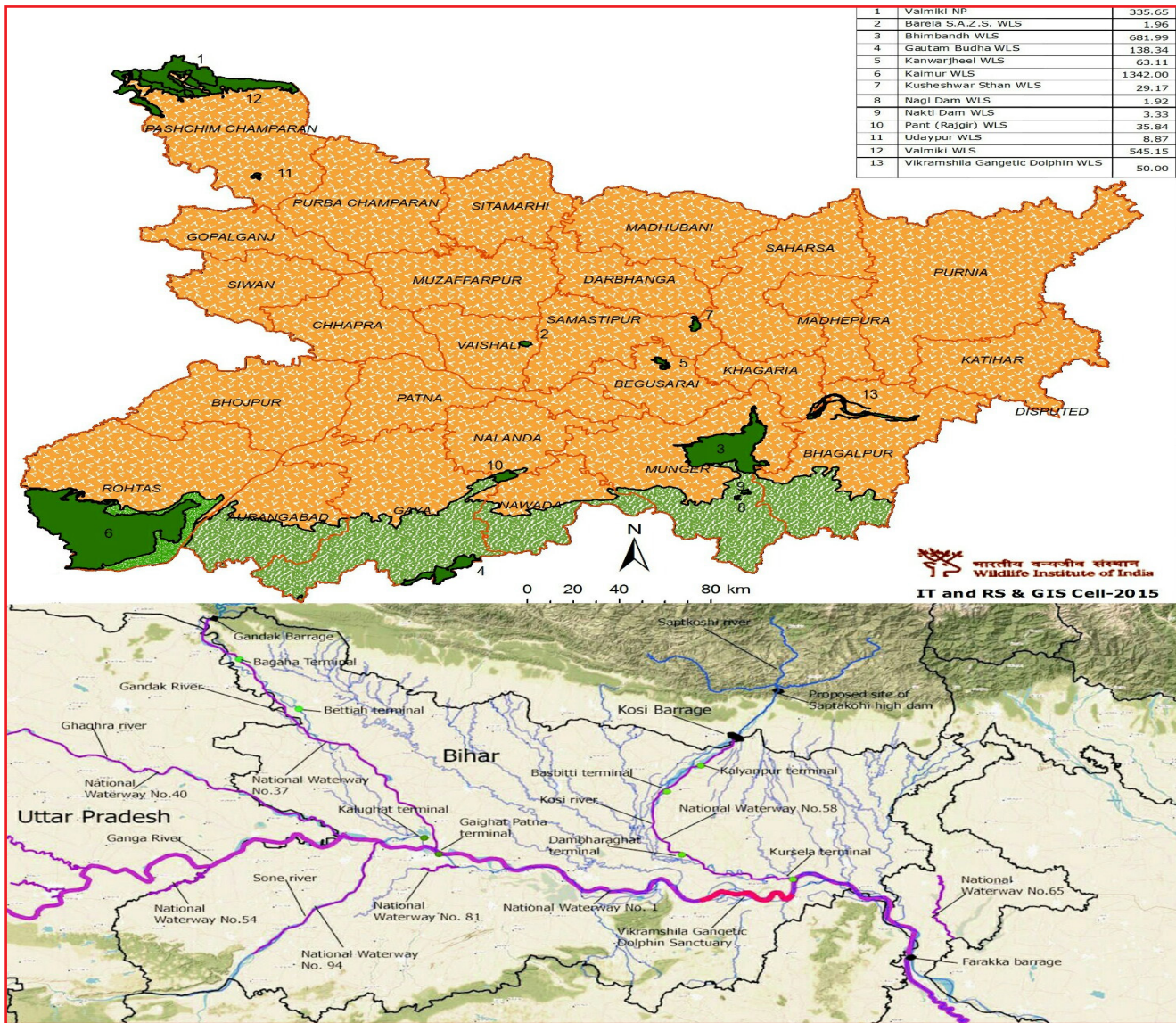
- A total ban on **sand and stone mining** inside VTR, and strict restrictions on **mining** in its **eco-sensitive zone**, helped increase **grassland cover**.
- An **increase in grassland cover** thus helps in supporting the **prey population**, in turn increasing the chances of the carnivores’ survival.
- The reserve is dedicated to managing and sustaining the tiger population **by raising awareness among local residents** and monitoring mining activities in and around the area **to minimize human-wildlife conflict**.
- The **NTCA** placed the reserve in the **‘Very Good’ category**.

What are the Important Facts of Valmiki Tiger Reserve (VTR)?

- The **VTR** is the **only tiger reserve** in **Bihar**, which forms the easternmost extent of the **Himalayan Terai forests** in India.
 - The **VTR** is located in **Bihar’s West Champaran district**, bordering **Nepal** to its **north** and **Uttar Pradesh** to its **west**.
- Situated in the **Gangetic plains bio-geographic region**, the vegetation of this Tiger Reserve is a combination of **Bhabar** and **Terai regions**.
- According to the **Forest Survey of India Report 2021**, **85.71%** of its total area is covered by forest cover.
- Wild mammals found in the forests of **Valmiki Tiger Reserve** include **tiger, sloth bear, leopard, wild dog, bison, wild boar** etc.
- **Rivers Gandak, Pandai, Manor, Harha, Masan** and **Bhapsa** flow through various parts of the reserve.

Note:





What is the National Tiger Conservation Authority (NTCA)?

➤ About:

- NTCA is a **statutory body** under the **Ministry of Environment, Forests and Climate Change**.
- It was established in **2005** following the recommendations of the **Tiger Task Force**.
- It was constituted under enabling provisions of the **Wildlife (Protection) Act, 1972**, as amended in **2006**, for **strengthening tiger conservation**, as per powers and functions assigned to it.

➤ Objectives:

- Providing **statutory authority** to **Project Tiger** so that compliance of its directives becomes legal.

- Fostering **accountability** of **Center-State** in management of **Tiger Reserves**, by providing a basis for **MoU** with States within our federal structure.
- Providing for an **oversight by Parliament**.
- Addressing livelihood interests of local people in areas surrounding Tiger Reserves.

Illegal Sand Mining

Why in News?

Recently, Bihar police arrested sand smugglers in a major crackdown against **illegal sand mining**.

- This operation, near the **Sone River**, signifies a significant step in the ongoing battle against powerful

Note:

criminal syndicates involved in illicit sand mining activities.

What is Sand Mining?

➤ About:

- Sand mining is defined as the **removal of primary natural sand and sand resources** (mineral sands and aggregates) from the natural environment (terrestrial, riverine, coastal, or marine) for extracting valuable minerals, metals, crushed stone, sand and gravel for subsequent processing.
- This activity, driven by various factors, poses serious **threats to ecosystems and communities**.

➤ Source of Sand in India:

- **Sustainable Sand Mining Management Guidelines (SSMMG) 2016** suggest that the source of sand in India are through
 - River (riverbed and flood plain),
 - Lakes and reservoirs,
 - Agricultural fields,
 - Coastal / marine sand,
 - Palaeo-channels,
 - Manufactured Sand (M-Sand).

➤ Factors Contributing to Illegal Sand Mining:

- Lack of Regulation and Enforcement:
 - Inadequate regulatory frameworks and weak enforcement mechanisms contribute to the proliferation of illegal sand mining.
- High Demand for Construction Materials:
 - The **construction industry's hefty demand for sand** fuels is illegal extraction, intensifying pressure on riverbeds and coastal areas due to the rising need for sand in construction projects.
 - Rapid **population growth and urbanization** drive the need for construction, escalating the demand for sand.
- Corruption and Mafia Influence:
 - Corrupt practices and the influence of organized **sand mafias** contribute to the continuation of illegal mining.
 - Collusion between authorities and illegal operators undermines efforts to control and regulate the sand mining industry.

○ Lack of Sustainable Alternatives:

- Limited adoption of sustainable alternatives like **manufactured sand (M-sand)** contributes to overreliance on riverbed sand.
- Inadequate promotion of eco-friendly alternatives maintains the demand for natural sand, exacerbating environmental consequences.

○ Weak Environmental Impact Assessment (EIA) Implementation:

- Ineffective implementation of EIAs for sand mining activities allows for unauthorized extraction.
- Insufficient public awareness and monitoring mechanisms contribute to illegal mining activities going unnoticed.

➤ Consequences of Sand Mining:

○ Erosion and Habitat Disruption:

- The **Geological Survey of India (GSI)** notes that unregulated sand mining alters riverbeds, leading to increased **erosion**, changes in channel morphology, and disruption of aquatic habitats.
- Sand Mining leads to loss of stability in stream channels, threatening the survival of native species adapted to pre-mining habitat conditions.

○ Flooding and Increased Sedimentation:

- Depletion of sand from river beds contributes to increased **flooding and sedimentation in rivers** and coastal areas.
- Altered flow patterns and sediment loads negatively impact aquatic ecosystems, affecting **both flora and fauna**.

○ Groundwater Depletion:

- Deep pits formed due to sand mining can cause a drop in the **groundwater table**.
 - This in turn affects **local drinking water wells**, leading to **water scarcity** in surrounding areas.

○ Biodiversity Loss:

- Habitat disruption and degradation arising from activities such as sand mining lead to the significant **loss of biodiversity**, adversely affecting both aquatic and riparian species. The destructive impact extends even to **mangrove forests**.

Note:



What are the Initiatives to Prevent Sand Mining in India?

- Mines and Mineral Development and Regulation Act, 1957 (MMDR Act):
 - Sand is classified as a **“minor mineral”, under The Mines and Minerals (Development and Regulations) Act, 1957 (MMDR Act)** and administrative control over minor minerals vests with the **State Governments**.
 - Section 3(e) of the MMDR Act aims to prevent illegal mining, with the government implementing laws to curb illicit practices.
 - The **Mines and Minerals (Development and Regulation) Amendment Act, 2023** was recently passed by the Parliament to **amend the MMDR Act, 1957**.
- **2006 Environment Impact Assessment (EIA):**
 - The Supreme Court of India mandated that **approval is required for all sand mining collection activities**, even in areas less than 5 hectares.
 - This decision aimed to address the severe impact of sand mining on the ecosystem, affecting plants, animals, and rivers.
- Sustainable Sand Management Guidelines (SSMG) 2016:
 - Issued by the Ministry of Environment, Forests, and Climate Change (MoEFCC), the main objectives of these guidelines include environmentally **sustainable and socially responsible mining**, conservation of the **river equilibrium** and its natural environment by **protection and restoration of the ecological system**, avoiding pollution of river water, and prevention of depletion of **groundwater reserves**.
- **Enforcement and Monitoring Guidelines for Sand Mining 2020:**
 - The guidelines provide a uniform **protocol for monitoring sand mining across India**.
 - The guidelines cover the identification of sand mineral sources, their dispatch, and their end-use.
 - The guidelines also consider the use of new surveillance technologies, such as drones and night vision, to monitor the sand mining process.

Sone River

- The Sone River, a **perennial river in central India**, is the **Ganges’ 2nd-largest southern tributary**.
- Originating near **Amarkantak Hill in Chhattisgarh**, it flows through Chhattisgarh, Madhya Pradesh, Uttar Pradesh, and Bihar, forming waterfalls at the Amarkantak plateau.
 - It merges with the Ganges near Patna, Bihar.
- Tributaries include Ghaghar, Johilla, Chhoti Mahanadi, Banas, Gopad, Rihand, Kanhar, and North Koel River.
- Prominent dams include the **Bansagar Dam in Madhya Pradesh** and the **Rihand Dam** near Pipri in Uttar Pradesh.

Namdapha Flying Squirrel

Why in News?

- Recently, a Namdapha flying squirrel (*Biswamoyopterus biswasi*) has resurfaced in Arunachal Pradesh after going missing for 42 years.
- The Namdapha flying squirrel was **last described in 1981** based on a single individual found in the **Namdapha Tiger Reserve in Arunachal Pradesh’s Changlang district**.

What is a Namdapha Flying Squirrel?

- **About:**
 - It is a **rare nocturnal flying squirrel species** found in the **Namdapha Tiger Reserve** in Arunachal Pradesh, India.



- It is **distinct from the red giant flying squirrel (Petaurista petaurista)**, another species in the same ecosystem, primarily due to the prominent tuft of hair on its ears.

Note:

- The difficulty in locating this species led to concerns that it might have been mistaken for the **red giant flying squirrel or, worse, faced extinction.**

➤ **Threats:**

- The Namdapha flying squirrel is presently threatened by habitat loss and degradation, caused by clear-felling for human settlements, shifting agriculture, and the extraction of non-timber forest products, particularly the leaves of a rattan palm, *Zalacca secunda*, for use as a roofing material.

➤ **Protection Status:**

- **IUCN Red List:** Critically Endangered
- **Wildlife (Protection) Amendment Act, 2022:** Schedule I

What are the Key Points About Namdapha Tiger Reserve?

➤ **About:**

- Namdapha Tiger Reserve was declared in 1983 as the 15th Tiger Project of the country.

- It was declared a **Wildlife Sanctuary in 1972**, then a **National Park in 1983** and became a Tiger Reserve under the Project Tiger scheme in the same year.

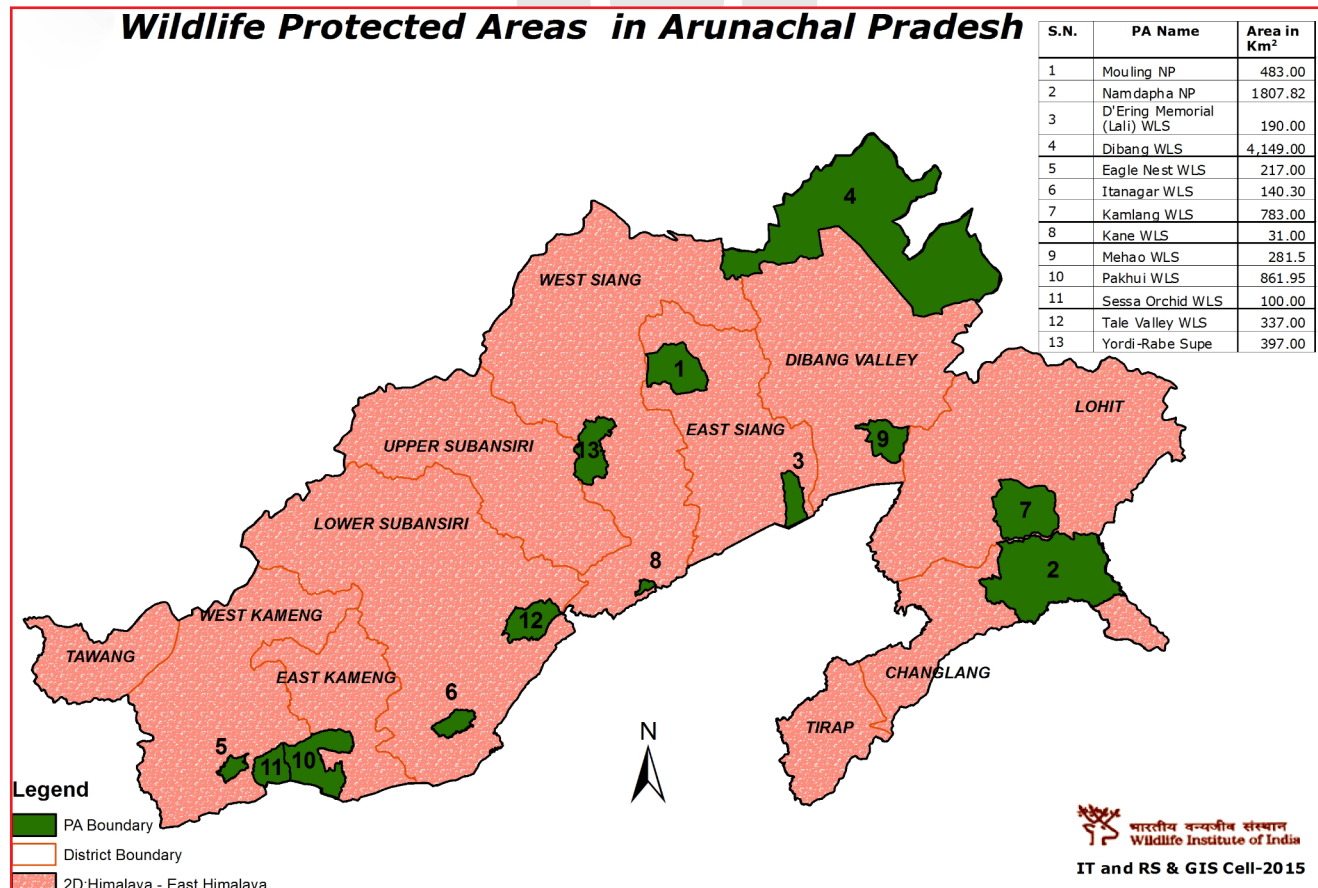
- Namdapha is in fact the name of a river which originates from Daphabum (Dapha is the name of hill, Bum means peak of hill) and meets **Noa-Dehing river**. This river flows right across in a North-South direction of the National Park and hence the name **Namdapha has been given.**

- It is located in Arunachal Pradesh. The park is **located between the Dapha bum range of the Mishmi Hills and the Patkai range.**

➤ **Climate:**

- Enjoys the sub-tropical climate. The mountainous part has a mountain type of climate while the low-lying plains and valleys experience tropical climate.

Wildlife Protected Areas in Arunachal Pradesh



Note:

India's Maiden Winter Arctic Research

Why in News?

Recently, the Union Minister of Earth Sciences flagged off India's first **winter scientific expedition** to Himadri, the nation's **Arctic Research Station** situated in Ny-Ålesund within the **Norwegian archipelago of Svalbard** in the **Arctic**.

- The first batch of the maiden Arctic winter expedition comprises researchers from the host **National Centre for Polar and Ocean Research (NCPOR)**, Indian Institute of Technology (IIT) Mandi, Indian Institute of Tropical Meteorology (IITM) and **Raman Research Institute**.

What is the Importance of The Winter Arctic Scientific Expedition?

- Indian scientific expeditions to the **Arctic** during the **winter** will allow researchers to conduct unique scientific observations during **polar nights**, where there is **no sunlight for nearly 24 hours** and **sub-zero temperatures**.
- It opens more avenues for India to expand our scientific capabilities in Earth's poles.
- This will aid in expanding understanding of the **Arctic**, especially **climate change**, **space weather**, **sea-ice** and **ocean circulation dynamics**, **ecosystem adaptations**, etc. which affect **weather** and **climate** in the tropics, including monsoons.
- India has operated a research base in the **Arctic** named **Himadri** since **2008**, which has been mostly hosting scientists during the summer (April to October).
- Priority research areas include **atmospheric**, **biological**, **marine**, and **space sciences**, **environmental chemistry**, and **studies on cryosphere**, **terrestrial ecosystems**, and **astrophysics**.
- India will join a small group of countries that operate their Arctic research bases through the winter.
- In recent years, **climate change and global warming research** has been attracting scientists to the **Arctic region**.



Note:

- **Dakshin Gangotri in Antarctica** was set up much earlier in **1983**. **Dakshin Gangotri** is now submerged under ice, but India's two other stations, **Maitri** and **Bharti**, are in use.
- **Indian scientific expeditions** to the Earth's poles (the Arctic and the Antarctic) are facilitated under the **PACER (Polar and Cryosphere)** scheme of the **MoES**, solely through the aegis of the **National Centre for Polar and Ocean Research (NCPOR)**, Goa, an autonomous institution of the **MoES**.

Greenwashing

Why in News?

The United Kingdom's Advertising Standards Authority (ASA) has banned advertisements from Air France, Lufthansa, and Etihad.

- These airlines face accusations of **'greenwashing'**, as they allegedly misled consumers by falsely claiming the **sustainability for their flights**, and downplaying the **environmental impact of air travel**.

Note:

What is Greenwashing?

➤ About:

- The term greenwashing was first used in **1986** by **Jay Westerveld**, an American environmentalist and researcher.
- Greenwashing is a deceptive practice where companies or even governments exaggerate their actions and their **impact on mitigating climate change**, often providing **misleading information or making unverifiable claims**.
 - It is an **attempt to capitalize** on the growing demand for **environmentally sound products**.
- It is fairly widespread, and entities often label **various activities as climate-friendly without verifiable evidence**, undermining genuine efforts against climate change.

➤ Examples of Greenwashing:

- The Volkswagen scandal, in which the German car company was found to have been cheating in emissions testing of its supposedly green diesel vehicles, was a case of greenwashing.
 - Several other multinational corporations, including oil giants like Shell and BP, and Coca Cola have faced accusations of greenwashing.

➤ Concerns:

- It creates a **risk of diluting the authenticity of climate goals** by presenting misleading or exaggerated information about environmental initiatives.
- Entities engaged in greenwashing may receive **unwarranted recognition or benefits**, rewarding **irresponsible behavior**.
 - Greenwashing can distort markets by creating an uneven playing field, where **entities engaging in deceptive practices gain an unfair advantage** over those adhering to genuine environmental standards.
- The absence of **comprehensive regulations and standards** for environmental claims allows greenwashing to persist without adequate scrutiny.
- The practice of greenwashing introduces challenges to the **integrity of carbon credit systems**, particularly

in informal markets, where the expansion of credit sources and certification by unofficial entities raises concerns about transparency and reliability.

- One carbon credit is equivalent to **one metric ton of carbon dioxide or equivalent greenhouse gases** removed from the atmosphere.
- The **Kyoto Protocol** introduced the concept of carbon credits. Countries or firms that exceed emission reduction mandates are rewarded with carbon credits.

➤ Global Initiatives Related to Greenwashing:

- At the **27th Conference of Parties (COP27)**, the **United Nations Secretary-General** has declared **zero tolerance for greenwashing**, urging private corporations to rectify their practices.
- The **European Union** approved the **world's first green bond standards to combat greenwashing** in October 2023.
 - The "European Green Bond" label mandates transparency, **directing 85% of funds to EU sustainable activities**. The legislation aims to support the EU's climate neutrality transition.

➤ Laws in India Related to Greenwashing:

- Greenwashing is designated as an unfair trade practice under the **Consumer Protection Act, 2019 in India**. The Act prohibits such **deceptive claims** and outlines penalties and remedies for consumers adversely affected by these misleading practices.
- In February 2023, the **Securities and Exchange Board of India (SEBI)** issued guidelines for issuers of **green debt securities** to ensure transparency and avoid greenwashing.
 - The guidelines are intended to protect investors, promote the development of the securities market, and regulate it.
- The **Advertising Standards Council of India (ASCI)** plays a regulatory role in monitoring advertising practices and holds some jurisdiction over allegations of greenwashing.
 - The ASCI, a voluntary self-regulatory organization in India, ensures ads are **legal, honest, and fair**, safeguarding consumer interests and **promoting fair competition**.

Note:



Climate Change Performance Index 2024

Why in News?

India's secured **7th position** in recently released **Climate Change Performance Index (CCPI) 2024** underscoring its notable role and contribution in the ongoing global efforts aimed at mitigating **climate change**.

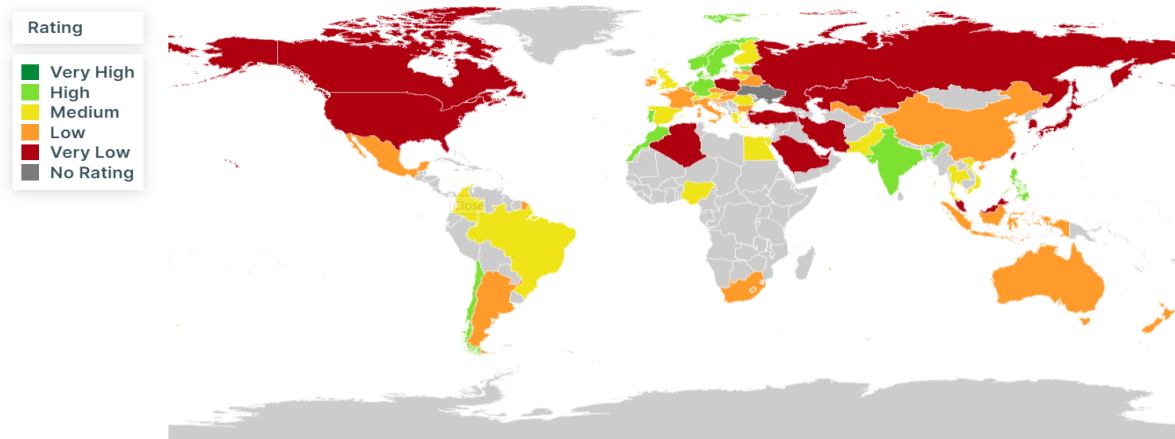
What are the Major Takeaways From CCPI 2024?

➤ **About:** CCPI, published annually since 2005, is an independent monitoring tool for tracking countries' climate protection performance. It increases **transparency in national and international climate policy** and enables comparison of individual countries' climate protection efforts and progress.

- It is published by **Germanwatch, the NewClimate Institute, and Climate Action Network International**.
- It indicates the **climate mitigation efforts of 63 countries and the EU**, which collectively account for over **90% of global greenhouse gas (GHG) emissions**.

- **Performance Metrics:** The CCPI evaluates countries across four key categories: **Greenhouse Gas (GHG) Emissions (40%)**, **Renewable Energy (20%)**, **Energy Use (20%)**, and **Climate Policy (20%)**.
- **CCPI 2024:** No country performed well enough in all index categories to achieve an overall very high rating. The **first three overall positions therefore remain empty**.
 - **Denmark** claimed the 4th spot, **Estonia** followed in 5th place, and the **Philippines** secured the 6th position among the top ranks.

Top 3 remain empty as countries must speed up implementation



➤ **India's Ranking in CCPI 2024:** India secured the **7th position** in the **CCPI 2024**, exhibiting a stride forward from **8th spot in CCPI 2023**. Interestingly, due to the **absence of countries in the first three spots**, India effectively stands **4th** in global climate performance.

- **India's Score and Rankings in Key Categories:**
 - **GHG Emissions & Energy Use:** India ranked **9th in GHG Emissions** and **10th in Energy Use** among assessed countries, largely attributed to its lower per capita energy use, a factor bolstering its climate standing.

- Also, in the per capita GHG category, the country is on track to meet a benchmark of well below 2°C.
- **Climate Policy:** India secured the **10th spot in Climate Policy**, showcasing moderate progress compared to its performance in previous assessments.
- **Renewable Energy:** India's performance showed a more moderate rank, standing at **37th**, barely remaining within the 'high' performance category.
 - This position marks a decline from the **24th spot in CCPI 2023**.

Note:

- Global Context and Comparative Analysis:
 - **Global Trends:** The CCPI report highlighted a concerning trend, despite the urgency to decarbonize, **global GHG emissions have increased in 2022, with atmospheric CO2 levels soaring 50% higher** than pre-industrial levels.
 - **G20-performance:** With **India (7th), Germany (14th), and the EU (16th)**, only three G20 countries/regions are among the high performers in CCPI 2024.
 - The G20 members account for **more than 75% of the world's greenhouse gas emissions**.
 - **Developed Countries:** Notably, many developed countries including the **United Kingdom, the United States, Italy**, and others showcased poorer performances compared to the **CCPI 2023**, reflecting a lack of substantial progress in countering climate change.

Note: The report also emphasizes **India's reliance on coal, oil, and gas to meet its energy needs**, despite efforts to promote renewable energy. This reliance contributes significantly to GHG emissions and severe air pollution in cities.

International Energy Agency's Coal 2023 Report

Why in News?

The **International Energy Agency's (IEA) annual coal market report** predicts a significant shift in the trajectory of global coal demand, **hinting at a structural decline by 2026**.

- This anticipated transformation is influenced by various factors, including the expansion of **renewable energy** and a rise in **nuclear generation** in key regions.

What are the Key Highlights of the Report?

- Global Coal Demand Trends:
 - Global coal demand reached a record high in 2022 amid the global energy crisis, rising by **4% year-on-year to 8.42 billion tonnes (Bt)**.
 - Asia remains the primary driver of coal demand growth in both power and non-power sectors.
 - China experienced a demand rise of 4.6%, equivalent to 200 million tonnes (Mt) of coal.
 - India saw a substantial increase of 9%, amounting to 97 Mt.

- Indonesia witnessed a remarkable surge of 32%, reaching 49 Mt, driven by nickel smelters.
- The United States faced an 8% decline in coal demand, totalling 37 Mt, the most significant drop among major markets.
- Europe, despite a 4.3% increase in consumption, exhibited more restrained growth than anticipated.
 - Subdued hydropower and nuclear electricity generation in certain European countries.
 - A weak economy and mild winter in Europe contributed to the restrained impact of natural gas price spikes.
- Future Projections and Uncertainties:
 - Anticipated decline in coal demand in most advanced economies during 2023.
 - Overall, global coal **consumption in 2026 is projected to be 2.3% lower than in 2023**.
 - Despite the expected decline, global coal consumption is projected to remain **above 8 billion tonnes through 2026**, highlighting its continued role as a significant source of **carbon dioxide emissions**.
 - **China, India, and Indonesia, the three largest coal producers globally**, are expected to break output records in 2023, pushing global production to a new high in 2023. These three countries **now account for more than 70% of the world's coal production**.
 - In China and India, in particular, rising coal consumption is driven by robust growth in demand for electricity and low **hydropower** output.
- Factors Influencing Decline in Coal Demand:
 - The decline in coal demand is attributed to a **global shift towards renewable energy sources**.
 - The IEA links the expected decline to changes in global climate, with **El Nino conditions transitioning to La Nina**, potentially leading to **increased hydropower output**.
 - The report highlights a significant upward trend in **low-cost solar photovoltaic deployment**, contributing to the growth of renewable power generation.
 - **Nuclear generation** is expected to see moderate increases, particularly in China, India, and the European Union, further influencing coal-fired generation.
- China's Dominance in Coal Markets:
 - China's coal consumption is expected to fall in 2024 and remain steady through 2026.

Note:



- Hydropower output is set to recover, while electricity generation from solar PV and wind is expected to increase significantly in China.
- The pace of **economic growth in China and its coal use is uncertain**, as the country undergoes major structural changes.
- India, Indonesia, and other emerging economies are expected to rely on coal for economic growth, despite commitments to deploy renewables.
- Efforts to reduce the use of **'unabated' coal**, in line with the **28th Conference of Parties (COP28)** are deemed essential for meeting international climate targets, aiming for a **nearly 95% reduction in coal emissions between 2020-2050**.
- Coal Industry Shifts:
 - Coal prices have experienced an unexpected surge over the past two years, impacting both consumers and industry dynamics.
 - Despite escalating costs, coal mining companies have maintained strong profit margins. This has allowed diversified mining firms to strategically reinvest coal profits in other commodities, capitalizing on the expected surge in demand linked to the **energy transition**.

What is the International Energy Agency?

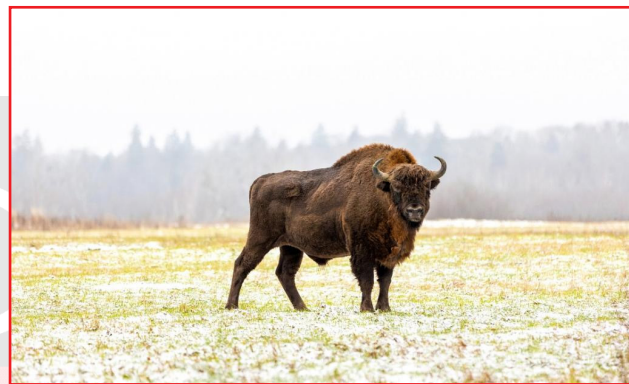
- **About:**
 - The International Energy Agency (IEA), which has its **headquarters in Paris, France** was set up as an **autonomous agency in 1974** by member countries of the **Organisation for Economic Cooperation and Development(OECD)** in response to the **mid-1970s oil crisis**.
 - The IEA's main focus is on energy policies, which include economic development, energy security, and environmental protection.
 - The IEA also plays a major role in providing information related to the international oil market and taking action against any physical disruptions in the supply of oil.
- **Members:**
 - The IEA family is made up of 31 member countries, 13 association countries including **India**, and 4 accession countries.
 - A candidate country to the **IEA must be a member country of the OECD**.
- **Major Reports:**
 - **World Energy Outlook.**
 - **World Energy Investment Report.**
 - **India Energy Outlook Report.**

The Wisent: European Bison

Why in News?

Recently, the ongoing war in Ukraine has cast a shadow over conservation efforts aimed at preserving the **wisent**, also known as the **European wood bison**.

- This majestic creature, once abundant across the European continent, faced near-extinction by **1927**.
- Despite successful conservation endeavors in **Ukraine** and **Russia**, the **Russian invasion of Ukraine** in February 2022 poses a significant threat to the revival and restoration of the wisent.



What is the Wisent (European Wood Bison)?

- **About:** The **European wood bison (Bison bonasus)** stands as the **largest and heaviest** terrestrial mammal in Europe.
 - Once comprising three subspecies, only one, **Bison bonasus bonasus**, remains extant, with the other two having succumbed to extinction.
- **Habitat:** Thriving in **grasslands**, **deciduous**, and **mixed forests**,
 - Noteworthy for its role as an **ecosystem engineer**, the wisent plays a crucial part in **restoring grassland habitats**.
- **Distribution:** Belarus; Lithuania; Poland; Russian Federation; Slovakia; Ukraine
- **IUCN Red list Status:** Near Threatened
- **Threats:** Rapid environmental change and hunting by humans were the main drivers of the wisent's extirpation across Europe.

Note:

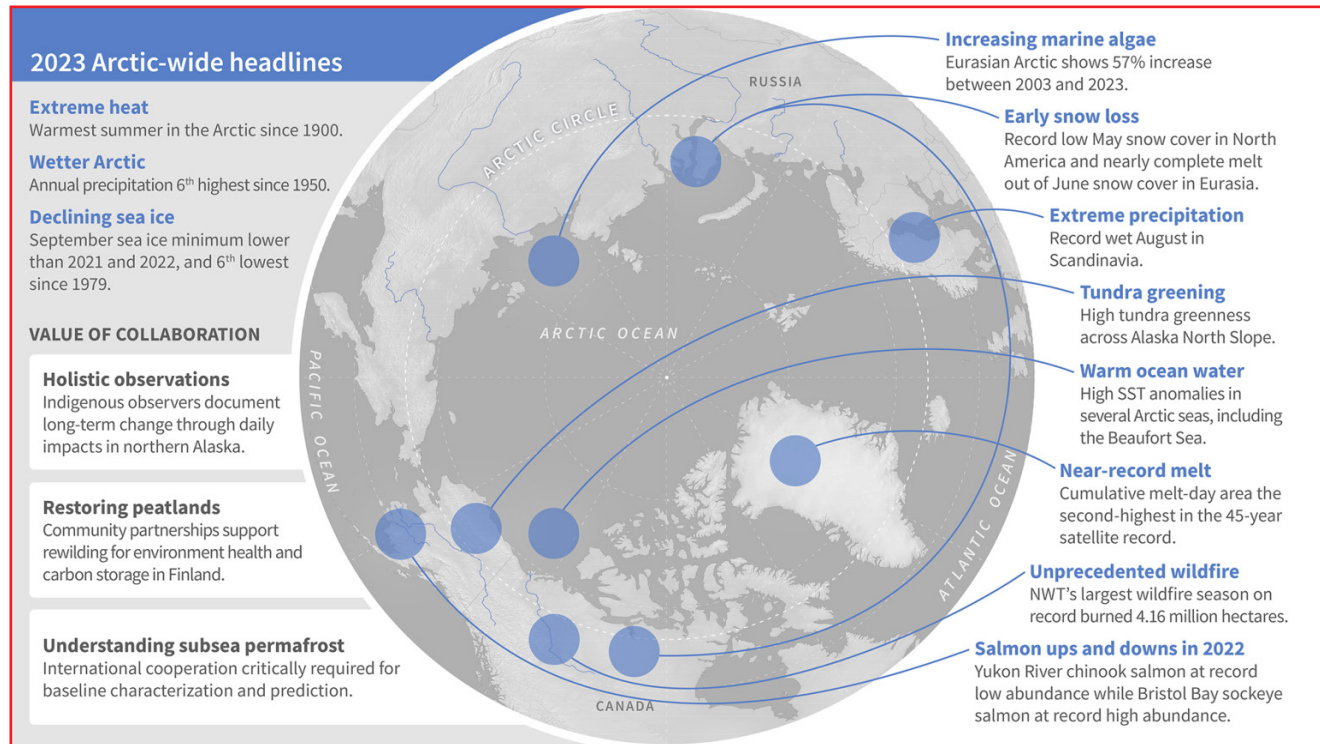
Annual Arctic Report Card: NOAA

Why in News?

Recently, the **National Oceanic and Atmospheric Administration (NOAA)** has released its 18th Annual

Arctic Report Card, highlighting the profound impact of extreme weather and Climate Events on the **Arctic**.

- NOAA is a **United States government agency** that is responsible for providing accurate and timely information about weather forecasts, climate, oceans, coasts, and even the exploration of outer space.



What is the Arctic Report Card?

- It has been Issued annually since 2006, the **Arctic Report Card is a timely and peer-reviewed source** for clear, reliable and concise environmental information on the current state of different components of the Arctic environmental system relative to historical records.

What are the Key Highlights of the Arctic Report Card?

- **Record High Temperatures:**
 - The 2023 summer was the **warmest on record in the Arctic**, which, due to climate change, has warmed nearly four times faster than the globe since 1979.
 - This year was noted as **the sixth warmest in the Arctic since reliable records began in 1900**.

- **Impact of Rising Temperatures:**
 - The soaring temperatures led to **unprecedented wildfires**, forcing community evacuations, a decline in sea ice extent, **severe floods, food insecurity**, and rising sea levels.
 - These impacts directly affect ecosystems, human health, and cultural practices.
- **Thawing of Subsea Permafrost:**
 - Warmer ocean temperatures are **accelerating the thawing of subsea Permafrost**, releasing methane and carbon dioxide.
 - This process contributes to **Global Warming** and exacerbates ocean acidification. There's concern about the unknown extent and impact of these released greenhouse gasses.
- **Food Insecurity Due to Salmon Decline:**
 - Western Alaska **experienced significantly reduced populations of Chinook** and chum salmon (81% and 92% below the 30-year mean, respectively),

Note:



impacting **Indigenous communities reliant on these fish for sustenance.**

- This decline has cultural, food security, and economic implications.
- Wildfires in Arctic Regions:
 - Canada witnessed **its worst wildfire season on record**, affecting 40% of its land mass considered Arctic and Northern.
 - High temperatures and dry conditions facilitated the **burning of over 10 million acres in the Northwest Territories**, leading to evacuations and diminished air quality.
- Glacier Thinning and Flooding:
 - Rising temperatures have **led to dramatic thinning of the Mendenhall Glacier**, located in Alaska, over the past 20 years
 - As a result, over the years, **the meltaway water has annually caused floods** in the region.
 - One such disaster took place in August 2023, when “a glacial lake on a tributary of the Mendenhall Glacier burst through its ice dam and caused unprecedented flooding and severe property damage” **in Alaska’s Juneau.**
- Greenland Ice Sheet Melting:
 - Greenland’s ice sheet experienced melting for only the **fifth time in the 34-year record**. Not only this, the ice sheet continued to lose mass despite above-average winter snow accumulation — between August 2022 and September 2023, it lost roughly 350 trillion pounds of mass. Notably, Greenland’s ice sheet melting is the **second-largest contributor to sea-level rise.**

What is the Arctic?

- The Arctic is a polar region located at the northernmost part of Earth.
- Land within the Arctic region has seasonally varying snow and ice cover.
- It consists of the Arctic Ocean, adjacent seas, and parts of Alaska (United States), Canada, Finland, Greenland (Denmark), Iceland, Norway, Russia, and Sweden.

IUCN Red List Update 2023

Why in News?

Recently, the **International Union for the Conservation of Nature (IUCN) Red List** underwent an update, featuring thousands of new species assessments and reassessments.

- This information was presented at the **28th Conference of Parties**, shedding light on the escalating impacts of climate change on a diverse range of species.
- The IUCN Red List now includes 157,190 species, of which 44,016 are threatened with extinction.

What are the Key Highlights of the Report?

- Climate Change Threatens Diverse Species:
 - Species ranging from Atlantic salmon to green turtles face growing threats due to **climate change.**
 - IUCN Director General, emphasises the urgency of ambitious **climate action to combat species decline.**
 - The IUCN Red List update underscores the interlinked nature of climate and **biodiversity crises**, urging joint efforts for sustainable solutions.
- Freshwater Fish Assessment:
 - The first comprehensive assessment of **global freshwater fish species** is revealed.
 - 25% of assessed freshwater fish species are at risk of extinction.
 - Climate change, pollution, **overfishing**, and invasive species contribute to the decline.
- Impact on Atlantic Salmon:
 - Atlantic salmon (*Salmo salar*) are ray-finned fish that can grow up to a meter long, found in the North Atlantic Ocean basin. They are **anadromous**, meaning they live in both fresh and saltwater.
 - Atlantic salmon population declined by 23% (2006-2020), moving them from Least Concern to Near Threatened.
- Green Turtles Facing Extinction:
 - Central South Pacific and East Pacific **green turtle** populations are respectively **Endangered and Vulnerable.**
 - Climate change poses threats throughout their life cycle, impacting hatching success and food sources.
- Mahogany Trees Facing Endangerment:
 - The big-leaf mahogany (*Swietenia macrophylla*), a sought-after timber tree, shifts from **Vulnerable to Endangered.**
 - Unsustainable harvest, **urban encroachment**, and **illegal logging** contribute to a **60% reduction over 180 years.**
- Conservation Success Stories:
 - **Scimitar-horned oryx**, a **desert antelope** moves from **Extinct in the Wild to Endangered**, showcasing successful reintroduction efforts in the Republic of Chad.
 - **Saiga antelope** improves from **Critically Endangered to Near Threatened** due to conservation measures.

Note:

International Union for the Conservation of Nature (IUCN) Red List

- The IUCN Red List is the foremost global resource for **assessing the risk of extinction among animals, fungi, and plant species**.
- Accessible to all, it serves as a **crucial indicator of global biodiversity health**, it offers comprehensive insights into species' characteristics, threats, and conservation measures, playing a pivotal role in shaping informed conservation decisions and policies.
- The IUCN Red List Categories define the extinction risk of species assessed. Nine categories extend from **NE (Not Evaluated) to EX (Extinct)**. **Critically Endangered (CR), Endangered (EN) and Vulnerable (VU)** species are considered to be threatened with extinction.
 - It is also a key indicator for the **Sustainable Development Goals** and **Aichi Targets**.
- The IUCN Red List includes the **IUCN Green Status of Species**, which **assesses the recovery of species' populations** and measures their conservation success.
 - There are eight Green Status Categories: Extinct in the Wild, Critically Depleted, Largely Depleted, Moderately Depleted, Slightly Depleted, Fully Recovered, Non-Depleted and Indeterminate.

- A Green Status assessment examines how conservation actions have affected the current Red List status.

Production Gap Report 2023

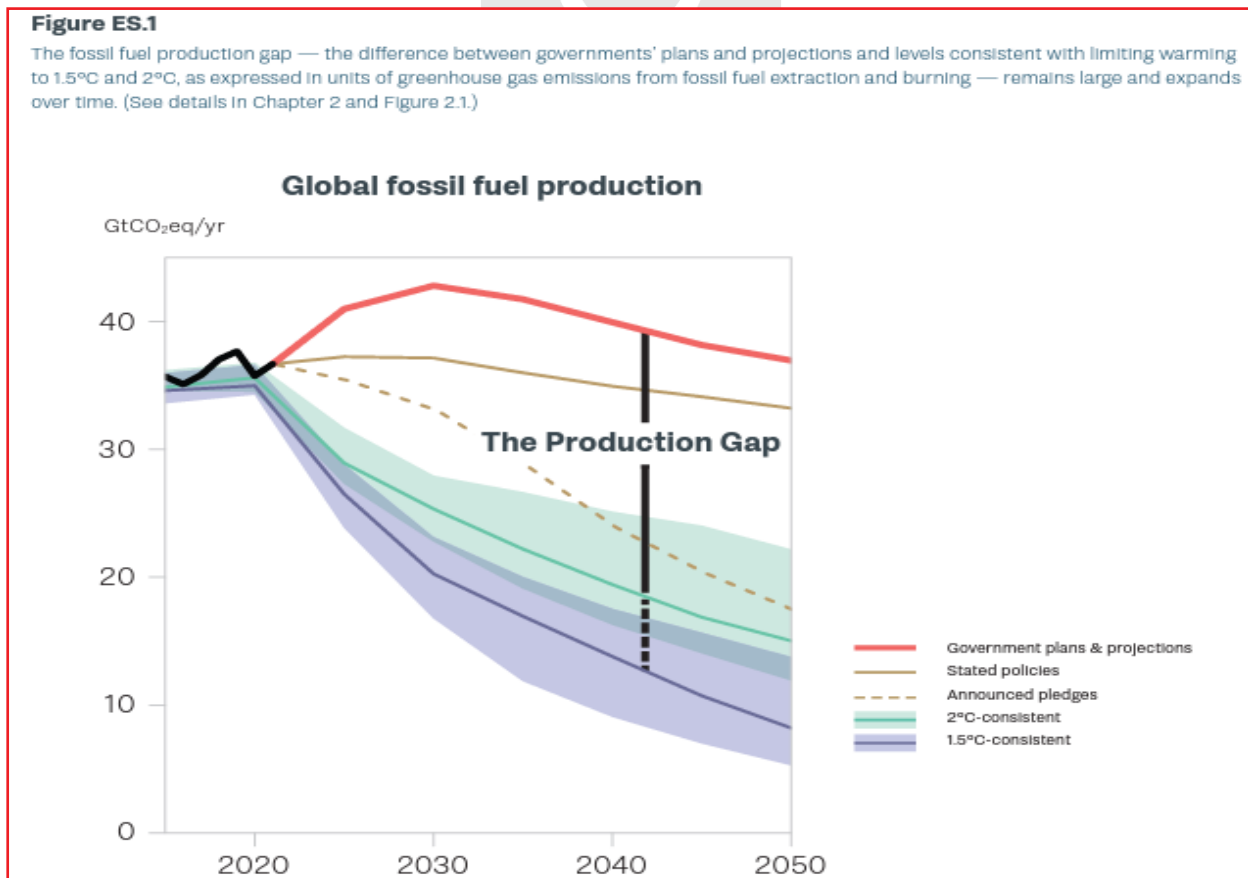
Why in News?

Recently, **Production Gap report 2023** has been published by the **Stockholm Environment Institute (SEI)**, Climate Analytics, E3G, International Institute for Sustainable Development (IISD) and the **UN Environment Programme (UNEP)**.

- The report assesses governments' planned and projected production of coal, oil, and gas against global levels consistent with the **Paris Agreement's** temperature goal.
- The production gap is the difference between governments' planned fossil fuel production and global production levels consistent with **limiting global warming to 1.5°C or 2°C**.

Figure ES.1

The fossil fuel production gap — the difference between governments' plans and projections and levels consistent with limiting warming to 1.5°C and 2°C, as expressed in units of greenhouse gas emissions from fossil fuel extraction and burning — remains large and expands over time. (See details in Chapter 2 and Figure 2.1.)



Note:

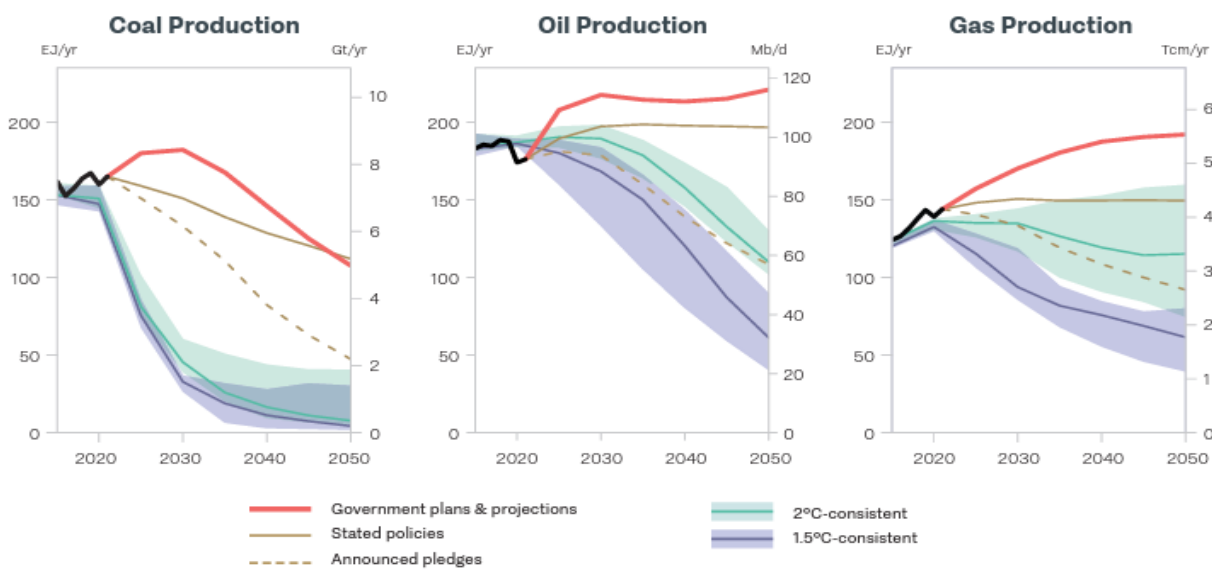
What are the Key Findings of the Production Gap Report?

- **Projected Increase in Fossil Fuels Production:** Governments are planning to produce twice as much fossil fuel in 2030 than is compatible with the 1.5°C warming limit.
 - This **projection exceeds the 2°C target by 69%**, emphasizing the pressing need for more ambitious climate action.
 - Taken together, government plans and projections **would lead to an increase in global coal production until 2030**, and in global oil and gas production until at least 2050.
 - This **conflicts with government commitments under the Paris Agreement**, and clashes with expectations that global demand for coal, oil,

and gas will peak within this decade even without new policies.

- Major producer countries have pledged to achieve net-zero emissions and launched initiatives to reduce emissions from fossil fuel production, but **none have committed to reduce coal, oil, and gas production in line with limiting warming to 1.5°C.**
- **India Specific Findings:**
 - India's Updated NDCs:
 - **Emission Reduction:** **India's NDC** aims to cut emissions intensity by 45% compared to 2005 levels by 2030.
 - **Renewable Energy Share:** It targets 50% non-fossil power capacity by 2030.
 - **Long-term Vision:** The updated NDC is a stride toward the 2070 **net-zero emissions goal.**

Government plans and projections would lead to an increase in global coal production until 2030, and in global oil and gas production until at least 2050. (See details in Chapter 2 and Figure 2.2.)



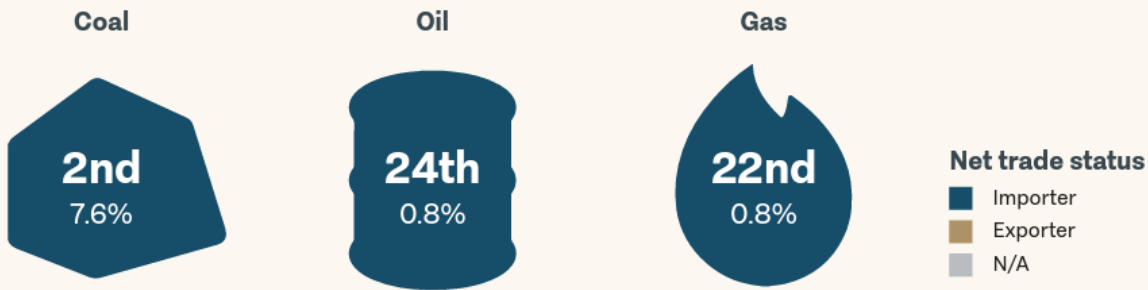
- Government's Stance on Fossil Fuel Production:
 - **Low-Carbon Transition with National Scale:** The Long Term-Low Emission Development Strategy(LT-LEDS) released during **COP27** commits to a low-carbon shift that preserves development needs.
 - Emphasis is placed on maintaining energy security, access, and employment.
 - **Support for Domestic Fossil Fuel:** An emphasis on self-reliance calls for the expansion of coal production to generate state income and job opportunities.
 - Plans include scaling up domestic oil and gas exploration to meet increasing demand as

the country's **demand for gas** is expected to **rise by over 500% by 2030.**

- The government has set up rolling electronic auctions of mining blocks to increase domestic coal production and is encouraging **foreign direct investment** in the oil and gas sector
- While investing in green energy, India maintains its commitment to fossil fuels, primarily coal.
- **ONGC Videsh Ltd (OVL)**, a subsidiary of India's national oil company, has stakes in 33 oil and gas projects in 15 countries (ONGC Videsh, 2023).

Note:

Rank of country in, and share of, global production, and net trade status



Fossil fuel transition capacity and dependence indicators



Global Tiger Numbers Rise, Southeast Asia Faces Habitat Threats

Why in News?

Countries have submitted **tiger** population numbers from 2010-2022 to the **Global Tiger Recovery Program (GTRP)** and **United Nations Convention on International Trade in Endangered Species (CITES)** under GTRP 2.0 which aims to pave the way for tiger conservation from 2023-2034.

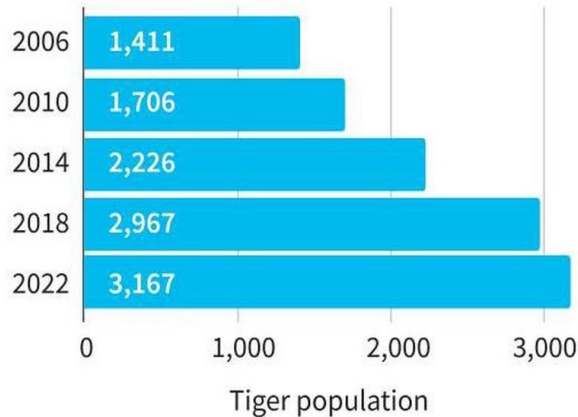
- The St Petersburg Declaration in 2010 saw 13 tiger range countries commit to reversing the decline of the species population and double their numbers by 2022.

What is the Status of Tiger Conservation in World?

- The **wild tiger status is good in South Asia and Russia**, but the picture in Southeast Asia is grim, posing challenges to the global tiger population recovery.

Big cat count

According to the data released by the PM, the number of tigers in India increased by 200 in the past four years. A look at the tiger population



Steady rise: A tiger at Van Vihar National Park in Bhopal on Sunday. PTI

Note:

- There has been an **overall increase in the tiger population by 60%, taking the number to 5,870.**
 - However, countries like **Bhutan, Myanmar, Cambodia, Lao-PDR and Vietnam** showed a **decline in tiger populations**, making the situation “grim” in the Tiger Range Countries (TRCs) of Southeast Asia.
- The **success of countries in South Asia like Bangladesh, Bhutan, India and Nepal** including China and Russia in North East Asia is attributed to effective measures taken for habitat conservation and protection.
 - India’s wild tiger population is 3,167 in 2022. Nepal has tripled the tiger population.

Baler Machine

Why in News?

With the problem of farm fires being taken up by the **Supreme Court**, Belar, a machine that facilitates **ex-situ**

(**off-site**) stubble management has been in demand in Punjab and adjacent regions.

- Baler machines have been around for a decade, and currently around 2,000 of them operate in Punjab. Of these 1,268 are highly subsidised (50-80%) under the Centre’s **Crop Residue Management (CRM) scheme.**

What is a Baler Machine?

➤ About:

- Balers play a **pivotal role in stubble compression, acting as hydraulic presses to compact crop residues into dense, manageable packages.** These compressed stubbles are securely bound using twine, wire, or strapping.
 - **Before using a baler machine, farmers cut the crop residue** with a tractor-mounted cutter. A tractor-mounted baler machine compresses the stubble into compact bales using netting.



Note:

➤ Significance:

- **Environmental Preservation:** Eliminates the need for **crop stubble burning**, contributing to **reduced air pollution** and soil degradation.
 - Farmers burn stubble after harvesting, which contributes to air pollution. Balers offer an environmentally-friendly alternative to burning stubble by compressing it into bales.
- **Resource Efficiency:** Efficiently **compresses stubble**, making it easier for handling, transport, and storage.
 - It allows farmers to immediately plough the field and sow the next crop.
- **Economic Gain:** Opens **avenues for revenue generation** through the sale of compressed stubble as a **valuable resource**.

➤ Other Ways to Handle Stubble:

- **In-situ treatment of Stubble:** For example, crop residue management by zero-tiller machine and [Use of bio-decomposers \(e.g., Pusa bio-decomposer\)](#).
- **Use of Technology:** For example, Turbo Happy Seeder (THS) machine, which can uproot the stubble and also sow seeds in the area cleared. The stubble can then be used as mulch for the field.

One Year of Project Cheetah

Why in News?

Project **Cheetah**, India's ambitious attempt to introduce **African cheetahs** in the wild in the country, has been **completed a year** after its launch in **September 2022**.

- The project has claimed to have achieved **short-term success on four counts**: "**50% survival of introduced cheetahs from South Africa and Namibia**, the establishment of **home ranges**, the **birth of cubs in Kuno**", and revenue generation for local communities.

What Are the Comprehensive Outcomes of Project Cheetah's First Year?

➤ Survival in the Wild:

- According to [the Cheetah reintroduction project](#), Cheetahs, meant for a total of **142 months in the wild, spent less than 27 months combined**.
- The project faced a **setback with a 40% loss in the functional adult population**, resulting in the **death of six out of 20 cheetahs**, including Dhatri, Sasha, Suraj, Uday, Daksha, and Tejas.
 - Additionally, four cubs were born in India, of which three died, and the fourth is being raised in captivity.

Ideal situation vs what happened in Kuno

MONTHS THE CATS SHOULD HAVE SPENT IN WILD IN INDIA

	Namibian		South African	
	Male	Female	Male	Female
Numbers	3	5	7	5
Months ideally in the wild	10	9	6	5
'Cheetah months' ideally in wild	30	45	42	25

Source: Project Cheetah Annual Report



Total 'cheetah months' that should ideally have been spent in wild

142

MONTHS ACTUALLY SPENT IN WILD IN INDIA

Cheetah	Namibian		South African	
	Cheetah	Months in the Wild	Cheetah	Months in the Wild
Pawan		1.75	Gamini	2
Asha		4.37	Agni	1.25
Gaurav		4	Vayu	1.3
Shaurya		4	Nirva	2.5
Dhatri*		2	Veera	1.1
Jwala#, Nabha# and Sasha*# not released in the wild			Dheera	0.75
			Pravash	0.5
			Pavak	0.5
			Suraj*	0.75
TOTAL		16.12	TOTAL	10.65

26.77

Total months spent by all cheetahs in the wild

*Dead adult, #Unfit for the wild

Note:



drishti

➤ Home Range Establishment:

- The goal was for cheetahs to establish home ranges in Kuno.
 - **Only three cheetahs**, namely Namibian imports Asha, Gaurav, and Shaurya, spent more than three months continuously in **the wild**. However, they have been confined to bomas(enclosures) since July 2023.
- There are doubts about the successful establishment of “home ranges” in Kuno.

➤ Reproduction Success:

- The Action Plan aimed at successful cheetah reproduction in the wild.
 - **Siyaya aka Jwala, a Namibian female**, gave birth to four cubs in Kuno. However, she was captive-raised and considered unfit for the wild. Her cubs were born inside a hunting boma.
- The reproduction goal faces challenges and compromises, raising questions about the project’s long-term success.

➤ Contribution to Local Livelihood:

- Project Cheetah positively contributed by generating jobs, and contracts, and **appreciating land prices around Kuno**.
 - **No reported human-cheetah conflicts** in the area, indicating a harmonious coexistence between the introduced cheetahs and local communities.

What is the Cheetah Reintroduction Project?

- The Cheetah Reintroduction Project in India formally commenced on September 17, 2022, to restore **the population of cheetahs**, which were declared **extinct in the country in 1952**.
- The project involves the translocation of cheetahs from South Africa and Namibia to **Kuno National Park in Madhya Pradesh**.
- The project is implemented by the **National Tiger Conservation Authority (NTCA)** in collaboration with the **Madhya Pradesh Forest Department, Wildlife Institute of India (WII)**, and cheetah experts from Namibia and South Africa.

Cheetah

Common Name - Cheetah

Scientific Name - *Acinonyx jubatus*

- *Acinonyx jubatus jubatus* (African Cheetah)
- *Acinonyx jubatus veneticus* (Asiatic Cheetah)

Reintroduction of Cheetah to India:

- The “Action Plan for Introduction of Cheetah in India” was released by MoEF&CC at the 19th meeting of the National Tiger Conservation Authority (NTCA) (January 2022).
- Such a plan was first proposed in 2009.
- In September 2022, eight cheetahs landed in India from Namibia.
- The 8 cheetahs have been relocated to the Kuno-Palpur National Park, Madhya Pradesh.
- The relocation of cheetahs to India from Namibia is the world’s first inter- continental large wild carnivore translocation project.

Slightly brownish and golden skin; thicker than the Asiatic Cheetahs

More prominent spots and lines on the face

Found all over the African continent

IUCN Red List Status - Vulnerable

African Cheetah


Slightly smaller than the African ones.

Pale yellowish fawn coloured skin - more fur under body, belly specifically.

Found only in Iran; the country claims there are only 12 of them left. Year 1952 - Asiatic Cheetah officially declared extinct from India.

IUCN Red List Status - Critically Endangered

Asiatic Cheetah



Note:

- Cheetahs, the **fastest land animals**, are considered “**crepuscular**” hunters, meaning they hunt at sunrise and sunset.
- Cheetah females have a **gestation period of 92-95 days**; and will give birth to a litter of approximately three or five cubs.

Note:

Composite Water Management Index

Why in News?

The **Composite Water Management Index (CWMI)** has been a pivotal tool in India, serving as a significant **barometer for assessing states' efficacy in water management.**

- However, recent developments have **raised queries regarding its future, casting doubts on its continuity.**

What is the Composite Water Management Index?

➤ About:

- The **Composite Water Management Index (CWMI)** is launched by **NITI Aayog** to provide an annual snapshot of the water sector status and **water management performance of the states and union territories (UTs) in India.**

➤ Genesis and Evolution of the Report:

- Launched in **June 2018 by Niti Aayog**, the CWMI's debut edition spotlighted India's water challenges, **rating states based on 28 parameters, utilizing data from 2015-16 and 2016-17.** The second edition launched in August 2019 was for 2017-18.
 - The report was a result of collaborative efforts between **NITI Aayog and three key ministries: Water Resources, Drinking Water & Sanitation, and Rural Development.**

➤ Themes and Indicators:

- The Index comprises **nine themes** (each having an attached weight) with 28 different indicators.
 - Source augmentation and restoration of waterbodies
 - Source augmentation (Groundwater)
 - Major and medium irrigation — Supply side management
 - Watershed development — Supply side management
 - Participatory irrigation practices — Demand side management
 - Sustainable on - farm water use practices — Demand side management
 - Rural drinking water

- Urban water supply and sanitation
- Policy and governance

➤ Delay in Subsequent Editions:

- The NITI Aayog attributed delays in the third and fourth rounds of the CWMI to the unavailability of updated data caused by the Covid-19 pandemic.
 - Considerations were made to **combine rounds 3.0, 4.0, 5.0, and 6.0** to cover the years 2021-22 and 2022-23, while contemplating extending data coverage to the **district level.**

What is the Status of Water Resources in India?

- The **net amount of water that can be used in India in a year is estimated at 1,121 billion cubic meters (bcm).** However, the data published by the Ministry of Water Resources shows that the total water demand will be 1,093 bcm in 2025 and 1,447 bcm in 2050.
 - This means that there will be a major water shortage in India within 10 years.
- As per the **Falkenmark Water Index** (used for measuring water scarcity throughout the world), wherever the amount of water available per capita is below 1,700 cubic meters in a year, there is water scarcity.
 - Going by this index, **almost 76% of people are already living with water scarcity in India.**

What are the Government Initiatives Related to Water Management in India?

- **National Aquifer Mapping and Management Program**
- **Jal Shakti Abhiyan**
- **National Water Policy, 2012**
- **Atal Bhujal Yojana**

8-Point Plan in NCR and Nearby Regions under GRAP Stage-IV

Why in News?

Commission for Air Quality Management in National Capital Region (NCR) and Adjoining Areas has invoked an **eight-point action plan aligning with Stage-IV of the Graded Response Action Plan (GRAP)**, aiming to avert any additional decline in the **region's air quality.**

Note:

What is the Graded Response Action Plan (GRAP)?

➤ **About:**

- The **GRAP** consists of emergency measures designed to prevent the deterioration of air quality after reaching specific thresholds in the **Delhi-NCR region**.
- The **Ministry of Environment, Forests & Climate Change (MoEF&CC)** notified the GRAP in 2017.
- Commission for Air Quality Management in NCR & Adjoining Areas (CAQM) implements the GRAP.

➤ **Implementation:** It is implemented under four stages:

- **GRAP is incremental in nature** and thus, when the air quality dips from 'poor' to 'very poor,' measures listed under both sections have to be followed.

The stages and restrictions

Good 0-50	Satisfactory 51-100	Moderate 101-200
Poor 201-300	Very Poor 300-400	Severe 401-500

STAGE I (AQI 201-300)

Agencies to strictly enforce orders by NGT, SC on keeping vehicles older than 10 years (for diesel) and 15 years (petrol) off roads.

STAGE II (AQI 301-400)

- Measures to curb air pollution at hot spots
- Diesel generators of more than 19KW cannot be used unless they run on dual fuel or have emission control devices.

STAGE III (AQI 401-450)

- BS-III petrol, BS-IV diesel private cars to be banned in NCR. Last year, the rule was optional for state governments
- Schools will likely be closed for children up to Class 5.

STAGE IV (AQI OVER 450)

- Light commercial vehicles registered outside Delhi will be restricted except those that are EVs/CNG/ BS-VI diesels. Vehicles carrying essentials or providing essential services to be allowed
- Educational institutions will likely be closed. Non-emergency commercial activities and odd-even vehicle policy may be rolled out.

Note:



drishti

What is the Eight Point Action Plan as per Stage-IV of GRAP?

- Prohibiting the entry of truck traffic into Delhi, except for those transporting essential goods and services, along with LNG/CNG/electric trucks.
- Restricting non-Delhi-registered **Light Commercial Vehicles (LCVs)** to enter Delhi, unless they are EVs/CNG/BS-VI diesel, except for essential service carriers.
- Banning the operation of Delhi-registered diesel **Medium Goods Vehicles (MGVs)** and **Heavy Goods Vehicles (HGVs)**, except for those transporting essential items.
- Imposing a prohibition on construction and demolition (C&D) activities in linear public projects like highways, roads, flyovers, power transmission, and pipelines.
- Advising NCR State Governments and GNCTD to transition physical classes for grades VI to IX, XI to online mode.
- Directing NCR State Governments/GNCTD to consider allowing 50% capacity in public, municipal, and private offices, with the remainder working remotely.
- Empowering the Central Government to decide on work-from-home protocols for employees in Central Government offices.
- Encouraging State Governments to contemplate additional emergency measures such as the closure of educational institutions, non-essential commercial activities, and implementing an odd-even vehicle registration number scheme.

Critical Evaluation of Elephant Corridor Report 2023

Why in News?

Several discrepancies have been identified in the recently published "**Elephant Corridors of India, 2023**" report by the central government.

What are the Major Discrepancies Observed in the Elephant Corridors of India 2023 Report?

- **Corridor Definition Inconsistencies:** Critics argue that the initial significance of corridors has been diluted, as there is a trend to label any area where elephants move as corridors.
 - This has led to the classification of landscapes and habitats as corridors in the report and the subsequent surge in the number of elephant corridors.
- **North and Northeast Corridor Discrepancies:** Critics argue that while certain areas in West Bengal are suitable for elephants due to small forest patches, most regions elephants traverse in South Bengal are dominated by agriculture.
 - The report proposes linking these areas to other elephant landscapes, a departure from the original intent of a corridor.
 - Expansive corridors might escalate human-elephant conflicts.
- **Dangers to Elephants:** Critics argue that the expansion of elephant ranges has also led to increased incidents of elephant deaths due to electrocution and falling into wells.

What are the Project Elephant Directives on Elephant Corridors?

- In 2005-06, **Project Elephant** issued directives to states regarding elephant corridors. It stated that corridors in forest areas should adhere to the rules outlined in the **Wild Life (Protection) Act, 1972**.
 - Meanwhile, areas with revenue and private lands were instructed to comply with the **Environment (Protection) Act, 1986** as eco-sensitive areas, potentially prohibiting red-category industries.

Note:

ELEPHANT



4 Main Species of Elephant

Species	Found in	IUCN Red List Status	Habitat
Indian	Asia	EN (CITES - Appendix I, WPA - Schedule I)	Subtropical broadleaf forest, tropical broadleaf moist forest, dry forest, grassland
Sumatran	Asia	CR	Broadleaf moist tropical forests
Savanna (Bush)	Africa	EN	All sub-Saharan Africa except for Central Africa's dense tropical forest
Forest	Africa	CR	Dense Tropical Forests

Indian Elephant (*Elephas maximus*)

Largest Land Mammal on Asian Continent
National Heritage Animal of India

Top 5 Indian States by Maximum Elephant Population:

(As per elephant census 2017)

- Karnataka > Assam > Kerala > Tamil Nadu > Odisha

Social Structure:

- Female elephants are more social than males; form herd (generally 5-7)
 - Led by the oldest female, the 'matriarch'
- Males usually live alone

Threats:

- Habitat Fragmentation
- Poaching for Ivory
- Human-Elephant Conflict
- Mistreatment in Captivity

Conservation Efforts:

- Gaj Soochna App (2022)
- Gaj Yatra (2017)
- Hathi Mere Sathi campaign (2011)
- National Elephant Corridor project (2005)
- Monitoring the Illegal Killing of Elephants (MIKE) Programme (2003)
- Project Elephant (1992)

What are Elephant Corridors?

About:

- Elephant corridors are **strips of land** that enable elephant movement between two or more friendly habitats.
- Major Takeaways from Elephant Corridors of India, 2023 Report:
 - The report highlighted a **surge of 62 new corridors**, marking a 40% increase since 2010, now **totalling 150 corridors across the nation**.
 - **West Bengal** has the highest number of elephant corridors, totaling **26**, constituting **17% of the total corridors**.
 - The **East central region** contributes **35% (52 corridors)**, and the **North East region** follows as the **second-largest with 32% (48 corridors)**.
 - **Southern India** registered 32 elephant corridors, representing 21% of the total, while **northern India** has the lowest count of 18 corridors, amounting to 12%.
 - Elephants have expanded their ranges in the **Vidarbha region of Maharashtra** and southern Maharashtra bordering Karnataka.
 - Their presence has also increased in areas such as **Madhya Pradesh within the Sanjay Tiger Reserves and Bandhavgarh**, along with expanded ranges in **northern Andhra Pradesh, allowing movement from Odisha**.

Note:

Elephant Reserves

33 Elephant Reserves

(as of November 2022)



FACTS

- Tamil Nadu and Assam have the highest number (5) of elephant reserves in India.
- The Indian elephant *Elephas maximus* is included in Schedule I of the Indian Wildlife (Protection) Act, 1972 and in Appendix I of CITES.
- Indian Elephant has also been listed in the Appendix I of the Convention of the Migratory Species and as 'Endangered' in the IUCN Red List.
- The elephant was declared the National Heritage Animal of India in 2010.
- MoEFCC provides financial and technical support to major elephant range states in the country through Project Elephant. Project Elephant was launched by the Government of India in the year 1992 as a Centrally Sponsored Scheme.



Note:



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Adaptation Gap Report, 2023

Why in News ?

As per the latest edition of **Adaptation Gap Report, 2023** released by **UN Environment Programme**, developing countries, together, **need at least USD 215 billion every year** this decade to carry out meaningful adaptation work. In 2021, **just about USD 21 billion** went to developing countries for adaptation projects, which was down about 15% from the previous years.

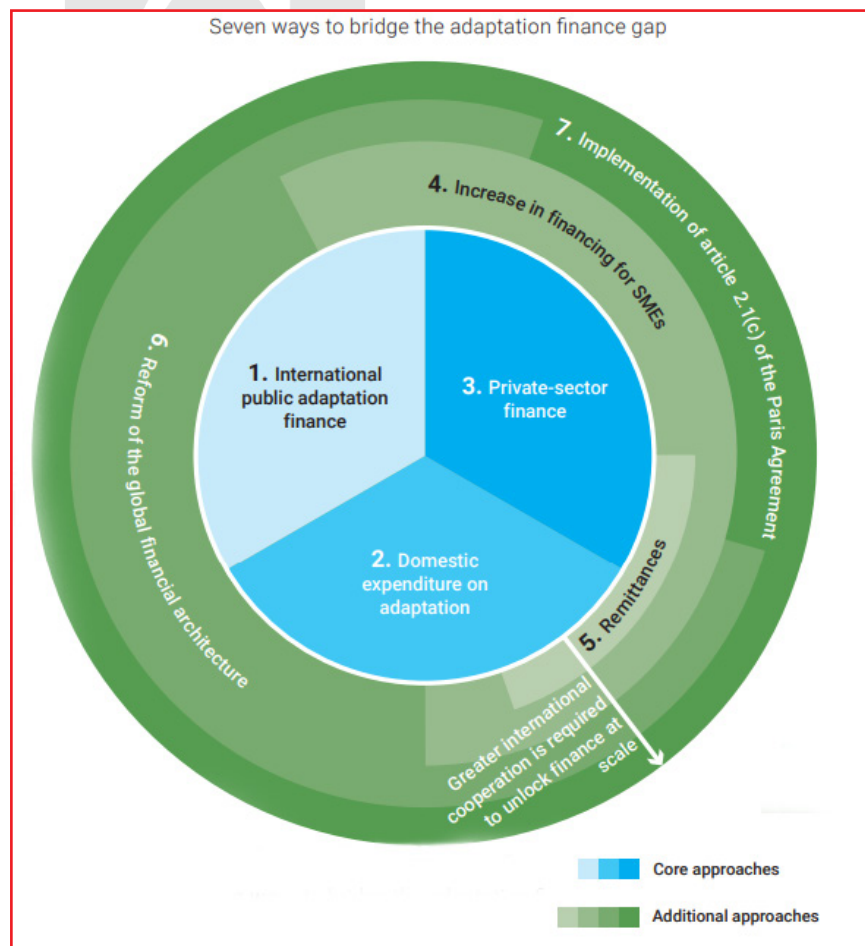
- This year's report focuses on **adaptation finance**, or the availability of money to carry out the adaptation projects.

What are the Key Highlights of the Adaptation Gap Report, 2023?

- Adaptation Finance Gap:
 - The adaptation finance gap – the difference between estimated adaptation financing needs and costs and finance flows – has grown over the past.
 - The adaptation gap is likely **10-18 times as great as current international adaptation finance flows** – at least **50% higher than previous range estimates**.
 - The current adaptation finance gap is now estimated at **USD 194-366 billion per year**.
- Gender Equality in Financing:
 - Of the international public finance for adaptation that is also tagged with gender equality as a principal objective, only 2% is assessed as gender-responsive, with a further 24% considered gender-specific or integrative.
- Seven Ways to Increase Financing:
 - Private Financing:
 - **Domestic expenditure and private finance** are

potentially important sources of adaptation finance where domestic budgets are likely to be a large source of funding for adaptation in many developing countries, **ranging from 0.2 % to over 5 % of government budgets**.

- There is also fragmented evidence of increasing private-sector adaptation interventions all over the world and in most sectors such as water, food and agriculture; transport and infrastructure; tourism.
- Internal Investments:
 - **'Internal Investments'** by large companies, financial institutions' provision of finance for activities that contribute to **adaptation, and companies' provision of adaptation goods and services** are much needed.
 - Also the options of **Corporate Social Responsibility** can be explored in India for achieving climate financing and adaptation goals.



Note:

- Reform of Global Financial Architecture:
 - Report calls for a reform of **global financial architecture**, to **ensure greater and easier access to finance for climate-related purposes** from multilateral agencies the **World Bank** or the **International Monetary Fund (IMF)** after it has become evident that current levels of international financial flows for fighting climate change are highly inadequate.

Global Declaration for River Dolphins

Why in News?

Recently, **11 Asian and South American** countries signed a landmark deal in Bogota, Colombia to save the world's **six surviving species of river dolphins** from extinction.

- This landmark deal signifies a ray of hope in combating the severe decline of river dolphin populations, which have dwindled by a staggering **73% since the 1980s**.

What is the Global Declaration for River Dolphins?

➤ About:

- The **Global Declaration for River Dolphins** aims to halt the **decline of all river dolphin species** and bolster the most vulnerable populations through concerted efforts.
 - It outlines measures such as **eradicating gillnets, reducing pollution, expanding research initiatives**, and creating protected areas to safeguard the remaining river dolphin species.
- Countries that adopted the declaration include: Bangladesh, Bolivia, Brazil, Cambodia, Colombia, Ecuador, **India**, Nepal, Pakistan, Peru, and Venezuela.
 - There was also a representative from

the regional government in Indonesia that has responsibility for the Mahakam river.

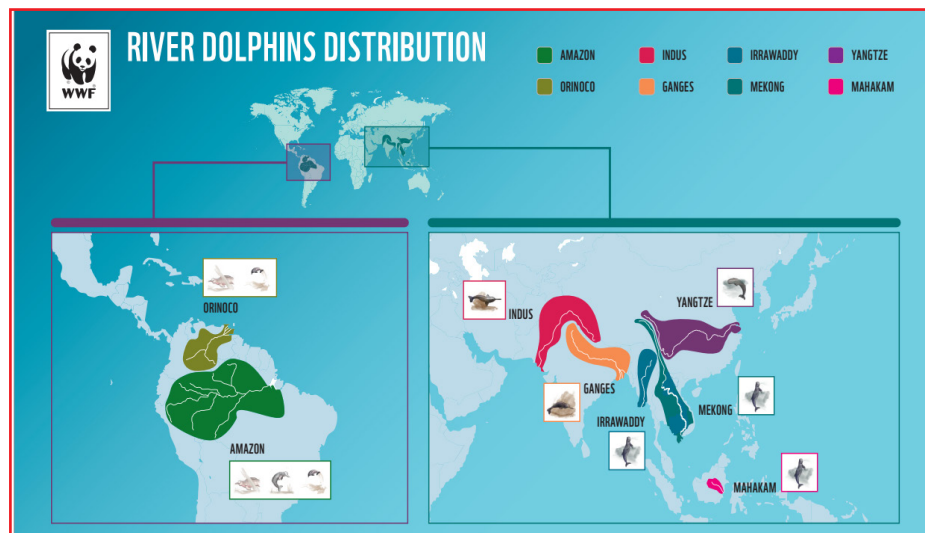
➤ Foundational Pillars:

- The **eight foundational pillars** of the Global Declaration for River Dolphins comprise initiatives like **establishing a network of protected areas, improving river dolphin site management, expanding research and monitoring efforts, engaging local communities and Indigenous Peoples, eradicating unsustainable fishing practices, enhancing water quality and quantity, promoting World River Dolphin Day (24th October)** to raise awareness, and augment resource allocation and partnerships.

What are the Key Facts Associated with River Dolphins?

➤ About:

- River dolphins are a group of **freshwater cetaceans** that inhabit various river systems across Asia and South America.
- The **Six Surviving River Dolphin Species** include: **Amazon, Ganges, Indus, Irrawaddy, Tucuxi, and the Yangtze finless porpoise**.
 - The Chinese river dolphin was deemed 'probably extinct' in 2007.
- As per the **IUCN Red list**, **Yangtze finless porpoise** are classified as **Critically Endangered**.
 - Amazon, Ganges, Indus, Irrawaddy and Tucuxi are labeled as Endangered.



Note:

Note: The Yangtze finless porpoise is the **world's only freshwater porpoise** but it is included with the **other freshwater cetaceans** under the umbrella name 'river dolphins'.

- The **Amazon river dolphin**, also known as the **pink river dolphin or boto** is the largest river dolphin.
- Challenges Faced by River Dolphins:
 - River dolphins are threatened by diverse factors, including **unsustainable fishing practices, hydropower dam construction, pollution from various industries**, agriculture, and mining, as well as habitat loss.
 - Also, the recent tragic deaths of **over 150 river dolphins in the drought-stricken Lake Tefe** in the

Amazon illustrate how climate change poses an increasingly severe threat to their survival.

- **Successful Conservation Efforts:**
 - Conservation efforts in populated river basins like the **Indus and Yangtze have seen success.**
 - For instance, the Indus river dolphin population in Pakistan doubled due to joint stakeholder action.
 - Additionally, the Yangtze finless porpoises witnessed a 23% increase in numbers owing to protective measures.
 - Moreover, the World Wildlife Fund's **electronic pinger project** saved **80 dolphins in Indonesia's Mahakam river** from gill net entanglement.

GANGES RIVER DOLPHIN

(*Platanista gangetica gangetica*)

National aquatic animal of India

Facts

- ✦ Can only live in freshwater; prefer deep water
- ✦ Essentially blind; hunts by emitting ultrasonic sound
- ✦ Can't breathe in water; must surface every 30-120 seconds for air
- ✦ Also called 'susu' because of sound they make while breathing

Habitat & Distribution

- ✦ Distributed in Ganges and Brahmaputra River basins of India, Nepal and Bangladesh.
- ✦ Distribution range in India covers 7 states namely, Assam, Uttar Pradesh, Madhya Pradesh, Rajasthan, Bihar, Jharkhand and West Bengal.

Protection Status

- ✦ **IUCN Red List:** Endangered
- ✦ **CITES:** Appendix I
- ✦ **Wildlife Protection Act 1972:** Schedule I

Threats

- ✦ Habitat destruction
- ✦ Pollution
- ✦ Bycatch
- ✦ Climate Change
- ✦ Hunting

Conservation Efforts

- ✦ **Project Dolphin (2021):** On lines of project Tiger
- ✦ **National Dolphin Research Centre (2021):** India's and Asia's First; in Patna University (Bihar)
- ✦ **Dedicated Dolphin Sanctuary:**
 - ▣ Vikramshila sanctuary (Bihar) – 1991
 - ▣ Hastinapur sanctuary (UP) – Proposed



Note:

International Biosphere Reserve Day 2023

Why in News?

The second anniversary of **International Biosphere Reserve Day**, celebrated on **November 3**, annually highlights the critical importance of **biosphere reserves (BR)** in safeguarding our environment and promoting sustainability.

- In this context, the **United Nations Educational, Scientific and Cultural Organization (UNESCO)** partnered with the **Ministry of Environment, Forests and Climate Change** and the **National Centre for Sustainable Coastal Management**, concluded the **10th South and Central Asian Biosphere Reserve Network Meeting (SACAM)** in Chennai, India.
 - The SACAM event, themed **“Ridge to Reef,”** facilitated collaboration on sustainable environmental practices in South and Central Asia.

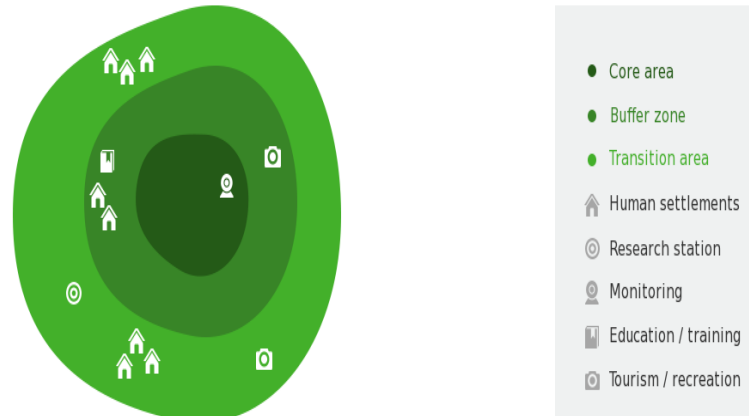
What is World Biosphere Reserve Day?

- This day celebrates the role of biosphere reserves in **conserving biodiversity** and promoting sustainable development.
- Established by **UNESCO in 2022**, to be observed annually on November 3.
- Aims to raise awareness, share best practices, and showcase achievements of the **World Network of Biosphere Reserves (WNBR)**.

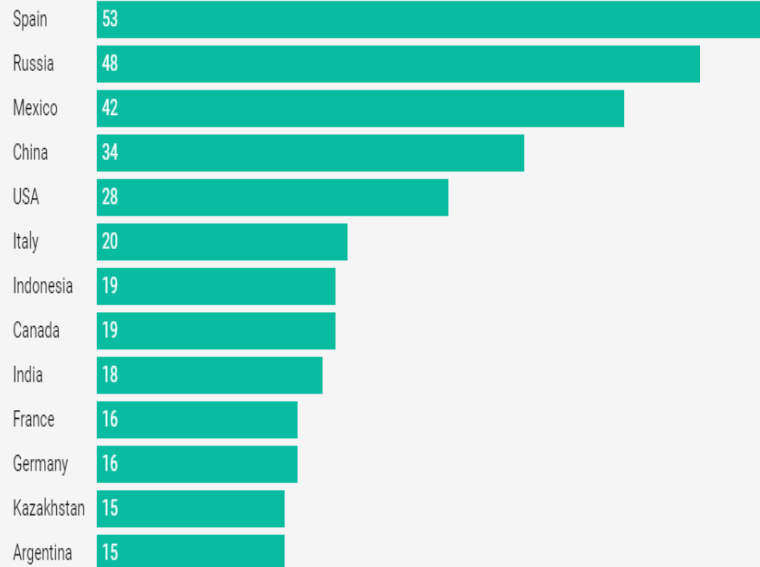
What is a Biosphere Reserve?

- **About:**
 - Biosphere reserves are ‘learning places for **sustainable development**’.
 - They are sites for testing interdisciplinary approaches to understanding and managing changes and interactions between **social and ecological systems**, including **conflict prevention and management of biodiversity**.

The three zones that characterise a Biosphere Reserve are



Countries with highest biosphere reserves



- They are places that provide local solutions to global challenges. Biosphere reserves include terrestrial, marine and coastal ecosystems.
 - Each site promotes solutions reconciling the conservation of biodiversity with its sustainable use.
- **Features:**
 - Biosphere reserves consist of **three main zones**:
 - The core area is the strictly protected zone, where natural processes and biodiversity are preserved.

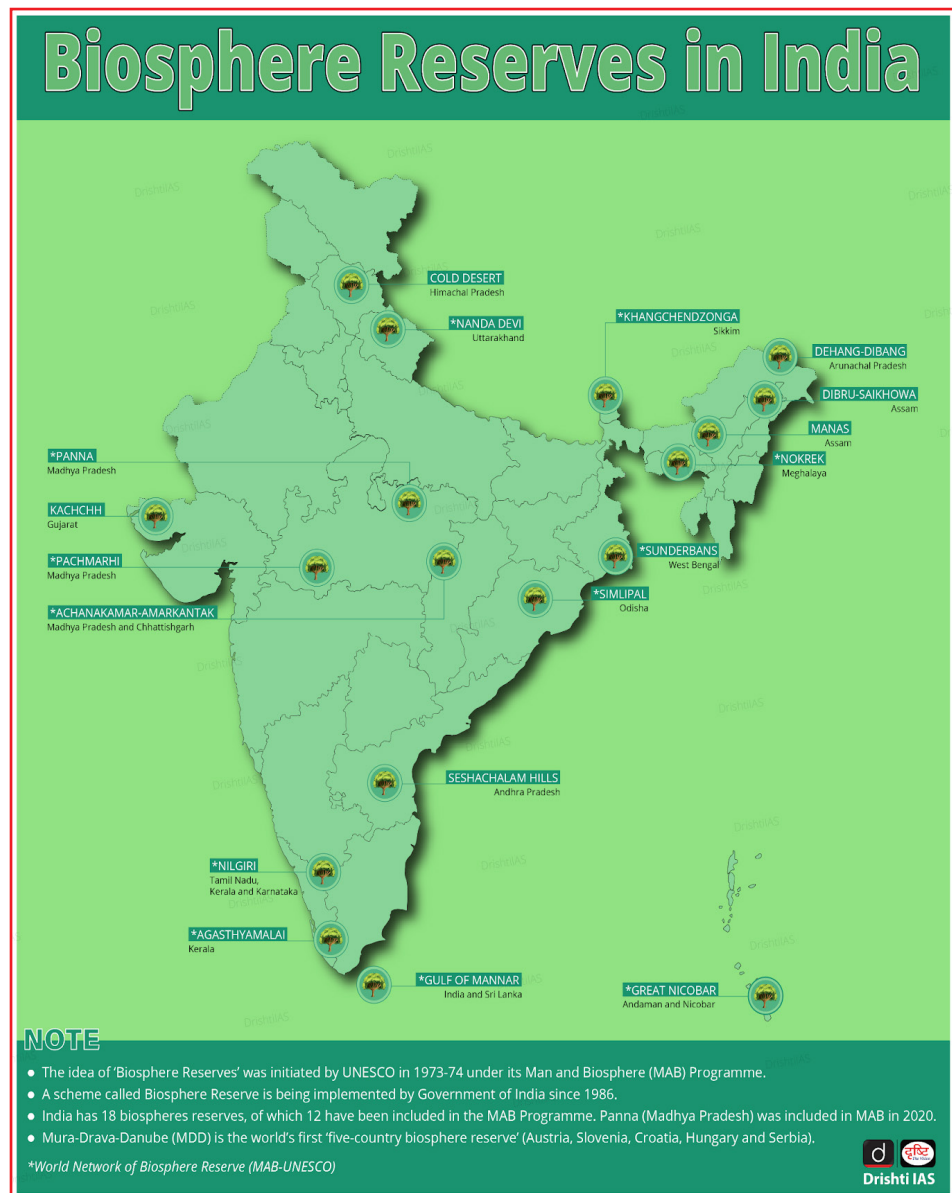
Note:

- The buffer zone surrounds the core area, where human activities are compatible with conservation and research objectives.
 - The transition area is the outermost zone, where sustainable development and human well-being are promoted.
- Biosphere reserves are **nominated by national governments** and remain under the sovereign jurisdiction of the states where they are located.
 - Biosphere reserves are designated by **UNESCO under the Man and the Biosphere (MAB) Programme** which was launched in 1971.
 - The MAB Programme aims to improve the relationship between people and their environment and to foster the integration of natural and social sciences.
 - The MAB Programme also supports the implementation of the 2030 Agenda for Sustainable Development and the post-2020 global biodiversity framework.
 - Biosphere reserves are part of the **World Network of Biosphere Reserves (WNBR)**, which currently comprises **748 sites in 134 countries, including 22 transboundary sites**.
 - The WNBR facilitates the exchange of information, knowledge, and best practices among biosphere reserves and their stakeholders.
 - The WNBR also fosters cooperation

and innovation for addressing global challenges such as climate change, biodiversity loss, poverty, and pandemics.

- Biosphere reserves are nominated by **national governments** and remain under the sovereign jurisdiction of the states where they are located.
- Biosphere reserves are also supported by other United Nations agencies, for example, the **United Nations Development Programme**, the **United Nations Environment Programme**, as well as the **International Union for Conservation of Nature**.

➤ **Biosphere Reserves in India:**



Note:

Melting of West Antarctica's Ice Sheet

Why in News?

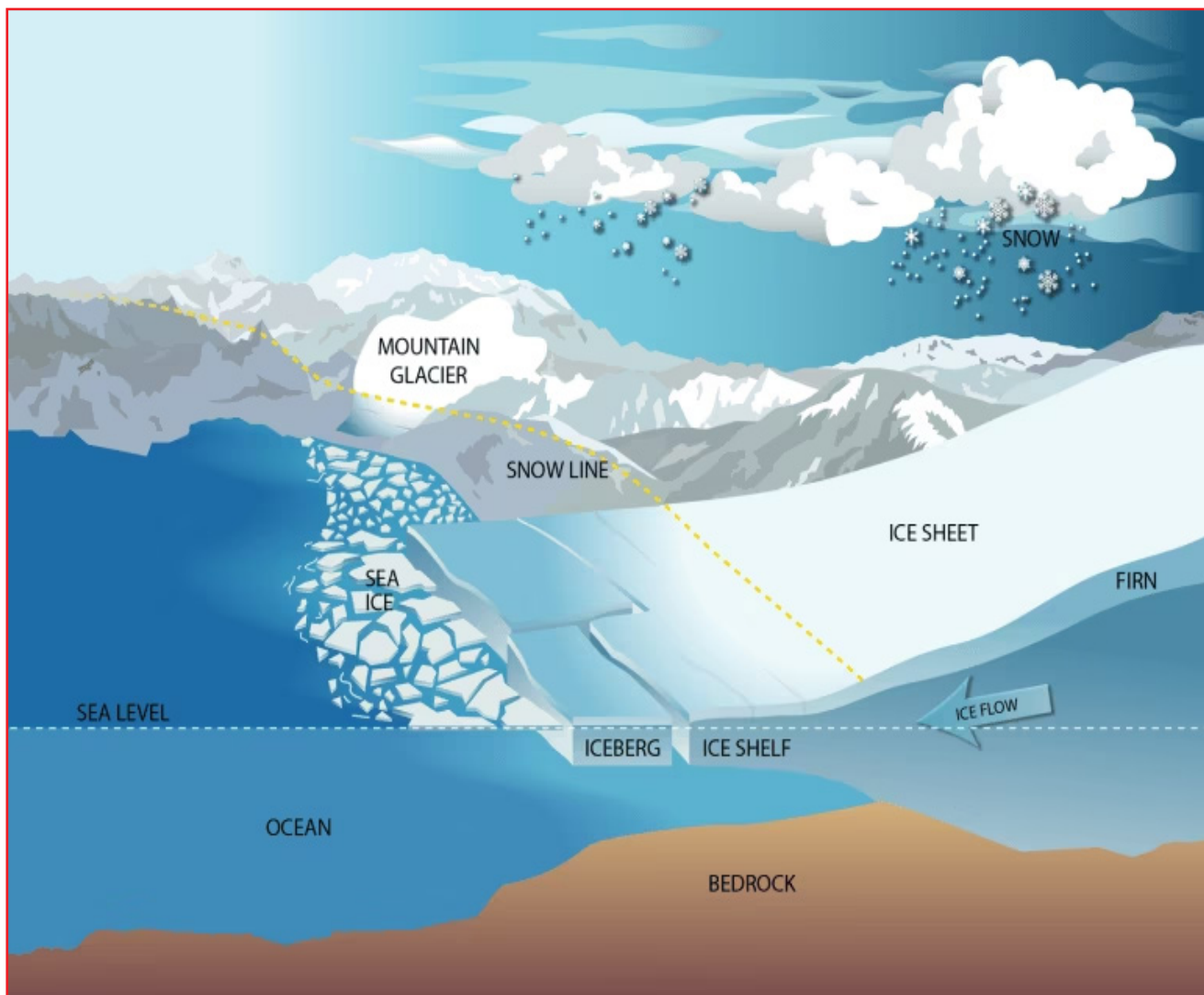
A recent study reveals alarming predictions about the **West Antarctic ice sheet's inevitable melting** due to warming ocean waters.

- The implications of this melting are profound, with the **potential to significantly elevate global mean sea levels by 5.3 meters**, adversely affecting millions of individuals residing in vulnerable **coastal cities** worldwide, including those in India.

What do Ice Sheets Represent and How Do They Affect Sea Levels?

- **About:**
 - An ice sheet is essentially a mass of glacial ice that covers more than 50,000 square kilometers of land.
 - An ice sheet, such as the **West Antarctic ice sheet**, covers vast land areas, holding a substantial amount of **freshwater**.
 - The two major ice sheets in the world, **Greenland and Antarctica**, collectively possess around **two-thirds of the Earth's freshwater**.
 - When ice sheets gain or lose mass, they respectively **contribute to a fall or rise in global mean sea levels**.

Note: The present Antarctic ice sheet accounts for **90% of Earth's total ice volume**.



Note:

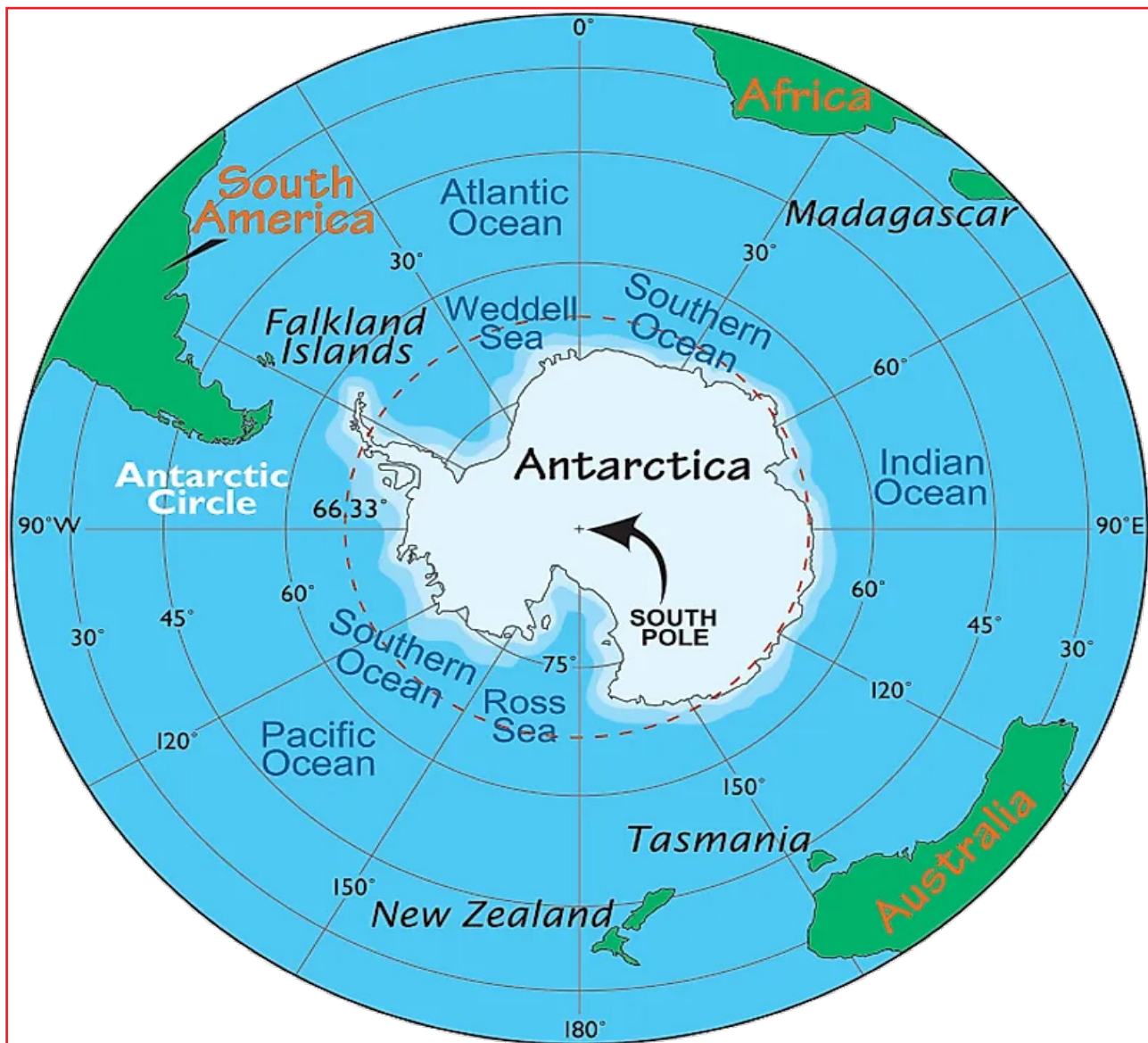


- Processes Driving West Antarctic Ice Sheet Melting:
 - Ice shelves stabilize the land-based glaciers just behind them. The melting of ice sheets occurs through various mechanisms. One key process involves **warm ocean waters eroding ice shelves**, which are the edges of an **ice sheet** floating on the ocean.
 - As these ice shelves thin or disintegrate, the **glaciers behind them accelerate**, releasing **more ice into the ocean** and consequently causing sea level rise.

Note: Ice shelves and ice sheets differ from sea ice, which constitutes the free-floating ice encircling the polar regions. Sea ice forms when seawater freezes.

➤ **Current Trends and Findings:**

- The recent findings are distressing, indicating a significant, **widespread warming of the Amundsen Sea** and escalating ice shelf melting across all scenarios considered.
- This projected melting will **inevitably lead to increased sea level rise**, profoundly impacting coastal communities worldwide.
- **Implications for India and Vulnerable Coastal Regions:**
 - India, with its extensive coastline and dense population, is particularly susceptible to sea level rise.
 - Coastal communities **might face displacement or become climate refugees** if unable to fortify against rising seas, highlighting the **urgency for adaptive strategies** such as building protective infrastructure.



Note:



What Actions has India Taken Related to Antarctica?

- India acceded to the **Antarctic Treaty** in 1983, received the consultative status on the **12th September, 1983**.
- **National Centre for Polar and Ocean Research** (erstwhile National Centre for Antarctic and Ocean Research) is India's premier R&D institution responsible for the country's research activities in the Polar and Southern Ocean realms.
- The **Indian Antarctic Act of 2022** regulates visits and activities in Antarctica, covering mineral protection, native plant conservation, and banning non-native bird introductions.
- Presently, India has **two operational research stations at Antarctica – Maitri and Bharati**.
 - **Dakshin Gangotri** was the first station to be built before **1985** but is **no longer operational**.

WJC Report Links Wildlife Trafficking to Organized Crime

Why in News?

The **Wildlife Justice Commission (WJC)**, a nonprofit organization dedicated to combating organized crime, has released a new report titled **Convergence of Wildlife Crime with Other Forms of Organised Crime: A 2023 Review**.

- It is a follow-up to the first report published in 2021, which mentioned 12 case studies linking **wildlife trafficking** with **human trafficking**, fraud, **migrant smuggling**, **illicit drugs**, **corruption** and **money laundering**.
- The report also reveals the **environmental crime of illegal sand mining** for the first time.

What are the Key Highlights of the Report?

- **Convergence of Wildlife Crime and Organized Crime:**
 - The report uncovers strong connections between **wildlife trafficking and various forms of organized crime**.
 - These connections include protection rackets, **extortion**, **murder**, **money laundering**, **illicit drugs**, **tax evasion**, and **corruption**.
- **Illegal Sand Mining:**
 - For the first time, the report identifies **illegal sand mining as an environmental crime**.

- Sand, a raw material and **second-most-used resource in the world** is used to make concrete, asphalt and glass.

- About **40-50 billion tonnes of sand resources are exploited each year**, but their extraction is managed and **governed poorly** in many countries,

- The Report sheds light on the adverse impacts of **unregulated sand extraction**, which is a crucial raw material globally.

➤ Environmental Impact of Sand Mining:

- Indiscriminate sand mining leads to **erosion**, negatively affecting **communities and their livelihoods**.

- It has dire consequences for aquifers, storm surge protection, deltas, freshwater and marine fisheries, land use, and biodiversity.

➤ Involvement of Violent Sand Mafias:

- The report emphasizes that illegal sand-mining operations are often organized and operated by **violent sand mafias**.

- The report recognizes instances of individuals, including journalists, activists, and government officials, who were **killed for opposing illegal sand mining**.

- These incidents were reported not only in India but also in other countries, including Indonesia, Kenya, Gambia, South Africa, and Mexico.

➤ Case Studies:

- In addition to the 12 case studies from 2021, the report puts on record three cases from Southeast Asia, Africa and Central America.

- The first case study illustrated the diversion of commodities such as **pangolin scales**, illegal sand mining, protection rackets and **elephant ivory** in Southeast Asia and Africa.

- The Second case from Africa involved an embedded convergence between **corruption**, **rhino poaching** and **money laundering**.

- The third study from Central America represented transactional convergence between **drug trafficking networks and seafood businesses** involving **sea cucumber** and **sharks** closely linked to the smuggling of illicit drugs, money laundering, **tax evasion** and corruption.

➤ Guiding Law Enforcement and Policymakers:

- The report highlights the **growing seriousness of wildlife trafficking**, which has become a highly profitable and serious criminal activity.

- Crime convergence should be further studied

Note:



and integrated as part of the approach to tackle wildlife crime and organized crime more broadly.

- The paper aims to provide typologies and strategies that can inform and support law enforcement and policymakers in their efforts to **address transnational organized crime more effectively.**

NITI Ayog Releases CCUS Policy Framework

Why in News?

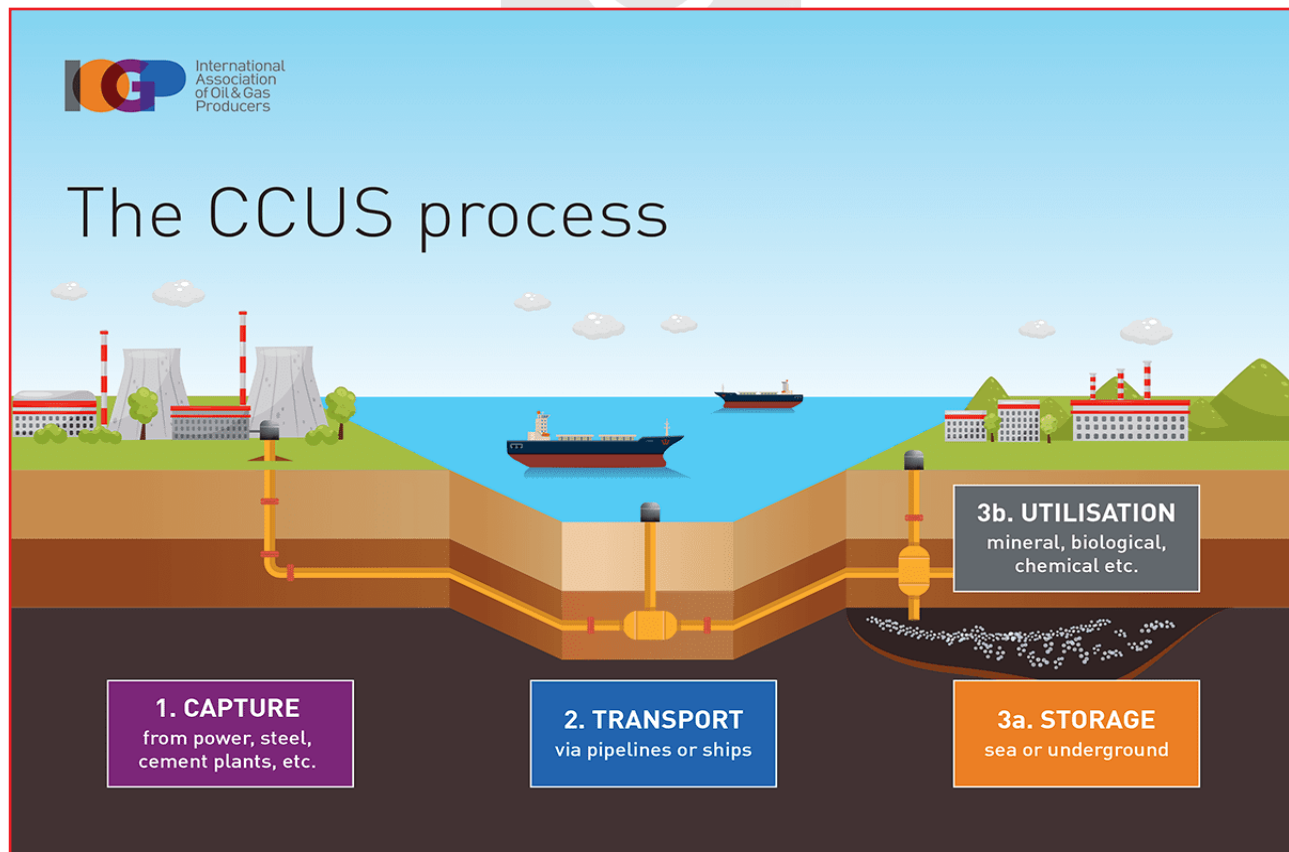
Recently, experts from research and academia highlighted the need for investment both from the government and industry in **Carbon Capture, Utilisation and Storage (CCUS)** and the importance of leading experts in the field to work collaboratively towards India's net zero targets through CCUS.

What is Carbon Capture, Utilization, and Storage (CCUS)?

- **About: CCUS** is a set of technologies and processes aimed at mitigating **carbon dioxide (CO₂) emissions**

generated from large-scale point sources like power plants, industrial facilities, and refineries.

- **Objective:** The primary goal of CCUS is to prevent CO₂ from being released into the atmosphere. It is considered a crucial strategy for the reduction of greenhouse gas emissions from industries.
- **Process:** The process involves three main steps:
 - **Capture:** This step involves capturing CO₂ emissions at their source before they are released into the air.
 - There are various capture technologies, including post-combustion capture, pre-combustion capture, and oxy-fuel combustion.
 - **Transport:** This step involves moving compressed CO₂ by ship or pipeline from the point of capture to the point of storage.
 - **Storage:** The transported CO₂ is stored in underground geological formations which include depleted oil and gas fields or deep saline aquifers.
 - **Utilization:** Once captured, the CO₂ can be utilized in various ways rather than being released. This may include using CO₂ in industrial processes, such as manufacturing chemicals or fuels.



Note:

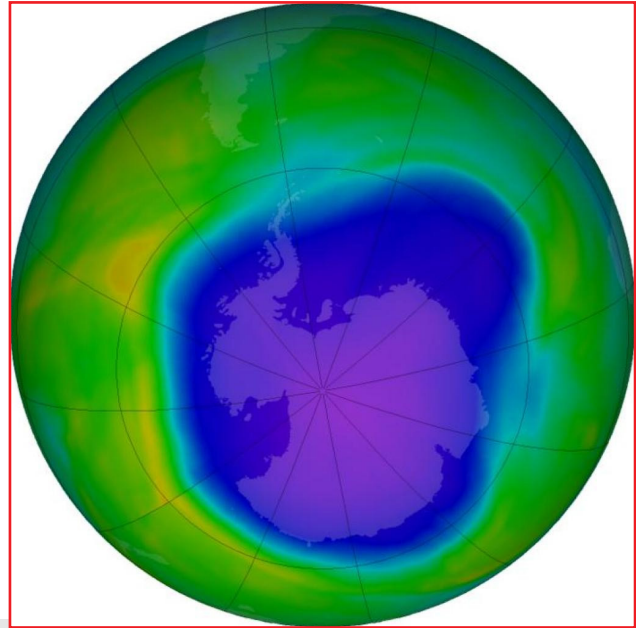
What is Significance of the CCUS?

- **Strategic Role in Decarbonization:**
 - In its report titled 'Policy Framework and Deployment Mechanism for Carbon Capture, Utilisation, and Storage in India,' **NITI Aayog** emphasizes the significance of CCUS as a strategy for reducing emissions, particularly in **hard-to-abate** sectors.
 - Hard-to-abate industries include categories like steel, cement, and petrochemicals.
 - The **IPCC** emphasizes that the deployment of CCUS technologies is crucial for achieving net zero emissions globally.
- **Energy Security:**
 - The incorporation of CCUS into the energy mix provides flexibility to the energy grid.
 - CCUS facilitates **low-carbon electricity and hydrogen production**. Hydrogen produced through CCUS serves as a direct substitute for fossil fuels.
 - This diversity enhances energy security, aligning with the growing priorities of governments worldwide.
- **Industrial Applications of CCUS**
 - **Concrete and Cement Industrial Sectors:** In the concrete and cement industry, CCUS technology captures CO₂ emitted during the firing of limestone and clay. The recovered CO₂ is then injected into concrete mixtures can enhance its strength and durability, a process known as carbonation.
 - **Basic Chemicals and Fuel Industrial Sectors:** CCUS serves as a source of CO₂ for synthetic gas production, which is essential for the further production of bio-jet fuel, aligning with sustainable aviation fuel initiatives.
 - **Fine Chemicals Sector:** The fine chemicals industry employs CCUS by capturing carbon dioxide (CO₂), blending it with biomass, and subsequently transforming it into oxygenated compounds like high-functional plastics.
- **Cost-Effective Solution:**
 - CCUS allows industries to continue using existing infrastructure, such as power plants and manufacturing facilities, reducing the need for significant capital investments in new, low-carbon alternatives.

Antarctic Ozone Hole

Why in News?

According to a recent study, published in Nature Communications, stated that the **Antarctic Ozone Hole** has been massive in the last four years.



What are the Key Highlights of the Study?

- **Ozone Depletion:**
 - The Antarctic ozone hole has been **consistently large and has shown thinning** over recent years, contrary to the expected recovery trend observed since the 2000s.
 - The concentration of ozone at the **center of the hole has notably reduced**, indicating significant thinning of the ozone layer.
 - The concentration of ozone at the core of the ozone hole has **decreased by 26% from 2004 to 2022**, despite the efforts outlined in the **Montreal Protocol**, which aimed to reduce human-generated chemicals that deplete the ozone layer.
- **Polar Vortex Influence:**
 - The Antarctic ozone hole exists within the polar vortex, a circular wind pattern in the stratosphere that forms during winter and is maintained until late spring.
 - Within this vortex, the Antarctic air from the mesosphere (the atmospheric layer above the stratosphere) falls into the stratosphere. This **intrusion of air brings natural chemicals (nitrogen dioxide, for example)** which impact ozone chemistry in October.
- **Factors Affecting Ozone Depletion:**
 - The role of meteorological conditions, such as temperature, wind patterns, aerosols from wildfires and volcanic eruptions, and changes in the solar cycle, influenced the size and behavior of the Antarctic ozone hole.

Note:



drishti

➤ **Recommendations:**

- There's a need for **further research to understand the descent of air from the mesosphere** and its specific impacts on ozone chemistry.
- Investigating these **mechanisms will likely shed light on the future behavior** of the Antarctic ozone hole.

What is an Ozone Hole?

➤ **About:**

- An Ozone Hole refers to a **severe depletion of the ozone layer**—a region in the Earth's stratosphere containing a **higher concentration of ozone molecules**.
- Ozone molecules (O₃) in this layer play a crucial role in **shielding the Earth from harmful Ultraviolet (UV) radiation from the sun**.
- The ozone layer depletion leads to the **formation of an area with significantly reduced ozone concentrations**, often observed over Antarctica.
- This phenomenon occurs primarily during the **Southern Hemisphere's spring months (August to October)**, though it can also be influenced by global factors.

➤ **Reasons for Ozone Hole:**

- The depletion is caused by human-generated chemicals known as **ozone-depleting substances (ODS)**, including **Chlorofluorocarbons (CFCs)**, halons, carbon tetrachloride, and methyl chloroform.
- These substances, once released into the atmosphere, rise to the stratosphere, where they break down due to the sun's ultraviolet radiation, releasing chlorine and bromine atoms that destroy ozone molecules.
 - The Antarctic ozone hole is the most famous and severe example of this phenomenon. It's characterized by a drastic reduction in ozone levels, **allowing increased amounts of harmful UV radiation** to reach the Earth's surface.

➤ **Impact:**

- The increased UV radiation poses health risks to humans, including higher rates of skin cancers, cataracts, and compromised immune systems.
- UV radiation can harm various organisms and ecosystems. Ozone depletion can indirectly influence climate change. Changes in the stratosphere due to ozone depletion can **impact atmospheric**

circulation patterns, potentially affecting weather and climate in certain regions.

What are the Global Initiatives to Curb Ozone Depletion?

- The **1985 Vienna Convention for the Protection of the Ozone Layer** was an international agreement in which United Nations members recognized the fundamental importance of preventing damage to the stratospheric ozone layer.
- The **1987 Montreal Protocol on Substances that deplete the Ozone Layer** and its succeeding amendments were subsequently negotiated to control the consumption and production of anthropogenic (ODSs) and some hydrofluorocarbons (HFCs).
 - The Protocol **was signed by 197 parties in 1987 to control the use of ozone-depleting substances**, mainly chlorofluorocarbons (CFCs). Montreal Protocol deals with the development of replacement of substances, firstly hydrochlorofluorocarbons (HCFCs) and then HFCs, in a number of industrial sectors.
 - While HFCs have only a minor effect on stratospheric ozone, some HFCs are powerful greenhouse gases (GHGs).
- The adoption of the **2016 Kigali Amendment** to the Montreal Protocol will phase down the production and consumption of some HFCs and avoid much of the projected global increase and associated climate change.

Emissions Gap Report 2023: UNEP

Why in News?

Recently, **United Nations Environment Programme (UNEP)** has released a report titled- ***the Emissions Gap Report 2023: Broken Record – Temperatures hit new highs, yet world fails to cut emissions (again)***, stating that urgent Climate Action is crucial to avoid the alarming trajectory of Temperature Rise.

- The report is the 14th edition in a series that brings together many of the world's top climate scientists to look at future trends in greenhouse gas emissions and provide potential solutions to the challenge of **Global Warming**.

Note:



What Emissions Gap Report (EGR)?

- The EGR is UNEP's spotlight report launched annually in advance of the Annual Climate negotiations.
- The EGR tracks the **gap between where global emissions are heading with current country commitments** and where they ought to be to limit warming to 1.5°C.

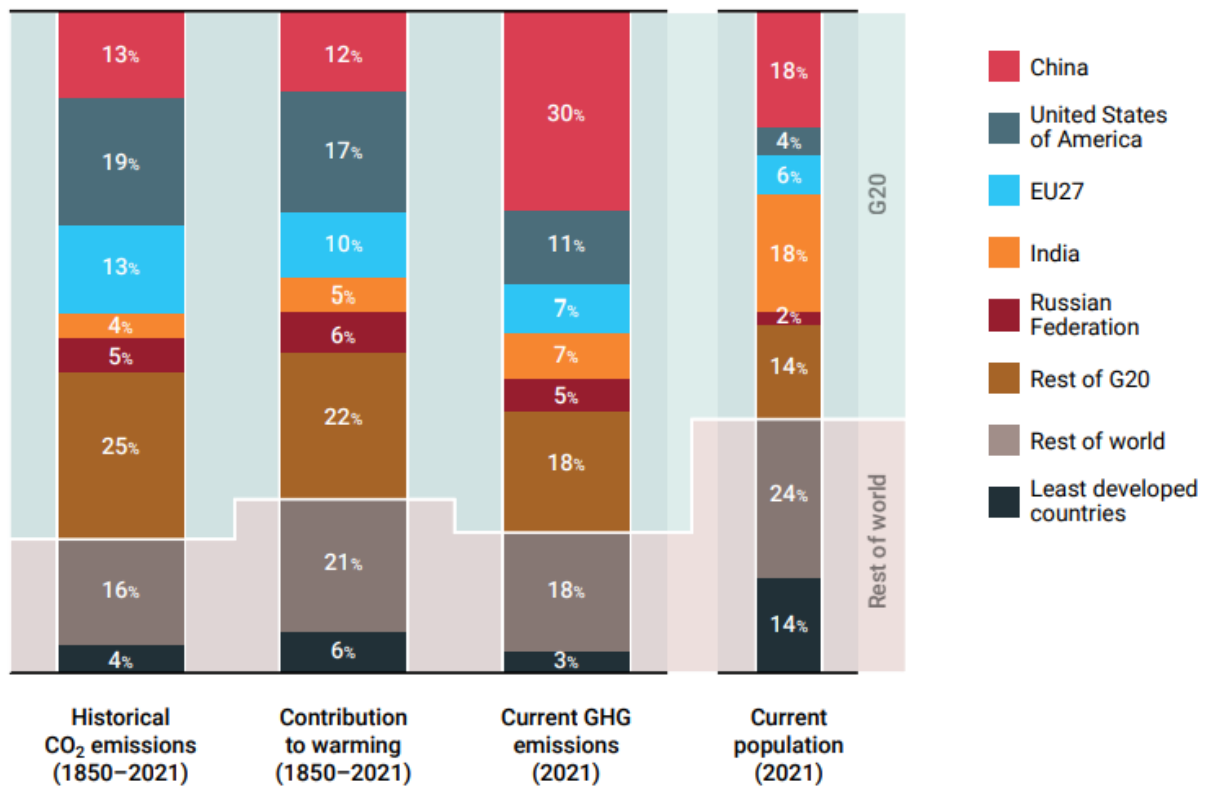
What are the Key Highlights of the Report?

- **Temperature Rise Trajectory:**
 - Current pledges under the **Paris Agreement** set the world on a course for a **2.5-2.9°C temperature rise above pre-industrial levels** by the end of this century.
 - Paris Agreement (also known as the Conference of Parties 21 or COP 21) is a landmark environmental accord that was adopted in **2015 to address climate change and its negative impacts.**
 - To limit warming to 1.5-2°C, substantial emission cuts of **28-42% by 2030** are necessary.

Global Emissions Trends:

- **Greenhouse Gas Emissions (GHG)** hit a new record of **57.4 Gigatonnes of Carbon Dioxide Equivalent (GtCO₂e) in 2022**, with a 1.2% increase from the previous year.
 - Fossil CO₂ emissions account for approximately two thirds of current GHG emissions using 100-year global warming potentials.
 - According to multiple datasets, fossil CO₂ emissions grew between 0.8–1.5% in 2022 and were the main contributor to the overall increase in GHG emissions. In 2022, fluorinated gases emissions grew by 5.5%, followed by Methane at 1.8% and nitrous oxide (N₂O) at 0.9%.
- GHG emissions across **the G20 also increased by 1.2% in 2022**. However, members vary widely in their trends with increases in **China, India, Indonesia and the United States of America**, but decreases in Brazil, the European Union and the Russian Federation. Collectively, the **G20 currently accounts for 76% of global emissions.**

Current and historic contributions to climate change
(% share by countries or regions)



Note:

- **Emissions from Major Economic Sectors:**
 - Emissions can be split into five major economic sectors, Energy supply, industry, agriculture and Land use, land-use change and forestry (LULUCF), transport and buildings.
 - In 2022, energy supply was the largest source of emissions at 20.9 GtCO₂e (36% of the total), followed by Industry (25%), followed by agriculture and LULUCF CO₂ (18%), transport (14%) and buildings (6.7%).
- **Mitigation Efforts:**
 - If current policies and pledges continue, **global warming will likely reach 3°C above pre-industrial levels** by the end of the century.
 - Implementing unconditional **Nationally Determined Contributions (NDCs)** could limit the rise to 2.9°C, while conditional NDCs might cap it at 2.5°C.
- **Net-Zero Pledges:**
 - Although countries have made **Net-Zero Pledges**, none of the **G20 Countries** are reducing emissions at a pace **consistent with their targets**.
 - Even in the most optimistic scenario, the likelihood of limiting warming to 1.5°C is only 14%.
- **Progress and Challenges:**
 - Policy progress since the Paris Agreement has reduced the implementation gap but is not sufficient.
 - Nine countries updated their NDCs, potentially reducing emissions by **about 9% annually by 2030**.
 - However, further reductions are essential to establish least-cost pathways for limiting global warming to 1.5°C.

Note: According to the recent **Oxfam** report, the richest **1% globally emitted a volume of carbon equal to the emissions of the poorest 5 billion**, who form **66% of the population**.

- The report highlighted that these emissions are responsible for an **estimated 1.3 million deaths due to heat-related issues**.
- It added that taxes on the wealth and income of the rich could cut carbon pollution and raise over **USD 9 trillion a year to invest in a green, equal future for all**.

What are the Initiatives to Reduce Emissions in India?

- **Bharat Stage-IV (BS-IV) to Bharat Stage-VI (BS-VI)** emission norms.
- **UJALA scheme**.
- **International Solar Alliance**.
- **National Action Plan on Climate Change (NAPCC)**.
- **Ethanol Blending in India** by 2025.
- India **Updated its NDC**.

What is the United Nations Environment Programme?

- **About:**
 - It is a leading global environmental authority established on 5th June 1972.
 - It sets the global environmental agenda, promotes sustainable development within the United Nations system, and serves as an authoritative advocate for global environment protection.
- **Headquarters:**
 - Nairobi, Kenya.
- **Major Reports:**
 - Emission Gap Report, **Adaptation Gap Report**, **Global Environment Outlook**, Frontiers, Invest into Healthy Planet.
- **Major Campaigns:**
 - Beat Pollution, UN75, **World Environment Day**, Wild for Life.

Stratospheric Aerosol Intervention Impact on Global Food Production

Why in News?

A recent study published in the journal **Nature Food** highlights the potential consequences of a **geoengineering technique**, **stratospheric aerosol intervention (SAI)**, on **global food production**.

What are the Key Highlights of the Study?

- **SAI as a Climate Intervention:**
 - SAI is considered a Plan B for addressing climate change if traditional mitigation strategies fail.

Note:

- SAI mimics volcanic eruptions by injecting **sulphur dioxide** into the **stratosphere** (layer of atmosphere extending from about 10 kilometres to 50 km in altitude), where it oxidises to form sulphuric acid, which then forms reflective **aerosol particles**.
 - For example, **Mount Pinatubo in the Philippines** erupted in 2001 and injected about **15 million tonnes of sulphur dioxide** into the stratosphere, which then formed aerosol particles.
 - According to the **National Aeronautics and Space Administration(NASA)**, it caused a drop in the **average global temperature of about 0.6 degrees Celsius over the next 15 months**.
- **Diverse Impact on Agriculture:**
 - Reduction in temperature due to SAI affects agriculture differently based on factors like **precipitation and solar radiation**.
 - Understanding the ideal global temperatures for crop production is crucial for informed decision-making.
 - Researchers employ computer models to evaluate the effects of SAI scenarios on crops like **maize, rice, soybean, and spring wheat**.
 - Under **uncontrolled climate change**, crop production thrives in cold, high-latitude areas like Canada and Russia.
 - **Moderate SAI levels** could enhance food productivity in mid-latitude temperate regions like **North America and Eurasia**.
 - Under **large amounts of climate intervention**, agricultural production in the tropics could see an increase.
 - These regions include Mexico, Central America, the Caribbean and the top half of South America, most of Africa, parts of the Middle East, most of India, all of Southeast Asia, most of Australia and most of the island nations of Oceania.
 - Different nations may opt for varying SAI levels to maximize crop production, considering their geographical location and climate conditions.
- **Comprehensive Impact Assessment:**
 - Beyond crop production, the study underscores the need to explore other consequences, such as effects on human health and ecosystems.

What is Stratospheric Aerosol Intervention (SAI)?

- SAI is a proposed method of solar geoengineering (or solar radiation modification) to reduce **global warming**.

- This would introduce aerosols into the stratosphere to create a cooling effect via global dimming and increased **albedo**, which occurs naturally from volcanic winter.
- However, some of the possible disadvantages of SAI are that it could have unintended consequences for the environment and human society, such as affecting the ozone layer, the hydrological cycle, the monsoon systems, and crop yields.

What is Geoengineering Technique?

- **About:**
 - It is a term that refers to the deliberate large-scale intervention in the Earth's climate system to combat climate change.
 - These interventions generally fall into two categories: **Carbon Dioxide Removal (CDR) and Solar Radiation Management(SRM)**.
- **Carbon Dioxide Removal (CDR):**
 - These techniques aim to remove excess carbon dioxide from the atmosphere, thereby reducing the greenhouse effect.
 - Examples of CDR Techniques:
 - **Afforestation and Reforestation:**
 - Planting trees or restoring forests to increase the natural absorption of carbon dioxide by plants.
 - **Biochar:**
 - Converting **biomass** into **charcoal** and burying it in the soil to enhance its carbon storage capacity.
 - **Bioenergy with Carbon Capture and Storage (BECCS):**
 - Growing crops for **biofuel production** and capturing the carbon dioxide emitted during combustion and storing it underground or in the ocean.
 - **Ocean Fertilization:**
 - Adding nutrients such as iron or **nitrogen to the ocean to stimulate the growth of phytoplankton** that consume carbon dioxide and transfer it to the deep ocean.
- **Solar Radiation Management (SRM):**
 - These techniques aim to reduce the amount of solar energy that reaches the Earth's surface, thereby cooling the planet.

Note:

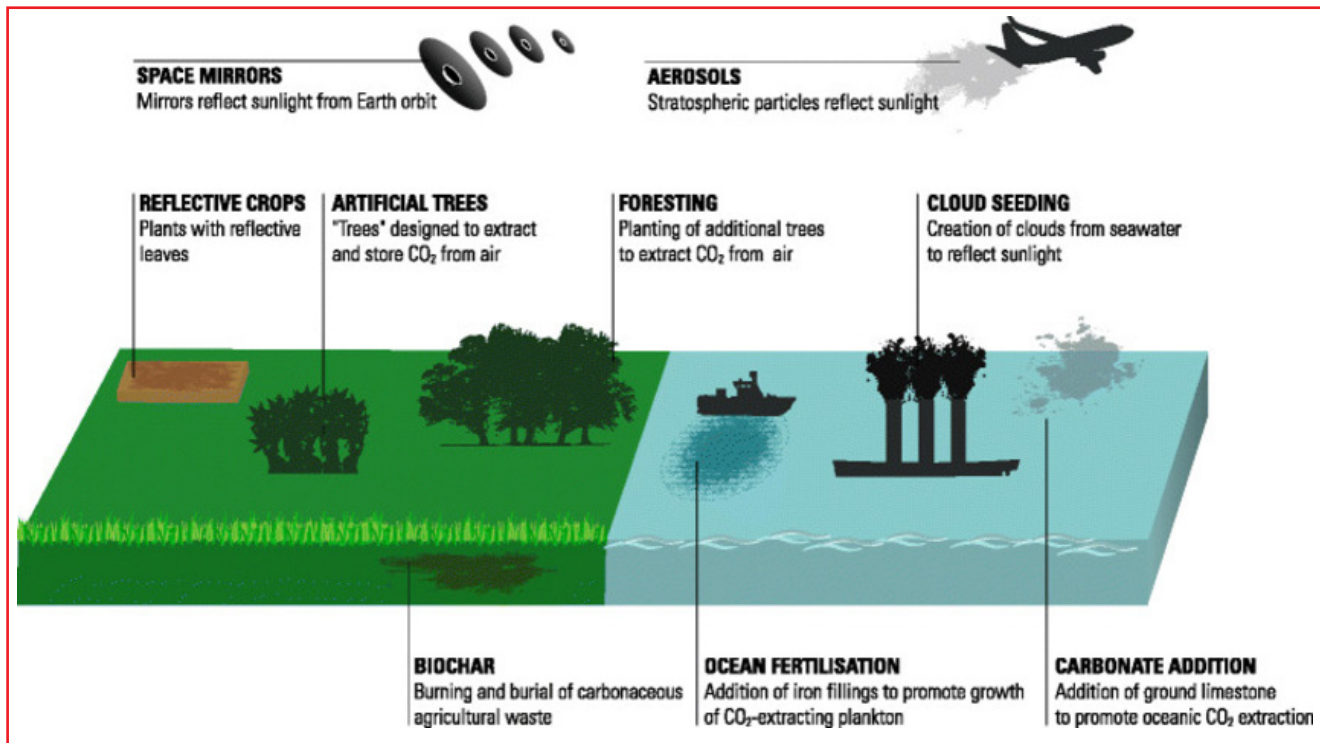


○ Examples of SRM Techniques:

- **Stratospheric Aerosol Intervention (SAI).**
- **Space-Based Reflectors (SBR):**
 - Placing mirrors or other devices in orbit around the Earth to deflect or block some of the incoming sunlight.
- **Marine Cloud Brightening (MCB):**
 - Spraying sea water droplets or other substances into low-level clouds over the ocean to increase their reflectivity and albedo.

● **Cirrus Cloud Thinning (CCT):**

- Reducing the formation or persistence of high-level cirrus clouds that trap heat by **cloud seeding** them with ice crystals or other agents.
- **Surface Albedo Modification (SAM):**
 - Changing the reflectivity of the land or sea surface by painting roofs white, covering deserts with reflective sheets, or increasing the ice cover.



Amphibians Threatened by Climate Change

Why in News?

Recently, the study titled 'Ongoing declines for the world's amphibians in the face of emerging threats' published in the Nature journal reveals significant threats to **Amphibians** worldwide particularly from **Climate Change**.

- The study is based on the second global amphibian assessment coordinated by the Amphibian Red List Authority, a branch of the Amphibian Specialist Group of the **International Union for Conservation of Nature's (IUCN)** Species Survival Commission.

- The assessment evaluated the **extinction risk of more than 8,000 amphibian species** from all over the world, including 2,286 species evaluated for the first time

What are the Key Highlights of the Study?

➤ **Extinction Risk:**

- Two out of every five amphibian species are threatened with extinction.
- 40.7% of the species being globally threatened – highest for any species. This is compared to **26.5% of mammals**, 21.4% of reptiles and 12.9% of birds.
- Between 2004 and 2022, over 300 amphibian species have **moved closer to extinction**, with climate change identified as the primary threat for 39% of these species.

Note:

- Amphibians are particularly sensitive to environmental changes, making them vulnerable to the effects of climate change.
- Amphibians Gone Extinct:
 - Four amphibian species were documented as having gone **extinct since 2004** — the Chiriquí harlequin toad (**Atelopus chiriquiensis**) from Costa Rica, the sharp-snouted day frog (**Taudactylus acutirostris**) from Australia, Craugastor myllomylon and the Jalpa false brook salamander (**Pseudoeurycea exspectata**), both from Guatemala.
- Greatest Concentration of Threatened Amphibians:
 - The greatest concentrations of threatened amphibians were found to be in the Caribbean islands, **Mexico and Central America, the tropical Andes region, India's Western Ghats**, Sri Lanka, Cameroon, Nigeria and Madagascar.
- Human Impact:
 - Habitat destruction and degradation due to activities such as agriculture, infrastructure development, and other industries remain the most common threats to amphibians, **affecting 93% of all threatened species**.
- Disease and Overexploitation:
 - Disease caused by **the chytrid fungus** and overexploitation continue to contribute to amphibian declines.
 - Disease and habitat **loss drove 91 %** of status deteriorations **between 1980 and 2004**.
 - Ongoing and projected climate change effects are **now of increasing concern, driving 39%** of status deterioration since 2004, followed by habitat loss amounting to 37%.
- Salamander Threat:
 - Three out of **every five salamander species** are threatened with extinction, primarily due to habitat destruction and climate change.
 - Salamanders are identified as the world's **most threatened group of amphibians**.

- Amphibians first **appeared more than 300 million years ago**. Three orders of amphibians exist today:

- Salamanders and newts (60% threatened with extinction); frogs and toads (39%); and the limbless and serpentine caecilians (16%).

➤ Conservation Action:

- Conservationists plan to **use the study's findings** to develop a global conservation action plan, prioritize conservation efforts, secure additional resources, and influence policies to reverse the negative trend for amphibians.

Ganges River Dolphin

Why in News?

A recent scientific publication titled "**Rescuing Ganges river dolphins from irrigation canals in Uttar Pradesh, 2013-2020**" has elucidated the comprehensive endeavors focused on the **rescue and relocation of Gangetic river dolphins** from precarious situations within the **irrigation canals of the Ganga-Ghagra basin**.

What are the Major Highlights of the Report?

- **Dams and barrages** have severely affected the habitat of the dolphins, forcing them to move into irrigation canals where they are at risk of injury or death.
 - Over **70% of entrapments** were reported **either post-monsoon or during peak winter**, while the other **30% of dolphins were rescued during peak summer** when water levels fall and the minimum water flow is maintained.
- **19 Gangetic river dolphins** were rescued from irrigation canals in the **Ganga-Ghagra basin** in Uttar Pradesh between 2013 and 2020.

What are the Major Points Related to Ganga River Dolphin?

- **About:**
 - The Ganga River Dolphin (**Platanista gangetica**), also known as the "**Tiger of the Ganges**" was officially discovered in **1801**.

Note:

GANGES RIVER DOLPHIN

(*Platanista gangetica gangetica*)

National aquatic animal of India

Facts

- Can only live in freshwater; prefer deep water
- Essentially blind; hunts by emitting ultrasonic sound
- Can't breathe in water; must surface every 30–120 seconds for air
- Also called 'susu' because of sound they make while breathing

Habitat & Distribution

- Distributed in Ganges and Brahmaputra River basins of India, Nepal and Bangladesh.
- Distribution range in India covers 7 states namely, Assam, Uttar Pradesh, Madhya Pradesh, Rajasthan, Bihar, Jharkhand and West Bengal.

Protection Status

- IUCN Red List:** Endangered
- CITES:** Appendix I
- Wildlife Protection Act 1972:** Schedule I

Threats

- Habitat destruction
- Pollution
- Bycatch
- Climate Change
- Hunting

Conservation Efforts

- Project Dolphin (2021):** On Lines of project Tiger
- National Dolphin Research Centre (2021):** India's and Asia's First; in Patna University (Bihar)
- Dedicated Dolphin Sanctuary:**
 - Vikramshila sanctuary (Bihar) – 1991
 - Hastinapur sanctuary (UP) – Proposed



- **Habitat:** Ganges river dolphins historically distributed in major river systems (**Ganges-Brahmaputra-Meghna and Karnaphuli-Sangu**) of India, Nepal and Bangladesh.
 - According to the recent study in the Ganga River Basin, the species recorded from the main stream of Ganga River followed by the tributaries, **Ghagra, Kosi, Gandak, Chambal, Rupnarayan, and Yamuna.**
- Features:
 - The Ganges river dolphin can **only live in freshwater** and is essentially blind. They hunt by emitting **ultrasonic sounds**, which bounces off of fish and other prey, enabling them to **“see” an image in their mind.**
 - They are frequently found alone or in small groups, and generally a mother and calf travel together.
 - **Females are larger than males** and give birth once every two to three years to only one calf.
- Being a mammal, the **Ganges river dolphin cannot breathe in water** and must surface every 30-120 seconds.
 - Because of the sound it produces when breathing, the **animal is popularly referred to as ‘Susu’.**
- Importance:
 - They have significant importance because it is a **reliable indicator of the health of the entire river ecosystem.**
 - The government of India declared it the **National Aquatic Animal in 2009.**
 - It is also the **State Aquatic Animal of Assam.**
- Major Threats:
 - Unintentional killing through **entanglement in fishing gear.**
 - Poaching for **dolphin oil**, used as fish attractant and for medicinal purposes.

Note:

- Habitat destruction due to **development projects** (e.g. water extraction and the construction of barrages, high dams and embankments), **pollution** (industrial waste and pesticides, municipal sewage discharge and noise from vessel traffic).
- Protection Status:
 - **International Union for the Conservation of Nature (IUCN)**: Endangered
 - **Indian Wildlife (Protection) Act 1972**: Schedule I
 - **Convention on International Trade in Endangered Species (CITES)**: Appendix I
 - **Convention on Migratory Species (CMS)**: Appendix 1
- Related Government Initiatives:
 - **Project Dolphin**
 - Vikramshila Ganges Dolphin Sanctuary has been established in Bihar.
 - **National Ganga River Dolphin Day** (5th October)

Dandeli Forest

Why in News?

The Dandeli forest in Karnataka's Uttara Kannada district, known for its diverse wildlife and ecosystem, faces substantial environmental shifts due to changing climate patterns and human interventions.

What are the Key Points Related to Dandeli Forest?

- Dandeli forest is located in the Uttara Kannada district of Karnataka and is part of the Western Ghats, a globally recognized **biodiversity hotspot**.
- The forest is known for its **rich biodiversity**, including a diverse range of flora and fauna, making it an important wildlife habitat.
- The **Kali Tiger Reserve** is a protected area **adjacent to the Dandeli Forest**.
 - The Tiger Reserve comprises two important protected areas of the region viz., **Dandeli Wildlife Sanctuary and Anshi National Park**.

Platypus

Why in News?

Recent research sheds light on a troubling situation related to **water-dwelling animal, Platypuses**

(*Ornithorhynchus anatinus*), following the **2019–20 Black Summer bushfires in eastern Australia**.

- Despite their aquatic habitat, **platypus populations are dwindling in the post-fire environment**. This study delves into the implications for the conservation of these unique creatures. **Environmental DNA (eDNA)** was used to detect platypus presence in the study.

What are the Major Points Related to Platypus?



➤ About:

- **Platypuses** are unique to **Australia**. Its streamline body and a broad, flat tail are covered with dense waterproof fur, which provides excellent thermal insulation.
 - They possess webbed feet for swimming and **electroreceptors** in their bills to find food in rivers and streams.
- Along with **echidnas**, Platypuses are grouped in a separate order of mammals known as **monotremes**, which are **distinguished from all other mammals because they lay eggs**.
 - Also, **males have a venomous spur** on their ankles, a unique feature among mammals, that they primarily used during the breeding season.
 - While not **lethal**, the venom can cause severe pain and swelling in humans.
- Habitat and Distribution:
 - Platypuses inhabit **freshwater systems** across a wide range of Australian landscapes.

Note:



- They can be found in **tropical rainforest lowlands**, plateaus of northern Queensland, and even cold, **high-altitude regions like Tasmania and the Australian Alps**.
- Seasonality and Behavior:
 - Platypuses are active year-round, with a preference for **twilight and nighttime activity**.
 - Platypuses spend much of their time in **burrows along riverbanks** or in rocky crevices and stream debris.
- Feeding Habits:
 - Platypuses primarily feed at night on a wide variety of **aquatic invertebrates**.
 - They feed on **insect larvae, shrimps, swimming beetles**, water bugs, tadpoles, worms, and more.
 - Larger prey is taken individually and **consumed after floating on the water surface**.
- Predators and Threats:
 - Predators include **crocodiles, goannas, carpet pythons, eagles**, and large native fish.
 - Land-based predators like **foxes, dogs, and dingoes** may pose a threat.
 - **Ectoparasites, tick species, and fungal infections** can also affect platypuses.
- Conservation Status:
 - **IUCN Red List:** Near Threatened.

What is Environmental DNA?

- DNA, short for **deoxyribonucleic acid**, is the hereditary material in organisms that contains the biological instructions for building and maintaining them.
 - **Environmental DNA (eDNA)** is **nuclear or mitochondrial DNA** that is released from an organism into the environment.
 - Sources of eDNA include **secreted feces, mucous, and gametes**, shed skin and hair.
- In aquatic environments, eDNA is diluted and distributed by currents and other hydrological processes, but it only lasts about 7–21 days, depending on environmental conditions.

Illicit Trade of Tortoises and Hard-Shell Turtles

Why in News?

A recent study titled *'From Pets to Plates,'* published in **Oryx, The International Journal of Conservation**, has provided insights into the **illicit trade of tortoises and hard-shell turtles**.

- The study was conducted by experts associated with the Counter Wildlife Trafficking Programme of the Wildlife Conservation Society-India.

What are the Key Highlights of the Report?

- Chennai Leads the Network:
 - **Chennai emerges as the primary node** in the tortoise and hard-shell turtle trafficking network.
 - The city plays a central role in the global pet trade, facilitating the illicit trade in these reptiles.
 - Mumbai, Kolkata, Bengaluru, Anantapur, Agra, North 24 Parganas (in West Bengal), and Howrah (near the India-Bangladesh border) are also crucial in the network, contributing significantly to the trafficking of tortoises and turtles.
- Predominantly Domestic Soft-Shell Turtle Trafficking:
 - Soft-shell turtle trafficking is **primarily domestic** in nature. International trafficking of soft-shell turtles to and from India is **mostly limited to Bangladesh**.
- The Asian Turtle Crisis:
 - Wild populations of tortoises and freshwater turtles face immense pressure from illegal **trade for pets, food, and medicines**.
 - At least **15 of the 30 threatened TFT (Tortoises and Freshwater Turtles) species** in India are illegally traded.
 - Freshwater species, such as the **Indian flapshell turtles**, are in great demand in illegal markets.
 - The Indian Softshell turtle, also known as the **Ganges Softshell turtle**, is a **freshwater reptile** found in the **Ganges, Indus** and **Mahanadi rivers** in northern and eastern India.

Note:

- Comparing Networks:
 - The study found that the **tortoise and hard-shell turtle network had a more extensive geographical scale** with more international trafficking links compared to the soft-shell turtle network.
 - Complex routes were recorded in tortoise and hard-shell turtle smuggling, whereas soft-shell turtle trafficking primarily followed a one-directional route from source to destination.
- Dire Condition of Trafficked Turtles:
 - Turtles involved in the illegal trade often arrive dehydrated, starved, and with injuries.
 - High mortality rates among trafficked turtles highlight the urgency of addressing this issue.

Tortoise and Hard-Shell Turtles

- All tortoises are turtles as they belong to the order Testudines/Chelonia.
- Tortoises are distinguished from other turtles by **being land-dwelling**, while many (though not all) other **turtle species are at partly aquatic**.

- Hard-shell turtles have rigid and bony shells that provide protection and cannot be easily compressed.
- According to the **International Union for Conservation of Nature (IUCN)** most of the species of turtles and tortoises are vulnerable, endangered or critically endangered.
- **Indian star tortoise, Olive Ridley Turtle, and Green Turtle** are a few examples of Tortoise and Hard-Shell Turtles in India.

Soft-Shell Turtle

- Softshell turtles are a large group of reptiles in the family **Trionychidae**.
- They are called softshells because their shells lack **hard scales, and are instead leathery and flexible**.
- They often lie buried in mud, sand, and shallow water.
- Commonly found Soft-Shell Turtles in India are **Indian Flapshell Turtles, Indian peacock softshell turtles, and Leith's Soft-shelled Turtle**.

Characteristic	Tortoises	Turtles
		
Shell Shape	High-domed, rounded, heavy shell	Thinner and more streamlined
Habitat	Primarily terrestrial (land-dwelling)	Adapted for life in water
Diet	Primarily herbivorous	Omnivorous or herbivorous
Limbs	Thick, columnar legs, claw-like toes	Flipper-like legs, webbed feet

Methane Emissions from Livestock

Why in News?

A recent **Food and Agriculture Organization (FAO)** report, titled **“Methane Emissions in Livestock and Rice Systems,”** highlights the significant climate **impact of methane emissions from livestock and rice paddies**.

- Released during FAO’s inaugural **‘Global Conference on Sustainable Livestock Transformation’** in September 2023, the report emphasizes the importance of reducing methane emissions in achieving the **Paris Agreement’s goals**, as noted in the **Intergovernmental Panel on Climate Change’s Sixth Assessment Report**.

What are the Key Findings from the Report?

- Sources of Methane Emissions:

Note:

- Ruminant livestock and manure management contribute to approximately 32% of global anthropogenic methane emissions.
- Rice paddies account for an additional 8% of methane emissions.
- Besides agrifood systems, other human activities that generate methane emissions include landfills, oil and natural gas systems, coal mines and more.

Note:

- Ruminants are mammals of the suborder Ruminantia (order Artiodactyla).
 - They encompass a diverse group of animals such as giraffes, okapis, deer, cattle, antelopes, sheep, and goats.
- Most ruminants have a four-chambered stomach and two-toed feet. Camels and chevrotains, however, have a three-chambered stomach and are often referred to as pseudoruminants.
- Impact of Ruminant Livestock:
 - Among ruminants, cattle are the highest daily emitters of methane, followed by sheep, goats, and buffalo.
 - Ruminant meat and milk are significant protein sources, and global demand for animal products is expected to rise by 60-70% by 2050.
- Improving Feed Efficiency:
 - Report focuses on improving feed to reduce methane emissions by enhancing feed efficiency.
 - This involves increasing nutrient density, and feed digestibility, altering rumen microbial composition, and selectively breeding animals with negative residual feed intake and smaller metabolic body weight.
 - Enhanced feed efficiency boosts animal productivity per unit of feed, potentially increasing farm profitability based on feed costs and meat/milk revenues.
- Need for Regional Studies:
 - The report underscores the need for regional studies to quantify the effects of improved

nutrition, health, reproduction, and genetics to increase animal production and decrease methane emission.

- Such studies would help assess the impact of mitigation strategies on net greenhouse gas emissions at a regional level.
- Strategies for Mitigating Methane Emissions:
 - The study noted four broad strategies in mitigating methane emissions:
 - Animal breeding and management.
 - Feed management, diet formulation and precision feeding.
 - Forages.
 - Rumen manipulation.
- Challenges and Research Gaps:
 - Challenges include the lack of regional information to calculate carbon footprints and limited economically affordable methane mitigation solutions.
 - Further research is needed to develop practical and cost-effective measures.

Methane

- Methane is the simplest hydrocarbon, consisting of one carbon atom and four hydrogen atoms (CH₄).
 - It is flammable, and is used as a fuel worldwide.
- Methane is a powerful greenhouse gas (GHG), which has an atmospheric lifetime of around a decade and affects the climate for hundreds of years.
- Methane has more than 80 times the warming power of carbon dioxide over the first 20 years of its lifetime in the atmosphere.
- The common sources of methane are oil and natural gas systems, agricultural activities, coal mining and wastes.

What are the Initiatives to Tackle Methane Emissions?

- Indian:
 - 'Harit Dhara' (HD):

Note:

- Indian Council of Agricultural Research (ICAR) has developed an anti-methanogenic feed supplement '**Harit Dhara' (HD)**, which can cut down cattle methane emissions by 17-20% and can also result in higher milk production.
- **The National Mission on Sustainable Agriculture (NMSA):**
 - It is implemented by the Ministry of Agriculture and Farmers Welfare, involves **climate resilient practices** including methane reduction practices in **rice cultivation**.
 - These practices contribute to substantial reduction of methane emissions.
- **National Innovations in Climate Resilient Agriculture (NICRA):**
 - Under the **NICRA project**, the **Indian Council of Agricultural Research (ICAR)** has developed technologies to mitigate methane emissions from rice cultivation. These technologies include:
 - **System for Rice Intensification:** This technique can increase rice yield by 36-49% while using 22-35% less water compared to conventional transplanted rice.
 - **Direct Seeded Rice:** This method reduces methane emissions by eliminating the need for raising nurseries, puddling, and transplanting. Unlike traditional paddy cultivation.
 - **Crop Diversification Programme:** By shifting from paddy cultivation to alternative crops like pulses, oilseeds, maize, cotton, and agroforestry, methane emissions are minimized.
- **Bharat Stage-VI Norms:**
 - India shifted from **Bharat Stage-IV (BS-IV) to Bharat Stage-VI (BS-VI)** emission norms.

- **Global:**
 - **Methane Alert and Response System (MARS):**
 - MARS will integrate data from a large number of existing and future satellites that have the ability to detect methane emission events anywhere in the world, send out notifications to the relevant stakeholders to act on it.
 - **Global Methane Pledge:**
 - At the **Glasgow climate conference (UNFCCC COP 26)** in 2021, **nearly 100 countries had come together in a voluntary pledge**, referred to as the Global Methane Pledge, to cut methane emissions by at least 30% by 2030 from the 2020 levels.
 - **India is not a part of Global Methane Pledge.**
 - **Global Methane Initiative (GMI):**
 - It is an international public-private partnership focused on reducing barriers to the recovery and use of methane as a clean energy source

Review of Maritime Transport 2023: UNCTAD

Why in News?

Recently, the **United Nations Conference on Trade and Development (UNCTAD)** has released the **Review of Maritime Transport 2023**, highlighting the Issue of **Greenhouse Gas (GHG) Emissions** from **International Shipping** and Challenges in **Decarbonization**.

What are the Key Highlights of the Review?

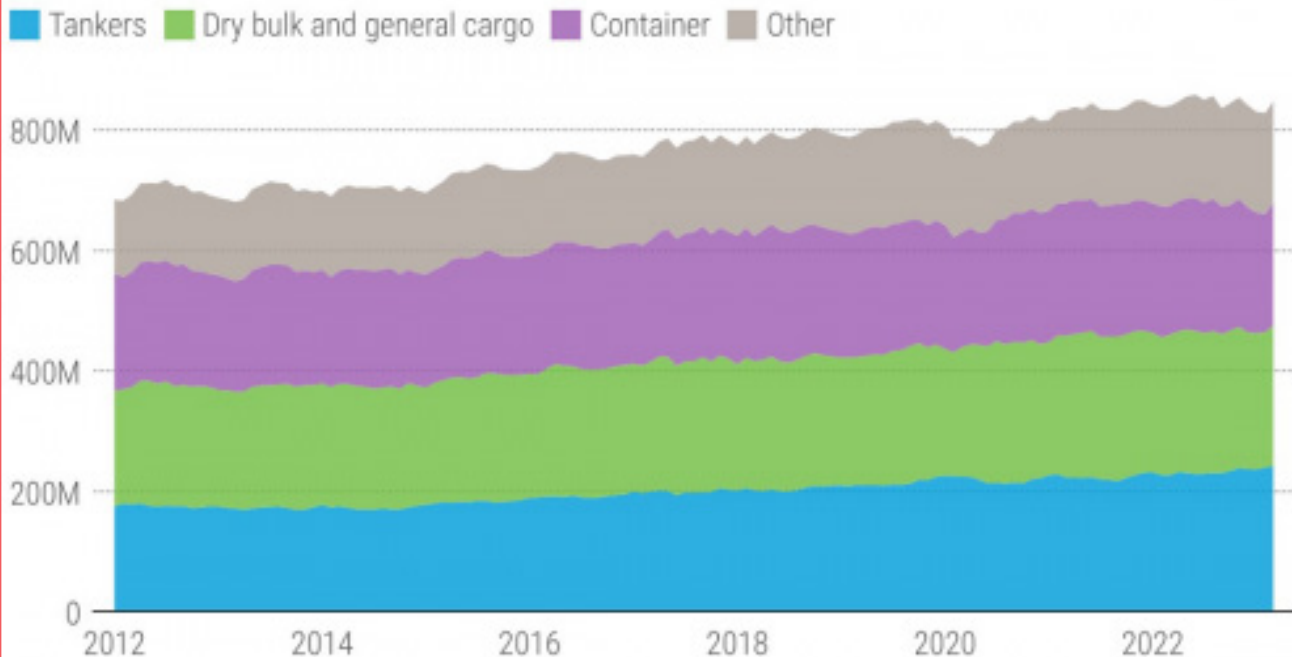
- Emissions from International Shipping:
 - GHG emissions from international shipping were 20% higher in 2023 compared to a decade ago.
 - The shipping industry contributes to over **80% of the world's trade volume** and nearly 3% of global GHG emissions.

Note:



Shipping emissions are headed in the wrong direction

Carbon dioxide emissions by main vessel types, tons, 2012–2023



Note: The group "other" includes vehicles and roll-on/roll-off ships, passenger ships, offshore ships and service and miscellaneous ships.

Source: UNCTAD based on data provided by Marine Benchmark, June 2023.

➤ Growth in Shipping Volume:

- Global maritime shipping volumes experienced a **0.4% drop in 2022** due to disruptions in global supply chains **caused by Covid-19**.
- However, it is **projected to grow by 2.4% in 2023**.
 - Containerized trade is **expected to grow by 1.2% in 2023** and further by 3% between 2024-2028.
 - Oil and gas trade volumes showed robust growth in 2022.

➤ Non-Availability of Alternative Fuels:

- Early in January 2023, commercial ships were on **average 22.2 years old** and more than half of the **world's fleet was over 15 years old**.
- As the average age of the world fleet is increasing, it raises concern that **alternative fuels are not**

yet available at scale and are more costly, and the ships that can use them are **also more costly than traditional ships**.

➤ Transitioning to Alternative Fuels:

- It is very difficult for ship owners to **renew their fleet without clarity on technology and regulatory regimes**, and port terminals also face **similar challenges**, particularly **with regard to investment decisions**.
- **98.8% of the global fleet uses conventional fuels** like heavy fuel oil, light fuel oil, and diesel/gas oil.
- **Only 1.2% are using alternative fuels**, mainly LNG, LPG, methanol, and to a lesser extent, battery/hybrid.
 - However, progress is underway as **21 % of vessels currently on order are designed to run**

Note:



drishti

on **alternative fuels**, notably LNG, LPG, battery/hybrid and methanol.

- Cost Estimates and Transition Challenges:
 - Decarbonizing the world's fleet by 2050 could require annual investments ranging from USD 8 billion to USD 90 billion.
 - Full decarbonization could double yearly fuel costs, necessitating a just transition for the sector.
 - **IMO (International Maritime Organization)** has set a target to achieve net-zero GHG emissions by around 2050.
 - The **2023 IMO GHG Strategy** aims for at least **5-10% uptake of zero or near-zero GHG fuels by 2030.**

India Begins Producing Reference Fuel

Why in News?

India has marked a significant milestone in its pursuit of self-reliance, **initiating the production of 'reference' grade petrol and diesel.** It holds the promise of not only catering to domestic requirements but also tapping into the export market.

- Historically, only a select few companies, primarily from Europe and the US, provided reference fuels to India.

What is Reference Fuel?

- **About:**
 - **Reference fuels (petrol and diesel),** represent high-value premium products specifically utilized for **calibrating and testing vehicles by automotive original equipment manufacturers (OEMs)** and institutions engaged in automotive testing and certification.
- **Features:**
 - They have **higher specifications than regular or premium fuels.** It includes various specifications such as **Cetane number, flash point, viscosity, sulfur and water content, hydrogen purity, and acid number.**
 - For instance, reference grade petrol and diesel feature an **octane number of 97,** exceeding the octane numbers of regular and premium fuels, **which stand at 87 and 91,** respectively.
- **Indigenous Production by Indian Oil Corporation:**

- India historically depended on imports to fulfill the need for these specialized fuels. However, the **Indian Oil Corporation (IOC)** has now indigenously developed 'reference' grade **petrol at its Paradip refinery in Odisha** and **diesel at its Panipat unit in Haryana.**
 - Reference gasoline (petrol) fuels will be available in **E0, E5, E10, E20, E85, E100** from Paradip refinery.
 - Reference diesel fuel shall be available in **B7 grade** from Panipat refinery.
- **Benefit:**
 - **Cost Advantage:** The cost of the imported 'reference' fuel stands between **Rs 800-850 per litre,** whereas the domestic production is estimated to lower the cost to around **Rs 450 a litre,** signifying a substantial cost advantage.
 - **Benefit to Vehicle Manufacturers:** This development will provide **minimum lead time for vehicle manufacturers,** enabling import substitution at a better price.

Note:

- **E0, E5, E10, E20, E85, E100** refer to different ethanol-gasoline blends. **Ethanol blending** is the process of mixing ethanol with gasoline to create various ethanol-gasoline blends. This blending is aimed at reducing the overall carbon footprint and emissions from gasoline-powered vehicles.
- Diesel B7 is a fuel with added **biocomponents of up to 7%**
- **Octane Number:**
 - It measures the **fuel's resistance to engine knocking.** Higher octane numbers signify better resistance to premature combustion in gasoline.
- **Cetane Number:**
 - Indicates the **ignition quality of diesel fuel.** A higher cetane number signifies easier ignition.
- **Flash Point:**
 - It is the lowest temperature at which a substance produces enough vapor to ignite momentarily.
- **Viscosity:**
 - Measures a **fluid's resistance to flow;** higher viscosity indicates thicker, less fluid-like behavior.
- **Acid Number:**
 - It is a measurement of the amount of acidic substance in the oil.

Note:



Ammonia as a Automotive Fuel

Why in News?

Recently, an **internal combustion engine** powered by **ammonia** is gaining traction in the **automotive industry**.

- This unique approach is sparking interest as it **explores alternative propulsion technologies** while not completely departing from **traditional Internal Combustion Engine (ICE) systems** or transitioning to **Battery Electric Vehicles (BEVs)**.

What are ICE Systems and BEV Systems?

- **Internal Combustion Engine (ICE) Systems:**
 - ICE vehicles use traditional engines that burn fossil fuels (e.g., petrol or diesel) to generate power.
 - **Fuel is mixed with air, ignited**, and the resulting explosion drives the vehicle's wheels.
 - They are commonly found in cars, trucks, and motorcycles.
 - They emit exhaust gases and contribute to air pollution and greenhouse gas emissions.
- **Battery Electric Vehicles (BEVs):**
 - **BEVs** are electric vehicles that rely **solely on rechargeable batteries to power an electric motor**.
 - They must be charged using electricity from the grid, which can be generated from various sources, including renewable energy.
 - They produce **zero tailpipe emissions** and are considered environmentally friendly.

What are the Current Major Applications of Ammonia?

- **About:**
 - **Ammonia** is a chemical compound with the **formula NH₃**. It is a **colorless gas with a pungent odor** and is widely used in various **industrial, agricultural, and household applications**.
- **Major Application:**

- **Agriculture:** Key component in the **production of ammonia-based fertilizers**, such as ammonium nitrate and urea, which are essential for crop growth.
- **Chemical Industry:** Fundamental ingredient in the production of substances like **nitric acid, ammonium sulfate, and various nitrogen-based compounds**.
 - It plays a crucial role in the manufacturing of synthetic fibers as well, like **nylon**
- **Manufacturing:** As a **refrigerant in industrial refrigeration systems** and air conditioning.
 - Also, ammonia is used in the manufacture of dyes and as a **pH regulator in dyeing processes**.
- **Household:** An ingredient in **household cleaning products**, including glass and surface cleaners.

Note: The **Ministry of Power, Government of India** has notified the **Green Hydrogen/ Green Ammonia Policy in February 2022**, which provides various incentives and support measures for the manufacturers of green hydrogen and **green ammonia using renewable power**.

Interconnected Disaster Risks Report 2023

Why in News?

Recently, the **release of the Interconnected Disaster Risks Report 2023** has thrust the world's interdependence into the spotlight, **warning of impending global tipping points and underlining the critical need for immediate action** to prevent potential **catastrophic consequences**.

What are the Major Findings of the Interconnected Disaster Risks Report 2023?

- **About:** The **UN Interconnected Disaster Risks Report** is an annual science-based report released by the **United Nations University- Institute for Environment and Human Security (UNU-EHS)**, (first published in 2021).

Note:

- The report analyses **several concrete examples of disasters** each year and explains **how they are inter-connected** with each other and with human actions.
- The report illustrates how **seemingly stable systems can gradually deteriorate until a critical threshold is crossed**, resulting in catastrophic consequences.
 - It introduces the concept of “**risk tipping points**,” moments when **socio ecological systems** can **no longer buffer risks** and face a heightened risk of catastrophic impacts.

Note: The **United Nations University (UNU)** is the academic arm of the **United Nations** and acts as a global think tank. The mission of the **Institute for Environment and Human Security (UNU-EHS)** is to carry out cutting edge research on risks and adaptation related to environmental hazards and global change. The institute is **based in Bonn, Germany**.

- **Tipping Points:** The report highlights that the world is approaching **six environmental tipping points** -
 - **Groundwater Depletion:** **Groundwater** stored in aquifers is vital for over **2 billion people, with 70% used for agriculture**.
 - However, **21 of the world's major aquifers are depleting faster** than they can recharge.
 - Aquifer water often took thousands of years to accumulate and is essentially non-renewable.
 - Over-extraction has occurred in some areas, like **Saudi Arabia**, depleting over **80% of its aquifer**. This forces reliance on imported crops, posing challenges for food security.
 - Certain areas within the **Indo-Gangetic basin in India** have already crossed the **critical threshold of groundwater depletion**, and the entire northwestern region is expected to face severely limited groundwater availability by **2025**.
 - **Accelerating Species Extinctions:** Human activities like **land use changes, overexploitation, and climate change** have accelerated species extinction.
 - Current extinction rates due to human influence are hundreds of times higher than normal.
 - **Extinction can trigger a chain reaction**, causing the collapse of ecosystems.

- **Mountain Glacier Melting:** Glaciers are vital water sources, but they are **melting at double the rate due to global warming**.
 - Between 2000 and 2019, **glaciers lost 267 gigatons of ice per year**. We are **projected to lose around 50% of glaciers by 2100**, even with limited warming.
 - **90,000+ glaciers** of the **Himalayas, Karakoram and Hindu Kush mountains** are at risk, and so are the nearly 870 million people that rely on them.
- **Space Debris:** **Satellites** are crucial for **weather monitoring, communication, and safety**, but the growing number of satellites in space is causing a **space debris** problem.
 - Only **25% of objects in orbit are active satellites**; the rest are non-functional debris.
 - There are **about 130 million smaller, untrackable debris pieces**.
 - These objects move at high speeds and pose a collision risk to operational satellites, creating a hazardous orbital environment.
- **Unbearable Heat:** Climate change is causing more deadly heat waves. High temperatures and humidity make it hard for the body to cool down.
 - When the “**wet-bulb temperature**” exceeds **35°C** for over six hours, it can lead to **organ failure and brain damage**. This has already occurred in places like **Jacobabad, Pakistan**.
- Also, during a **2023 heatwave in India**, wet-bulb temperatures went above **34°C**.
 - It is **expected to affect over 70% of the global population by 2100**.
- **Uninsurable Future:** Frequent severe weather is causing a sevenfold increase in damages since the 1970s, with **USD 313 billion in losses in 2022**.
 - **Insurance costs are rising due to climate change**, making coverage unaffordable for many.
 - Some insurers are leaving high-risk areas, leading to regions being labeled “**uninsurable**.”
 - For example, in **Australia**, about 520,940 homes may become uninsurable by 2030 due to increased flood risk.

Note:



- **Interconnectedness: Climate change, driven by increased greenhouse gas emissions**, acts as a common driver of tipping points. This includes glacier melting, extreme weather events, and shifts in the insurance risk landscape.
 - These **interconnected environmental issues can trigger feedback loops**, such as rising sea levels from glacier melt, intensifying coastal flooding and elevating the demand for disaster insurance.
 - Ultimately, these tipping points have **significant socioeconomic consequences**.

What are the Initiatives for Disaster Risk Reduction?

- Global:
 - Sendai Framework for Disaster Risk Reduction 2015-2030
 - The Climate Risk and Early Warning Systems (CREWS)
 - International Day for Disaster Risk Reduction - 13th October
 - Green Climate Fund's Sectoral Guide on Climate Information & Early Warning Systems
- India's Initiatives:
 - Coalition for Disaster Resilient Infrastructure Society (CDRIS)
 - National Disaster Management Plan (NDMP)

Impact of Disasters on Agriculture and Food Security: FAO

Why in News?

Recently, the Food and Agriculture Organization (FAO) has released a report titled 'The Impact of Disaster on Agriculture and Food Security' stating that the frequency of Extreme Disaster events has risen significantly over the past 50 years.

- The report estimated losses caused by disasters on agricultural production over the past three decades and delves into the diverse threats and impacts

affecting the **crops, livestock, forestry, and fisheries and aquaculture** subsectors.

- It analyzed the complex interplay of underlying risks, such as Climate Change, Pandemics, Epidemics and Armed conflicts, and how they drive disaster risk in agriculture and Agrifood systems at large.

What are the Key Highlights of the Report?

- Magnitude of Agricultural Losses:
 - Over the last 30 years, an estimated USD 3.8 trillion worth of crops and livestock production has been **lost due to disaster events**.
 - This translates to an average annual loss of USD 123 billion, which is approximately 5% of the global agricultural Gross Domestic Product (GDP).
 - Agriculture is **one of the most highly exposed and vulnerable sectors** in the context of disaster risk, given its **profound dependence on natural resources** and climate conditions.
 - Recurrent disasters have the **potential to erode gains in food security** and **undermine the sustainability** of agrifood systems.
- Impact on Different Countries:
 - Disasters have the **highest relative impact on lower and lower middle-income countries**, where they can cause losses of up to 15 % of their total agricultural GDP.
 - Small Island Developing States (SIDS) also experience **significant losses, amounting to nearly 7%** of their agricultural GDP.
- Losses by Product Groups:
 - There are increasing trends in losses related to **major agricultural products**.
 - Cereals are the **most affected**, followed by **fruits and vegetables** and sugar crops, with average losses of millions of tonnes each year.
 - Meats, dairy products, and eggs also show substantial losses.
- Regional Differences:
 - Asia experiences the largest share of total economic losses, followed by **Africa, Europe, and the Americas**.
 - However, in Asia, these losses account for a smaller percentage of agricultural added value compared to Africa.

Note:

Cost of extreme events

The charts were sourced from a report published by the Food and Agriculture Organization titled "The Impact of Disasters on Agriculture and Food Security 2023"



Chart 1: The chart shows the number of disasters by EM-DAT^A grouping and total economic losses in \$ billion

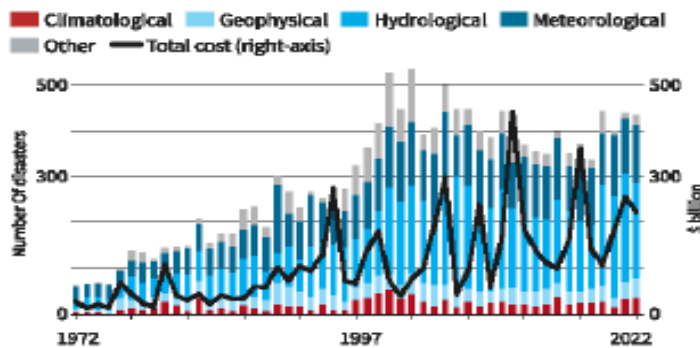


Chart 2: The chart shows the share of loss in agriculture by hazard type. About 65% of losses were caused by droughts

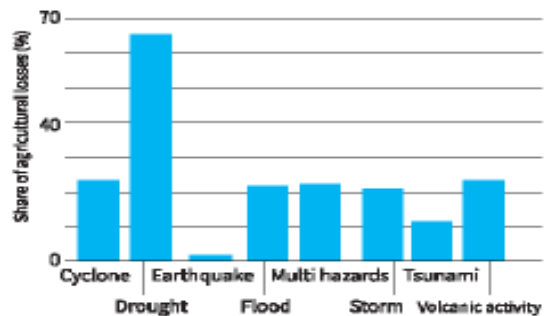


Chart 3: The chart shows the estimated loss in various product groups (In million tonnes) between 1991 and 2021

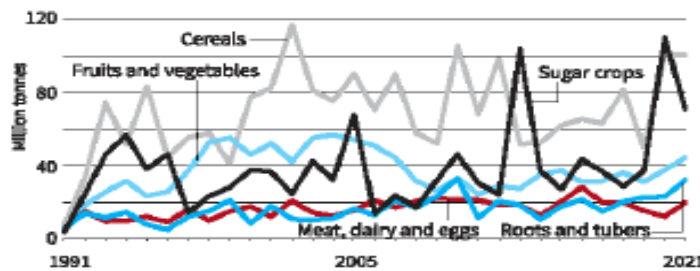


Chart 5: The chart shows total agricultural losses as a share of agricultural GDP by country groups (1991-2021)

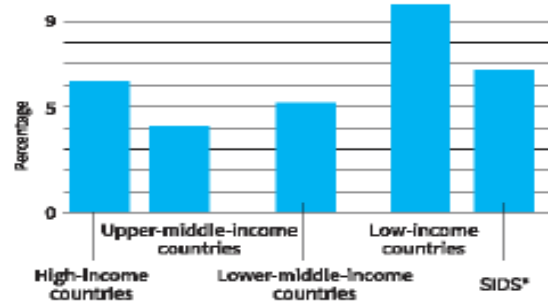
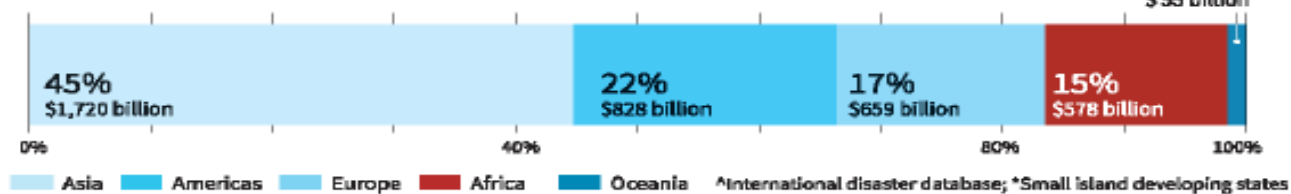


Chart 4: The chart shows the distribution of total estimated \$3.8 trillion losses by region (1991-2021)



➤ **Increasing Frequency of Disasters:**

- Disaster events have been on the rise, increasing from **100 per year in the 1970s** to around **400 events per year worldwide** in the past two decades.
- These events are becoming more frequent, intense, and complex, with expected worsening impacts due to climate-induced disasters.

Note:

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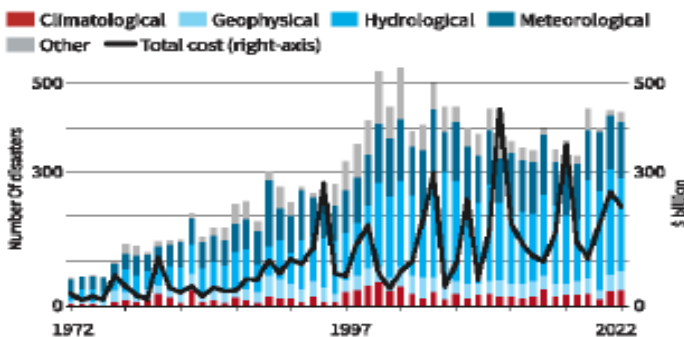


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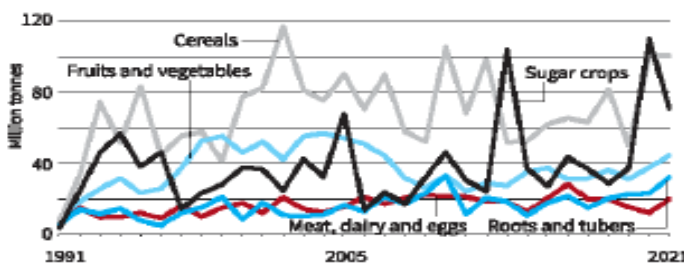


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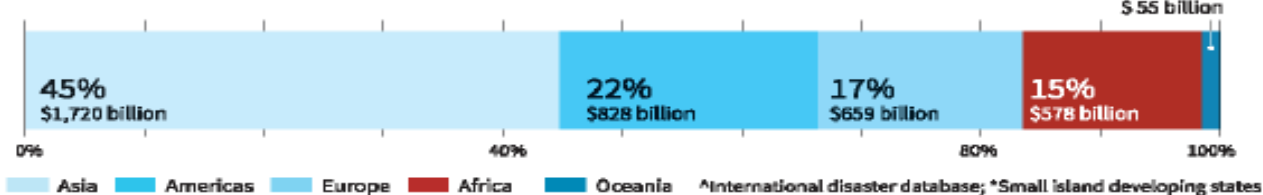


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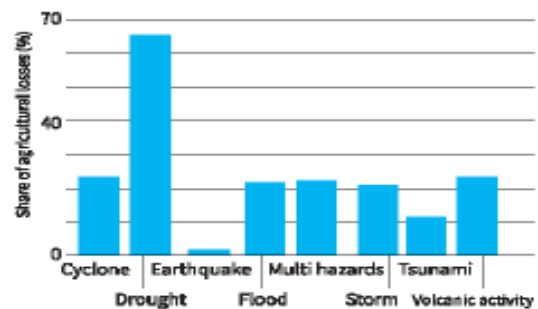
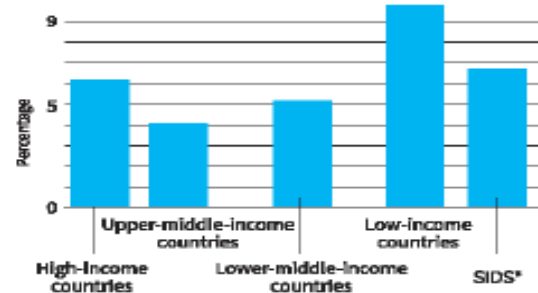


Chart 5: The chart shows total agricultural losses as a share of agricultural GDP by country groups (1991-2021)



➤ Impact on Vulnerable Groups:

- Small-scale farmers, particularly those practicing **Rain-Fed agriculture**, are the most vulnerable to disaster impacts.
- Supporting the adoption of farm-level disaster risk reduction practices can help reduce losses and enhance resilience.
- Investment in farm-level disaster risk reduction good practices can perform on average **2.2 times better** than previously applied practices.

Note:

What is the Food and Agriculture Organization?

- **About:**
 - FAO is a specialised agency of the **United Nations** that leads international efforts to defeat hunger.
 - **World Food Day** is celebrated every year **around the world on 16th October**. The day is celebrated to mark the anniversary of the founding of the FAO in 1945.
 - It is one of the UN food aid **organisations based in Rome (Italy)**. Its sister bodies are the **World Food Programme** and the International Fund for Agricultural Development (IFAD).
- Initiatives Taken:
 - **Globally Important Agricultural Heritage Systems (GIAHS)**.
 - Monitors the **Desert Locust** situation throughout the world.
 - The **Codex Alimentarius Commission or CAC** is the body responsible for all matters regarding the implementation of the Joint FAO/WHO Food Standards Programme.
 - The **International Treaty on Plant Genetic Resources for Food and Agriculture** was adopted by the Thirty-First Session of the Conference of the FAO in 2001.
- Flagship Publications:
 - The State of World Fisheries and Aquaculture (SOFIA).
 - The State of the World's Forests (SOFO).
 - **The State of Food Security and Nutrition in the World (SOFI)**.
 - The State of Food and Agriculture (SOFA).
 - The State of Agricultural Commodity Markets (SOCO).

Biomass Co-Firing In Thermal Power Plants

Why in News?

In recent years, the government has tried to tackle the issue of **stubble burning** by bringing the focus on ex-situ mechanisms of handling biomass or **crop residue management (CRM)** such as **biomass co-firing** and production of **bio-CNG**.

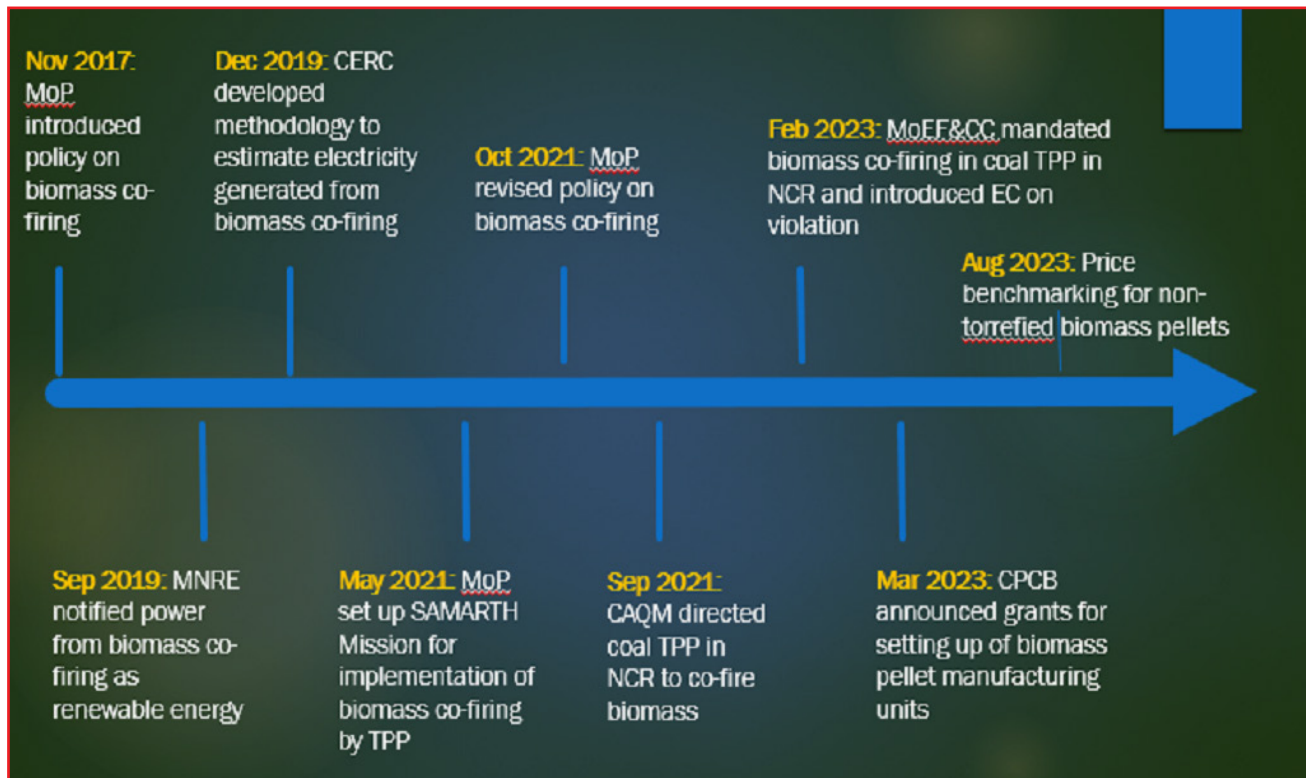
- The Centre for Science and Environment (CSE) conducted a survey-based study in 2022 to understand the on-ground progress of the policy implementation on co-firing biomass in **coal-fired thermal power plants in the National Capital Region (NCR)**.

What Are the Highlights of the Survey Conducted by CSE?

- Limited Biomass Co-Firing Progress:
 - The study found that, as of the end of 2022, co-firing was sporadic, with most plants only conducting trial runs. Unfortunately, **the situation has not significantly improved since then. Only three plants reported increased biomass co-firing** from December 2022 to August 2023.
- Reasons for Delay in Biomass Co-Firing Implementation:
 - CSE **investigated the reasons behind the delay in implementing the mandated 5% co-firing by coal thermal power plants (TPP) in the NCR and adjoining areas.**
 - The **Harduaganj Thermal Power Plant** attributed its success in co-firing biomass to a consistent and affordable biomass supply. However, they **acknowledge that the supply chain needs further strengthening.**
 - In contrast, **Haryana Power Generation Corporation Limited (HPGCL)** faced challenges due to **technical limitations and a shortage of torrefied biomass pellet manufacturers.**
 - **Mahatma Gandhi Thermal Power Plant** faced technical limitations of only being able to co-fire up to 1.5% biomass pellets instead of 5% as mandated and would **need significant investments to increase biomass co-firing to the mandated level, impacting electricity tariffs.**
 - **Talwandi Saboo TPP** struggled to find vendors for its plant due to the absence of established technology for manufacturing torrefied biomass pellets.
- Efforts to Overcome Supply Challenges:
 - Several plants, like Indira Gandhi TPP, have initiated measures to address the supply challenge **by issuing tenders for raw materials to set up in-house pellet manufacturing units and** also explored **partnerships and in-house manufacturing for biomass pellets.**
- Challenges in Implementing Biomass Co-Firing for Farm Fire Reduction:

Note:

- Despite government directives and efforts to enhance pellet manufacturing capacity, the study suggests that **biomass co-firing may not significantly reduce farm fires.**
- **Timely planning and a coordinated approach, from tendering by coal TPPs to crop residue procurement by pellet manufacturers, are essential to effectively address stubble burning, which is time-sensitive.**



What is Biomass Co-firing?

➤ About:

- Biomass co-firing is the practice of substituting a part of the fuel with biomass at **coal thermal plants.**
 - Biomass co-firing stands for adding biomass as a partial substitute fuel in high efficiency coal boilers.
 - Coal and biomass are combusted together in boilers that have been designed to burn coal. For this purpose, the existing coal power plant has to be partly reconstructed and retrofitted.
 - Co-firing is an option to convert biomass to electricity, in an efficient and clean way, and to reduce **GHG (Greenhouse Gases) emissions** of the power plant.
 - Biomass co-firing is a globally accepted cost-effective method for **decarbonising** a coal fleet.
 - India is a country where biomass is usually burnt on the field which reflects apathy towards resolving the problem of clean coal using a very simple solution that is readily available.
 - Co-firing **5 to 7% biomass pellets** in thermal power plants can prevent 38 million tonnes of carbon dioxide every year, as per the Finance Minister in the budget speech in 2022.
- #### ➤ Agro Residues for Biomass Pellet Production:
- The Ministry of Power has identified various surplus agro residues that can be utilized for biomass pellet production. These include:
 - Crop Residues:
 - Agro-residues from crops such as Paddy, Soya, Arhar, Gwar, Cotton, Gram, Jawar, Bajra, Moong, Mustard, Sesame, Til, Maize, Sunflower, Jute, Coffee, etc.
 - Shell Waste:
 - Waste products like Groundnut Shell, Coconut Shell, Castor Seed Shell, etc.
 - Additional Biomass Sources:
 - Bamboo and its by-products, horticulture waste, and other biomass materials like Pine Cone/Needle, Elephant Grass, Sarkanda, etc.

Note:

Implementing Kunming-Montreal Global Biodiversity Framework

Why in News?

Recently, the 25th meeting of the **Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA-25)** in Nairobi, Kenya concluded with recommendations aimed at facilitating the transition from agreement to action following the adoption of the **Kunming-Montreal Global Biodiversity Framework (KMGBF)** in December 2022.

- The meeting primarily focused on creating a progress monitoring mechanism, while also addressing the implications of assessments conducted by the **Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES)** and the **Sixth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC AR6)**, among other matters.

What is the Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA)?

- Article 25 of the **Convention on Biological Diversity** establishes an open-ended **intergovernmental scientific advisory body** known as the **Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA)**.
- Its purpose is to provide the Conference of the Parties (COP) and, as appropriate, its other subsidiary bodies, with **timely advice relating to the implementation of the Convention**.

What Was the Recent SBSTTA-25 Meeting About ?

- IPBES Reports on Invasive Species and Biodiversity Valuation:
 - The recent IPBES report has highlighted the critical role that **invasive species** play in driving the extinction of plants and animals. Additionally, the

Methodological Assessment Report on Diverse Values and Valuation of Nature, as well as the **Thematic Assessment Report on the Sustainable Use of Wild Species**, were discussed.

- These findings shed light on the intricate relationship between biodiversity and the impact of invasive species.
- IPCC AR6 Findings on Biodiversity and Climate Change:
 - The findings from the **IPCC AR6 report** were also a focal point of discussion. The report underscores that climate change is the **primary driver of biodiversity loss and emphasizes the capacity of biodiversity to support climate adaptation, resilience, mitigation, and disaster risk reduction**.
 - This connection between biodiversity and climate change has significant implications for global environmental management.
- **Converging Crises**
 - During the meeting, experts recognized that **biodiversity loss, climate change, ocean acidification, desertification, land degradation, invasive alien species, and pollution** are interconnected crises.
- **Recommendations:**
 - To address these challenges coherently and effectively, **the group finalized 15 key points for presentation at the 16th meeting of the Conference of the Parties (COP16) to the Convention on Biological Diversity (CBD)**.
 - This approach aligns with the goals of the Convention, the Kunming-Montreal Global Biodiversity Framework, and other global initiatives such as the **United Nations Framework Convention on Climate Change** and the **2030 Agenda on Sustainable Development**.
 - Moreover, the meeting **emphasized the importance of utilizing the work of other multilateral agencies, including the World Health Organization and the Food and Agriculture Organization**, to enhance scientific and technical guidance in implementing the Kunming-Montreal Global Biodiversity Framework.

Note:



What is Kunming-Montreal Global Biodiversity Framework?

➤ About:

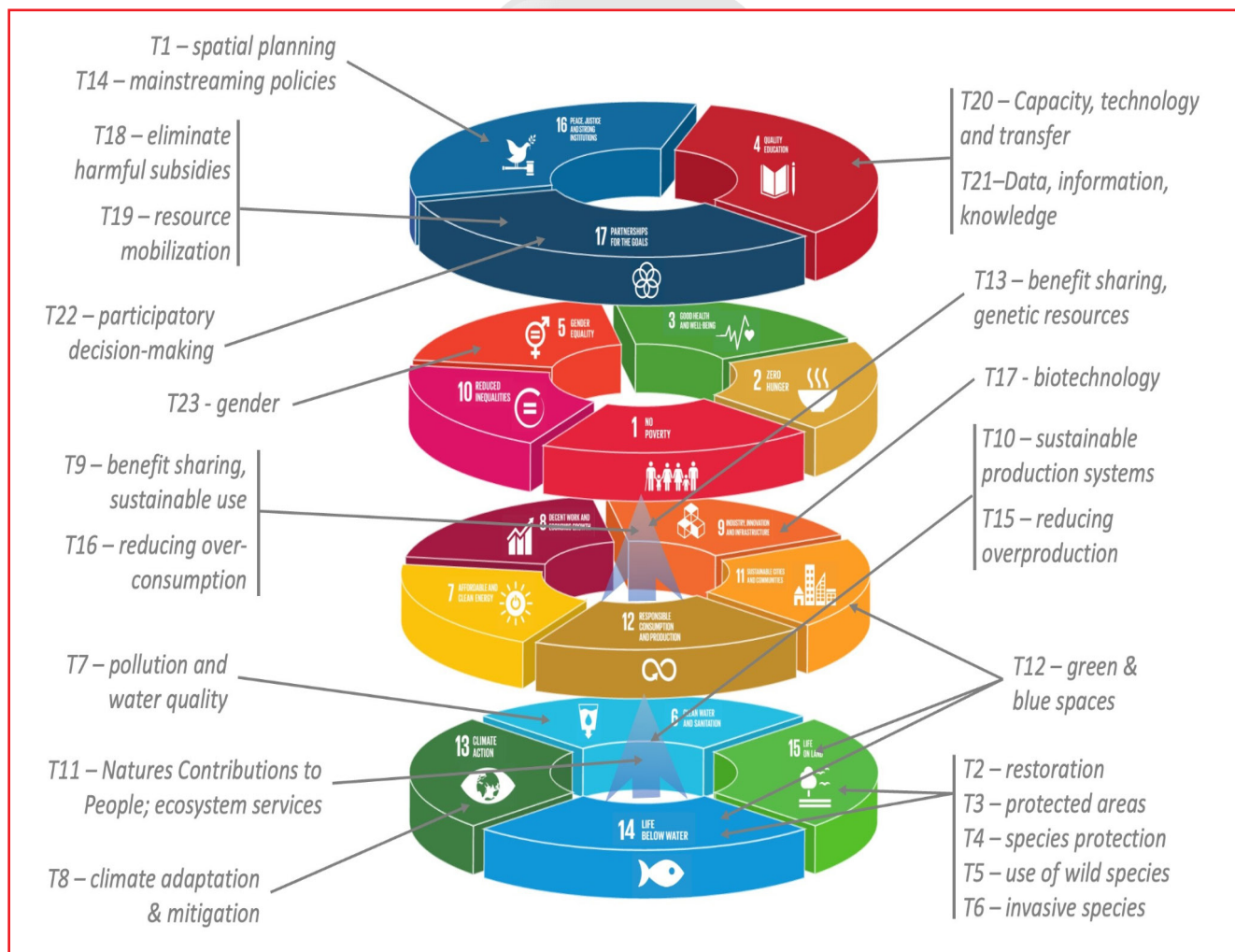
- The Kunming-Montreal Global Biodiversity Framework (GBF) was adopted during the fifteenth meeting of the **Conference of the Parties (COP)-15** of CBD following a four year consultation and negotiation process.
- This historic Framework, which supports the **achievement of the Sustainable Development Goals** and builds on the Convention's previous Strategic Plans, sets out an ambitious pathway to reach the **global vision of a world living in harmony with nature by 2050**.

➤ 30 by 30 Target:

- The declaration made a reference to the **'30 by 30'** target which is a key proposal being debated at the **COP15**, that would afford 30% of the Earth's land and oceans protected status by 2030.

➤ Main Targets:

- The framework consists of **four goals for 2050** and **23 targets for 2030**.
 - The four goals are:
 - Conserve and restore biodiversity.
 - Ensure sustainable use of biodiversity.
 - Share benefits fairly and equitably.
 - Enable transformative change.
 - The 23 Targets are:



Note:

Kunming Biodiversity Fund

- China has also pledged to inject **USD 233 million** into a new fund to protect biodiversity in developing countries. The fund is being referred to by **China as Kunming Biodiversity Fund.**
- Further, some rich country donors say a new fund for conservation is unnecessary because the **United Nations' Global Environment Facility** already helps developing nations finance green projects.

SDG Summit 2023

Why in News?

Recently, the Global leaders expressed apprehension regarding the **slow progress in achieving Sustainable Development Goals (SDGs)** during the SDG Summit in New York, the US.



What are the Key Highlights of the SDG Summit 2023?

- Acknowledging Funding Gap:
 - The annual SDG funding gap, which was USD 2.5 trillion before the pandemic, has now increased to an **estimated USD 4.2 trillion**, emphasizing the **urgent need for substantial investment in achieving the SDGs.**
- Addressing the Finance Challenge:
 - The leaders stressed the **importance of the Addis Ababa Action Agenda (AAAA)** in achieving the 2030 Agenda, emphasizing efficient use of all

financial flows, public and private, for sustainable development.

- They called for swift implementation of the **UN Secretary-General's proposal for an SDG stimulus**, a significant increase in funding by USD 500 billion annually.
 - The AAAA is a global framework for financing sustainable development. It aims to discuss and agree upon ways to mobilize **resources and provide the necessary financing for the implementation of the 2030 Agenda for Sustainable Development** and its 17 SDGs.

Note:



- **Multilateral Actions and Debt Swaps:**
 - To strengthen SDG implementation, the leaders urged multilateral actions and coordination by all creditors, emphasizing scaling up **Debt Swaps for SDGs**, including climate and nature-related debt swaps.
 - Debt swaps provide opportunities for raising capital in low-income countries to address environmental and other policy challenges and support green growth.
- Impact of Covid-19:
 - The declaration acknowledged that the **Covid-19 Pandemic** has disproportionately impacted the SDGs, particularly in the world's poorest and most vulnerable nations. It highlighted the need for an emergency course correction to accelerate progress in achieving the SDGs.
- Integrating Climate Action and Disaster Risk Reduction:
 - Leaders recommitted to fully implementing the **Sendai Framework for Disaster Risk Reduction** and pledged to step up efforts to combat climate change.
 - They also committed to operationalizing new finance arrangements to respond to loss and damage, aligning with climate goals.
- Commitment to 2030 Agenda:
 - The leaders expressed **deep concern about the state of SDGs** at the halfway point of their implementation, highlighting challenges such as poverty, forced relocations, disparities, and the adverse impacts of climate change.
 - Despite these challenges, they recommitted to **fully implementing the 2030 Agenda and 17 SDGs** to protect the rights and well-being of all for a sustainable world.

Drought in the Amazon Rainforest

Why in News?

The **Amazon Rainforest**, often referred to as the “**lungs of the earth**,” is currently facing an unprecedented and **severe drought**.

- This environmental crisis is causing significant disruptions to the **lives of Indigenous people, impacting the entire ecosystem**.

What are the Contributing Factors to Drought in the Amazon Rainforest?

- **El Niño Phenomenon:**
 - The **El Niño phenomenon** is identified as one of the key drivers of drought in the Amazon.
 - It results in abnormal warming of the **surface waters of the Pacific Ocean**, which subsequently affects rainfall patterns.
 - In the Amazon region, El Niño leads to **decreased humidity and reduced rainfall, exacerbating drought conditions**.
- **High Water Temperatures in the Northern Tropical Atlantic Ocean:**
 - Another weather phenomenon is the unusually high water temperatures in the northern tropical Atlantic Ocean. Due to warmer ocean waters, heated air rises into the atmosphere, which then reaches the Amazon rainforest. The warm air **inhibits the formation of clouds**, causing rainfall to drop sharply.
- **Anthropogenic Climate Change:**
 - Human-induced climate change is making the situation worse.
 - **Deforestation**, primarily caused by **activities like agriculture and logging**, hampers the Amazon's ability to regulate climate and retain moisture.
 - The destruction of vast areas of vegetation also contributes to rising temperatures, creating a cycle of increasingly severe droughts.
 - This lack of vegetation leads to reduced **evapotranspiration** and, consequently, an increased susceptibility to drought.
- **Mining Activity:**
 - Unregulated mining activity in the region contributes to the problem by creating **land banks that impede river navigation**.

Note:

- The alteration of aquatic and terrestrial ecosystems through mining also releases **pollutants and greenhouse gases into the environment**, further affecting the climate.
- **Hydroelectric Dams:**
 - The construction and operation of hydroelectric dams in the Amazon, particularly on the **Madeira River** a major **tributary of the Amazon** contribute to drought scenarios.
 - The creation of reservoirs for power generation alters natural river flows and affects aquatic and terrestrial ecosystems.
 - The decomposition of organic matter in these reservoirs releases **methane, a potent greenhouse gas, into the atmosphere.**
- **Transportation Infrastructure:**
 - The construction of infrastructure, like highways, can have detrimental effects on the rainforest by **cutting through conserved areas**, increasing deforestation,
 - and intensifying climate anomalies in the **biome.**
- **Impacts on the Water Cycle:**
 - All of these factors collectively disrupt the **natural water cycle in the Amazon region.**
 - These lead to a decrease in **water volume in rivers**, prolonged droughts, and negative consequences for **aquatic fauna, riparian habitats, and local communities dependent on these water resources.**

Amazon Rainforest

- These are large tropical rainforests occupying the **drainage basin of the Amazon River** and its tributaries in northern South America and covering an area of 6,000,000 square km.
 - The Amazon Basin supports the **world's largest rainforest**, which accounts for more than half the total volume of rainforests in the world.
- Comprising about **40% of Brazil's total area**, Peru, and also parts of Guyana, Colombia, Ecuador, Bolivia, Suriname, French Guiana, and Venezuela, the **Amazon River Basin is the world's largest drainage system.**

- It is bounded by the **Guiana Highlands** to the north, the **Andes Mountains** to the west, the **Brazilian Central Plateau** to the south, and the **Atlantic Ocean** to the east.
 - Tropical forests are closed-canopy forests growing within 28 degrees north or south of the equator.
 - They are very wet places, receiving more than 200 cm of rainfall per year, either seasonally or throughout the year.
 - Temperatures are uniformly high - between 20°C and 35°C.



Arabian Leopards and Wolves

Why in News?

At present times, both the **Arabian wolf and Arabian leopard** are **critically endangered**, with the leopard having lost 98% of its historical range and is believed to be extinct in its northern range, including the **Negev and Judean deserts.**

Dhib and Nimr: Dhib and Nimr are the Arabic terms for the two animals (wolf and leopard respectively).

Note:





What are the Characteristics of the Arabian Leopards and Wolves?

➤ Arabian Wolves:

○ About:

- The **Arabian wolf (*Canis lupus arabs*)**, is a subspecies of the gray wolf. The Arabian wolf holds the distinction of being the **world's smallest wolf**, making it a unique and significant part of the region's wildlife.

○ Geographical Spread:

- These wolves are native to the **Arabian Peninsula**, including regions such as the **Negev Desert in southern Israel and parts of the Middle East**.

○ Significance:

- In the Negev Desert and Arava Valley of southern Israel, **the Arabian wolf remains a resilient apex predator, playing a vital ecological role**. These wolves are adapted to life in arid environments with limited productivity.
- Arabian wolves are known to **"suppress" populations of smaller canids like jackals and foxes**, helping to regulate the ecosystem in the Negev Desert.
- These wolves are a crucial part of the desert ecosystem and contribute to **maintaining herbivore populations and consuming carrion**, which underscores their ecological importance.

➤ Arabian Leopards:

○ About:

- The Arabian leopard (*Panthera pardus nimr*), is another iconic but **critically endangered species** native to the Arabian Peninsula. These leopards were historically found in various parts

of the Arabian Peninsula, including the Negev and Judaeen deserts.

○ Geographical Spread:

- Unfortunately, the status of the Arabian leopard in these regions is dire. A recent study published in 2023 reported that the Arabian leopard has **lost most of its historical range**, and its populations have become highly isolated and fragmented.
- In the Negev and Judaeen deserts, **this species is considered extinct in its entire northern range**.

➤ Conservation Efforts for Both Arabian Wolves and Leopards:

- From an ecological perspective, it would **require adequate prey availability, suitable habitat, and protection from human persecution**.
- However, the **competition between wild and domestic prey, overgrazing of vulnerable vegetation, and conflicts with herders pose significant challenges**.
- Efforts are being made to **increase tolerance and coexistence with Arabian wolves, especially in pastoralist landscapes**. Education about the ecological role of these wolves is being promoted.
- It is recommended to **reduce hunting rates, not only of wolves but also of their prey**, to support the recovery of the wolf's natural prey base.

Green Credit Program

Why in News?

The government has recently unveiled an innovative and voluntary **Green Credit program** designed to reward

Note:



drishti

and incentivize individuals and entities for their positive environmental contributions.

- Participants can earn Green Credits for a wide range of activities that promote environmental sustainability.

What is Green Credit?

➤ About:

- **Green Credit** refers to a unit of **incentive** provided to individuals and entities engaged in activities that deliver a **positive impact on the environment**.
 - It is a voluntary program initiated by the government to **incentivize various stakeholders in contributing to environmental preservation and sustainable practices**.
- This program is part of the broader **'LiFE' campaign (Lifestyle for Environment)**, and it encourages and rewards voluntary environmentally-positive actions.

➤ Covered Activities:

- The Green Credit program encompasses **eight key types of activities** aimed at enhancing environmental sustainability:
 - **Tree Plantation:** Planting trees to increase **green cover** and combat deforestation.
 - **Water Management:** Implementing strategies to efficiently manage and conserve water resources.
 - **Sustainable Agriculture:** Promoting eco-friendly and sustainable agricultural practices.
 - **Waste Management:** Implementing effective **waste management** systems to reduce environmental pollution.
 - **Air Pollution Reduction:** Initiatives aimed at **reducing air pollution** and improving air quality.
 - **Mangrove Conservation and Restoration:** Protecting and restoring **mangrove ecosystems** for ecological balance.

➤ Earning and Calculation of Green Credit:

- To earn Green Credits, participants need to register **their environmental activities through a dedicated website**. The activities will then be subject to verification by a designated agency.
 - Based on the agency's report, the administrator will grant the applicant a certificate of Green Credit.
- The calculation of Green Credit is determined by factors such as **resource requirements, scale, scope, size, and other relevant parameters** necessary to achieve the desired environmental outcomes.

➤ Green Credit Registry and Trading Platform:

- A critical component of the program is the establishment of a **Green Credit Registry**, which will help track and **manage earned credits**.
- Additionally, the administrator will create and maintain a trading platform, enabling the **trading of Green Credits on a domestic market**.

➤ Independence from Carbon Credits:

- It is important to note that the **Green Credit program operates independently of the carbon credits** provided under the **Carbon Credit Trading Scheme, 2023**, which is governed by the **Energy Conservation Act of 2001**.
- An environmental activity generating **Green Credits may have climate co-benefits**, such as **reducing or removing carbon emissions**, which can potentially lead to the acquisition of carbon credits in addition to Green Credits.

Note: A **carbon credit** is a unit of exchange that can be used to **offset greenhouse gas emissions**. One carbon credit is equivalent to **one metric ton of carbon dioxide or equivalent greenhouse gases** removed from the atmosphere.

- The concept of carbon credit originated from the **Kyoto Protocol**.

What are the Other Government Initiatives to Promote the Green Economy?

- **Sovereign Green Bond**
- **Green Energy Corridor**
- **National Green Hydrogen Mission**

Bio-Decomposer to Address Stubble Burning

Why in News?

Recently, the Delhi Government has initiated the spraying of a **Bio-Decomposer** to tackle **Stubble Burning**. However, the effectiveness of the microbial solution largely depends on its **timing of application**, according to farmers.

- Stubble burning in Delhi is not a **major contributor to its pollution levels**, with a minimal number of instances reported in recent years.

Note:

What is Bio-Decomposer to Tackle Stubble Burning?

- **About:**
 - Biodecomposer is designed to accelerate the **natural decomposition process of crop residues**.
 - It is typically a **concoction of various microorganisms** like **fungi, bacteria, and enzymes** that work together to **break down the plant material** into organic matter that enriches the soil.
 - Examples:
 - **Bacteria:** Bacillus, Clostridium, E. coli, Salmonella
 - **Fungi:** Mushrooms, Molds, Yeasts
 - **Earthworms**
 - **Insects:** Beetles, Flies, Ants, Maggots
 - **Arthropods:** Millipedes, Woodlice
- Pusa-Biodecomposer:
 - It is a **fungi-based liquid solution** that can soften **hard stubble** to the extent that it can be easily mixed with soil in the field to act as compost.
 - The fungi thrive at 30-32 degree Celsius, which is the temperature prevailing when paddy is harvested and wheat is sown.
 - It produces enzymes to digest cellulose, lignin and pectin in paddy straw.
 - It is developed by the **Indian Council of Agricultural Research (ICAR)** and named after **ICAR's campus at Pusa in Delhi**.
 - It rapidly **converts crop residues**, animal waste, dung and other waste into organic manure.
- Benefits:
 - The decomposer **improves the fertility and productivity** of the soil as the stubble works as manure and compost for the crops and lesser fertiliser consumption is required in the future.
 - It is an efficient and **effective, cheaper, doable and practical technique** to stop stubble burning.
 - It is an eco-friendly and environmentally useful technology and will contribute to achieving the **Swachh Bharat Mission**.
- Efficacy:
 - The microbial solution aims to decompose paddy straw left in the field post-harvest. It needs to be sprayed after harvest, ploughed into the soil, and lightly irrigated for the stubble to decompose over a **period of 20-25 days**.
 - Farmers have emphasized the importance of aligning the spraying process with the timing of **harvest to maximize the effectiveness of the decomposer**.

- Factors like crop rotation, labor availability, and the type of crop grown **affect the relevance and usability of the decomposer** for farmers.
- The effectiveness of the microbial solution is also **dependent on weather conditions**, with less rain in September and October favoring its application.

What are the Other Initiatives to Tackle Stubble Burning?

- The State Governments of Punjab, National Capital Region (NCR) States and the Government of National Capital Territory of Delhi (GNCTD) have developed **detailed monitorable action plans** based on the framework by the Commission for Air Quality Management (CAQM) to tackle the problem of air pollution.

Global Stocktake Report

Why in News?

Recently, the synthesis report of the first **Global Stocktake** released by the **United Nations Framework Convention on Climate Change (UNFCCC)** ahead of the **18th G-20 summit** in New Delhi.

- The synthesis report presents **17 key findings**, painting a concerning picture of the world's progress towards **Paris Agreement targets**. While there is a limited window for corrective action, the report echoes **previous warnings that global efforts** are falling short.

What is Global Stocktake?

- The Global Stocktake is a **periodic review mechanism** established under the **Paris Agreement in 2015**.
 - The stocktake **takes place every five years**, with the first-ever stocktake scheduled to conclude at the UN Climate Change Conference (COP28) at the end of 2023.
- Its primary objectives **are to assess individual countries' efforts** to reduce **Greenhouse Gas (GHG)** emissions and transition to renewable energy sources.
- The stocktake is **designed to keep countries accountable and encourage** them to increase their climate ambitions over time.
 - In 2015, when countries committed in Paris **to keep global temperatures from rising beyond 2 degrees Celsius by the end of the century** and "as far as possible" below 1.5 degrees Celsius, they also agreed to **periodically review, or take stock of efforts**, made by individual countries in containing greenhouse gasses.

Note:



- While countries have laid out their **Nationally Determined Contributions (NDC)**, they are expected to — but not obliged to — increase their ambitions every five years.
- While the latest NDC were submitted in 2020, a stocktake also aims to push countries to set higher targets before the next **NDCs are published in 2025**.

What are the Key Recommendations of the Report?

- **Galvanizing Effect of Paris Agreement:**
 - The Paris Agreement has galvanised countries into **setting goals and signalling the urgency of the climate crisis**.
 - Governments need to support ways to transition their economies away from fossil fuel businesses and that states and communities must strengthen efforts.
- **Equitable Economic Transition:**
 - While rapid change could be “disruptive,” countries should work on ensuring that the **economic transition is equitable and inclusive**.
 - Much more ambition is needed to reduce global GHG emissions by **43% by 2030 and further by 60% in 2035** and reach net zero CO₂ emissions by 2050 globally.
 - Rapid change should prioritize equitable and inclusive economic transitions.
- **Scaling Up Renewable Energy and Halting Deforestation:**
 - Renewable energy has to be scaled up and all ‘unabated fossil fuels are to be **rapidly eliminated**.
 - Deforestation and land-degradation **have to be halted and reversed** and **agricultural practices** critical to reducing emissions and conserving and enhancing carbon sinks have to be encouraged.
- **Fragmented Adaptation Efforts:**
 - While the world, as a whole, has committed to scale up **steps to help adapt to the unfolding and future impacts of climate change**, most efforts were “fragmented, incremental, sector-specific and unequally distributed across regions.”
 - Transparent reporting on **adaptation could facilitate and enhance understanding**, implementation and international cooperation.
- **Addressing Loss and Damage:**
 - Averting, **minimising and addressing ‘loss and damage,’** requires urgent action across climate and development policies to manage risks

comprehensively and provide support to impacted communities.

- Support for adaptation and funding **arrangements for averting, minimising and addressing loss and damage**, from the impact of climate change, needed to be rapidly scaled up from expanded and innovative sources.
- **Enhancing Climate Finance Access:**
 - Financial flows **needed to be made consistent** with climate-resilient development to meet urgent and increasing needs.
 - A substantial shift in financial flows is **essential to support low greenhouse gas emissions** and climate-resilient development.

2nd Berlin Forum on Chemicals and Sustainability

Why in News?

Recently, the **Union Minister for Environment, Forest, and Climate Change** participated in the virtual ‘**High Level Dialogue on Human Health and Environment**’ convened under the **2nd Berlin Forum on Chemicals and Sustainability**- Just Transition Towards a Pollution-free Planet.

- The summit aims to foster a **shared global understanding of critical issues in chemical and waste management** while providing crucial political direction.

What is the 2nd Berlin Forum on Chemicals and Sustainability?

- The 2nd Berlin Forum on Chemicals and Sustainability is a high-level event that aims to provide political guidance and momentum on key international issues and priorities regarding **sound management of chemicals and waste**.
 - It was organized by the **German Federal Ministry for the Nature, Nature Conservation, Nuclear Safety, and Consumer Protection (BMU)**.
 - It also aimed to garner support and ensure a high level of ambition of the ‘**SAICM Beyond 2020**’ during the upcoming **5th meeting of the International Conference on Chemicals Management (ICCM5)**.
 - The **First Berlin Forum on Chemicals and Sustainability** highlighted the **need for a science-policy interface (SPI) on chemicals and wastes**.

Note:

What is SAICM Beyond 2020?

- The **Strategic Approach to International Chemicals Management (SAICM)**, adopted in 2006, is a policy framework to promote chemical safety worldwide.
 - The initial objective was to achieve “**the sound management of chemicals throughout their life cycle so that by the year 2020**, chemicals are produced and used in ways that minimize significant adverse impacts on the environment and human health.”
 - The scope of SAICM is nearly unlimited, **it includes both toxic chemicals and hazardous industrial activities**. However, **SAICM imposes no binding obligations on countries**.
- As the **mandate of SAICM ended in 2020** and the goal of a sustainable chemicals management has not been achieved, the parties agreed on developing a follow up process – **SAICM Beyond 2020** – which was supposed to be adopted in 2020 at ICCM 5.
 - Since in-person meetings have been suspended due to the Covid-19 pandemic, the 5th session of the ICCM5, **organized by UNEP under the presidency of the government of Germany**, will take place from **25 to 29 September 2023** at the **World Conference Center Bonn (WCCB), Germany**.

Note:

- The **Stockholm Convention** is a global treaty aimed at **safeguarding human health and the environment from persistent organic pollutants (POPs)**, which are long-lasting, **widespread chemicals** that pose risks to both people and wildlife.
 - India **ratified the convention in 2006**, which allows it to maintain a **default “opt-out”** status, meaning that amendments to convention Annexes do not apply to India unless it **explicitly deposits a ratification, acceptance, approval, or accession instrument** with the UN depositary.
- Other Conventions Related to Chemicals are: **Basel Convention (on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal)**, **Minamata Convention (mercury)**, **Rotterdam Convention (on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade)**.

E-Waste Management in India

Why in News?

The **Indian Cellular and Electronics Association (ICEA)** has released a comprehensive report titled ‘**Pathways to Circular Economy in the Indian Electronics Sector**.’

- This report highlights the urgent need to **rethink e-waste management** and **explore opportunities to harness its potential**.
- The report suggests that this transformation could unlock an additional **USD 7 billion market opportunity**.

What are the Major Highlights of the Report?

- The E-Waste Landscape in India:
 - According to the ICEA report, **e-waste management in India is predominantly informal**, with approximately **90% of e-waste collection and 70% of recycling being managed by a competitive informal sector**.
 - The informal sector excels at salvaging older electronic devices for spare parts and profitably carrying out repairs.
 - Industrial hubs like Moradabad specialize in **processing printed circuit boards (PCBs) to extract valuable materials like gold and silver**.
- Circular Economy Principles:
 - The report emphasizes the **need to shift the outlook on e-waste management towards establishing a circular economy**.
 - China serves as an example, **targeting to use 35% of secondary raw materials in the manufacturing of new products by 2030**, reflecting a circular economy approach.
 - **Proposed Strategies for a Circular Economy in E-Waste:** The ICEA report outlines several key strategies to usher in a circular economy for e-waste in India:
 - **Public-Private Partnerships (PPP):** Collaboration between **government bodies and private enterprises** is essential to distribute the costs of setting up a reverse supply chain.
 - This complex endeavor involves collecting devices from users, erasing personal data, and channeling them for further processing and recycling.

Note:

- **Auditable Database:** The creation of a **transparent and auditable database of materials** collected through the reverse supply chain process can enhance accountability and traceability.
- **Geographical Clusters:** Establishing **geographical clusters where discarded devices are gathered and dismantled** can optimize the recycling process, making it more efficient and cost-effective.
- **Incentivizing 'High-Yield' Recycling Centers:** Encouraging the development of high-yield recycling facilities can help **maximize the value extraction from electronic products**, including rare earth metals in **semiconductors**.
- **Promoting Repair and Product Longevity:** Policy recommendations include **encouraging repair and making products last longer**.
 - This could involve supporting a **user's right to repair**, reducing the environmental burden of electronic waste.

Note: In a circular economy, **discarded electronics can be given a new life**, either as **standalone devices or by reintroducing their components** and precious metals into new hardware.

- It views all materials produced on Earth as valuable resources rather than waste.

European Honeybees as Biomonitoring Agents for AMR

Why in News?

A recent study has revealed an unconventional yet efficient method for **monitoring the proliferation of antimicrobial resistance (AMR) in urban areas**: the utilization of **European honeybees** as biomonitoring agents.

What are the Major Highlights of the Research?

- **European honeybees** serve as a unique **environmental proxy**, effectively **"crowdsourcing" data as they interact with contaminants** in various urban elements such as soil, dust, air, water, and pollen during their foraging activities.

- **Their short lifespan, around 4 weeks**, allows them to provide real-time data on the state of the environment concerning antimicrobial resistance.
- Researchers have shed light on the significance of these bees in assessing pollution that may pose risks to human health. They analyzed the **gut bacteria of 144 bees and identified Class 1 integrons (int1)** as a universal marker for **tracking AMR**.
 - Surprisingly, around **52% of the bees carried int1 in urban areas**.
 - **Integron** is a mobile DNA element that can capture and carry genes, particularly those responsible for antibiotic resistance.
- Furthermore, the **researchers examined eight bees from each of the 18 hives** owned by citizen-scientist beekeepers in Greater Sydney, Australia.
 - 80% of these bees across all hives **tested positive for one or more AMR targets**.
 - Higher concentrations were observed near bodies of water like dams and lakes.

What are European Honeybees?

About:

- European honeybees (*Apis mellifera*) commonly referred to as the **Western honey bee**, possess two pairs of wings and usually display **black or brown coloring with distinctive yellow stripes on its abdomen**.
 - They prefer to **nest in a cavity such as a hollow tree or house wall**.
- They are assessed as **"Data Deficient" on the IUCN Red List**.
- Distribution:
 - The species lives predominantly in managed bee colonies **throughout Europe**, although there are potentially feral and **wild bee colonies found in a wide range of habitats**.
 - Generally, the species can be found to **inhabit temperate forests, grasslands and even semi-deserts**.

What is the Social Structure and Behaviour of Honeybee?

Social Structure:

- Among them, **queen bees, the fertile females**, develop into the largest individuals.

Note:



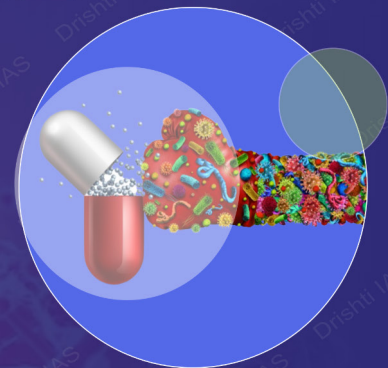
- **Drones, which are the males**, have a medium build and notably larger eyes compared to females.
- **Worker bees, smaller sterile females**, are equipped with **barbed stingers** and **possess unique hind legs utilized as pollen baskets**.
- **Behavior:**
 - **Communication:** They communicate through a complex system of dance called “**waggle dance**”

to relay information about food sources and hive conditions.

- **Hive Construction:** Bees construct intricate **hexagonal honeycomb structures** made of beeswax to store honey, **pollen**, and raise brood.
- **Pollination:** While foraging for nectar and pollen, honeybees unintentionally **pollinate many plant species**, aiding in plant reproduction.

What is Antimicrobial Resistance?

ANTIMICROBIAL RESISTANCE



The ability of microorganisms to resist the effects of antimicrobial drugs

CAUSES OF ↑ AMR

- Poor infection control/sanitation
- Antibiotic overuse
- Genetic mutations of microbe
- Lack of investment in R&D of new antimicrobial drugs

Microbes that develop AMR are called 'Superbugs'

IMPACTS OF AMR

- ↑ Risk of spreading infections
- Makes infections harder to treat; prolonged illness
- ↑ Healthcare costs

EXAMPLE

- Carbapenem antibiotics stop responding due to AMR in *K. pneumoniae*
- AMR *Mycobacterium tuberculosis* causing Rifampicin-Resistant TB (RR-TB)
- Drug-resistant HIV (HIVDR) making antiretroviral (ARV) drugs ineffective

RECOGNITION BY WHO

- Identified AMR as **one of the top 10 threats** to global health
- Launched **GLASS** (Global Antimicrobial Resistance and Use Surveillance System) in 2015

INDIA'S INITIATIVES AGAINST AMR

- Surveillance of AMR in microbes causing **TB, Vector Borne diseases, AIDS etc.**
- **National Action Plan on AMR (2017)** with One Health approach
- **Antibiotic Stewardship Program** by ICMR

New Delhi metallo-β-lactamase-1 (NDM-1) is a bacterial enzyme, emerged from India, that renders all current β-lactam antibiotics inactive

Note:

Note: A [United Nations Environment Programme](#) report in February 2023 warned that the unchecked rise of AMR could lead to up to **10 million deaths annually by 2050**.

Global Push to Criminalize Ecocide

Why in News?

The controversial [Maya](#) train project in Mexico aims to link tourists with historic [Maya sites](#), sparking concerns over its potential environmental and cultural impact.

- The debate surrounding this project brings into focus the **concept of “ecocide”** and the growing **global movement to criminalize [environmental destruction](#)**.

What is an Ecocide?

➤ About:

- **Ecocide**, derived from Greek and Latin, translates to ‘**killing one’s home**’ or ‘**environment**’.
- Although there is currently **no universally recognized legal description of ecocide**, a group of lawyers convened by an NGO named **Stop Ecocide Foundation in June 2021** crafted a definition that would place **environmental devastation within the same realm as crimes against humanity**.
- According to their proposal, ecocide is defined as “**unlawful or reckless actions carried out with the awareness that there exists a substantial probability of causing severe and either extensive or enduring harm to the environment.**”

➤ Historical Context:

- In 1970, biologist **Arthur Galston** was the first to draw a **connection between environmental devastation and genocide** (which is recognised as an **international crime**).
 - He made this link when addressing the U.S. military’s utilization of **Agent Orange**, an herbicide, during the **Vietnam War**.
- **Swedish Prime Minister Olof Palme** also used this concept in a speech at the **United Nations**.
 - He cautioned that **uncontrolled industrialization** could lead to irreversible harm to the environment.

- In 2010, a British lawyer played a pivotal role by urging the **United Nations’ International Criminal Court (ICC)** to officially acknowledge ecocide as an **international crime**.

- Currently, the **Rome Statute of the ICC** addresses four major offenses: **genocide, crimes against humanity, war crimes, and the crime of aggression as a international crime**.
- The provision related to **war crimes is the sole statute** that can hold a **wrongdoer accountable for environmental destruction**, but only if it is intentionally caused during times of armed conflict.

What is the Present Status of Ecocide Acknowledgment in India?

- India has **neither signed nor ratified the Rome Statute of the International Criminal Court** and has **not expressed any official position on the proposal to criminalize ecocide at the international level**.
 - However, India has ratified several **international environmental treaties** and conventions, such as the **Convention on Biological Diversity**, the **United Nations Framework Convention on Climate Change** and **Convention on International Trade in Endangered Species of Wild Fauna and Flora**.
 - India has also enacted various **national laws and policies** to protect and conserve its environment, such as the **Environment Protection Act 1986**, the **Wildlife Protection Act 1972**, and **Compensatory Afforestation Fund Act, 2016 (CAMPA)**.
- While some Indian court judgments have casually used the **term ‘ecocide,’** the concept **has not been formally integrated into Indian law**.
 - In the case of **Chandra CFS and Terminal Operators Pvt. Ltd. v. The Commissioner of Customs and Ors, 2015**, the **Madras High Court** noted the continuous and unbridled activities of ecocide related to the removal of valuable timbers.
 - The **T.N. Godavarman Thirumulpad vs Union Of India & Ors, 1995** case in the **Supreme Court** drew attention to the need to shift from an **anthropocentric approach to an ecocentric approach for achieving [environmental justice](#)**.

Note:



Marine Sand Extraction

Why in News?

Recently, a newly launched data platform called “**Marine Sand Watch**” sheds light on this critical issue, revealing the **scale of sand extraction** and its far-reaching consequences.

- The relentless extraction of sand from the world’s oceans is posing a severe threat to **marine ecosystems and coastal communities**.

What is Marine Sand Extraction?

➤ About:

- Marine sand extraction is the process of **removing sand from the seabed or the coastal zone** for various purposes, such as **construction, land reclamation, beach nourishment, or mining**.

➤ Process:

○ Dredging:

- Dredging is the most common method of marine sand extraction. It **involves using a vessel equipped with a suction pipe or a mechanical grab to scoop up the sand** from the seabed and transport it to the shore or another location.

○ Mining:

- Mining is another method of marine sand extraction. It involves using specialized equipment, such as drills, cutters, or jets, to break up the sand deposits and extract the minerals or metals from them.

○ Harvesting:

- Harvesting is a less common method of marine sand extraction. It involves using natural forces, such as waves, currents, or tides, to collect the sand from the coastal zone and deposit it onshore.

➤ Extraction Estimates:

- The platform has estimated that **between four and eight billion tonnes of sand** are being dredged from the **ocean floor** every year.
 - Marine sand extraction is **expected to rise to 10 to 16 billion tonnes** per year, which is the **natural replenishment rate** or the amount that rivers need to maintain coastal and marine ecosystem structure and function.

Marine Sand Watch

- It is a data platform developed by a **Centre for Analytics within the United Nations Environment Programme (UNEP)**.
- The platform will **track and monitor dredging (removal) activities** of sand, clay, silt, gravel, and rock in the world’s marine environment.
- It will provide information on areas used for sand extraction, areas of capital and maintenance dredging, sand trading ports/hubs, number of vessels and operators, and extraction of sediment and other types of activities by countries with **Exclusive Economic Zones**.

What are the Responses to Marine Sand Extraction?

➤ Sand Mining in India:

- Sand is classified as a “**minor mineral**”, under the **Mines and Minerals (Development and Regulations) Act, 1957 (MMDR Act)** and administrative control over minor minerals vests with the State Governments.

- **Rivers and coastal areas** are the main sources of sand, and the demand for it has increased significantly in recent years due to the construction and infrastructure development boom in the country.

- The **Ministry of Environment, Forests, and Climate Change (MoEFCC)** has issued “**Sustainable Sand Mining Management Guidelines 2016**” to promote **scientific sand mining** and environmentally friendly management practices.

➤ Global Responses:

- Some countries like Indonesia, Thailand, Malaysia, Vietnam, and Cambodia have banned marine sand exports in the last two decades.

➤ UNEP Recommendations:

- The UNEP advocates for better monitoring of sand extraction and use.
- UNEP calls for the establishment of international standards for sand extraction in the marine environment.

➤ International Seabed Authority (ISA):

- The **ISA** is an **intergovernmental organization that regulates deep-sea mining and exploration in international waters**.
- The ISA was established in 1982 under the **United Nations Convention on the Law of the Sea (UNCLOS)**.

Note:

Forest Conservation and Tribal Rights in Northeast India

Why in News?

Recently, The Mizoram Assembly has passed a resolution opposing the **Forest (Conservation) Amendment Act (FCA), 2023**, highlighting the ongoing challenges in forest conservation and tribal rights in Northeast India.

What are the Concerns Raised by the North Eastern States Against FCA?

- **Amendment's Impact on Northeast India:**
 - The Forest (Conservation) Amendment Act of 2023 allows for forest land diversion for projects located within 100 km of India's international borders **without requiring forest clearance under the Forest (Conservation) Act of 1980**.
 - Most of Northeast India falls within the 100 km range, raising concerns about the environmental impact and infringement on tribal rights.
- Forests Not Officially Classified are not Protected:
 - **Until 1996, the provisions of the FCA were only applied to forests that had been declared or notified as a forest, and to forests recorded in government records on or after 25th October 1980.**
 - The **areas not officially classified as forests** in a government record, even if they are standing forests, will **not be protected from commercial exploitation** or any other kind of diversion.
 - This overturns a **1996 Supreme Court order in the Godavarman case** which ruled that any area resembling a forest's dictionary meaning would be **protected under conservation laws**.
- State Opposition:
 - Mizoram and Tripura have passed resolutions opposing the amendment, expressing their **commitment to protecting the rights and interests of their people**.
 - Nagaland faces demands to follow suit, and Sikkim has also opposed the 100 km exemption clause.
- Significant Area is Unclassed Forest:
 - A huge portion of forests in the North East are privately owned: either by individuals, or **clans**

or **village councils, or communities**, enabled by special privileges that the Constitution guarantees **to tribal communities**.

- More than 50% of the Recorded Forest Areas (RFA) in the North East falls **under "unclassified forests"**—forests which are not notified under any law.
 - For example, 97.3% of RFA in Nagaland, 88.2% in Meghalaya, 76% in Manipur, 53% in Arunachal Pradesh, 43% in Tripura, 33% in Assam, and 15.5% of Mizoram fall **under unclassified forests category**.
- This means that these large areas of unclassified forests **would be excluded from this Act** unless they are included in government records.

How are Forests Protected in North East India?

- **Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act (FRA) 2006:**
 - Forest Land includes unclassified forests, undemarcated forests, existing or deemed forests, protected forests, reserved forests, Sanctuaries, and National Parks.
 - This complied with the **1996 Supreme Court redefinition**.
- **Article 371A and 371G:**
 - Special Constitutional protections in **Article 371A (Nagaland)** and **371G (Mizoram)** prohibit the **application of laws that impinge on tribal customary law**, land ownership, and transfer without the **State Legislative Assemblies' resolutions**.
 - Mizoram, unlike Nagaland, falls under the purview of FCA due to its status as a State. The amendment **affects 84.53% of its forest areas**.
 - Mizoram from the **Union Territory** became a State with the Constitution (**Fifty-Third Amendment) Act 1986**, adding **Article 371G** to the Constitution, stipulating that **all Central Acts in force before 1986 are extended to the State, including the FCA**.
- **Forest Rights Act (FRA) 2006:**
- FRA recognizes traditional forest rights in various forest types, including unclassified forests, providing an additional layer of protection for tribal communities.
 - The potential benefits, most Northeastern states, **except Assam and Tripura, have not implemented FRA**, citing reasons such as land ownership patterns and lack of forest-dependent communities.

Note:

What are the Constitutional Articles that Provide Exemptions to the Northeastern States?

Article (Amendment)	State	Provision
Article 371A (13th Amendment Act, 1962)	Nagaland	Parliament cannot legislate in matters of Naga religion or social practices, Naga customary law and procedure, administration of civil and criminal justice involving decisions according to Naga customary law, and ownership and transfer of land without the concurrence of the state Assembly.
Article 371G (53rd Amendment Act, 1986)	Mizoram	Parliament cannot make laws on “religious or social practices of the Mizos, Mizo customary law and procedure, administration of civil and criminal justice involving decisions according to Mizo customary law, ownership and transfer of land unless the Assembly decides.

Invasive Alien Species

Why in News?

The **Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES)** has recently released an “Assessment Report on **Invasive Alien Species** and their Control.”

- This comprehensive study sheds light on the **alarming proliferation of invasive alien species worldwide** and their **devastating impact on global biodiversity**.

What are the Major Highlights of the Report?

- The scale of the Problem of Invasion of Alien Species:
 - The report reveals the **presence of approximately 37,000 alien species**, introduced by **human activities**, across various regions and biomes.
 - Of these, more than **3,500 are classified as invasive alien species**, posing severe threats to local ecosystems.
 - About **6% of alien plants, 22% of alien invertebrates, 14% of alien vertebrates**, and 11% of alien microbes are known to be invasive.
- Leading Invasive Species:
 - The **water hyacinth** ranks as the **world’s most widespread invasive alien species** on land.
 - **Lantana, a flowering shrub**, and the **black rat** hold the second and third positions on the global invasion scale.
 - The **brown rat and house mouse** are also widespread invaders.

➤ Perceived Benefits vs. Negative Impacts:

- Many invasive alien species were intentionally introduced for perceived benefits in sectors such as **forestry, agriculture, horticulture, aquaculture, and as pets**.
- However, their **negative impacts on biodiversity and local ecosystems** were often not considered.
 - Invasive alien species have played a **significant role in 60% of documented global plant and animal extinctions**.
 - These species are now recognized as **one of the five primary drivers of biodiversity loss**, alongside **land and sea use change, direct exploitation of organisms, climate change, and pollution**.
 - **Nearly 80% of the documented impacts of invasive species** on nature’s contribution to people are **negative**.

➤ Regional Distribution: 34% of the impacts of biological invasions were reported from the Americas, 31% from Europe and Central Asia, 25% from Asia and the Pacific, and about 7% from Africa.

- The majority of negative impacts occur on land, especially in forests, woodlands, and cultivated areas.
- **Invasive alien species are most damaging on islands**. On more than 25% of all islands, the number of alien plants now exceeds the native plants.
- 85% of the impacts of biological invasions on native species are negative.

Note:

What are Invasive Alien Species?

➤ About:

- Invasive alien species, also known as **invasive exotic species or non-native species**, refer to organisms that have been introduced to regions or ecosystems outside of their native range and **have established self-sustaining populations**.
- These species often **outcompete native species** and **disrupt the balance of ecosystems**, leading to a range of negative impacts.

➤ International Instruments and Programmes on Invasive Species:

- **Kunming-Montreal Global Biodiversity Framework (2022)**: Governments have committed to reducing the rate of introduction and establishment of invasive alien species **by at least 50% by 2030**.
- **Convention on Biological Diversity (CBD - 1992)**: Adopted at the **1992 Earth Summit in Rio de Janeiro**, it recognizes invasive alien species as a major threat to the environment, second only to habitat destruction.
- **Convention on the Conservation of Migratory Species (CMS - 1979)**: This intergovernmental treaty aims to **conserve migratory species** and includes measures to control or eliminate invasive alien species already present.
- **Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES - 1975)**: Focuses on ensuring **international trade does not threaten the survival of wild animals and plants**; it also considers the impact of invasive species involved in trade.

Hollongapar Gibbon Sanctuary

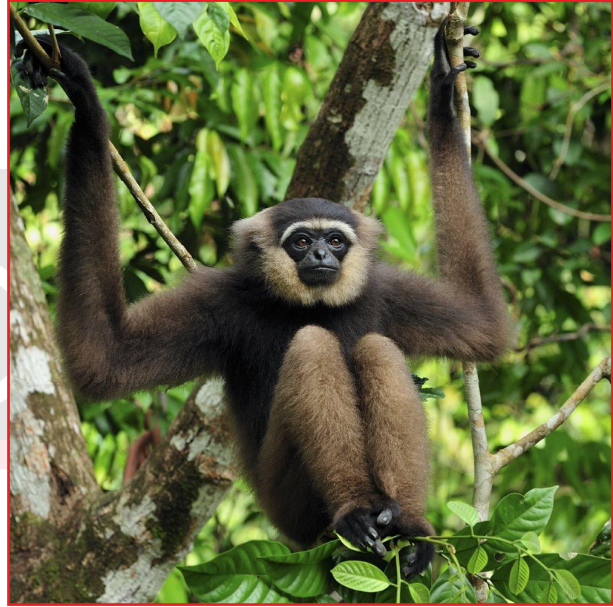
Why in News?

Primatologists have suggested rerouting a 1.65-km-long railway track that has divided the Hollongapar **Gibbon Sanctuary**, in eastern Assam dedicated to the **western hoolock gibbon** into two unequal parts.

What are the Key Facts About Hoolock Gibbons?

➤ About:

- Hoolock Gibbons, known as the **smallest and fastest of all apes, inhabit tropical and subtropical forests in Southeast Asia**.
- They have high intelligence, distinct personalities, and strong family bonds similar to other apes.
- They represent one of the 20 gibbon species found worldwide.
- Hoolock Gibbons are India's only ape species.



➤ Gibbon Species in India:

- **Western Hoolock Gibbon (*Hoolock hoolock*)**:
 - It inhabits in **all the states of the north-east**, restricted **between the south of the Brahmaputra River and east of the Dibang River**. Outside India, it is found in **eastern Bangladesh and north-west Myanmar**.
 - **International Union for Conservation of Nature's Red List (IUCN)**: Endangered
- **Eastern Hoolock Gibbon (*Hoolock leuconedys*)**:
 - It inhabits specific pockets of **Arunachal Pradesh and Assam in India**, and in **southern China and north-east Myanmar outside India**.
 - IUCN Red List: Vulnerable
- In India, both species are listed on **Schedule 1 of the Indian (Wildlife) Protection Act 1972**.

Note:



- **Characteristics:**
 - They are known for their **distinct white eyebrows, long arms, and a throat sac used for vocalizations.**
- **Arboreal Lifestyle:**
 - Gibbons are exclusively **arboreal, spending their lives in the treetops of tropical forests.**
- **Challenges:**
 - Hoolock gibbons are particularly sensitive to habitat disruptions, such as canopy gaps.
 - Fragmentation of their habitat can lead to genetic isolation and threaten their populations.
- **Conservation Efforts:**
 - Initiatives like **artificial canopy bridges aim to facilitate their movement and preserve genetic diversity.**
 - Gibbons play a vital role in forest ecosystems by dispersing seeds as they travel through the canopy.
 - Their conservation is essential for maintaining the health and biodiversity of their habitats.

Gibbon Sanctuary:

- Hoollongapar Gibbon Sanctuary, formerly known as **Gibbon Wildlife Sanctuary**, is located in Assam's Jorhat district, India.
- Established in 1997, it boasts a **rich biodiversity, housing India's only gibbons, the western Hoolock hoolock**, and the Bengal slow loris, the sole nocturnal primate in Northeastern India.

Red Sand Boa

Why in News?

Recently, a report by the **Wildlife Conservation Society (WCS)-India** titled '**Illegal Trade of Red Sand Boa in India 2016-2021**' has exposed the trade of red sand boa.

- This alarming revelation underscores the pressing concern about the illegal trade of Red Sand Boas and the urgency for conservation efforts.

What are the Key Highlights of the Report?

- The report documents a total of **172 incidents of seizures involving red sand boas between 2016 and 2021**, revealing the alarming extent of illegal trade.
- Illegal trade spans **18 Indian states, 1 Union Territory, and 87 districts**; Maharashtra and UP record the highest incidents.

- **Maharashtra dominates with 59 cases**, including urban areas like Pune, Thane, Mumbai Suburban.
- Uttar Pradesh closely follows 33 incidents, often near Nepal's border in districts like Bahraich, and Lakhimpur-Kheri.
- Social media, especially **YouTube, aids illegal trade, with 200 sales-promoting videos in 2021.**
- The report's findings underscore the urgent need for **conservation efforts to prevent the further decline of the red sand boa** population and protect India's biodiversity.

What are the Key Facts About Red Sand Boa?



- **About:**
 - **The Red Sand Boa (*Eryx johnii*)**, commonly called the **Indian Sand Boa**, is a **non-venomous species**.
 - It is a primarily **reddish-brown and thick-set snake that grows to an average length of 75 cm**.
 - Unlike most snakes, the tail is almost as thick as the body and gives the reptile the appearance of being **"double-headed"**.
 - **The Red Sand Boa is the largest of the sand boa in the world. Nocturnal and spends the majority of its time under the ground.**
- **Distribution:**
 - Found in the whole of India **excluding North-east states and North-Bengal**; also not found in **Indian islands**.
- **Status:**
 - **IUCN Red List:** Near Threatened
 - **Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES):** Appendix II.
 - Indian **Wildlife (Protection) Act of 1972:** Schedule IV.

Note:

- Threats to Red Sand Boa:
 - Expansion of human settlements and activities.
 - Demand upsurge in pet trade, as well as for use in **black magic**.
 - Poached for perceived medicinal benefits.

Wildlife Conservation Society (WCS)-India:

- **WCS-India** is a Section 25 (association having objects to promote commerce, art, science, religion, charity or any other useful purpose and not having any profit motive) **non-profit organization in India**, demonstrates a strong commitment to conservation.
- It operates in full compliance with Indian regulations, emphasizing its dedication to preserving the country's natural environment and its rich biodiversity.

Flora Fauna and 'Funga'

Why in News?

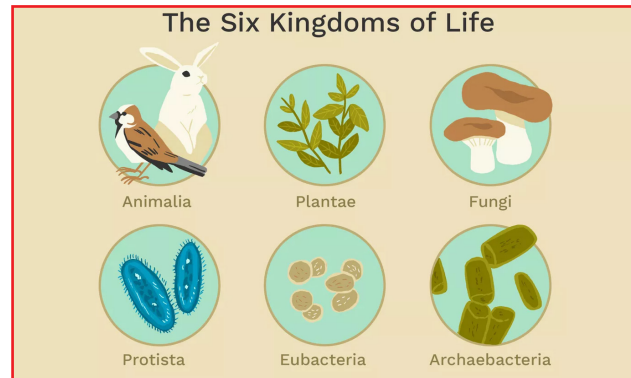
Recently, **United Nations Biodiversity** has urged people globally to use the word '**funga**' whenever they say '**flora and fauna**', in order to **highlight the importance of fungi**.

Why has the UN Biodiversity urged to use the word 'Funga'?

- According to **UN Biodiversity** "It is time for **fungi** to be recognised and protected on an equal footing with **animals and plants** in **legal conservation frameworks**."
- This is not the first time when a request has been made to include **fungi** along with **flora and fauna**.
 - Earlier, the **Species Survival Commission (SSC)** of the **IUCN** announced that it would use "**mycologically inclusive**" language in its internal and public-facing communications and to incorporate **fungi** in **conservation strategies** with rare and **endangered plants and animals**.
- There would be **no life on Earth** without **fungi**, the **yeasts, molds** and **mushrooms** as they are critical to **decomposition and forest regeneration, mammalian digestion, carbon sequestration**, the **global nutrient cycle** and **antibiotic medication**.

What is Fungi?

- **About:**
 - **Fungi or fungus** are a diverse group of **eukaryotic microorganisms** or **macroscopic organisms** that belong to their own **biological kingdom**, distinct from **plants, animals, and bacteria**.



- **Characteristics:**
 - **Eukaryotic:** Like **plants, animals, and protists**, **fungi** have complex, **membrane-bound cell organelles** and a **true nucleus**.
 - **Heterotrophic:** **Fungi** are primarily **decomposers** or **saprophytes**, meaning they obtain nutrients by **absorbing organic matter** from their **surroundings**.
 - **Secrete Enzymes:** **Fungi** secrete enzymes to **break down complex organic compounds** into simpler substances, **which they can then absorb**.
- **Benefits:**
 - **Nutrient Cycling**
 - **Fungi** can convert nutrients to make them accessible to **plants**, acting as **decomposers** by **breaking down organic matter**, thereby enhancing **nutrient cycling** and **soil fertility**.
 - **Carbon Cycling and Climate regulation:**
 - **Fungi** play a vital role in **soil carbon storage** by participating in the **carbon cycle**. They decompose **organic matter**, **cycling carbon** from **dead plants**, and form **symbiotic relationships** with **plant roots**.
 - **Mycorrhizal fungi** form **symbiotic relationships** with **plant roots**, aiding in nutrient uptake.
 - **Fungi as Food:**
 - It has **numerous beneficial applications**. **Yeasts**, for instance, are used in **baking** and **brewing**. **Fungi** also produce **antibiotics** like **penicillin**.

Note:

- Some **fungi**, like **mushrooms and truffles**, are **edible and prized in cuisine**. Others, like **molds**, are used in **cheese production**.
- Environmental Protection:
 - **Fungi** have been found to help degrade **various pollutants** from the **environment**, such as **plastic** and other **petroleum-based products, pharmaceuticals and personal care products, and oil**.
- Harmful Effects of Fungi:
 - Human and Animal Diseases:
 - **Fungi** can cause a variety of diseases in **humans and animals**. **Examples** include **athlete's foot (caused by dermatophytes), ringworm, histoplasmosis, and aspergillosis**.
 - Some fungi produce **toxic compounds** known as **mycotoxins**, which can **contaminate food** and lead to **health problems when consumed**.
 - Crop and Plant Diseases:
 - **Fungal pathogens** can infect and damage **crops and plants**, leading to **significant economic losses** in agriculture.
 - **Examples** include **rusts, powdery mildews, and various types of fungal blights**.
 - Allergic Reactions:
 - Exposure to **fungal spores**, especially in **indoor environments with high humidity**, can **trigger allergies and respiratory problems** in some individuals.
 - Conditions like **allergic rhinitis and allergic bronchopulmonary aspergillosis** are associated with **fungal allergens**.
 - Biodegradation of Materials:
 - **Fungi** can **break down** materials such as **textiles, leather, and paper**, which can be detrimental if these materials are not properly preserved or stored.

Vibrio Vulnificus Infection

Why in News?

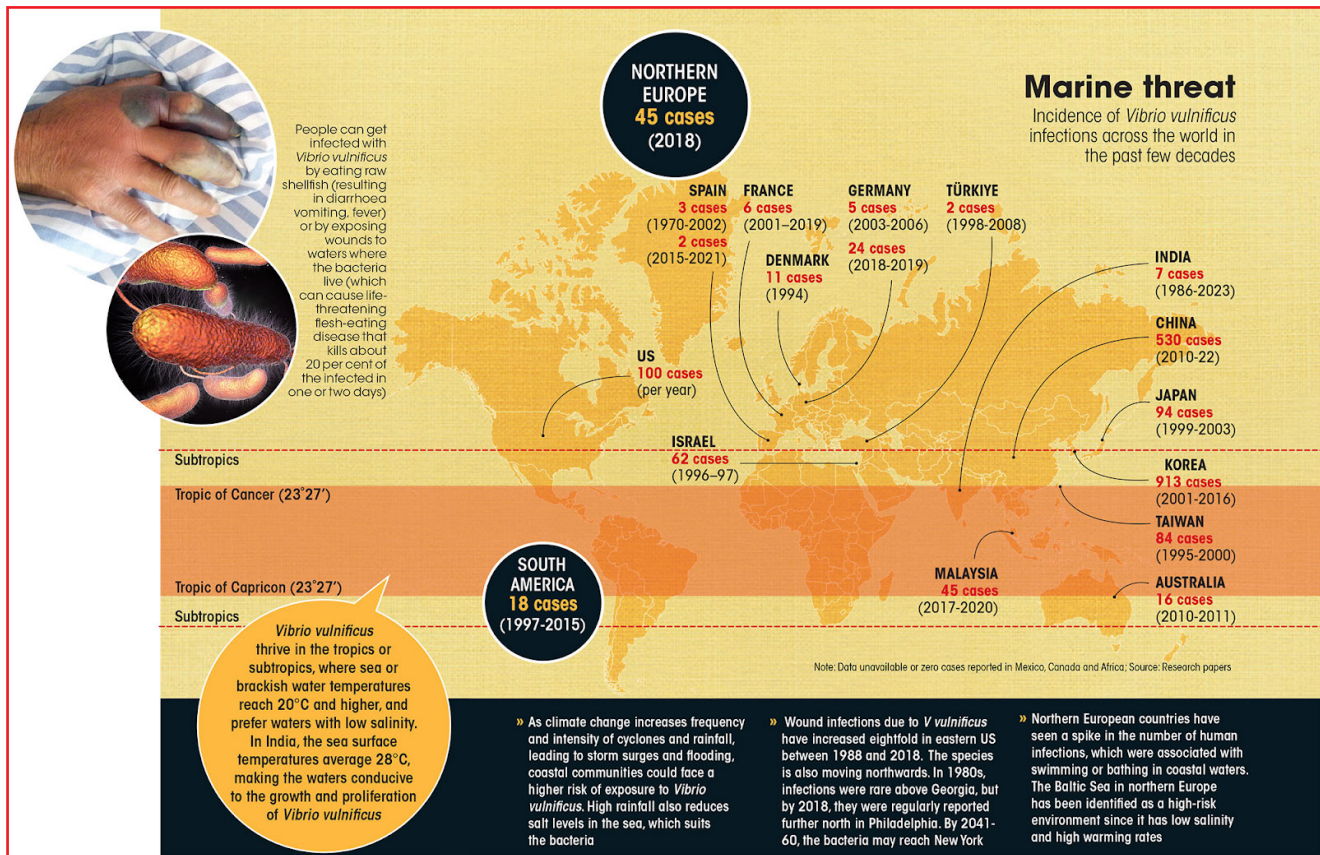
In recent years, India has been grappling with a growing concern related to ***Vibrio vulnificus* infections**, a deadly **bacteria found in marine environments**.

- Despite its potential threat, this **pathogen remains largely underreported in India**.

What is Vibrio Vulnificus?

- **About:**
 - ***Vibrio vulnificus* is a bacterium** that can cause severe infections in humans. It can result from **eating undercooked seafood, especially oysters, which may contain the bacteria**.
- **Carriers:**
 - It is typically contracted through two main routes: **consuming infected raw shellfish and exposing wounds to contaminated waters**.
 - It spreads through marine organisms like **fish like eel, derbio, tilapia, trout, and shrimp**.
 - The first case in marine organisms was **documented in Japanese eel in 1975**. The **first case of *V vulnificus* in humans** was recorded in **1976 in the US**.
 - The pathogen **arrived in Spain through imported eels in 1985**.
 - In 2018, India documented an outbreak of ***V vulnificus* in a tilapia farm in Kerala**.
 - Originally from Africa and West Asia, **tilapia** is one of the **most traded food fish globally**.
- **Symptoms:**
 - Symptoms of *V. vulnificus* infection include **diarrhea, vomiting, fever**, and, in severe cases, **flesh-eating diseases** that can be fatal within days.
- **Environmental Factors Favoring *V. vulnificus* in India:**
 - This **bacterium thrives in warm waters above 20°C**. India's average sea surface temperature of **28°C** provides a perfect habitat.
 - **Climate change**, with increased rainfall and reduced coastal salinity, further supports the growth of *V. vulnificus*.
- **Consequences:**
 - *V. vulnificus* infections have a **high mortality rate, ranging from 15% to 50%**, even with prompt diagnosis and treatment.
 - Vulnerable populations, such as **those with chronic liver disease, cancer, chronic kidney disease, and diabetes**, are at increased risk.
 - Infections can lead to **limb amputations (surgical removal of part of the body, such as an arm or leg)**, making them a significant health concern.
- **The Global Spread:**

Note:



➤ Measures to Mitigate *V. vulnificus* Risk:

- **Healthcare Awareness:** Ensure that healthcare professionals in coastal areas are aware of *V. vulnificus* risks and test patients with relevant symptoms.
- **Predictive Tools:** Researchers are developing risk-warning tools using satellite-based sensors to monitor **sea surface temperature** and **phytoplankton** levels, which are associated with increased *V. vulnificus* infections.
- **Learning from Seasonal Consumption in Japan:** In Japan, bivalves like **oysters and mussels** are consumed **only in winter**, avoiding the summer when bacteria levels are high. This practice significantly reduces infection risk.

Climate Ambition Summit 2023

Why in News?

The **United Nations Climate Ambition Summit (CAS)** held in United Nations Headquarters, New York on 20th

September 2023, aimed to accelerate climate action as a prelude to the **28th Conference of Parties (COP28)** to the **United Nations Framework Convention on Climate Change (UNFCCC)**.

- However, **China, the US and India**, who collectively account for about **42% of global greenhouse gas emissions** and are the **top three emitters** in that order were all absent from the CAS.

What is the Climate Ambition Summit (CAS)?

- **About:**
 - The CAS is a prominent international event aimed at addressing the pressing issue of **climate change**.
 - The CAS is designed to showcase **“first mover and doer”** leaders from government, business, finance, local authorities, and civil society who came with **credible actions, policies and plans** – and not just pledges – to accelerate the **decarbonization of the global economy and deliver climate justice**
 - The central aim of the CAS is to uphold the **Paris Agreement’s 1.5°C temperature limit**, which seeks to prevent severe climate consequences by capping **global warming at 1.5°C above pre-industrial levels**.

Note:

- Participants at the Summit:
 - A total of 34 states and 7 institutions had speaking slots, including India's neighbouring countries Sri Lanka, Nepal, and Pakistan, as well as emerging economies like South Africa and Brazil.
 - Key players such as the **European Union**, Germany, France, and Canada also addressed the audience.
- Criteria for Participation:
 - Countries were required to present **updated pre-2030 Nationally Determined Contributions (NDCs), net-zero targets, and energy transition plans.**
 - Commitments to no **new coal, oil, and gas projects, fossil fuel phase-out plans, and ambitious renewable energy targets were expected.**
 - Countries were urged to **pledge to the Green Climate Fund** and provide economy-wide plans for adaptation and resilience.
- Highlights of the Summit:
 - Updated Climate Goals:
 - Brazil pledged to reinstate its original 2015 climate goals, emphasizing the need for more ambitious measures and a transition away from fossil fuels.
 - **Nepal aimed for Net Zero emissions by 2045 instead of 2050, while Thailand targeted Net Zero by 2050, and Portugal set a carbon-neutral goal for 2045.**
 - All **G-20 governments** were asked to commit to presenting more ambitious **NDCs featuring absolute emissions cuts by 2025.**
 - The summit emphasized the need to **deliver climate justice**, particularly to communities on the front lines of the **climate crisis who are disproportionately affected.**
 - Other Announcements:
 - Canada, which was one of the largest expanders of fossil fuels in 2022, announced **the development of an emissions cap framework for the oil and gas sector.**
 - The EU and Canada call for global carbon **pricing to cover at least 60% of emissions.**
 - Current carbon pricing mechanisms **cover only 23% of emissions, generating USD 95 billion.**
 - In another development, Germany announced the **launch of the International Climate Club**, which it will **co-chair with Chile**, aiming to **decarbonise industrial sectors and scale up green growth.**

- The CAS highlighted the importance of comprehensive plans addressing adaptation and resilience across entire economies.

What is the Paris Climate Accord?

- **Legal status:** It is a **legally binding international treaty on climate change.**
- **Adoption:** It was adopted by **196 countries at the Conference of the Parties COP 21** in Paris in December 2015.
- **Goal:** To limit global warming to **well below 2° Celsius, and preferably limit it to 1.5° Celsius**, compared to pre-industrial levels.
- **Objective:** To achieve the **long-term temperature goal**, countries aim to reach global peaking of greenhouse gas emissions as soon as possible to achieve a climate-neutral world by mid-century.
- India is a **signatory to the Paris Agreement.** India reaffirmed its commitment to the agreement in August 2022 by submitting an **updated NDC to the UNFCCC. The NDC outlines India's goals for 2021–2030.**

What are India's Climate Commitments?

- In 2022, India updated its climate pledges to **reduce emissions intensity by 45% from 2005 levels by 2030.** This is a **10% increase from its previous 2016 pledge.** The updated pledge is part of India's NDCs.
- India sets 2030 target to produce 50% of its energy need through non-fossil fuels.
- India aimed to **create an additional carbon sink of 2.5 to 3 billion tonnes of CO₂-equivalent by 2030.**
- India pledged to achieve **net-zero emissions** by 2070.

State of the Rhino 2023

Why in News?

Recently, the **International Rhino Foundation (IRF)** published the report, **State of the Rhino, 2023** which documents **current population estimates and trends for the five surviving rhino species in Africa and Asia.**

- Every year, **World Rhino Day** is observed on **22th September** to spread awareness for all five species of rhino and work being done to save them.
- It was first announced by the **World Wildlife Fund (WWF)** - South Africa in 2010.

Note:

 <p>WHITE RHINO <i>Ceratotherium simum</i></p>  <p>IUCN Estimated Population: 16,803 DECREASING</p> <p>IUCN Status: NEAR THREATENED</p>	 <p>GREATER ONE-HORNED RHINO <i>Rhinoceros unicornis</i></p>  <p>IUCN Estimated Population: 4,014 INCREASING</p> <p>IUCN Status: VULNERABLE</p>	 <p>BLACK RHINO <i>Diceros bicornis</i></p>  <p>IUCN Estimated Population: 6,487 INCREASING</p> <p>IUCN Status: CRITICALLY ENDANGERED</p>	 <p>JAVAN RHINO <i>Rhinoceros sondaicus</i></p>  <p>IUCN Estimated Population: 76* STABLE</p> <p><small>*Indonesia's Ministry of Environment and Forestry has reported that 12 of these individuals may be missing.</small></p> <p>IUCN Status: CRITICALLY ENDANGERED</p>	 <p>SUMATRAN RHINO <i>Dicerorhinus sumatrensis</i></p>  <p>IUCN Estimated Population: 34-47 DECREASING</p> <p>IUCN Status: CRITICALLY ENDANGERED</p>
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What are the Key Findings of the Report ?

➤ Major Threats:

- **Poaching, Habitat Loss:** Poaching still threatens **all five rhino species** and has increased in several regions that had not previously been targeted.
 - **South Africa** continues to **battle devastating poaching losses** of its white rhinos.
 - **Black rhino** populations are increasing despite constant poaching pressure.
- Climate Change:
 - In **Africa**, **climate change**-induced **drought** is causing myriad detrimental impacts .
 - In **Asia** dramatically increased precipitation and longer **monsoon** periods could cause more direct deaths of rhinos and humans alike.
 - **Changing weather conditions** and landscapes can also trigger an increase in **invasive plant species**, crowding out or overtaking native rhino food plants and causing general habitat degradation.

➤ Status of Rhino:

- **Javan Rhinos:**The status and whereabouts of 12 of the approximately 76 remaining Javan rhinos is **unknown**.
- **Sumatran Rhinos:** Signs of Sumatran rhinos are increasingly **hard to find**, creating more uncertainty about their population in the wild.
- **White Rhinos:** 2,000 white rhinos from “**World’s Largest Rhino Farm**” will now be rewilded throughout Africa.
- **Bright Spots:**
 - **Greater one-horned rhinos in India and Nepal** continue to thrive due to strong protection .
 - **Black rhinos in Africa** are rebounding in the past few decades at a strong growth rate despite still significant poaching losses.
 - With the right interventions, all five rhino species can rebound and thrive in our ever changing world.
- **Recommendations:**
 - Implement a holistic strategy to safeguard rhinos by **addressing poaching, habitat protection, community involvement, capacity building, demand reduction, advocacy, and wildlife trafficking disruption**.

Note:



RHINOCEROS

World Rhino Day - 22nd September (declared by WWF in 2010)

5 Main Species of Rhino

Species	Found in	IUCN Red List Status	Habitat
African White	Africa	NT	Long/short grass Savannah
African Black	Africa	CE	Semi-Desert Savannah
Greater one-horned	Asia	Vu (CITES - Appendix I, WPA - Schedule I)	Tropical grassland
Javan	Asia	CE	Tropical, subtropical forests
Sumatran	Asia	CE	Same as Javan

Ujung Kulon National Park (a UNESCO WHS) is home to the last remaining wild Javan rhinos on Earth

Greater One-Horned Rhino

Only species found in India (aka Indian Rhino)



CHARACTERISTICS

- Largest of the 5 species
- Identified by a single black horn and a grey-brown hide with skin folds



Threats

- Poaching for horns
- Habitat loss
- Decreasing Genetic diversity



Protected Areas (India)

- **UP**
 - Dudhwa TR
- **West Bengal**
 - Jaldapara NP ● Gorumara NP
- **Assam**
 - Pabitora WLS
 - Orang NP
 - Kaziranga NP (max no. of Rhinos: ~2400)
 - Manas NP



Conservation Efforts (India)

- National Rhino Conservation Strategy
- Indian Rhino Vision 2020 (launched in 2005)

New Delhi Declaration on Asian Rhinos 2019

Signed by 5 rhino range nations (India, Bhutan, Nepal, Indonesia and Malaysia)



Drishti IAS

Note:



drishti

What are the Conservation Efforts by India ?

- **Translocation:** Rhino translocations to **Manas National Park** set for the beginning of 2023 were rescheduled for 2024 while security measures were reinforced after a poached rhino was discovered in January.
- **Rhino Corridor:** In 2022, the Assam government finalized the addition of approximately 200 sq km to **Orang National Park** in north-central Assam, more than doubling the size of this protected area and key rhino habitat.
 - With this added land, Orang National Park is now connected to **Burhachapori Wildlife Sanctuary** in the east, completing the creation of a linked corridor between all the protected areas in Assam that hold rhinos: **Manas National Park, Pobitora Wildlife Sanctuary, Orang National Park, the Laokhowa and Burhachapori Wildlife Sanctuaries and Kaziranga National Park.**
- **New Delhi Declaration on Asian Rhinos:** India, Bhutan, Nepal, Indonesia and Malaysia have signed a declaration for the conservation and protection of the species.
- **DNA Profiles of all Rhinos:** The project will help in curbing poaching and gathering evidence in wildlife crimes involving rhinos
- **National Rhino Conservation Strategy:** It was launched in 2019 to conserve the greater one-horned rhinoceros.
- **Indian Rhino Vision 2020:** It was an ambitious effort to attain a wild population of at least 3,000 greater one-horned rhinos spread over seven protected areas in the Indian state of Assam by the year 2020.

Elephant Corridors

Why in News?

Recently, the Indian government identified 62 new **elephant corridors**, marking a significant milestone in the nation's commitment to **wildlife conservation**. This brings the total number of such corridors to 150, a remarkable increase from the 88 registered in 2010.

What are the Key Highlights About Elephant Corridors?

- **About:**
 - Elephant corridors can be described as a **strip of land that enables elephant movement between two or more friendly habitats.**

- The corridors were reported by **respective state governments** and ground validation methods were used to verify them.
- **State Wise Distribution:**
 - According to the report, **West Bengal leads with 26 corridors, constituting 17% of the total.**
 - East central India contributes 35% (52 corridors), while the North East region has 32% (48 corridors).
 - Southern India has 21% (32 corridors), and **northern India has the lowest with 12% (18 corridors).**
- **Status of Corridor Use:**
 - **Elephant corridor report released by the central government showed a 40% increase in elephant corridors across 15 elephant range states in India.**
 - **19% of corridors (29) show a decrease in use, and 10 require restoration due to impairment.**
 - Decreased use is attributed to **habitat fragmentation and destruction.**
- **Reasons for Increase in Corridors:**
 - Elephants have **expanded their ranges in the Vidarbha region of Maharashtra and southern Maharashtra bordering Karnataka.**
 - Elephant corridors have increased in these areas.
 - Elephants have also been seen in **increased numbers in Madhya Pradesh and northern Andhra Pradesh.**

Elephants

- **Elephants in India:**
 - Elephants are **keystone species** as well as the **Natural Heritage Animal** of India.
 - India has the **largest number of wild Asian Elephants.** The elephant population in the country is estimated to be over 30,000.
 - Karnataka has the highest elephant population in India.
- **Conservation Status:**
 - **Convention of the Migratory Species (CMS):** Appendix I
 - **Wildlife (Protection) Act, 1972:** Schedule I
 - **International Union for Conservation of Nature (IUCN) Red List of threatened species:**
 - **Asian Elephant:** Endangered
 - **African Forest Elephant:** Critically Endangered
 - **African Savanna Elephant:** Endangered
- **Conservative Efforts:**
 - India:
 - **Gaj Yatra**
 - **Project Elephant**
 - Worldwide:
 - **Monitoring of Illegal Killing of Elephants (MIKE) Programme.**
 - **World Elephant Day**

Note:

Elephant Reserves

33 Elephant Reserves

(as of November 2022)



FACTS

- Tamil Nadu and Assam have the highest number (5) of elephant reserves in India.
- The Indian elephant *Elephas maximus* is included in Schedule I of the Indian Wildlife (Protection) Act, 1972 and in Appendix I of CITES.
- Indian Elephant has also been listed in the Appendix I of the Convention of the Migratory Species and as 'Endangered' in the IUCN Red List.
- The elephant was declared the National Heritage Animal of India in 2010.
- MoEFCC provides financial and technical support to major elephant range states in the country through Project Elephant. Project Elephant was launched by the Government of India in the year 1992 as a Centrally Sponsored Scheme.



Note:

Marine Light Pollution

Why in News?

The impact of **artificial lighting** on land-based life (humans, fireflies, and birds) has been known for quite some time.

- However, a recent US-based study has argued to consider light pollution's influence on coastal **marine organisms** as well which affects everything from **whales to fish, corals, and plankton.**

What is Artificial Lighting in the Marine Environment?

➤ About:

- Artificial lighting refers to the light that is produced from **artificial sources such as candles, fire, electricity, etc.**
 - Ecologists and biologists have long recognized that artificial light at night can have adverse effects on the health of humans and terrestrial wildlife.
- Recent research is showing that **marine life is also sensitive to artificial light**, including extremely low levels and certain wavelengths, **particularly blue and green light.**

- **Marine Light Pollution:** When this **artificial light is used excessively or poorly**, it becomes **light pollution** and disrupts the natural patterns of wildlife, contributing to the **increase in carbon dioxide (CO₂)** in the atmosphere.

- The scientists found that 1.9 million km² of the ocean experience biologically significant amounts of artificial light pollution to a depth of 1 metre.
 - This represents about **3% of the world's Exclusive Economic Zones (EEZs).**
- Significant areas of the ocean are seeing **light exposures to depths of 10 metres, 20 metres, or more.**
 - In areas with very clear water, the light at night can reach depths of more than 40 metres.

➤ Sources:

- **Coastal development** (e.g., buildings, streetlights, billboards, ports, piers, docks and, light house).
- **Vessels** (e.g., fishing and merchant marine vessels), harbours and offshore infrastructure such as oil rigs.
- Some of the common types of artificial lights in the marine environment are **LED, fluorescent, metal halide, and plasma lamps.**
 - **White LEDs produce broad spectrum light that is sensed by a wide range of organisms** and have a peak at short wavelengths (blue and green light) to which many marine organisms are particularly sensitive.



LIGHT POLLUTION DEVASTATES WILDLIFE.

Plants and animals depend on Earth's daily light and dark cycle to govern life-sustaining behaviors. Research shows that artificial light at night has adverse and even deadly effects on many species.



LIGHT POLLUTION WASTES ENERGY AND MONEY.

As much as 50% of outdoor lighting is wasted, which increases greenhouse gas emissions, contributes to climate change, and renders us all more energy-dependent.



LIGHT POLLUTION ROBS US OF OUR HERITAGE.

Our ancestors experienced a night sky that inspired science, religion, philosophy, art, and literature. Now, millions of children across the globe will never know the wonder of the Milky Way.



LIGHT POLLUTION CAN MAKE YOU LESS SAFE.

There is no clear scientific evidence that increased outdoor lighting deters crime. Poor outdoor lighting can decrease personal safety by making victims and property more visible to criminals.



LIGHT POLLUTION MAY HARM YOUR HEALTH.

Studies suggest that artificial light at night negatively affects human health by increasing our risks for obesity, sleep disorders, depression, diabetes, breast cancer, and more.

Note:



Note:

- The **Earth is getting artificially brighter, at a rate of 2.2% per year**. As a result of these brighter nights, the impacts of **artificial light at night (ALAN)** have become an increasing focus in terrestrial ecology.
 - As per studies, **non-natural light increased the brightness of Skyglow**, by 9.2-10% every year between 2011 and 2022
- Research has shown that **ALAN is a major form of anthropogenic pollution** that can affect a wide range of biotic processes, including physiology, behaviour, animal movements, species interactions, community structure and reproduction.

How does Artificial Lightning Affect the Marine Ecosystem?

- **Disruption of Normal Cycles:** As per the study, it already took marine organisms an **evolution of over millions of years to adapt to natural light** and now the threat of ever-increasing anthropogenic light pollution has been posing several threats to them.
 - Artificial light can easily **wash out the glow of moonlight and starlight** consequently **disrupting their hormonal cycles, inter-species behaviour, and reproduction cycles**.
- **Illustration:** For instance, to lay their eggs, **female sea turtles** try to find a quiet, dark spot and avoid light. However, due to artificial lightning, they may end up not coming ashore at all.
 - Moreover, their hatchlings head toward inland lights instead of moonlight on the water and then die of dehydration or starvation.
- **LEDs Worsening the Impact:** The ever-growing usage of LED lighting is also altering the very nature of artificial light.
- **Suggestion:**
 - Encouraging land-based **Lights Out efforts** (local, state, and regional campaigns to darken skies) to help **migrating birds** that are drawn to light at night. It will also benefit marine systems near coastal cities.
 - **Increasing the usage of red light in coastal areas** as much as possible and **putting up barriers to shield the coastline from artificial light**.
 - Red light, having the longest wavelength in the visible spectrum, doesn't penetrate as far into the water.

Mangroves in India**Why in News?**

On the **International Day for the Conservation of the Mangrove Ecosystem**, West Bengal, which is home to **approximately 40% of India's mangrove forests**, unveiled plans to establish a dedicated '**Mangrove Cell**' to streamline mangrove management efforts.

International Day for the Conservation of the Mangrove Ecosystem

- The **International Day for the Conservation of the Mangrove Ecosystem** is celebrated every year on **26 July** and aims to raise awareness of the importance of mangrove ecosystems as "**a unique, special and vulnerable ecosystem**" and to promote solutions for their sustainable management, conservation and uses.
- This International Day was adopted by the General Conference of the **UN Educational, Scientific and Cultural Organization (UNESCO)** in 2015.

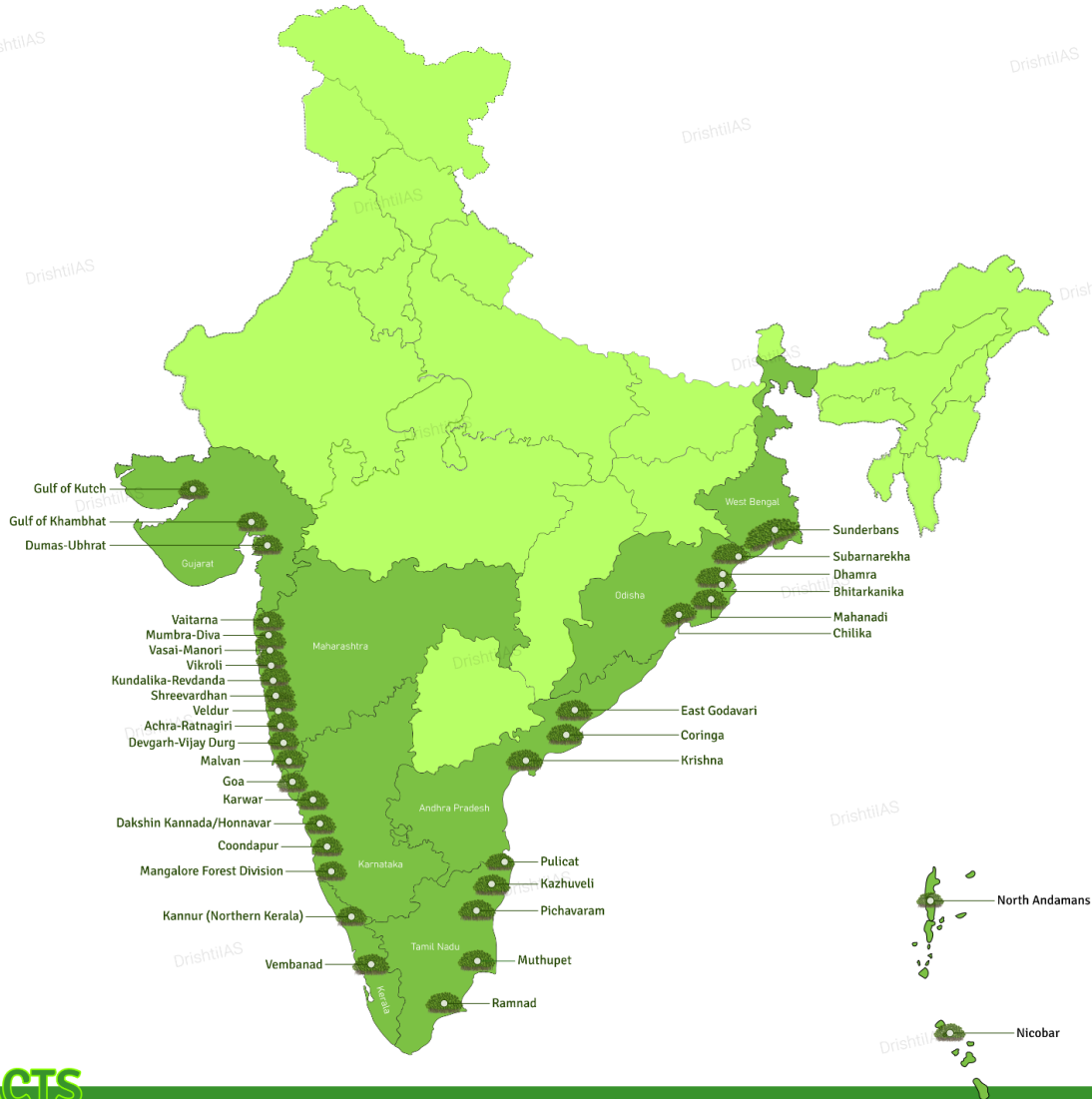
What is the Status of Mangroves in India?

- **About:**
 - Mangroves are a unique type of coastal ecosystem found in **tropical and subtropical regions**. They are dense forests of salt-tolerant trees and shrubs that thrive in **intertidal zones, where land meets the sea**.
 - These ecosystems are characterized by their ability to withstand harsh conditions, such as **saline water, tidal fluctuations, and muddy, oxygen-poor soils**.
- **Characteristics:**
 - **Mangroves exhibit Viviparity mode of reproduction**, where seeds germinate within the tree before falling to the ground. This is an adaptive mechanism to overcome the challenge of germination in saline water.
 - Some mangrove species **secrete excess salt through their leaves**, while others block the absorption of salt at their roots.
 - **Mangrove plants have special roots like prop roots and pneumatophores**, which help impede water flow and provide support in the challenging tidal environment.
- **Mangrove Cover in India:**
 - According to the **Indian State Forest Report 2021**, Mangrove cover in India is 4992 sq. Km which is **0.15% of the country's total geographical area**.

Note:

- **Sundarbans** in West Bengal are the largest mangrove forest regions in the world. It is listed as a **UNESCO World Heritage Site**.
- Besides the Sundarbans, the Andamans region, the Kachchh and Jamnagar areas in Gujarat too have substantial mangrove cover.

MANGROVES IN INDIA



FACTS

- * UNESCO observes **July 26** as the **International Day for the Conservation of the Mangrove Ecosystem**.
- * As per ISFR 2021, the mangrove cover in India is 4,992 sq km, which is **0.15%** of the country's total geographical area.
- * **West Bengal > Gujarat > A&N Islands > Andhra Pradesh > Maharashtra**, have the largest Mangrove cover in India (ISFR 2021).
- * In India, mangroves are protected by the **Environmental (Protection) Act 1986** and Coastal Zone Regulations.
- * **Sundarbans**, a **UNESCO World Heritage Site**, is the **world's largest single patch of Mangrove Forests**.
- * Sundarbans is the first Mangrove forest in the world, which was brought under scientific management, as early as in 1892.
- * The emergence of **shrimp farms** is responsible for at least **35%** of the overall loss of mangrove forests.

Note:

➤ **Significance:**

- **Biodiversity Conservation:** Mangroves provide a unique habitat for a wide variety of plant and animal species, serving as **breeding, nursery, and feeding grounds** for numerous marine and terrestrial organisms.
 - For example, sundarban hosts the **Royal Bengal tiger, Irrawady Dolphin, Rhesus macaque, Leopard cats, Small Indian civet.**
- **Coastal Protection:** Mangroves act as **natural buffers against coastal erosion, storm surges, and tsunamis.**
 - Their dense root systems and tangled network of prop roots stabilize shorelines and reduce the impact of waves and currents.
 - During hurricanes and cyclones, **mangroves can absorb and dissipate a significant amount of energy**, protecting inland areas and human settlements from devastating damage.
- **Carbon Sequestration:** Mangroves are **highly efficient carbon sinks**, sequestering large amounts of carbon dioxide from the atmosphere and storing it in their biomass and sediments.
- **Fisheries and Livelihoods:** Mangroves support fisheries by providing **nursery areas for fish and shellfish**, enhancing fishery productivity and contributing to livelihood and local food security.
- **Water Quality Improvement:** Mangroves act as **natural filters**, trapping and **removing pollutants and excess nutrients** from coastal waters before they reach the open ocean.
 - Their role in purifying water contributes to the **health of marine ecosystems** and helps maintain the balance of fragile coastal ecosystems.
- **Tourism and Recreation:** Mangroves offer recreational opportunities such as **eco-tourism, birdwatching, kayaking, and nature-based activities**, which can promote sustainable economic growth for local communities.

➤ **Challenges:**

- **Habitat Destruction and Fragmentation:** Mangroves are often cleared for various purposes, including **agriculture, urbanization, aquaculture, and infrastructure development.**
 - Such activities lead to the fragmentation and loss of mangrove habitats, disrupting their ecosystem functioning and biodiversity.
 - The **conversion of mangroves into shrimp farms** and other commercial uses is a significant concern.
 - **Climate Change and Sea Level Rise:** Rising sea levels due to climate change pose a significant threat to mangroves.
 - Climate change also brings about extreme weather events, such as cyclones and storms, which can cause **severe damage to mangrove forests.**
 - **Pollution and Contamination:** Pollution from **agricultural runoff, industrial discharges, and improper waste disposal** contaminate mangrove habitats.
 - **Heavy metals, plastics, and other pollutants** adversely affect the flora and fauna of these ecosystems.
 - **Lack of Integrated Management:** Often, mangroves are managed in isolation, without considering their interconnectedness with adjacent ecosystems like **coral reefs and seagrass beds.**
 - Integrated management approaches that consider the **broader coastal ecosystem** are necessary for effective conservation.
- **Government Initiatives Related to Mangrove Conservation:**
- **MISHTI (Mangrove Initiative for Shoreline Habitats & Tangible Incomes)**
 - **Sustainable Aquaculture In Mangrove Ecosystem (SAIME) initiative**

Note:



MANGROVES

Diverse group of salt-tolerant plant communities found in the (tropical/subtropical) coastal intertidal zone

CHARACTERISTICS ↴

- Survive under hostile environments (high salt, low oxygen)
- Their roots (pneumatophores) absorb oxygen from atmosphere
- Thick succulent leaves to store fresh water

MANGROVE COVER ↴

- Global: Asia > Africa > North and Central America > S America
- India (ISFR 2021): West Bengal > Gujarat > A&N Islands > Andhra Pradesh > Maharashtra

Sunderbans - World's largest single patch of Mangrove forests

SIGNIFICANCE ↴

- Stabilise the coastline and reduce soil erosion
- Protection against cyclones
- Improve water quality by absorbing nutrients
- Important carbon sink

THREATS ↴

- Commercialisation of coastal areas
- Emergence of shrimp farms
- Temperature fluctuations (Mangroves can't survive freezing temperatures)

CONSERVATION MEASURES

Global

- Inclusion of Mangroves in Biosphere Reserves and UNESCO Global Geoparks
- Mangroves for the Future Initiative (IUCN & UNDP)
- Mangrove Alliance for Climate (UNFCCC COP27)

India

- National Mangrove Committee (1976)
- Mangrove Initiative for Shoreline Habitats & Tangible Incomes (MISHTI) (Union Budget 2023-24)



International Day for Conservation of the Mangrove Ecosystem - July 26 (UNESCO)



Note:

India's Wind Energy Potential

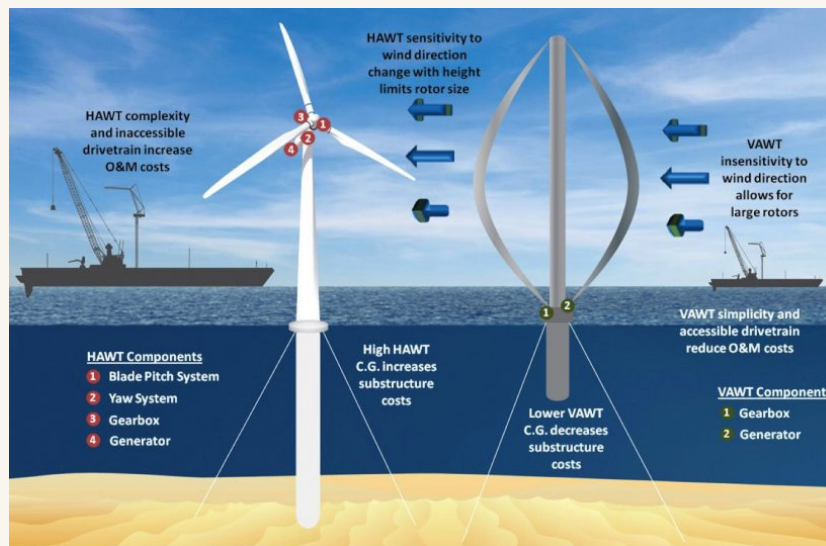
Why in News?

Recently, the Ministry of New and Renewable Energy unveiled noteworthy insights into **India's wind energy potential**. This revelation sheds light on **key states with the highest wind power potential** and emphasizes the nation's dedication to sustainable energy practices.

- Additionally, the Ministry outlined innovative strategies aimed at enhancing wind power utilization and ensuring eco-friendly practices in the sector.

Different Types of Turbine Used in the Wind Power:

Aspect	Vertical-Axis Wind Turbines (VAWT)	Horizontal-Axis Wind Turbines (HAWT)
Blade Orientation	Blades are vertical and perpendicular to the ground.	Blades are horizontal and parallel to the ground.
Blade Configuration	Blades are attached to the top and bottom of a vertical rotor.	Blades are like airplane propellers, extending outward.
Common Type	Darrieus wind turbine is a well-known design.	Three-bladed turbines are the most common type.
Performance	Generally less efficient compared to HAWT.	Typically more efficient in converting wind energy.
Electricity Generation	Typically lower electricity generation capacity.	Higher electricity generation capacity.
Application	Limited use due to lower performance.	Widely used in the wind energy industry.
Wind Direction Sensitivity	Less sensitive to wind direction due to omnidirectional rotation.	Needs to adjust to wind direction for optimal efficiency.



Note:

What is the Wind Power Potential in India?

- India ranks **4th globally after China, the United States and Germany**, in terms of **installed wind energy capacity, with 42.8 GW (onshore wind) as of April 2023.**
- Wind resource assessment by the **National Institute of Wind Energy** reveals an estimated wind **power potential of approximately 695.5 GW at 120 meters and 1,164 GW at 150 meters above ground level** across the nation.
- Best Performing States:
 - Wind Power Potential (in GW) at 120 m Above Ground Level:
 - Gujrat (142.56), Rajasthan (127.75), Karnataka (124.15), Maharashtra (98.21), and Andhra Pradesh (74.90).
 - Wind Power Potential (in GW) at 150 m Above Ground Level:
 - Rajasthan (284.25), Gujarat (180.79), Maharashtra (173.86), Karnataka (169.25), and Andhra Pradesh (123.33).

What are the Government Initiatives for Wind Energy Development?

- Policy for Repowering of the Wind Power Projects, 2016:
 - This policy incentivizes wind power project repowering by providing an **additional interest rate rebate of 0.25% over existing rebates for new wind projects** financed by the **Indian Renewable Energy Development Agency (IREDA).**
- **Guidelines for Disposal of Fiber Reinforced Plastic (FRP):**
 - The **Central Pollution Control Board (CPCB)** issued specific guidelines for the proper disposal of FRP, including Sheet Moulding Compound (SMC), **used in wind turbine blades.** These guidelines ensure environmentally responsible waste management.
- **National Wind-Solar Hybrid Policy, 2018:**
 - The main objective is to provide a **framework for promotion of large grid connected wind-solar PV hybrid systems** for optimal and efficient utilization of wind and solar resources, transmission infrastructure and land.
- **National Offshore Wind Energy Policy:**
 - Objective is to develop offshore wind energy in the Indian **Exclusive Economic Zone (EEZ)** along the Indian coastline of 7600 km.

World Lion Day

Why in News?

World Lion Day is celebrated **every year on August 10** to raise awareness about the conservation of lions and their habitats. It was first established in **2013 by Big Cat Rescue**, the world's largest accredited sanctuary dedicated to lions.

- Recent studies have revealed that **lions were once present in the Arabian Peninsula**, significantly influencing Arab culture.
- It is noted that **Arabic dialects and literature contain an extensive array of almost 700 distinct names or expressions** referring to the lion.

What does the Recent Research Suggest?

- **Lions**, often associated with the vast **savannas of East and Southern Africa**, and the **Gir forest** in Kathiawar, India but they were **once an integral part of the deserts of the Arabian Peninsula.**
 - The evidence of the lion's presence, though now extinct, resounds through historical accounts, archaeological findings, and linguistic nuances.
- Research reveals that lions occupied a vast and diverse range spanning the **Arabian Peninsula, North Africa, Eurasia, and parts of India.**
 - The **lion's habitat extended from latitudes as far south as 15°N (Yemen) to 18°N (Mali, Chad) and as far north as 45-48°N (Bulgaria, Ukraine, Hungary).**
 - It is noteworthy that lions thrived in various environments, including **deserts, steppes, and maritime coasts.**
- Lions exhibited remarkable adaptability, dwelling in the arid deserts of the Arabian Peninsula, including Sinai, Sahara, and Yemen.
 - This presence is supported by **Neolithic rock engravings** found in Saudi Arabia and Oman.
 - By the early **20th century, evidence of the lion's presence had faded.** Observations in 1920 showed no records of lions in **Afghanistan, Balochistan, or southern Arabia.**

Note:

What are the Major Facts About Lions?

- **Scientific Name:** *Panthera leo*
 - The lion is divided into two subspecies: the **African lion (*Panthera leo leo*)** and the **Asiatic lion (*Panthera leo persica*)**.
- **Characteristics:**
 - Lions are known for their **distinctive appearance**, including a tawny coat, a tufted tail, and a prominent mane in males.
 - They are social animals and **live in groups called prides**. A pride typically consists of multiple females, their offspring, and a few adult males.
- **Distribution and Habitat:**
 - Lions are found in **sub-Saharan Africa** and a small population exists in the **Gir Forest National Park** in the Indian state of Gujarat.
- **Protection Status:**
 - **IUCN Red List:**
 - **African Lion: Vulnerable (Globally)**
 - Asiatic Lion: Endangered.
 - **CITES:** Appendix I for populations of India, all other populations are included in Appendix II.
 - **Wildlife (Protection) Act 1972:** Schedule I
- **Conservation Efforts in India:**
 - Project Lion
 - [Asiatic Lion Conservation Project](#)

Addressing Air Pollution Through Technological Innovations

Why in News?

Recently, the **Minister of Environment, Forest and Climate Change** provided valuable insights into the projects related to deploying various **technologies to address Air Pollution in India** during a written reply in the Lok Sabha.

What is Air Pollution?

- Air pollution refers to the **contamination of the Earth's atmosphere** by harmful substances beyond their natural levels, due to human activities and natural processes.

- It originates from sources like **industrial emissions, vehicle exhaust, agricultural practices, and natural events**, and it can have wide-ranging negative effects on **air quality, human well-being, ecosystems, and the overall health of the planet**.
- **Common air pollutants include:** **PM2.5, PM10**, Nitrogen Dioxide (NO₂) and Nitric Oxides (NO_x), Sulfur Dioxide (SO₂), Carbon Monoxide (CO) etc.

What are Various Technology Based Projects Deployed to Curb Air Pollution?

- **Pariyantra Filtration Units on Buses:** A pilot study was initiated where **30 buses were retrofitted with Pariyantra Filtration** units installed on their rooftops.
 - These units were designed to **effectively capture dust particles (through filters fitted on vehicles) from the surrounding environment**, thereby minimizing the contribution of vehicular movement to air pollution levels.
 - **It does not require any power to operate** and is equivalent to the filtration provided by 6 room air filters.
- **WAYU Air Purification Units at Traffic Intersections:** A total of **54 WAYU Air Purification Units** were strategically installed at **major traffic intersections in Delhi**.
 - These units, designed to **purify the air in the immediate vicinity**, played a crucial role in reducing the impact of vehicular emissions on air quality.
 - The WAYU units acted as **localized air purifiers**, offering a potential solution to combat the adverse effects of traffic-related pollution.
- **Ionisation Technology for Ambient Air Pollution Reduction:** This technology aimed to **neutralize pollutants through ionization processes**, thereby enhancing air quality in the target areas.
 - The study evaluated the **feasibility and impact of ionization technology**, potentially opening new avenues for pollution reduction.
- **Installation of Medium/Large-Scale Smog Towers:** These towers, acting as **substantial air purifiers**, targeted the **reduction of particulate matter and pollutants on a broader scale**.
- **Retrofitting Emission Control Devices in In-Use Vehicles:** Older vehicles, especially those adhering

Note:

to older emission standards like BS III, contribute substantially to air pollution.

- A pilot project was undertaken to assess the feasibility and effectiveness of retrofitting emission control devices in such vehicles.
 - The project aimed to provide recommendations for emission reduction from these vehicles, aligning with broader efforts to improve air quality.
- **Indigenous Photonic System for Air Quality Monitoring:** A project by the Department of Science and Technology (DST) focused on developing an indigenous photonic system for real-time remote monitoring of air quality parameters.
 - This initiative aimed to enhance the accuracy and accessibility of air quality data, enabling more informed decision-making in pollution management strategies.
- **Advancements in Electric Vehicle (EV) Autonomous Technology:** An autonomous navigation foundation focused on EV-based autonomous vehicles was established under the DST [National Mission on Interdisciplinary Cyber Physical Systems \(NM-ICPS\)](#).
 - The integration of autonomous technology in EVs presents an opportunity to optimize driving patterns, reduce traffic congestion, and subsequently lower greenhouse gas emissions.

What are the Other Government Initiatives to Curb Air Pollution?

- **Graded Response Action Plan (Delhi)**
- **National Clean Air Programme (NCAP)**
- **BS-VI vehicles**
- **Air Quality and Weather Forecasting and Research (SAFAR)**
- **Dashboard for Monitoring Air Quality**
- **National Air Quality Index (AQI)**

505-Million Year Old Jellyfish Fossils

Why in News?

Recently, researchers have unveiled a collection of **jellyfish fossils from the Cambrian period**, providing a unique glimpse into their distant past.

- These preserved fossils, found in the **Burgess Shale**—a renowned fossil-rich site in the **Canadian Rockies**, offer an improbable pathway to preservation.

What are the Major Findings of the Research?

- **Special Features of the Fossils:**
 - The newly discovered jellyfish fossils retained remarkable features, such as over **90 fingerlike tentacles** protruding from their bell-shaped bodies.
 - Some specimens even contained stomach contents and gonads, providing invaluable insights into their anatomy and behavior.
 - These things help scientists learn about how the jellyfish looked and acted.
- **Link with Old Fossils from a Quarry:**
 - In the 1990s, scientists dug up over 170 jellyfish fossils in a place called **Raymond Quarry in British Columbia**. These fossils were kept for a long time.
 - Researchers re-examined the specimens from the excavation and identified that the fossils actually belonged to a **previously unknown species**.
 - This newly discovered species was named **Burgessomedusa phasmiformis**. The species falls under the **medusozoans category**.

What are Jellyfish?

- **About:**
 - Jellyfish are **members of the phylum Cnidaria**, a group of animals that includes **corals, sea anemones, hydroids**, and siphonophores.
 - Cnidarians are characterized by having **radial symmetry, a central mouth surrounded by tentacles**, and **specialized stinging cells called cnidocytes** that can inject venom into their prey or predators.
 - Jellyfish tend to just **follow the currents of the ocean**, they can be found around the world in every type of ocean water.
 - They are considered to be **one of the earliest branches of the animal tree of life**.
- **Characteristics:**
 - Despite their name, jellyfish do not have much characteristics of a fish, they are **invertebrates, or animals with no backbones**.
 - Jellyfish are also among the simplest animals in terms of body organization and nervous system, **lacking a brain, a heart, or a skeleton**.

Note:



- However, some jellyfish have evolved remarkable adaptations, such as **eyes**, **bioluminescence**, and **complex behaviors**.
- Prey:
 - They dine on **fish, shrimp, crabs and tiny plants**. They have tiny stinging cells in their tentacles to **stun or paralyze their prey** before they eat them.
- Challenge of Jellyfish Fossilization:
 - Jellyfish, composed of **95% water**, pose a considerable challenge when it comes to fossilization. Their delicate structure makes them prone to rapid deterioration, leaving behind minimal traces in the fossil record.

Himalayan Vulture: Gyps Himalayensis

Why in News?

Recently, the **Assam State Zoo in Guwahati** has achieved a groundbreaking feat by successfully **breeding the elusive Himalayan vulture (*Gyps himalayensis*) in captivity for the first time in India**.

- Additionally, the Union Ministry of Health and Family Welfare's decision to prohibit the **manufacture, sale, and distribution of ketoprofen and aceclofenac** has sparked optimism among vulture conservationists and experts.

What are the Key Highlights of the Himalayan Vulture ?

- **Conservation Status:**
 - **International Union for Conservation of Nature (IUCN) Red List:** Near Threatened.
 - **CITES (the Convention on International Trade in Endangered Species of Wild Fauna and Flora):** Appendix II.
- **Distinctive Characteristics:**
 - The Himalayan vulture is one of the **largest Old World vulture species**, boasting an **impressive wingspan and formidable presence**.
 - Its plumage is dominated by **shades of black and brown**, which aid in its **camouflage against the rugged mountain terrain**.
 - The vulture's powerful hooked beak and keen eyesight make it a **proficient scavenger**, playing a crucial role in the ecosystem by cleaning up carrion.
- **Habitat and Range:**
 - The Himalayan vulture is aptly named, as it primarily inhabits the **towering peaks and valleys of the**

Himalayan mountain range.

- It is a common winter migrant to the Indian plains.
- Its range extends across several countries, **including India, Nepal, Bhutan, and China**, where it thrives in challenging high-altitude environments.
- **Ecological Significance:**
 - As a top predator and scavenger, the Himalayan vulture plays a vital role in maintaining the **health of its habitat by efficiently disposing of animal remains**.
 - Its scavenging behavior helps **prevent the spread of diseases that could arise from decaying carcasses**, thus contributing to the overall balance of the ecosystem.
- **Challenges and Conservation Efforts:**
 - Breeding the Himalayan vulture in captivity posed challenges due to its **natural breeding habits in snow-clad mountains**.
 - Successful breeding at the zoo was made possible through long-term captivity and acclimatization to the tropical environment.
 - Factors such as **habitat loss, food scarcity, and accidental poisoning from veterinary drugs** have contributed to its vulnerable status.
 - Conservation breeding centers, such as the **Vulture Conservation Breeding Centre (VCBC)** at Rani, Assam, are instrumental in safeguarding vulture species.



What are Ketoprofen and Aceclofenac, and How Do They Impact Vultures?

- Ketoprofen and aceclofenac are two types of **non-steroidal anti-inflammatory drugs (NSAIDs)** that are used to **treat pain and inflammation** in animals, especially cattle.
- Prescribed for arthritis, injuries, and post-surgery pain.
- However, these drugs have been found to be **harmful to vultures**, as they cause **kidney failure and death** when the **vultures feed on the carcasses of animals** treated with these drugs.

Note:

Vultures in India

Sr. No.	Name of the Vulture Species	IUCN status	Pictorial Representation
1.	Oriental White-backed Vulture (Gyps Bengalensis)	Critically Endangered	
2.	Slender-billed Vulture (Gyps Tenuirostris)	Critically Endangered	
3.	Long-billed Vulture (Gyps Indicus)	Critically Endangered	
4.	Egyptian Vulture (Neophron Percnopterus)	Endangered	
5.	Red-Headed Vulture (Sarcogyps Calvus)	Critically Endangered	
6.	Indian Griffon Vulture (Gyps Fulvus)	Least Concerned	
7.	Himalayan Griffon (Gyps Himalayensis)	Near Threatened	
8.	Cinereous Vulture (Aegypius Monachus)	Near Threatened	
9.	Bearded Vulture or Lammergeier (Gypaetus Barbatus)	Near Threatened	

Note:

Forest Cover in India: Progress and Initiatives

Why in News?

Recently, the **Union Ministry of Environment, Forest and Climate Change** provided valuable insights into the **various initiatives to boost forest cover in India** during a written reply in the Lok Sabha.

What are the Major Forest Conservation Initiatives in India?

- About Forest Cover in India:
 - The **Forest Survey of India (FSI)**, Dehradun has been conducting **biennial (once every two years)** assessments of **forest cover since 1987**, and the findings are published in the **India State of Forest Report (ISFR)**.
 - As per the latest assessment in **ISFR 2021**, India's total forest and tree cover stands at **8,09,537 square kilometers, which accounts for 24.62%** of the country's geographical area.
 - Notably, this represents an **increase of 2261 square kilometers compared to the ISFR 2019 assessment**, indicating positive strides in forest conservation efforts.
- Government Initiatives to Boost Forest Cover:
 - **Green India Mission (GIM)**: Started in the Financial Year 2015-16, GIM focuses on afforestation activities.
 - Over the last five years, **Rs. 755.28 Crores** has been released to seventeen States and one union territory to support afforestation efforts.
 - **National Afforestation Programme**: Implemented for regeneration of degraded forests and adjoining areas.
 - **The National Afforestation Programme is now merged with Green India Mission.**
 - **Nagar Van Yojana (NVY)**: Launched in 2020, NVY aims to create **600 Nagar Vans and 400 Nagar Vatika in urban and peri-urban areas** by 2024-25.
 - The initiative intends to enhance the **green cover, preserve biological diversity, and improve the quality of life** for urban dwellers.
 - **Compensatory Afforestation Fund (CAMPA)**: Utilized by States/UTs for compensatory afforestation to

offset forest land diversion for developmental projects.

- **90% of the CAF money is to be given to the states** while 10% is to be retained by the Centre..
- **Multi-Departmental Efforts**: Apart from the central initiatives, afforestation activities are taken up under various programs and schemes of line Ministries, State Governments/UT Administrations, Non-Government Organizations, Civil Society, and Corporate bodies.
 - Some notable efforts include participation in the **Mahatma Gandhi National Rural Employment Guarantee Scheme, National Bamboo Mission, and Sub-Mission on Agroforestry.**
- **Draft National Forest Policy**: The policy focuses on **integrating climate change mitigation and adaptation measures into forest management practices**. It emphasizes building resilience to climate change, particularly among forest-dependent communities.

Plastic Overshoot Day

Why in News?

Recently, the **Earth** witnessed **Plastic Overshoot Day** on July 28, 2023. This marks the point in the year **when the amount of plastic waste generated exceeds the global waste management capacity**.

- The Plastic Overshoot Day Report by Swiss-based research consultancy **Earth Action (EA)** sheds light on the alarming issue of plastic pollution and its implications on the environment.

What are the Major Findings of the Report?

- **About**:
 - Plastic Overshoot Day is determined based on a country's **Mismanaged Waste Index (MWI)**. The gap in waste management capacity and plastic consumption is called MWI.
- **Plastic Pollution Crisis**: The report highlights that an additional **68,642,999 tonnes of plastic waste will enter nature in 2023**, indicating a severe plastic pollution crisis.
 - The report identifies 12 countries responsible for **52% of the world's mismanaged plastic waste**. **India** is among them, alongside **China, Brazil,**

Note:

Indonesia, Thailand, Russia, Mexico, the United States, Saudi Arabia, the Democratic Republic of Congo, Iran, and Kazakhstan.

- The three countries with the highest mismanaged waste percentages—**Mozambique (99.8%), Nigeria (99.44%), and Kenya (98.9%)** belong to Africa.
 - India ranks **fourth in the MWI**, with 98.55% of generated waste.
- **Short-life Plastics:** Short-life plastics, including plastic packaging and **single-use plastics**, make up approximately **37% of the total plastic used annually**. These categories pose a higher risk of leakage into the environment.
- **India's Plastic Overshoot:** Plastic Overshoot Day for India occurred on **January 6, 2023**, when the country's plastic waste generation outweighed its waste management capacity.
 - **India's per-person consumption is 5.3 kg**, significantly **lower than the global average of 20.9 kg**.

State of India's Birds 2023 Report

Why in News?

Recently, the **State of India's Birds (SoIB) 2023** was released, which highlighted that despite thriving a few bird species, there is a **substantial decline in numerous bird species**.

- The **SoIB 2023** is a first-of-its-kind collaborative effort of 13 government and non-government organisations, including the **Bombay Natural History Society (BNHS)**, **Wildlife Institute of India (WII)**, and **Zoological Survey of India (ZSI)**, **Wildlife Trust of India (WTI)**, Worldwide Fund for Nature–India (WWF–India) among others, which evaluates the overall **conservation status of the most regularly occurring bird species** in India.

What are the Methodologies Used in the Report?

- This report is based on data collected from **approximately 30,000 birdwatchers**.
- The report relies on **three primary indices to assess bird populations**,
 - Long-term trend (change over 30 years)

- Current annual trend (change over the past seven years)
- Distribution range size within India
 - Among the 942 bird species assessed, the report indicates that many could not have their **long-term or current trends accurately established**.

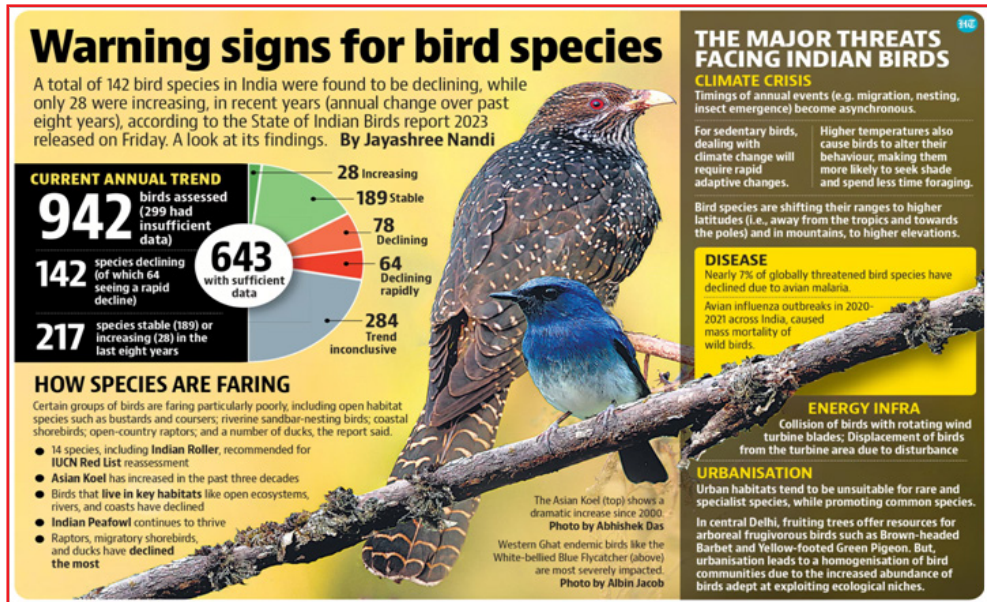
What are the Key Highlights of the Report?

- Status:
 - For the 338 species with identified long-term trends, 60% have experienced declines, 29% are stable, and **11% have shown increases**.
 - Among the 359 species with determined current annual trends, 39% are declining, 18% are rapidly declining, 53% are stable, and 8% are increasing.
- Positive Trends: Increasing Bird Species:
 - Despite the general decline, there are some positive trends among certain bird species.
 - The **Indian Peafowl**, for instance, the national bird of India, is **showing a remarkable increase** in both abundance and distribution.
 - This species has expanded its range into new habitats, including high-altitude Himalayan regions and rainforests in the **Western Ghats**.
 - The **Asian Koel**, House Crow, Rock Pigeon, and Alexandrine Parakeet are also highlighted as **species that have demonstrated a notable increase in abundance since the year 2000**.
- Specialist Birds:
 - Bird species that are **“specialists” – restricted to narrow habitats** like wetlands, rainforests, and grasslands, as opposed to species that can inhabit a wide range of habitats such as plantations and agricultural fields – **are rapidly declining**.
 - The **“generalist” birds that can live in multiple habitat types** are doing well as a group.
 - “Specialists, however, **are more threatened than generalists**.”
 - Grassland specialists have **declined by more than 50%**.
 - Birds that are **woodland specialists** (forests or plantations) **have also declined more than generalists**, indicating a need to conserve natural forest habitats so that they provide habitat to specialists.
- Migrant and Resident Birds:

Note:



- **Migratory Birds**, especially long-distance migrants from Eurasia and the Arctic, have experienced **significant declines** by more than 50% – followed by short-distance migrants.
- Shorebirds that breed in the Arctic have been particularly affected, declining by **close to 80%**.
- By contrast, resident species as a group have remained much more stable..



➤ Diet and Decline Patterns:

- Dietary requirements of birds have also shown up in abundance trends. Birds that feed on vertebrates and **carion have declined the most**.
 - Vultures were nearly driven to extinction by consuming carcasses contaminated with diclofenac.
- White-rumped Vultures, Indian Vultures, and Red-headed Vultures have suffered the maximum **long-term declines (98%, 95%, and 91%, respectively)**.

➤ Endemic and Waterbird Declines:

- Endemic species, unique to the **Western Ghats** and Sri Lanka biodiversity hotspot, have experienced rapid declines.
 - Of India's 232 endemic species, many are inhabitants of **rainforests, and their decline raises concerns** about habitat preservation.
- **Ducks, both resident and migratory, are declining**, with certain species like the Baer's Pochard, Common Pochard, and Andaman Teal being particularly vulnerable.
- Riverine sandbar-nesting **birds are also declining due to multiple pressures** on rivers.

➤ Major Threats:

- The report highlighted several major threats – including **Forest Degradation, urbanization, and energy infrastructure** – that bird species face across the country.
- **Environmental pollutants** including veterinary drugs such as nimesulide still threaten vulture

populations in India.

- Impacts of **Climate Change** (such as on migratory species), **avian disease, and illegal hunting and trade** are also among the major threats.
- Other Species:
 - **Sarus Crane has rapidly declined** over the long term and continues to do so.
 - Of the 11 species of woodpeckers for which clear long-term trends could be obtained, **seven appear stable, two are declining, and two are in rapid decline**.
 - The **Yellow-crowned Woodpecker**, inhabiting widespread thorn and scrub forests, has **declined by more than 70% in the past three decades**.
 - While half of all bustards worldwide are threatened, the three species that breed in India – the **Great Indian Bustard, the Lesser Florican, and the Bengal Florican** – have been found to be most vulnerable.

What Measures Have Been Taken to Safeguard Different Bird Species?

- **National Action Plan for the Conservation of Migratory Birds (2018-2023)**
- Transboundary protected areas for conservation of species like **Tigers, Asian elephants, Snow Leopard, the Asiatic Lion, the one-horned rhinoceros, and the Great Indian Bustard**.
- **Wildlife Protection Act, 1972**
- India has taken several steps to **conserve vultures** like imposing a ban on the veterinary use of diclofenac, establishment of Vulture breeding centres, etc.

Note:

Dholpur-Karauli: India's 54th Tiger Reserve

Why in News?

National Tiger Conservation Authority (NTCA) has given its approval for the establishment of the **Dholpur-Karauli Tiger Reserve** in the state of Rajasthan.

- It has secured its position as the **fifth tiger reserve** in the state of Rajasthan following **Mukundra Hills, Ramgarh Vishdhari, Ranthambore, and Sariska**.

What are Tiger Reserves?

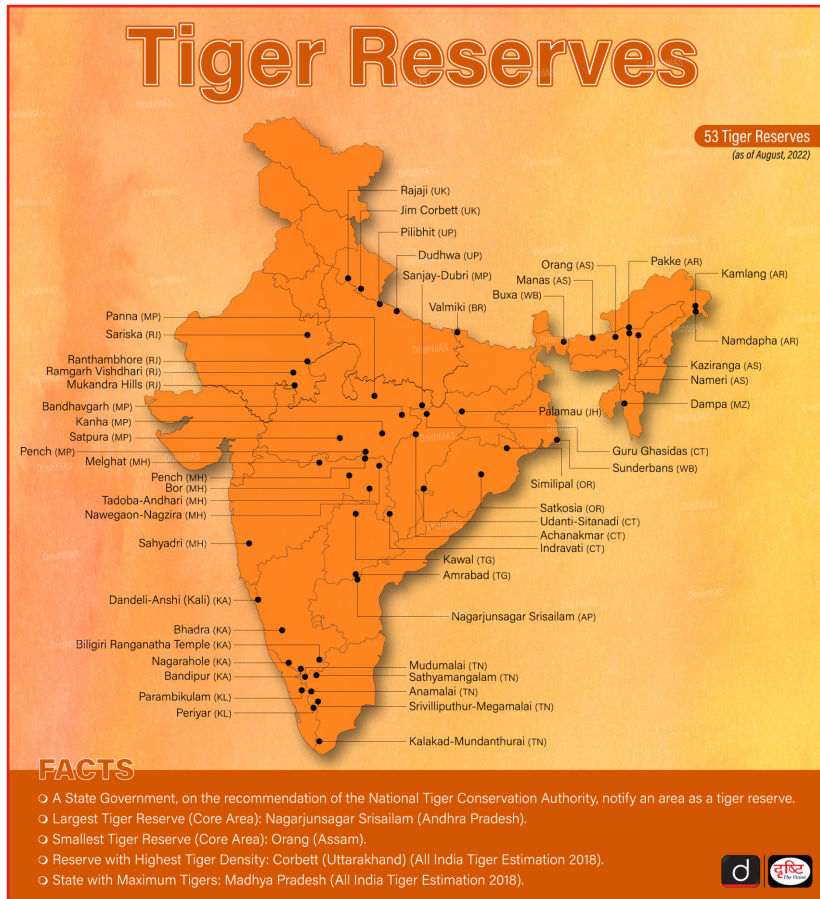
- A protected area designated for the conservation of the **striped big cats (tigers)** is referred to as **Tiger Reserve**. However, a **tiger reserve** may also be a **national park or wildlife sanctuary**.
 - For Example: The **Sariska Tiger Reserve** is also a **national park**. It is so because the place was originally created as a national park and **later dedicated to tiger conservation**.
- Tiger Reserves are **notified by State Governments** as per provisions of **Section 38V of the Wildlife (Protection) Act, 1972** on advice of the National Tiger Conservation Authority.
 - Presently, India accommodates a **total of 54 Tiger Reserves** (with the most recent addition being the **Dholpur-Karauli Tiger Reserve**).

Note:

- India is home to **75% of the world's tiger population**. As per the latest report on the **Status of Tigers in India**, the tiger count in the country has surged to **3,167 as of 2022**.
- **Project Tiger** is an ongoing **centrally sponsored program** of the Ministry of Environment, Forests, and Climate Change that provides **government assistance to tiger states for tiger conservation in designated tiger reserves**

What is the National Tiger Conservation Authority?

- **About:**
 - The **NTCA** is a **statutory body under the Ministry**



of Environment, Forests and Climate Change constituted under enabling provisions of the **Wildlife (Protection) Act, 1972**, as amended in 2006, for strengthening tiger conservation.

Objectives:

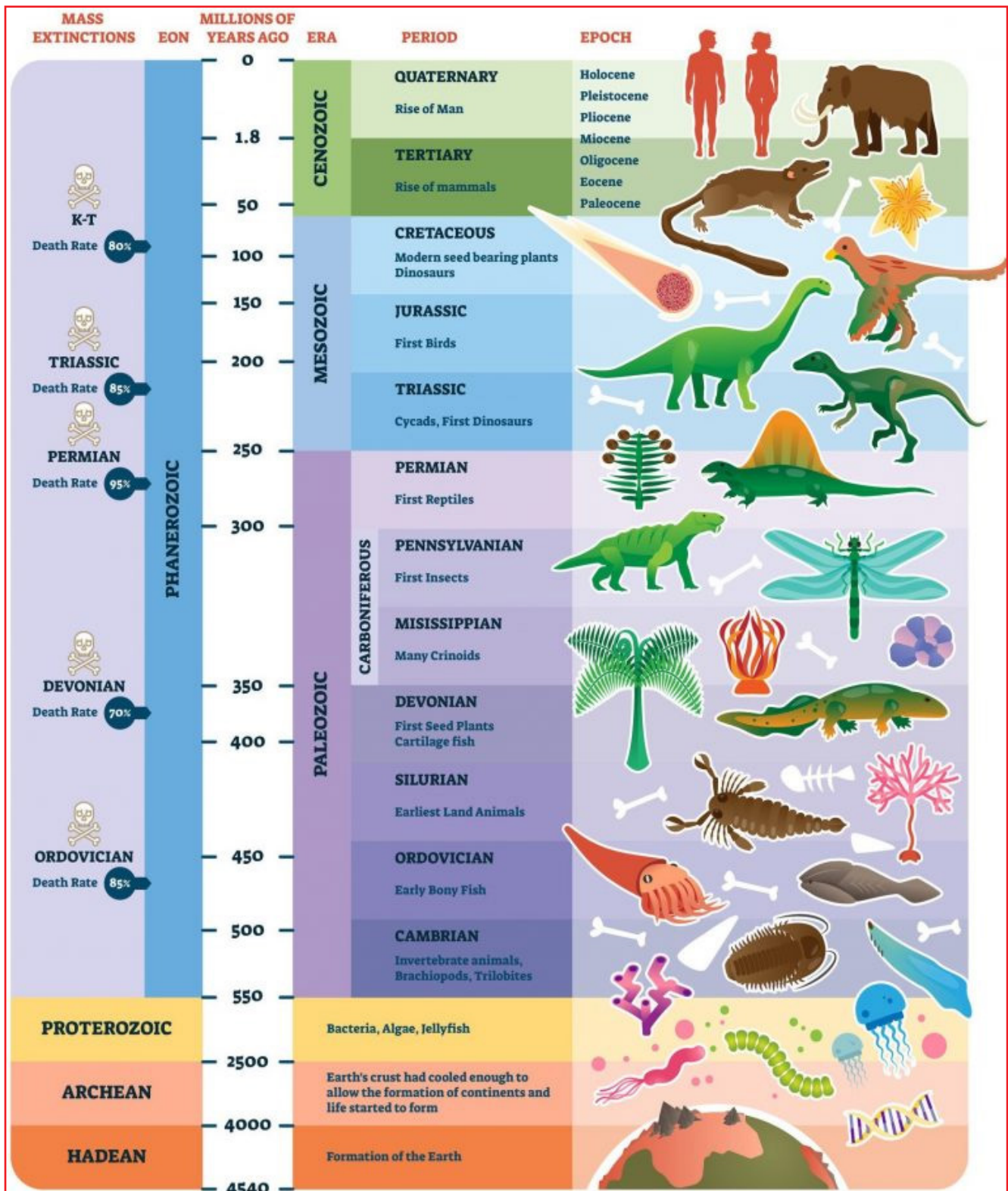
- Providing **statutory authority to Project Tiger** so that compliance of its directives becomes legal.
- Fostering **accountability of Center-State in management of Tiger Reserves**, by providing a basis for MoU with States within our federal structure.
- Addressing **livelihood interests of local people in areas surrounding Tiger Reserves**.

Unveiling California's Past Extinction to Illuminate Modern Challenges

Why in News?

As the prevalence of deadly **wildfires** has surged, driven by the combined forces of human-caused **climate**

Note:



Note:

change and disruptive land management practices, a new study delves into **California's** history during the **Pleistocene epoch**, a time marked by **profound climatic shifts** and **Earth's largest extinction event in over 60 million years**.

What is the Pleistocene Epoch?

- It is the geological epoch that lasted from about **2,580,000 to 11,700 years ago**, spanning the earth's most recent period of repeated glaciations.
 - It was during the Pleistocene that the most recent episodes of global cooling, or ice ages, took place.
- The epoch featured ice age giants, such as **woolly mammoths (Mammuthus primigenius)** giant bears, **dire wolves and camels**, many of which disappeared at the end of the Pleistocene in a major extinction event.
 - The extinction resulted in substantial losses, **North America lost over 70% of mammals** weighing more than 97 pounds, **South America lost over 80%, and Australia nearly 90%**.
- The end of the Pleistocene epoch also marks the beginning of the **Holocene epoch**, which is the **current epoch we are living in**.

What are the Major Highlights of the Study?

- **Revealing Insights from the La Brea Tar Pits:** La Brea Tar Pits is a prolific ice age fossil site in Los Angeles, US home to preserved remains of thousands of large mammals trapped in asphalt seeps.
 - By analyzing proteins in the fossils, the study reveals a deadly **combination of a warming climate marked by prolonged droughts and rapid human population growth**.
 - These factors pushed Southern California's ecosystem to a tipping point, causing irreversible changes in vegetation and mega-mammal populations.
 - As California warmed coming out of the last ice age, the landscape became drier and forests receded.
 - At La Brea, **herbivore populations also declined, probably from a combination of human hunting and habitat loss**. Species associated with trees, like camels, disappeared entirely.

- **A New Paradigm: Fire's Role:** The study highlights that **fire is a relatively recent phenomenon in Southern California**, with fire becoming frequent only after human arrival.
 - Over **90% of wildfires in coastal California are ignited by human activities** such as downed power lines and campfires.
 - Parallels between Pleistocene extinctions and contemporary crises underscore the vulnerability of ecosystems under compounded stress.
- **Relevance for Today's Climate and Biodiversity Crisis:** Today's **convergence of climate warming, human population expansion, biodiversity loss**, and human-triggered fires mirrors the past.
 - The pace of current temperature rise, primarily fueled by fossil fuel burning, far **surpasses that of the ice age's end**.
 - The study underscores the need to intensify efforts to curtail greenhouse gas emissions, prevent reckless fire ignitions, and safeguard megafauna.

What is the Geological Time Scale?

- The **Geological Time Scale** is like a vast timeline that helps us understand the history of our planet.
 - Just as a calendar breaks down years, months, and days, the Geological Time Scale breaks down **Earth's history into eons, eras, periods, and epochs**.
- Eons are divided into Eras, Eras into Periods, Periods into Epochs, and Epochs into Ages.

Sixth Anniversary of the Minamata Convention

Why in News?

- The **sixth anniversary of the Minamata Convention on Mercury** is a reminder of global efforts to combat the toxic effects of mercury.
- On this occasion, the **United Nations Environment Programme (UNEP)** reflects on the ongoing campaign to **eradicate the use of mercury in small-scale gold mining**.
 - This practice, despite its economic significance, poses **severe risks to both miners and the environment** due to the hazardous properties of mercury.

Note:



MERCURY POLLUTION AND MINAMATA CONVENTION

Mercury

- Symbol - Hg; Atomic No - 80
- **Naturally occurring** element (rocks in earth's crust, deposits of coal),
- Toxic effects on nervous, digestive and immune systems, lungs, kidneys etc.
- One of the top **10 chemicals/groups of chemicals of major public health concern** (WHO)

Methylmercury vs Ethylmercury

- Methylmercury (**MeHg**) is linked to health issues
- **Ethylmercury** is utilized as a preservative in some vaccines

MERCURY POLLUTION

Sources

- ⊙ Volcanic eruption and weathering of rocks
- ⊙ Artisanal and Small-Scale Gold Mining (ASGM) (**major source**)
- ⊙ Industrial processes (**chlorine production, cement manufacturing** etc)
- ⊙ Improper disposal of **e-waste** (fluorescent bulbs and batteries)

Impact:

- ⊙ MeHg accumulates in aquatic organisms (later consumed by humans)
- ⊙ MeHg carries a **higher risk of causing Minamata disease** (neurological symptoms)

MINAMATA CONVENTION

Objective

- ⊙ Protect human health and environment from adverse effects of Hg and its compounds
- ⊙ Controlling anthropogenic releases of Hg throughout its lifecycle (**key obligation**)

Agreed at

- ⊙ **Intergovernmental Negotiating Committee** (5th session), Geneva, Switzerland (2013)

Covers Control on

- ⊙ Mercury mining
- ⊙ Manufacture/trade of Hg and related products
- ⊙ Disposal of Hg waste
- ⊙ Emissions of Hg from industrial facilities

Members

- ⊙ 144 parties (India has ratified)
- ⊙ Member countries **bound to put the above controls in place**



What is the Minamata Convention?

- The **Minamata Convention on Mercury** is a global treaty to protect human health and the environment from the adverse effects of mercury and its compounds.
 - It was agreed at the **fifth session of the Intergovernmental Negotiating Committee in Geneva, Switzerland 2013.**

- Controlling the anthropogenic releases of mercury throughout its lifecycle is one of the key obligations under the Convention.

What is Mercury Pollution?

- About Mercury:
 - Mercury is a **naturally occurring element** found in the Earth's crust. It is considered by the **World**

Note:

Health Organization (WHO) as one of the top **ten chemicals** or groups of chemicals of major public health concern.

➤ Major Applications of Mercury:

- Thermometers and Barometers:
 - Mercury's **high coefficient of thermal expansion** and easy visibility make it suitable for use in traditional thermometers and barometers.
- Chemical and Mining Processes:
 - Mercury has been used in various chemical and mining processes, including the production of chlorine and mining of gold.
- **Electronics and Electrical Switches:**
 - Mercury-wetted switches are used in various electrical applications because **mercury's conductivity and low resistance** make it suitable for creating a reliable electrical connection.

➤ Sources of Mercury Pollution:

- Natural Sources:
 - **Volcanic eruptions** release small amounts of mercury.
 - **Erosion of rocks** and soil can release mercury into water bodies.
- Anthropogenic Sources:
 - **Artisanal and Small-Scale Gold Mining (ASGM):** ASGM is a major source of mercury pollution, where mercury is used to extract gold from ore.
 - Mercury is used to extract gold particles from ores, **creating amalgams** that are later heated to evaporate the mercury, leaving behind gold.
 - Artisanal gold mining **operations are responsible for 37% of global mercury pollution.**
 - **Industrial Processes:** Various industries, such as **chlorine production, cement manufacturing, and waste incineration**, emit mercury.
 - The cement industry is responsible for around **11% of global anthropogenic mercury emissions.**
 - **Waste Disposal:** Improper disposal of e-waste products containing mercury, such as **fluorescent bulbs and batteries**, leads to mercury leaching into the environment.

➤ Associated Impact:

- Methylmercury accumulates in aquatic organisms like fish. People primarily come into contact with **methylmercury** through the **consumption of fish and shellfish.**
 - This compound carries a **higher risk of causing Minamata disease**, a condition characterized by **sensory impairment, tremors, and both auditory and visual deficits.**
- This illness was initially observed in the residents of **Minamata Bay, Japan**, who consumed mercury-contaminated fish due to industrial waste pollution.

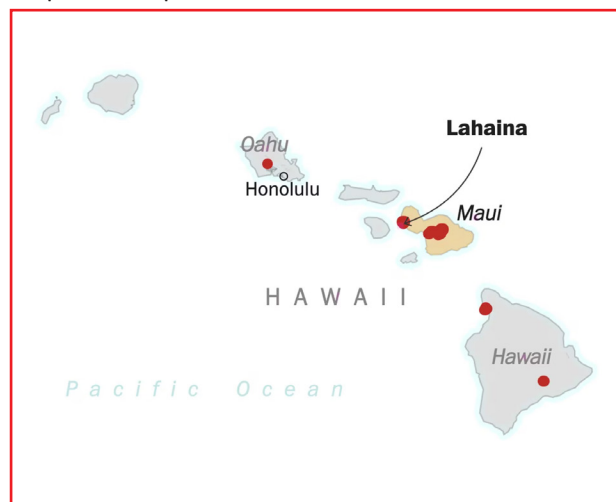
Note: Methylmercury and ethylmercury differ significantly. While methylmercury is linked to health issues, **ethylmercury is utilized as a preservative** in certain vaccines and **is not associated with health concerns.**

Large-Scale Wildfires in Hawaii

Why in News?

Recently, Hawaii has been grappling with extensive **Wildfires** that have wreaked havoc across the state.

- The situation has highlighted the significance of hazard mitigation plans and the identification of **vulnerable areas, like Lahaina and West Maui communities**, where frequent wildfire ignitions and a large number of at-risk buildings were identified in Maui County's plan last updated in 2020.



Note:

What caused such a Severe Wildfire in Hawaii?

- Flash Droughts:
 - Dry weather combined with strong winds from a passing hurricane **played a significant role** in fueling the blaze. These conditions, known as “Flash Droughts,” involve **rapid moisture evaporation from the atmosphere**, creating ideal conditions for fire spread.
 - Maui is home to one of the **six active Volcanoes of Hawaii**. Most of Maui was **experiencing severe drought, so the dry land, with dry non-native grasses** and vegetation, was ready fuel for fires.
 - These fed the fires and helped them spread.
- Anthropogenic and Climate Change:
 - **Climate change** has increasingly been linked to **the rising occurrence of devastating forest fires** globally and Hawaii’s wildfire outbreak is likely not an exception.
 - As temperatures rise and air becomes warmer **due to climate change, the conducive conditions for storms and wildfires** are amplified.
 - Furthermore, the historical **land use practices of cultivating** irrigated pineapples and sugar cane gave way to **invasive, fire-prone grass species** as these industries declined.
 - This transition has contributed to the vulnerability of the land to rapid fire spread.
- The Winds of Hurricane Dora:
 - The fire in Hawaii started in the wild and was carried by the **wind that was blowing at almost 100 kmph**.
 - The winds have their **origins in Hurricane Dora**, an unusually strong storm in the Pacific Ocean.
 - Hundreds of miles away from Hawaii, **Hurricane Dora did not hit Hawaii**. Instead, the islands **were caught between high and low pressure zones** due to the hurricane, which resulted in the **winds fanning the flames and making these difficult to control**.

What are the Key Facts About Hawaii?

- Hawaii sits over 2,000 miles west of California in the **Pacific Ocean**, comprising a diverse and unique ecosystem.
- It is the 50th and youngest state of the United States.
- Renowned for its stunning natural beauty, **Hawaii consists of eight main islands formed by volcanic activity**.

- The state’s capital is Honolulu.

- With a rich cultural heritage influenced by **Polynesian, Asian, and American cultures**, Hawaii boasts a **vibrant and diverse society**.
- The islands offer a variety of **landscapes, from lush rainforests to volcanic landscapes**, making it a haven for outdoor enthusiasts.
- The archipelago is famous for its **hula dance, luaus, and traditional ukulele music**. Hawaii’s unique **flora and fauna include endangered species like the Hawaiian monk seal and green sea turtle**.

What are the Government Initiatives to Tackle Wildfires?

- **National Action Plan for Forest Fires (NAPFF)**: It was started in 2018 with the goal of reducing forest fires by informing, enabling, and empowering forest fringe communities and incentivizing them to collaborate with state forest departments.
- **National Mission for Green India (GIM)**: Launched under the **National Action Plan on Climate Change**, the GIM aims to increase forest cover and restore degraded forests.
 - It promotes the use of community-based forest management, biodiversity conservation, and sustainable forest practices, which contribute to preventing forest fires.
- **Forest Fire Prevention and Management Scheme (FFPM)**: FFPM is implemented by the FSI under the MoEF&CC. It aims to strengthen the forest fire management system by utilizing advanced technologies such as **remote sensing**.
 - It is the only government-sponsored programme dedicated to assisting states in dealing with forest fires.

World Elephant Day 2023

Why in News?

Recently, on the occasion of **World Elephant Day**, the Union Minister of Environment, Forest and Climate Change and Labour and Employment highlighted various initiatives and accomplishments in India’s elephant conservation journey.

Note:



What is World Elephant Day?

➤ About:

- World Elephant Day, observed **globally on August 12**, is a dedicated observance aimed at raising awareness about the **critical challenges confronting elephants and advocating for their protection and conservation**.
- This significant day provides a platform to emphasize the issues elephants face, encompassing habitat loss, ivory poaching, human-elephant conflicts, and the imperative for enhanced conservation endeavours.

➤ Historical Perspective:

- The campaign World Elephant Day was **initiated in 2012 to bring awareness to the disturbing situations of African and Asian elephants**.
 - The objective of this campaign is to **create a sustainable environment where animals are not exploited and taken care of**.
- It was first observed by Canadian filmmakers Michael Clark and Patricia Sims with the Thailand-based Elephant Reintroduction Foundation.
 - In 2012, Patricia Sims **founded an organization called the World Elephant Society**.
 - The organization has succeeded to create awareness about the dangers confronted by elephants and the inevitability to protect them globally.

What are the Key Highlights of Elephants?

➤ About:

- Elephant is the **Natural Heritage Animal of India**.
- Elephants are considered a **“Keystone Species”** as they play a critical role in maintaining the balance and health of forest ecosystems.
 - They are **known for their exceptional intelligence**, boasting the largest brain size of any land animal.

➤ Significance in Ecosystem:

- Elephants are very **important grazers and browsers**, eating vast amounts of **vegetation every day, spreading seeds around as they go**.
 - They also help **shape the often-thick vegetation of the Asian landscape**.

- For example, in forests, **elephants create clearings and gaps in the trees that let sunlight in to reach new seedlings**, helping plants grow and the forest to regenerate naturally.

- Elephants will also dig for water when there is not any surface water – **opening water access for other creatures as well as themselves**.

➤ Elephants in India:

- India has the **largest number of wild Asian Elephants**, estimated at **29,964 according to the 2017 census by Project Elephant**.
 - It is about 60% of the species' global population.
- **Karnataka** has the highest number of elephants, followed by **Assam and Kerala**.

➤ Conservation Status:

- **International Union for Conservation of Nature (IUCN)** Red List of threatened species:
 - African Forest Elephant (*Loxodonta cyclotis*) - **Critically Endangered**
 - African Savanna Elephant (*Loxodonta africana*) - **Endangered**
 - Asian Elephant (*Elephas maximus*) - **Endangered**
- **Convention of the Migratory species (CMS)**:
 - African Forest Elephant: **Appendix II**
 - Asian Elephant: **Appendix I**
- **Wildlife (Protection) Act, 1972**: **Schedule I**
- **Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)**:
 - African Savanna Elephant: **Appendix II**
 - Asian Elephant: **Appendix I**

What are the Initiatives and Accomplishments in India's Elephant Conservation Journey?

➤ Addressing Elephant-Human Conflict:

- Establishment of over **40 elephant corridors and 88 wildlife crossings to reduce conflicts**.
- Creation of **buffer zones around protected areas covering more than 17,000 sq. km**.

➤ Project Elephant:

- Launched in 1992, covering 23 states across India.
- Improved the status of wild elephants, with a **population increase from about 25,000 in 1992 to around 30,000 in 2021**.

Note:



- Elephant Reserves:
 - Establishment of **33 Elephant Reserves** covering **approximately 80,777 Sq.km.**
 - These reserves play a crucial role in safeguarding **wild elephant populations and their habitats.**
- **Human-Elephant Conflict Management:**
 - Rapid response teams deployed in various states to handle conflict situations.
 - Around **110 critical stretches across the railway network in the country that traverse through elephant habitats** have been identified for the implementation of eco-friendly measures to mitigate human-elephant conflicts.
 - In these locations measures such as building underpasses, clearing vegetation along the tracks to increase visibility for the loco pilots to avoid collisions, provisioning ramps, and others will also be taken up.
- Community Participation and Empowerment:
 - **Gaj Yatra program** and **Gaj Shilpi initiative** involving people to raise awareness about elephant conservation.
- Recognition of Exemplary Efforts:
 - Conferment of **Gaj Gaurav awards** individuals and organizations for their exemplary contributions in the field of elephant conservation and management.
- **International Agreements and Protocols:**
 - Participation in international conferences like the **Conference of Parties** under CITES.
 - **Monitoring of Illegal Killing of Elephants (MIKE) Programme** - The MIKE Programme was established by the CITES by **Resolution 10.10 adopted at the tenth Conference of the Parties in 1997.**
 - The MIKE program **started in South Asia in the year 2003 with the following purpose:**
 - To provide information needed for elephant range States to make appropriate management and enforcement decisions, and to **build institutional capacity within the range States for the long-term management of their elephant populations.**

- **Mike Sites in India:**

- Chirang-Ripu Elephant Reserve (Assam)
- Deomali Elephant Reserve (Arunachal Pradesh)
- Dihing Patkai Elephant Reserve (Assam)
- Garo Hills Elephant Reserve (Meghalaya)
- Eastern Dooars Elephant Reserve (West Bengal)
- Mayurbhanj Elephant Reserve (Odisha)
- Shivalik Elephant Reserve (Uttarakhand)
- Mysore Elephant Reserve (Karnataka)
- Nilgiri Elephant Reserve (Tamil Nadu)
- Wayanad Elephant Reserve (Kerala)

Rising Water Levels in the Yamuna River

Why in News?

Delhi is currently experiencing a severe **waterlogging crisis due to the rising water levels of the Yamuna River**. The water level has surged to **208.13 meters**, marking the highest recorded level since **1963**.

What is the Cause and Impact of Increasing Water Level of Yamuna?

- **Cause:**

- Recent **heavy rainfall** in upstream states like **Himachal Pradesh, Uttarakhand, Haryana, and Punjab** are believed to be the main cause of the rising Yamuna River level.
- The **Hathnikund barrage in Haryana**, responsible for **regulating the flow of the Yamuna into Delhi**, has released a substantial amount of water due to the rainfall.

- **Impact:**

- The increased water level of the Yamuna has **resulted in flooding in low-lying areas of Delhi**, affecting a significant number of people and disrupting transportation and water supply.
- **Water supply in Delhi is also impacted** as Delhi government decided to cut down supply by **25%** following the **closure of three water treatment plants due to the rising level of the Yamuna.**

Note:

Yamuna River

- **About:** The Yamuna River is one of the major tributaries of the Ganges in Northern India.
 - It forms an integral part of the **Yamuna-Ganga Plain**, one of the world's most extensive alluvial plains.
- **Source:** It has its source in the **Yamunotri Glacier at an elevation of 6,387 meters** on the southwestern sides of **Banderpooch** crests in the lower **Himalayan ranges**.
- **Basin:** It meets the **Ganges at the Sangam (where Kumbh mela is held)** in Prayagraj, Uttar Pradesh after flowing through **Uttarakhand, Himachal Pradesh, Haryana and Delhi**.
- **Important Dam:** Lakhwar-Vyasi Dam (Uttarakhand), Tajewala Barrage Dam (Haryana) etc.
- **Important Tributaries:** Chambal, Sindh, Betwa and Ken.
- **Government Initiatives Related to Yamuna River:**
 - Yamuna Action Plan
 - Delhi Government's Six-Point Action Plan to Clean Yamuna by February 2025

Decline in Global Tropical Primary Forests: Global Forest Watch

Why in News?

The latest report from **World Resources Institute's (WRI) Global Forest Watch** has revealed a **staggering loss of tropical primary forests in 2022**, amounting to **4.1 million hectares**. This loss is **equivalent to losing an area of 11 football fields per minute**.

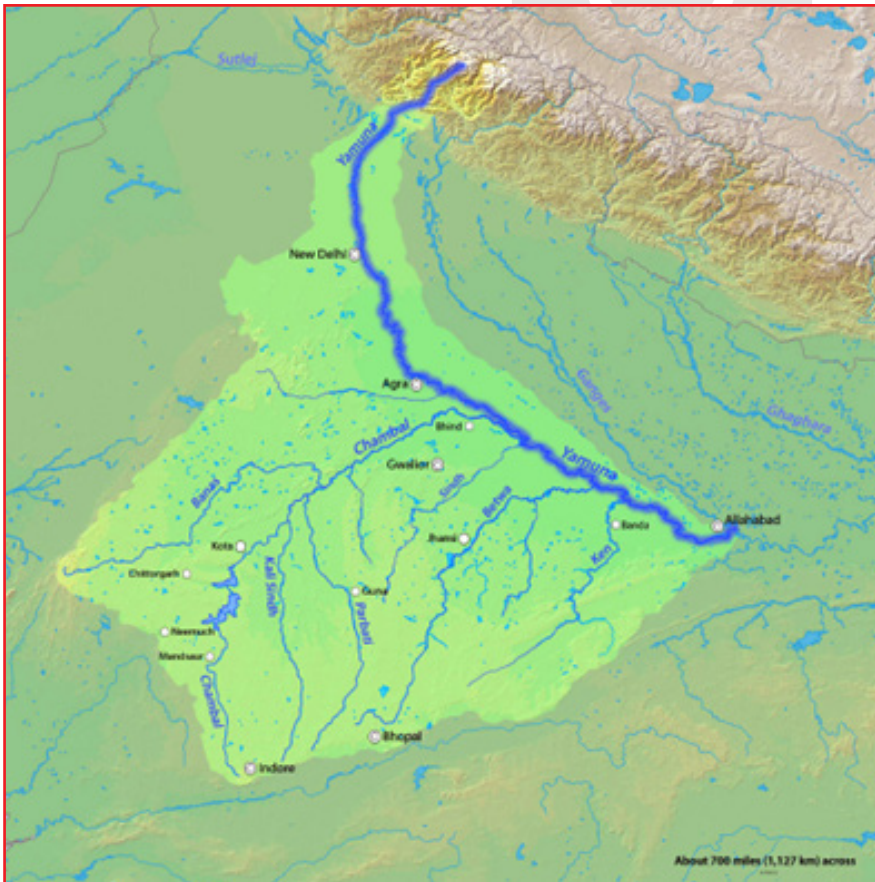
- The report emphasizes the significance of primary forests in the tropics, **where over 96% of deforestation occurs**, urging global attention to the issue.
- WRI is a **global nonprofit organization that works with leaders in government, business and civil society** to research, design, and carry out practical solutions that simultaneously improve people's lives and ensure nature can thrive.

What are Primary Forests?

- Primary forests are characterized by their **dense coverage of native tree species, minimal human interference, and undisturbed ecological processes**.
 - According to the **Food and Agricultural Organization (FAO)**, primary forests account for approximately **one-third (34%) of the world's forested land**.
 - They store **more carbon** and **support greater biodiversity** compared to other forest types. Therefore, **their loss is nearly irreversible**, as secondary forests cannot match their **biodiversity and carbon sequestration capabilities**.

What are the Major Findings of the Report?

- **Forest-Related Commitments and Progress:**
 - The current rate of forest loss indicates a failure to restore forests adequately. The world is **not on track to meet forest-related commitments**, including the goal to end and reverse deforestation by 2030 (**COP26 Glasgow 2021**).

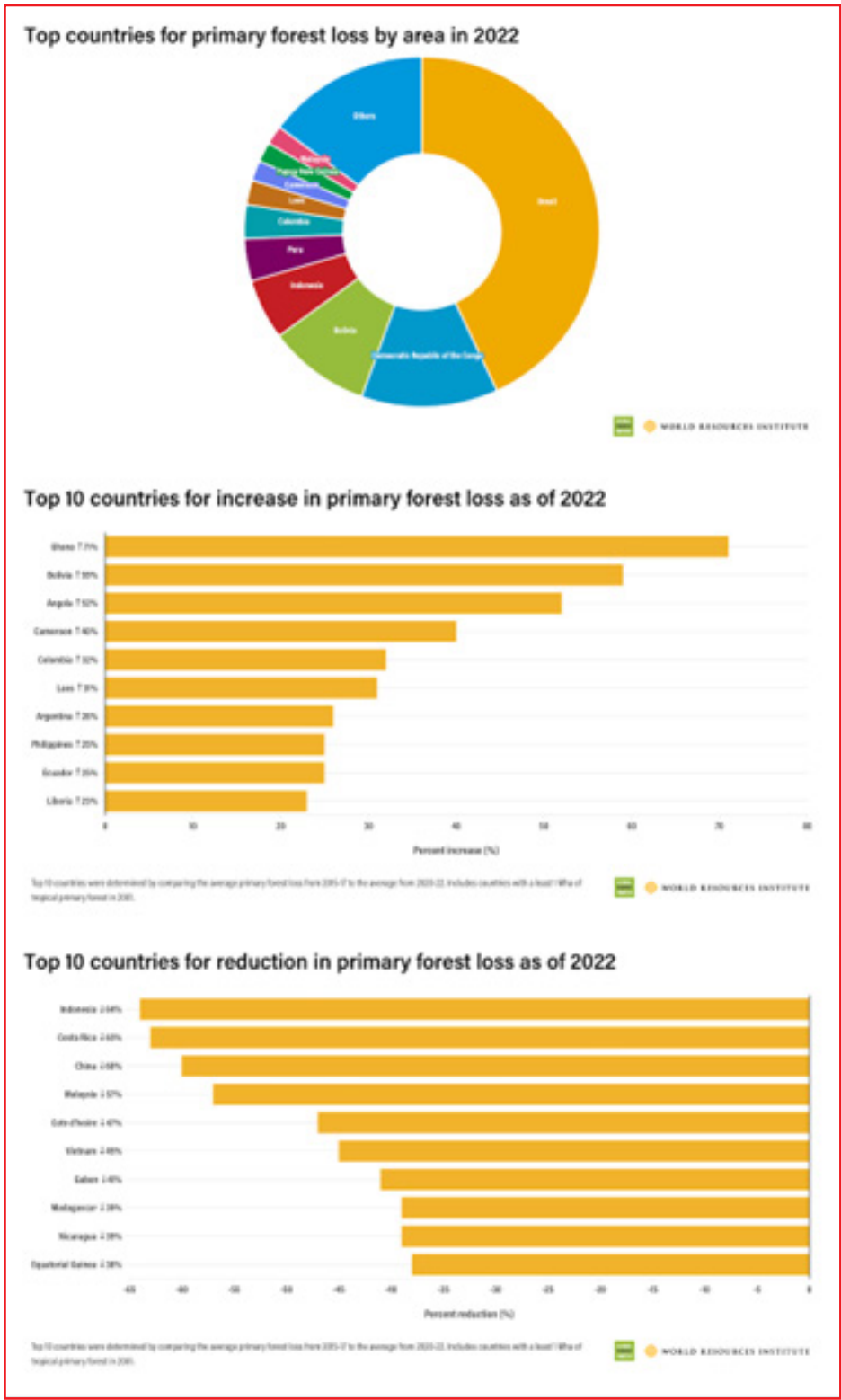


Note:



drishti

- Restoring 350 million hectares (Mha) of lost and degraded forests by 2030 is another key global pledge ([The Bonn Challenge](#)).
- To meet this target, **global deforestation must be reduced by at least 10% annually**. Also, tree cover must increase by **22 Mha per year between 2021 and 2030**.



Note:

- **Tree Cover Loss:** The total global tree cover loss in 2022 declined by 10%. This includes **primary, secondary, and planted forests**. This decrease, according to Global Forest Watch, is a **direct result of a decrease in fire-related forest losses** which decreased 28% from 2021.
 - However, non-fire losses in 2022 increased by slightly less than 1%.
- **Forest Loss in India:**
 - India experienced the loss of **43.9 thousand hectares of humid primary forest between 2021 and 2022**.
 - This accounted for **17% of the country's total tree cover loss** during the period, which amounted to **255 thousand hectares**.

Note:

- The **Ministry of Environment, Forest & Climate Change** defines 'forest cover' in India as "**all lands, more than one hectare in area with a tree canopy density of more than 10%**", and 'tree cover' as "**tree patches outside recorded forest areas exclusive of forest cover and less than the minimum mappable area of one hectare**".

What is the Status of Forests in India?

- **About:**
 - According to the **India State of Forest Report 2021**, the total forest and tree cover in India is **24.62%** of the geographical area of the country. The total forest cover is **21.71%** and the total tree cover is **2.91%**.
 - Area-wise **Madhya Pradesh has the largest forest cover** in the country followed by Arunachal Pradesh, Chhattisgarh, Odisha and Maharashtra.
 - In terms of forest cover as percentage of total geographical area, the top five States are **Mizoram (84.53%), Arunachal Pradesh (79.33%), Meghalaya (76.00%), Manipur (74.34%) and Nagaland (73.90%)**.
- **Government Initiatives for Forest Conservation:**
 - **Forest Conservation Act, 1980**
 - **National Afforestation Programme**
 - **Environment Protection Act of 1986**
 - **Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006**

Impact of Microplastics on Gut Microbiomes

Why in News?

Recently, the **FAO (Food and Agriculture Organization)** in its report "**Impact of Microplastics and Nanoplastics on Human Health**" highlighted that the **Microplastics** and nano plastics considerably impact human and animal gut microbiomes as well as the environment.

What is Gut Microbiome?

- The gut microbiome is the **totality of microorganisms, bacteria, viruses, protozoa, and fungi, and their collective genetic material present in the gastrointestinal tract (GIT)**.
- The gut microbiota plays an important role in **nutrient and mineral absorption, synthesis of enzymes, vitamins and amino acids**, and production of short-chain fatty acids (SCFAs).
 - The microbiome refers to the collection of genomes from all the microorganisms in the environment while **Microbiota usually refers to microorganisms that are found within a specific environment**.

What are the Key Highlights of the Report?

- **Intestinal Inflammation and Dysbiosis:**
 - **Exposure to plastic has led to intestinal inflammation and gut dysbiosis** — changes in the gut microbiome and microbiota.
 - Microplastics act as stressors and cause inflammatory responses in the host, affecting certain microorganisms and **resulting in microbial dysbiosis**.
 - Dysbiosis is defined by an imbalance in bacterial composition, changes in bacterial metabolic activities, or changes in bacterial distribution within the gut.
- **Deposition in Human Body:**
 - **Microplastics found in water bottles and food items** such as sugar, honey, sea salt, tea and others have eventually deposited in human lung tissue, placenta, stool, blood and meconium.

Note:

- **Plastics' Interaction with the Environment:**
 - Plastics of hydrophobic nature can adsorb hydrophobic chemicals or **persistent organic pollutants from the environment** (for example, polychlorinated biphenyls, polycyclic aromatic hydrocarbons and dichloro diphenyl trichloroethane).
- **Impact on Organism and Metabolism:**
 - Accumulation of microplastic in the gut, changes in the mucus layer and gut **permeability, alterations of the mucosal structure**, oxidative stress and immune response.
 - Physical abrasion of microplastic and its accumulation in the gut can lead to satiety in the organism and even reduce food consumption.
 - It may eventually lead to weight loss and metabolic changes and can also affect liver function and metabolism.
 - The severity of the impact is proportional to the **concentration and particle shape of microplastics**.

What are Microplastics?

- **About:**
 - They are defined as **plastics less than five millimeters in diameter**—smaller in diameter than the standard pearl used in jewelry. It can be harmful to our ocean and aquatic life.
 - Under the influence of **solar UV radiation**, wind, currents and other natural factors, plastic fragments into small particles, termed **microplastics (particles smaller than 5 mm) or nanoplastics (particles smaller than 100 nm)**.
 - There are **two categories of microplastics**: primary and secondary.
- **Classification:**
 - **Primary Microplastics:** They are tiny particles **designed for commercial use and microfibers shed** from clothing and other textiles.
 - E.g Microbeads found in personal care products, plastic pellets and plastic fibres.
 - **Secondary Microplastics:** They are **formed from the breakdown of larger plastics** such as water bottles.
 - This breakdown is caused by exposure to environmental factors, mainly the sun's radiation and ocean waves.

Additions to India's Faunal and Floral Databases

Why in News?

India witnessed significant advancements in its **biodiversity knowledge in the year 2022** with the **addition of numerous animal and plant species to its faunal and floral databases**.

- The findings were compiled in two publications: **"Animal Discoveries - New Species and New Records 2023"** by the **Zoological Survey of India (ZSI)** and **"Plant Discoveries 2022"** by the **Botanical Survey of India (BSI)**.

What are the Major Additions in India's Faunal and Floral Database?

- **Faunal Discoveries:**
 - In **2022**, India added a total of **664 animal species to its faunal database**. This includes **467 new species and 197 new records**, which are species found in India for the first time.
 - The discoveries encompassed various categories: **three new species and one new record of mammals, two new records of birds, 30 new species and two new records of reptiles**, 6 new species and one new record of amphibians, and 28 new species and eight new records of fish.
 - **Invertebrates** accounted for the majority of new faunal discoveries with **583 species**, while vertebrates constituted 81 species.
 - **Insects comprised the largest group among invertebrates**, and fish dominated among vertebrates.

Note:

- **Vertebrates:** Animals **with a backbone/spine**, well-developed internal skeleton, distinct head with a brain, bilateral symmetry, and complex internal organs. **Examples: mammals, birds, reptiles.**
- **Invertebrates:** Animals **without a backbone/spine**, typically have an exoskeleton or soft body varying body plans, and simpler internal organ systems. **Examples: insects, worms, jellyfish.**

Note:

- Kerala recorded the highest number of new discoveries, contributing 14.6% of the total, followed by Karnataka (13.2%) and Tamil Nadu (12.6%).
 - The Andaman and Nicobar Islands, West Bengal, and Arunachal Pradesh also made significant contributions.
- The new mammal species included *Miniopterus phillipsi*, a long-fingered bat, and *Glischropus meghalayanus*, a bamboo-dwelling bat, both found in Meghalaya.
- Another significant discovery was the *Sela macaque (Macaca selai)*, a new macaque species found in Arunachal Pradesh.
- Notable new records include the sighting of *Macaca leucogenys*, a white-cheeked macaque, in West Siang, Arunachal Pradesh that was previously found in southeastern Tibet.
- The yellow-rumped flycatcher (*Ficedula zanthopygia*) was also found in Narcondam Island of the Andaman archipelago after being known from various other regions.
- With the addition of these new discoveries and records, India's faunal diversity increased to 103,922 species.
- **Floral Discoveries:**
 - India added 339 new plant taxa to its floral database in 2022, consisting of 186 taxa new to science and 153 taxa as new distributional records within the country.
 - The discoveries encompassed various plant groups: 37% seed plants, 29% fungi, 16% lichens, 8% algae, 6% bryophytes, 3% microbes, and 1% pteridophytes.
 - Seed plants constituted the largest proportion of new discoveries, with dicotyledons accounting for 73% and monocotyledons for 27%.

Note:

- **Dicotyledons (Dicots):** Dicotyledons are plants that have embryos with two cotyledons or seed leaves.
 - They encompass a wide range of plants such as trees, shrubs, herbs, and many familiar flowering plants like roses.
- **Monocotyledons (Monocots):** Monocotyledons are plants that have embryos with a single cotyledon or seed leaf.
 - Monocots include plants such as grasses, corn, orchids, and onion.

- The **Western Himalayas** and the **Western Ghats** were the regions where a significant number of discoveries were made, contributing 21% and 16% respectively.
- Kerala stood out as the state with the highest number of plant discoveries, accounting for 16.8% of the total.
 - Among the notable plant discoveries were the new genera **Nandadevia Pusalkar**, found in the Uttarakhand Himalayas, and **Nilgiriella Pusalkar**, endemic to the southern Western Ghats in Karnataka, Kerala, and Tamil Nadu.
- Additionally, **Calanthe lamellosa**, an orchid species previously recorded in China and Myanmar, was found for the first time in India in the Japfu mountain range in Kohima, Nagaland.

Botanical Survey of India

- It is the apex research organization under the **Ministry of Environment and Forests (MoEFCC)** for carrying out taxonomic and floristic studies on wild plant resources of the country. It was established in 1890.
- It has nine regional circles situated at different regions of the country. However the headquarter is in **Kolkata, West Bengal**.

Zoological Survey of India

- **ZSI is also a subordinate organization of the MoEFCC** and was established in 1916 as a national center for the faunistic survey and exploration of the resources leading to the advancement of knowledge on the exceptionally rich faunal diversity of the country.
- **ZSI has its headquarters at Kolkata** and 16 regional stations located in different geographic locations of the country.

Global Environment Facility**Why in News?**

Recently, at the 64th Global Environment Facility (GEF) council meeting in Brazil, the governing body approved the disbursement of USD 1.4 billion to accelerate efforts to tackle the climate, biodiversity and pollution crises.

- This is the 2nd work program of the **GEF-8 funding period**, which runs from 2022 and 2026.

Note:

What are the Key Highlights of the Meet?

- **Global Biodiversity Framework Fund:**
 - The Governing board has approved the establishment of a new fund, the **Global Biodiversity Framework Fund (GBFF)**, to finance the implementation of the **Kunming-Montreal Global Biodiversity Framework**.
 - This fund is crucial as nearly 50% of its resources will be allocated to biodiversity-related work during the **GEF-8 period**.
- **Fund Allocations:**
 - 20% will be allocated to **Indigenous Peoples and local communities (IPLCs)**, 25% to GEF agencies, 36% to SIDS (Small Island Developing States), and 3% to **LDCs (Least Developed Countries)**.
 - The allocation for IPLCs will be reviewed two years after the ratification in August, while the allocations for SIDS and LDCs will be reviewed three years after ratification.

What is Global Environment Facility?

- The GEF was established on the **eve of the 1992 Rio Earth Summit**.
- It is a **family of funds dedicated to confronting biodiversity loss**, climate change, pollution, and strains on land and ocean health.
- It has a unique governing structure organized around an **Assembly, the Council, the Secretariat, 18 agencies**, a Scientific and Technical Advisory Panel, and the Evaluation Office.
- It provides **Financial Assistance for five major International Conventions:**
 - The **Minamata Convention** on Mercury (signed in 2013 and entered into force in 2017).
 - The **Stockholm Convention on Persistent Organic Pollutants (POPs)** (adopted in 2001 and entered into force in 2004).
 - The **United Nations Convention on Biological Diversity (UNCBD)** (entered into force in 1993).
 - The **United Nations Convention to Combat Desertification (UNCCD)** (adopted in 1994).
 - The **United Nations Framework Convention on Climate Change (UNFCCC)** (signed in 1992 and entered into force in 1994).
- It has **184 member countries**, including India.
- Its secretariat is based in Washington, D.C.
- The World Bank serves as the **GEF Trustee**, administering the GEF Trust Fund (contributions by donors).

What is GEF Council?

- The Council, the GEF's main governing body, **comprises 32 members appointed by constituencies of GEF member countries** (14 from developed countries, 16 from developing countries, and two from economies in transition).
 - **India has formed a permanent Constituency in the Executive Council** of the GEF together with Bangladesh, Sri Lanka, Bhutan, Nepal and Maldives.
- Council members rotate **at different intervals determined by each constituency**.
- The Council **meets twice annually**.
- The Council develops, adopts and evaluates **the operational policies and programs for GEF-financed activities**.
 - It also reviews and approves the work program (projects submitted for approval), making decisions by consensus.

Green Credit Programme

Why in News?

- Recently, the Ministry of Environment, Forest and Climate Change, Government of India has notified the draft '**Green Credit Programme (GCP)**' implementation rules for 2023.
- It was first announced in the **2023-24 Union Budget** with a view to leverage a competitive market-based approach and incentivize **voluntary environmental actions of various stakeholders**.

What is the Green Credit Programme?

- **About:**
 - The 'Green Credit' means a **singular unit of an incentive provided** for a specified activity, delivering a **positive impact on the environment**.
 - The Green Credit Programme is a mechanism that **complements the domestic Carbon Market**.
 - While the domestic carbon market focuses solely on **CO2 Emission reductions**, the Green Credit System aims to meet other environmental obligations as well, incentivizing sustainable actions by companies, individuals, and local bodies.
 - The green credits will be tradable and those **earning it will be able to put these credits up for sale** on a proposed domestic market platform.

Note:

➤ Green Credit Activities:

- **Tree Plantation-Based Green Credit:** To promote activities for increasing the green cover across the country through **tree plantation and related activities**.
- **Water-Based Green Credit:** To promote water conservation, water harvesting and water use efficiency / savings, **including treatment and reuse of wastewater**.
- **Sustainable Agriculture-Based Green Credit:** To promote natural and **Regenerative Agricultural practices** and land restoration to improve productivity, soil health and nutritional value of food produced.
- **Waste Management-Based Green Credit:** To promote sustainable and improved practices for waste management, **including collection, segregation and treatment**.
- **Air Pollution Reduction-Based Green Credit:** To promote measures for reducing air pollution and other pollution abatement activities.
- **Mangrove conservation and restoration-based green credit:** To promote measures for conservation and restoration of mangroves.
- **Ecomark-based Green Credit:** To encourage manufacturers to obtain 'Ecomark' label for their goods and services.
- **Sustainable Building and Infrastructure-based Green Credit:** To encourage the construction of buildings and other infrastructure using sustainable technologies and materials.
- Through the programme, **thresholds and benchmarks** will be developed for each Green Credit activity.

➤ Administration:

- The **Indian Council of Forestry Research and Education (ICFRE)** shall be the administrator of the programme which will develop **guidelines, processes and procedures for implementation** of the programme.

➤ Significance:

- The Green Credit Programme will also encourage private sector industries and companies as well as other entities **to meet their existing obligations**, stemming from other legal frameworks, by taking actions which are able to converge with activities relevant for **generating or buying green credits**.

- The guidelines bring together mechanisms to quantify and support ecosystem services together and would be of **great help for organic farmers and FPOs**.
- It's a first of its kind instrument that seeks to value and reward multiple ecosystem services to **allow green projects to achieve optimal returns beyond just carbon**.

Energy Transition Index 2023: WEF

Why in News?

Recently, the **World Economic Forum (WEF)** has ranked India at the **67th place globally** on its Energy Transition Index (ETI).

- The Index highlights **India as the sole major economy with energy transition momentum** accelerating across all dimensions and Singapore is the **only other major economy showing "true momentum by advancing sustainability**, energy security and equity in a balanced way.

Note: The ETI benchmarks **120 economies on the current performance of their energy systems** across economic development and growth, environmental sustainability and energy security and access indicators and their readiness for transition to secure, sustainable, affordable and inclusive energy systems.

What are the Key Highlights of the Energy Transition Index?

➤ Rankings:

- Sweden topped the list and was followed by **Denmark, Norway, Finland and Switzerland** in the top five on the list of 120 countries.
- **France (7) was the only G20 Country in the top 10**, followed closely by Germany (11), the U.S. (12), and the U.K. (13).

➤ Global Outlook:

- Global average ETI scores increased by 10% since 2014 but **showed only marginal growth** in the past three years.
- Only 41 countries have made steady progress in the past decade.

Note:

What are the Contributors to India's Energy Transition Progress and Concerns?

- **Contributors:** Universal electricity access, **clean cooking options, and renewable energy deployment** have improved India's performance.
 - Low reliance on natural gas and effective utilization of existing capacities helped India withstand the recent energy crisis.
- **Concerns:** Rising import dependence amid global energy market volatilities, predominantly carbon-intensive energy mix. Challenges include **balancing economic growth and creating quality jobs** for the growing working-age population.
- **Recommendations:** Sustained momentum, effective policy management, and partnerships are crucial for achieving long-term energy transition goals. This entails promoting **clean energy investments, innovation, and energy efficiency while ensuring inclusivity.**
 - Building a skilled workforce, fostering public-private collaboration, and **investing in low-carbon technology research and development** are essential for India's successful energy transition.

What is World Economic Forum?

- **About:**
 - WEF is a **Swiss nonprofit foundation established in 1971**, based in Geneva, Switzerland.
 - Recognized by the Swiss authorities as the international institution for public-private cooperation.
- **Mission:**
 - Committed to improving the **state of the world by engaging business**, political, academic, and other leaders of society to shape global, regional, and industry agendas.
- **Founder and Executive Chairman:** Klaus Schwab.
- **Major Reports published by WEF are:**
 - **Global Competitiveness Report.**
 - Global IT Report
 - WEF along with INSEAD, and Cornell University publishes this report.
 - **Global Gender Gap Report.**
 - Global Risk Report.
 - Global Travel and Tourism Report.

Seagrass Meadows

Why in News?

Scuba divers in Northern Germany are **extracting seagrass shoots to replant in barren areas**, aiming to **combat climate change** and **revive these ocean carbon sinks.**

What are Seagrass Meadows?

- **About:**
 - Seagrass meadows are composed of **flowering plants that grow in shallow coastal waters**, forming dense underwater carpets that can cover large areas.
 - They thrive in areas where sunlight can penetrate the water, allowing them to undergo **photosynthesis for growth.**
 - Also, they typically grow in **sandy or muddy substrates**, where their roots can take hold and stabilize the plant.
- **Significance:**
 - **Carbon Sequestration:** Though they cover **only 0.1% of the ocean floor**, these meadows are highly efficient carbon sinks, storing up to **18% of the world's oceanic carbon.**
 - This helps **reduce greenhouse gas emissions** and **slow down global warming.**
 - **Water Quality Improvement:** They also **filter pollutants from the water**, trap sediments and prevent erosion, thereby improving **water clarity and quality.**
 - This benefits both marine life and human activities such as **fishing, tourism and recreation.**
 - **Habitat and Biodiversity:** They are among the most productive and diverse ecosystems on Earth, providing habitats and food for many marine animals, including **fish, turtles, dugongs, crabs and seahorses.**
 - **Coastal Protection:** Seagrass beds act as natural barriers, protecting coastlines from erosion caused by **waves and tidal currents.**
- **Concern:**
 - According to **"Out of the Blue: The Value of Seagrasses to the Environment and to People"** report of **United Nations Environment Programme**

Note:



(UNEP), an estimated 7% of seagrass habitat is being lost worldwide each year.

- Since the late 19th century, almost 30% of seagrass area across the globe has been lost.
- The main causes of seagrass loss are:
 - **Coastal Development:** Construction of ports and marinas can destroy seagrass habitats or reduce their light availability.
 - **Pollution: Runoff of nutrients, chemicals and sediments** from agriculture, industry and urban areas can cause eutrophication, algal blooms and turbidity, which can smother or shade out seagrass plants.
 - **Climate Change: Rising sea temperatures, sea level rise, ocean acidification** and extreme weather events can stress or damage seagrass plants and alter their distribution and growth.
- **Seagrasses in India:**
 - In India, the major seagrass beds exist along the coastline of **Gulf of Mannar** and **Palk Bay** regions on the east coast, **Gulf of Kachchh** region on the west coast, the lagoons of islands in Lakshadweep in the Arabian Sea and **Andaman and Nicobar Islands** in the Bay of Bengal.
- **Restoration Efforts:**
 - Seagrass restoration has been attempted in various regions, such as the **Baltic Sea** in Germany, **Chesapeake Bay** in the USA and the **Gulf of Mannar** in India.

Forest Conservation Amendment Bill 2023

Why in News?

Recently, the **Forest (Conservation) Amendment Bill 2023** has been passed by the Lok Sabha, and it aims to bring significant changes to the **Forest (Conservation) Act, 1980**, which is a crucial central statute for the conservation of forests in India.

What is the Background?

- After Independence, vast areas of forest land were designated as reserved and protected forests.
 - However, many forested areas were left out, and areas without any standing forests were included in 'forest' lands.

- In **Godavarman case**, 1996, the **Supreme Court** suspended the felling of trees across the country, and ruled that the FC Act would apply to all land parcels that were either recorded as 'forest' or resembled the dictionary meaning of forest.
- In **June 2022**, the government amended the **Forest Conservation Rules** to propose a mechanism to allow developers to raise plantations "over land on which the (FC) Act is not applicable" and to swap such plots against subsequent requirements of compensatory afforestation.

What are the Key Provisions of the Forest (Conservation) Amendment Bill 2023?

- **Scope of the Act:**
 - The Bill broadens the scope of the Act by inserting a Preamble.
 - The Act's name was changed to **Van (Sanrakshan Evam Samvardhan) Adhiniyam, 1980** to reflect the potential of its provisions.
- **Applicability on Various Lands:**
 - The Act, which was initially applied to notified forest land, was later extended to revenue forest land and lands recorded as forest in government records.
 - The amendments seek to streamline the application of the Act to recorded forest lands, private forest lands, plantations, etc.
- **Exemptions:**
 - The Bill proposes certain exemptions to encourage afforestation and plantation outside forests.
 - 0.10 ha of forest land has been proposed to provide connectivity for habitation and establishments located on the side of roads and railways, up to 10 ha of land proposed for security related infrastructure and up to 5 ha of forest land in Left Wing Extremism Affected Districts for public utility projects.
 - These exemptions include strategic projects related to national security within 100 km of the International Borders, **Line of Actual Control (LAC)**, **Line of Control (LoC)** etc.
- **Provisions for Development:**
 - The Bill extends existing provisions of the **Principal Act** relating to assignment of forest land, on lease to private entities, to Government companies as well.

Note:

- This will facilitate development projects and ensure uniformity in the implementation of the Act.
- **New Forestry Activities:**
 - The amendments add new activities such as infrastructure for frontline forest staff, ecotourism, zoo, and safari into the array of forestry activities for the conservation of forests. **Surveys and investigations in forest areas will not be considered non-forestry activities.**
- **Climate Change Mitigation and Conservation:**
 - It aims to ensure that such areas **contribute to India's efforts in combating climate change** by being recognized as part of its forest conservation efforts and contribute to India's international commitments like **Net Zero Emission by 2070**
- **Empowering Local Communities:**
 - The Bill encourages activities like **establishment of zoos, safaris, and ecotourism**, which will be owned by the government and set up in approved plans outside Protected Areas.
 - These activities not only raise awareness about forest conservation and wildlife protection but also **create livelihood opportunities for local communities**, integrating them with overall development.

What are the Concerns Related to the Bill?

- **Objection on Hindi Name:**
 - There were objections to the **Act's new name (which is now in hindi)** on the grounds that it was **"non-inclusive"** and left out many among the "(non-Hindi speaking) population both in South India and also in the North-East.
- **Impact on Ecologically Sensitive Areas:**
 - The proposed exemptions in the Bill, particularly those related to strategic projects near international borders, have raised concerns about the **potential clearance of forests in ecologically sensitive areas**, such as the Himalayan, trans-Himalayan, and northeastern regions.
 - Bill, 2023 (FCA) will **erase the rights of indigenous communities** living on India's borders.
 - Without appropriate "assessment and mitigation plans," such clearances could threaten biodiversity and trigger extreme weather events.

- **Limited Applicability:**
 - The Bill restricts the legislation's ambit only to areas recorded as forests on or after October 1980. This exclusion may result in **leaving out significant sections** of forest land and biodiversity hot spots **from the Act's purview**, allowing them to be potentially sold, diverted, cleared, and exploited for non-forestry purposes.
- **Concurrent List and Center-State Balance:**
 - Some State governments have **argued that forest conservation falls** under the Concurrent List, which means **both the Center and States have a role** in the matter.
 - They believe that the **proposed amendments could tilt the balance towards the Center** and may impact the rights and authority of the State governments in forest conservation matters.

Mhadei Wildlife Sanctuary

Why in News?

Recently, in a significant development for tiger conservation efforts, the **Goa bench of the Bombay High Court** has issued a **directive to the Goa government** to notify the **Mhadei Wildlife Sanctuary** and its surrounding areas as a **tiger reserve** under the **Wildlife Protection Act, 1972** within three months from 24th July 2023.

- The decision comes **after a prolonged legal battle and demands from environmentalists and conservationists**, and it carries implications for wildlife protection and forest dwellers in the region.

Note:

- Tiger Reserves are notified by **State Governments** as per provisions of **Section 38V** of the **Wildlife (Protection) Act, 1972** on advice of the **National Tiger Conservation Authority**.

What are the Key Facts about Mhadei Wildlife Sanctuary?

- **Location and Landscape:**
 - Located in the **Northern part of Goa**, Sanguem taluka, near **Valpoi town**.
 - Encompasses picturesque waterfalls, including **Vazra Sakla Falls and Viridi Falls**.
 - Known for its nesting grounds of **critically endangered Long-billed vultures** near Vazra Falls.

Note:



- Diverse landscape with thick **moist deciduous forests** and some **evergreen species**.
- Notable for **sacred groves protecting rare and indigenous trees**.
- **Flora and Fauna**
 - Rich biodiversity with **Indian gaur, Tigers, Barking deer, Sambar deer, Wild boar, Indian hare, and more**.
 - Attracts **herpetologists** due to the presence of various snakes, including the **'big four' venomous snakes** which are **Indian krait, Russell's viper, Saw-scaled viper and Spectacled cobra**.
 - Designated an **International Bird Area** for hosting several bird species like **Malabar parakeet and Rufous babbler**.
 - Represents a crucial habitat for **tiger conservation in Goa**.
- **Unique Geographical Features:**
 - Home to the **three highest peaks in Goa: Sonsogod (1027 mts), Talavche Sada (812 mts), and Vageri (725 mts)**.
 - **Mhadei River**, a lifeline of Goa, originates in Karnataka, passes through the sanctuary, and meets the Arabian Sea at Panaji.
 - The sanctuary acts as a catchment area for the Mhadei River.

The 1.5°C Warming Target and Climate Projections

Why in News?

The **1.5 degrees Celsius warming target**, along with this year's **El Nino**, has garnered attention. Reports suggest the planet may cross this **temperature threshold due to the rising climate phenomenon**.

What is the Background of 1.5 Degrees Celsius Warming Target?

- **Paris Agreement** aims to **limit the temperature increase to 2 degrees Celsius** by the end of this century. This target is considered significant, but there are a couple of important things to remember.
 - Even though countries have been talking about this issue for over 20 years, the **amount of carbon emissions released into the atmosphere has not decreased** as much as needed.

- The **2 degrees Celsius target was not determined based on strict scientific evidence**. Instead, it was initially proposed by an economist named **William Nordhaus in the 1970s**.
- Later on, some politicians and climate scientists adopted this target.
- The **Alliance of Small Island States** pushed for the target to be lowered to **1.5 degrees Celsius**, leading to further retrofitting of future scenarios to **meet this goal**.
 - According to the **Intergovernmental Panel on Climate Change (IPCC)**, the leading scientific body on climate change, if current trends continue, the **world is likely to reach 1.5°C of warming by 2030-2052**.
 - Also, **IPCC Special Report on the difference in impacts between 1.5°C versus 2°C** warming suggests that **tropical countries such as India** are projected to experience the largest impacts on economic growth because of climate change.

How will Climate Change-induced Warming Impact India?

➤ About:

- According to a recent study by the **Indian Institute of Tropical Meteorology (IITM)**, India's average temperature has increased by **about 0.7°C during 1901-2018**, with more rapid warming in recent decades.

➤ Impacts:

- **Agriculture:** India's agriculture is heavily dependent on monsoon rains, and **any alterations in rainfall patterns due to warming** can significantly affect crop yields.
 - It would lead to **erratic monsoons, increased frequency of droughts, and extreme weather events** like heatwaves that will reduce agricultural productivity, posing a threat to food security and livelihoods of millions of farmers.
- **Public Health:** Warmer temperatures may lead to the spread of diseases like **malaria, dengue, and other vector-borne illnesses** as the range of disease-carrying organisms expands.
 - Heatwaves can increase heat-related illnesses and mortality rates, especially among vulnerable populations, putting pressure on the healthcare system.

Note:

- **Ecosystems and Biodiversity:** Warming can disrupt ecosystems and trigger **shifts in vegetation patterns**, altering habitats for various plant and animal species.
 - **Many endemic species in India may face extinction** or be forced to migrate to more suitable areas, leading to disruptions in the ecological balance and biodiversity loss.
- **Coastal Vulnerability:** India has an extensive coastline, and rising sea levels due to warming can **result in coastal erosion, inundation of low-lying areas**, and increased frequency of extreme weather events like cyclones.
 - This poses a threat to coastal communities, infrastructure, and economic activities.
- **Migration and Social Disruptions:** As climate-induced challenges intensify, there could be a rise in **climate-induced migration**, with people moving from severely impacted regions to more habitable areas.
 - This could lead to **social tensions, resource competition, and strain on urban centers**, leading to challenges for policymakers.
- **Government Initiatives:**
 - **National Action Plan on Climate Change (NAPCC)**
 - There are 8 national missions forming the core of the NAPCC including **National Solar Mission, National Mission on Sustainable Habitat** etc.
 - **National Adaptation Fund on Climate Change (NAFCC)**
 - **India Cooling Action Plan**
 - **LiFE Initiative**

Ludwigia peruviana Threatens Elephant Habitats in Tamil Nadu

Why in News?

An Invasive weed called *Ludwigia peruviana* is posing a significant threat to **elephant habitats** and foraging areas in Valparai, Tamil Nadu.

What is Ludwigia peruviana?

- **About:**
 - *Ludwigia Peruviana*, also known as **primrose willow**, is originally native to **Central and South America**.

- It is an aquatic plant that was likely introduced as an **ornamental species** due to its **attractive pale yellowish flowers**.
- However, its introduction to new regions has resulted in it becoming an invasive weed, causing **ecological disruptions in various swampy areas worldwide**.
- **Characteristics:**
 - *Ludwigia Peruviana* grows **relatively tall, reaching a height of about 12 feet**.
 - As an aquatic plant, it thrives in **wetlands and water bodies**.
 - It grows faster than many other harmful weeds, and the pre-monsoon temperature and monsoon rains contribute to its rapid growth and spread.
- **Impact on Elephants and Wildlife and Biodiversity:**
 - The invasion of *Ludwigia Peruviana* poses a significant threat to elephant habitats, **disrupting the growth of essential food sources for elephants** and other plant-eating animals.
 - The spread of this invasive weed also impacts the overall biodiversity of invaded areas, leading to the loss of native plant species and potentially **forcing wildlife to move to other areas, resulting in negative interactions with humans**.
- **Challenges in Prevention:**
 - *Ludwigia Peruviana* is listed as one of the **22 priority invasive plants in Tamil Nadu**, emphasizing the urgency of containment and control measures.
 - The elimination of *Ludwigia* presents a unique challenge compared to other invasive plants because it **grows in swamps, limiting the use of machinery** to tackle the problem **without damaging the ecosystem further**.
 - Manual removal is tricky because the **plant breaks easily and new growth can emerge from root or broken stems**.
 - **Hand-pulling and digging roots** can be effective.

Saltpan Workers of Little Rann of Kutch

Why In News?

On July 18, 2023, **saltpan workers (commonly known as agariyas)** presented a representation to Gujarat Chief

Note:

Minister and urged the state to intervene in response to instructions from forest department that restricted their entry into the Little Rann of Kutch.

What is the Order of the Forest Department?

- **Little Rann of Kutch** declared a wild ass sanctuary in 1972.
 - Settlement survey conducted in 1997, permitting salt cultivation and leasing land to saltpan workers. Traditional agariyas were excluded from the benefits of the settlement survey.
- **Legal Implications:**
 - Ongoing scrutiny of the 1997 settlement survey is being done by Gujarat High Court and National Green Tribunal involved in the resolution of land-poaching activities.

What are the Arguments Raised by Agariyas in Their Defence?

- **Wild Ass Population Growth vs. Man-Animal Conflict:** Census data shows a significant rise in the wild ass population in the area from 700 in 1973 to 6,082 in 2019.
 - Census data ruled out the possibility of man-animal conflict in the Wild Ass Sanctuary due to work of Saltpan workers.
- **Saltpan Workers' Land Use:** Saltpan workers use only 6% of the total land area for salt cultivation in Little Rann of Kutch, which is negligible in both quantity and space.
- **Concerns against improper Survey:** In meetings held at 16 out of 100-125 villages, forest department officials removed the names of 95% of the 8000 families of agariyas (saltpan workers).
 - Most of the agariyas listed in the settlement survey report are not alive.

Who are the Saltpan Workers?

- **Koli, Sandhi, and Miyana communities** residing in 100-125 villages around the Little Rann of Kutch in North Gujarat, Kutch, and Saurashtra regions are dependent on salt cultivation in the area called **Saltpan workers**.
 - They are engaged in the profession for 600-700 years, dating back to the British rule.

About Wild Ass Sanctuary

- **Location:** It is in the **Little Rann of Kutch** of the **Gujarat State** in India.
- It is the **only place where the Indian wild ass**, locally called **Khacchar**, is found.
- The sanctuary is home to a sizeable population of **Rabari and Bhar wad tribes**.

Key Facts about Indian Wild Ass

- It is a **sub-species of Asian Wild Ass**, i.e., *Equus hemionus*.
- It is characterized by **distinctive white markings** on the anterior part of the rump and on the posterior part of the shoulder and a **stripe down the back that is bordered by white**.
- **Distribution:** **World's last population** of Indian Wild Ass is restricted to **Rann of Kachchh, Gujarat**.
- **Habitat:** **Desert and grassland ecosystems**.
- **Conservation Status:**
 - **IUCN:** Near threatened.
 - **CITES:** Appendix II
 - **Wildlife Protection Act (1972):** Schedule-I

Desiccation-Tolerant Plant Species

Why in News?

New study discovers 62 desiccation-tolerant vascular plant species in India's Western Ghats, with potential applications in agriculture & conservation. These species of plants can withstand harsh environments.

- A recent study by scientists from **Agharkar Research Institute (ARI)** Pune, an autonomous institute of the **Department of Science and Technology (DST)**, has identified **62 DT species** in the **Western Ghats**, many more than the earlier known nine species.

What is DT Plant?

- Desiccation-tolerant vascular (DT) plants are able to tolerate the desiccation of their vegetative tissues. DT plants are the most common residents of tropical rock outcrops.
- DT plants can survive high dehydration, losing up to 95% of their water content.

Note:



- Dehydration in plants occurs when the plant loses more water than it takes in.
- Population:
 - As per the study, the global population of these species' ranges between 300 and 1,500.
 - Out of the 62 species found, 16 are native to India and 12 are restricted to Western Ghats outcrops.
- Habitation:
 - DT plants can be found in both tropical and temperate regions.
 - They can quickly regenerate when water supplies are restored and are frequently found on rocky outcrops in the tropics.
 - It is crucial for the world's warming that some species can thrive at higher temperatures.
 - Hydration and desiccation resistance are two widely studied mechanisms for plants in harsh environments.
 - Hydration is a situation in which plant tissues can withstand more than 30% water content.
 - Indian desiccation tolerant plants are primarily found in forest rock outcrops and partially shaded tree trunks. Ferricretes (a hard, erosion-resistant layer of sedimentary rock) and basaltic plateaus (plateaus produced by volcanic activity) seemed to be the preferred habitats.
 - **Glyphochloa goensis**, **Glyphochloa ratnagirica** and **Glyphochloa santapau** were found only on ferricretes (a hard, erosion-resistant layer of sedimentary rock), while the rest of the species were found in both ferricretes and basaltic (plateaus produced by volcanic activity) plateaus.
 - The dominant genus was **Glyphochloa**, with mostly annual species occurring on plateaus.
- Characteristic:
 - The DT species showed colour variations and morphological characteristics.
 - **Tripogon species** changed colours from greyish in dry conditions to green in hydrated situations.
 - In **Oropetium thomaeum**, the leaf cloud transformed from green to dark purple or orange in the hydrated phase and ranged from brownish to ash in the desiccation phase.

- Ferns (fronds) displayed a variety of characteristics, including curling inwards towards the costa, exposing spores at the start of the dry season and during brief dry spells.
- This, however, was not true for all species. In the case of **C lanuginosus**, the leaves folded and shriveled inward to shield the **chlorophyllous portion**, avoiding direct sunlight exposure during the desiccation phase.
- Significance:
 - Desiccation-resistant vascular plant genes can be used to develop a high temperature tolerant crop variety to boost climate resilience.
 - The discovery of the desiccation-tolerant (DT) vascular plants has **agricultural uses**, particularly in locations where water is scarce.
 - These plants' genes could be exploited to develop a high-temperature tolerant crop variety to boost climate resilience and ensure mass food security.

Project Cheetah and Radio Collar Infections

Why in News?

Recently, the use of **radio collars** in the **cheetah reintroduction project in Kuno Wildlife Sanctuary**, Madhya Pradesh, India, has resulted in unexpected setbacks, with cheetahs experiencing neck wounds and septicaemia, an infection of the blood by bacteria.

- This situation has raised concerns among experts familiar with collaring practices in India and Africa.

What are Radio Collars?

- **About:**
 - Radio collars are used to **track and monitor animals in the wild**.
 - They consist of a **collar with a small radio transmitter**.
 - Collars provide **data on animal behavior, migration, and population dynamics**.
 - They can be combined with GPS or accelerometers for additional information.
 - Collars are designed to be **lightweight and comfortable for animals**.
 - Potential risks and challenges, such as injuries or infections, must be managed.

Note:

➤ **Challenges Associated with Radio Collars:**

- **Festering Neck Wounds and Septicaemia:**
 - **Two cheetahs in Kuno died due to suspected septicaemia** caused by festering neck wounds from radio collars.
 - Additional cheetahs, including Oban, Elton, and Freddie, have exhibited similar injuries.
 - These setbacks have raised concerns about the use of radio collars in the cheetah reintroduction project.
- **Problems with Long-term Collar Usage:**
 - Carrying something on the body for an extended period can have downsides, as seen in studies on watch wearers and pet dogs.
 - **Staphylococcus aureus bacteria** presence was higher on watch wearers' wrists, which can lead to sepsis or death.
 - Dogs wearing collars can develop **acute moist dermatitis or hot spots, aggravated by ticks or fleas.**
 - Tight-fitting collars can cause **pressure necrosis and rapid hair loss around the neck**, similar to bedsores.
- **Weight Considerations:**
 - Globally, the general guideline is to keep **radio collar weight below 3% of the animal's body weight.**
 - Modern collars for wild cats typically weigh **around 400g**, which is suitable for cheetahs weighing between 20 kg and 60 kg.
 - However, fitting collars on cheetahs can be challenging due to their **small necks, especially for younger animals.**
- **Vulnerability to Collar-Induced Injuries:**
 - Cheetahs' winter coat, **which is thicker and furrier than that of tigers or leopards**, can retain more water and take longer to dry.
 - In a 2020 study, the collar weight rule was criticized for not considering **animal athleticism**, revealing that **collar forces can surpass the collar's weight during movement.**
 - For instance, the forces exerted by collars were found to be generally **equivalent to up to five times the collar's weight for a lion and a staggering 18 times for a cheetah.**

- African Cheetahs may be **more susceptible to local pathogens compared to Indian tigers and leopards**, potentially due to differences in immunity and environmental conditions.
- **Lack of Adaptation to Monsoon Conditions:**
 - Secondary bacterial infections under collars are not commonly reported in **African conditions due to drier skin between rain spells.**
 - In historical times, **cheetahs in India did not wear collars during the monsoon and may have adapted differently to the local climate.**
- **Implications for the Reintroduction Project:**
 - Tracking, immobilizing, and assessing cheetahs for neck injuries poses challenges and potential delays.
 - The absence of a clear roadmap for the next monsoon raises questions about re-collaring cheetahs and their well-being.

What is Cheetah Reintroduction Project in India?

➤ **About:**

- The Cheetah Reintroduction Project in India formally commenced on **September 17, 2022**, with the objective of restoring the **population of cheetahs**, which were declared **extinct in the country in 1952.**
- The project involves the translocation of cheetahs from South Africa and Namibia to Kuno National Park in Madhya Pradesh.

➤ **Reintroduction Process:**

- **20 radio-collared cheetahs** were translocated from **South Africa (12 cheetahs) and Namibia (8 cheetahs) to Kuno National Park.**
 - In March 2023, India announced the **birth of 4 cubs** to one of the eight cheetahs that were relocated from Namibia.
- The cheetahs underwent a **quarantine period** and were then shifted to larger acclimatization enclosures.
- Currently, there are **11 cheetahs in free-ranging condition** and **5 animals, including a cub**, in quarantine enclosures.
- Dedicated monitoring teams ensure round-the-clock monitoring of the free-ranging cheetahs.

Note:



- **Mortalities:**
 - 8 cheetahs have died in Kuno National Park due to natural causes.
 - Preliminary analysis by the **National Tiger Conservation Authority (NTCA)** indicates that the **deaths were natural and not related to other factors like radio collars.**
- **Project Implementation and Challenges:**
 - The project is implemented by the NTCA in collaboration with the **Madhya Pradesh Forest Department, Wildlife Institute of India (WII)**, and cheetah experts from Namibia and South Africa.
 - Challenges in the project include monitoring, protection, and management of the reintroduced cheetah population.
- **Conservation Efforts and Measures:**
 - Consultation with international cheetah experts and veterinary doctors from South Africa and Namibia is ongoing to investigate the cause of cheetah deaths.
 - Independent national experts are reviewing monitoring protocols, protection status, managerial inputs, veterinary facilities, training, and capacity building.
 - Efforts are underway to establish a **Cheetah Research Center**, expand forest areas under **Kuno National Park's administrative control**, provide additional frontline staff, establish a Cheetah Protection Force, and create a second home for cheetahs in **Gandhi Sagar Wildlife Sanctuary.**
 - The government is committed to conserving the reintroduced cheetah population and ensuring its long-term success.

India's Only Ape Species: The Hoolock Gibbon

Why in News?

The conservation status of India's sole ape species, the **hoolock gibbon**, has become a **pressing global concern.**

- The **Global Gibbon Network (GGN)** recently convened its inaugural meeting in **Haikou, China's Hainan province**, shedding light on the critical situation faced by these primates.

Note: Global Gibbon Network was initiated at the **International Gibbon Day 2020** event, representatives from 20 gibbon conservation organizations came together for the first time to discuss gibbon conservation.

What are the Key Facts about Hoolock Gibbon?

- **About:**
 - Gibbons, known as the **smallest and fastest of all apes**, inhabit tropical and subtropical forests in Southeast Asia.
 - They have **high intelligence, distinct personalities, and strong family bonds** similar to other apes.
 - They represent **one of the 20 gibbon species found worldwide.**
- **Population and Habitat:**
 - The current population of hoolock gibbons is estimated to be around **12,000** individuals.
 - They are found in forested areas of **Northeast India, Bangladesh, Myanmar and Southern China.**
- **Gibbon Species in India:**
 - **Two distinct hoolock gibbon species** are found in India's northeastern region: the **eastern hoolock gibbon (*Hoolock leuconedys*)** and the **western hoolock gibbon (*Hoolock hoolock*).**
 - A recent study by the **Centre for Cellular and Molecular Biology (CCMB)** in Hyderabad analyzed the genetics of these gibbons.
 - The study revealed that there is actually **only one species of gibbon in India**, debunking the previous belief of separate eastern and western species based on coat color.
 - The genetic analysis showed that the populations previously thought to be **eastern and western hoolock gibbons** diverged approximately **1.48 million years ago.**
 - The study also estimated that **gibbons diverged from a common ancestor around 8.38 million years ago.**
- **Threats:**
 - All 20 gibbon species, including hoolock gibbons, are at a **high risk of extinction** due to conservation challenges.
 - Gibbon populations and their habitats have significantly declined over the past century, **leaving small populations restricted to tropical rainforests.**

Note:

- In India, the primary threat to hoolock gibbons is the **loss of their natural habitat** caused by deforestation for infrastructure projects.
- **Conservation Status:**
 - **International Union for Conservation of Nature's Red List:**
 - Western Hoolock Gibbon: **Endangered**
 - Eastern Hoolock Gibbon: **Vulnerable**.
 - Also, both the species are listed on **Schedule 1 of the Indian (Wildlife) Protection Act 1972.**

Promoting Coal Gasification in India

Why in News?

The Ministry of Coal is considering a Comprehensive Scheme to promote **Coal Gasification**, aiming to achieve **100 Million Tonne (MT) coal Gasification by FY 2030.**

- The Ministry is also considering an incentive to reimburse the **Goods and Services Tax (GST) compensation cess** on coal utilized in gasification projects for a period of 10 years after the commercial operational date (COD), provided that the GST compensation cess is extended beyond FY27. This incentive aims to offset the **inability of entities to claim Input Tax Credit** for the same.

What are the Key Points of the Scheme?

- **About:**
 - The initiative incorporates a comprehensive set of **measures that capitalize on natural resources** and demonstrate financial and technical feasibility of **Coal Gasification.**
 - It aims to attract Government PSUs and the Private Sector, fostering innovation, investment, and sustainable development in the coal gasification sector.
- **Process:**
 - The selection of entities for the coal/lignite gasification scheme will be carried out through a competitive and transparent bidding process.
 - The government will provide **budgetary support to eligible Government PSUs**, and Private sector enabling them to undertake coal gasification projects.

- **Significance:**
 - This initiative holds the potential to alleviate the **environmental burden by reducing carbon emissions** and fostering sustainable practices, contributing to our global commitments towards a greener future.

What is Coal Gasification?

- **About:**
 - Coal gasification is a process in which **coal is partially oxidized with air, oxygen, steam or carbon dioxide** to form a fuel gas.
 - This gas is then used **instead of piped Natural Gas,** methane and others for deriving energy.
 - In-situ gasification of coal – or **Underground Coal Gasification (UCG)** – is the technique of converting coal into gas while it is still in the seam and then extracting it through wells.
- **Production of Syngas:**
 - It produces **Syngas** which is a mixture consisting primarily of **methane (CH₄), carbon monoxide (CO), hydrogen (H₂), carbon dioxide (CO₂)** and water vapour (H₂O).
 - Syngas can be used to produce a **wide range of Fertilizers, Fuels,** solvents and synthetic materials.
- **Significance:**
 - Steel companies can **reduce costs by replacing expensive imported coking coal with syngas** from coal gasification plants in their manufacturing process.
 - It is primarily used for electricity generation, for the production of chemical feedstocks.
 - The hydrogen obtained from coal gasification can be used for various purposes such as making ammonia and powering a hydrogen economy.

Climate Shifts in Kaas Plateau

Why in News?

A recent study conducted by the **Agharkar Research Institute (ARI)** and the National Centre for Earth Sciences has shed light on significant climate shifts in the **Kaas Plateau** during the Early-Mid-Holocene and late **Holocene Periods.**

Note:

- The researchers studied the **sediments of a seasonal lake** to understand and decipher the **past climate of the Kaas Plateau**.

What is Kaas Plateau?

- The Kaas Plateau, located in Maharashtra's Satara district, is a **UNESCO** World Natural Heritage Site and a designated biodiversity hotspot.
- Known as Kaas Pathar in Marathi, its name is derived from the **Kaasa tree, botanically known as *Elaeocarpus glandulosus* (rudraksha family)**.
- The plateau have various seasonal flowers forming a **floral carpet over the entire lateritic crust during August and September**.

What are the Key Findings of the Study?

- **Ancient Lake and Environmental Preservation:**
 - The present "Flower Wonder" of the Kaas Plateau is located on an ancient lake that dates back to the **Early-Mid-Holocene period**, approximately 8000 years ago.
 - The seasonal lake has been preserved **over a long time and provided valuable insights** into the past climate of the region.
- **Climate Shifts during the Early-Mid-Holocene:**
 - Around 8664 years ago, there was a change in the climate from freshwater to drier conditions with low rainfall.
 - **Pollen and diatom data indicated a major shift** in the Indian summer monsoon activity during this time.
 - Despite the drier conditions, there were **intermittent humid periods suggested by a significant rise** in the number of diatoms.
- **Late Holocene Climate Changes:**
 - During the late Holocene, approximately 2827 years ago, there was a **decrease in rainfall** and a weakened **Southwest Monsoon**.
- **Recent Environmental Impact:**
 - Over the last 1000 years, there is evidence of **lake Eutrophication**, indicated by the presence of high numbers of planktonic and pollution-tolerant diatom taxa.
 - Eutrophication is the process of a **water body becoming overly enriched with minerals and nutrients** which induces **excessive growth of**

algae or algal bloom, thereby, leading to oxygen depletion of the water body.

- Human activities, including agriculture and cattle/livestock farming in the catchment area, likely contributed to this environmental impact.
- **Monsoon Intensity and Duration:**
 - The southwest monsoon intensified during the **Early Holocene, around 8000 years ago**.
 - The northeast monsoon relatively weakened around 2000 years ago.
 - It is likely that the 'Flower Wonder' of the Kaas Plateau existed for a longer duration, up to March-April, during the early-mid-Holocene (8000–5000 years), when the monsoon rainfall was more abundant, with more than 100 rainy days.

Intergovernmental Negotiating Committee: UNEP

Why in News?

Recently, the **United Nations Environment Programme (UNEP)** has gathered in Paris, France, for the second meeting of the Intergovernmental Negotiating Committee (INC-2).

- The first session of the Intergovernmental Negotiating Committee (INC-1) concluded in Uruguay in 2022.
- INC-2 aimed to **set the stage** for negotiations on the substance of a global deal to **end plastic pollution** to edge closer to protecting ecosystems, species and humanity from the grave impacts of the linear plastics economy.

What are the Key Highlights of INC-2 Meeting?

- The **primary agenda of INC-2** was to **adopt the rules of procedure**. The rules govern various aspects such as the negotiation process, decision-making procedures (consensus or voting), and the entities authorized to make decisions.
- During the previous INC-1 meeting, a part of **Rule 37, stating** "each member shall have one vote," was kept in brackets, **indicating unresolved disagreement**.
- The bracketed part now includes **provisions from the Minamata Convention**, allowing **regional economic integration organizations (such as the European**

Note:

Union) to vote on behalf of their member states.

However, the member states must be present during voting or as part of the committee.

- **India has consistently insisted on bracketing Rule 38**, which states, “The Committee shall make every effort to reach agreement on all matters of substance by consensus.
 - **If all efforts to reach consensus have been exhausted** and no agreement has been reached, the decision shall, as a last resort, **be taken by a two-thirds majority of the representatives of Members** who are present and voting.”
- The formation of the OEWG (Open-Ended Working Group) has delayed the start of discussions in the contact groups on substantive matters.
 - In UNEA resolution 5/14, the assembly mandated **an ad hoc open-ended working group (OEWG)** to lay the groundwork for negotiations.

What is the Intergovernmental Negotiation Committee (INC)?

- **About:**
 - The INC was established in February 2022, at the 5th session of the **United Nations Environment Assembly (UNEA-5.2)**.
 - A historic resolution (5/14) was adopted to **develop an international legally binding instrument** on plastic pollution, including in the marine environment with the ambition to complete the negotiations by the end of 2024.
- **Need:**
 - The rapidly increasing levels of plastic pollution represent a serious global environmental issue that **negatively impacts the environmental, social, economic and health** dimensions of sustainable development.
 - In the absence of necessary interventions, the amount of plastic waste entering **aquatic ecosystems could nearly triple** from some 9–14 million tonnes per year in 2016 to a projected **23–37 million tons per year by 2040**.
- **Objective:**
 - Under the legally binding agreement, **countries will be expected to develop, implement and update national action plans** reflecting country-driven approaches to contribute to the objectives of the instrument.

- They will be **expected to promote national action plans** to work towards the **prevention, reduction and elimination of plastic pollution** and to support regional and international cooperation.

What is the United Nations Environment Assembly?

- It is the governing body of the **UN Environment Programme**.
- It is the world’s highest-level decision-making body on the environment.
- The Assembly is made up of the **193 UN Member States** and convenes every two years to advance global environmental governance.
- It was created in **June 2012**, during the United Nations Conference on Sustainable Development, also referred to as RIO+20.

What are the Initiatives to tackle Plastic Pollution?

- **Indian:**
 - **Plastic Waste Management (Amendment) Rules, 2022**
 - **Extended Producer Responsibility (EPR)**
 - **National Dashboard on Elimination of Single Use Plastic and Plastic Waste Management**
 - **India Plastics Pact**
 - **Project REPLAN**
- **Global:**
 - **European Union’ Directive on Single-Use Plastics**
 - **Closing the loop.**
 - **The Global Tourism Plastics initiative**

Arctic Sea Ice Melting

Why in News?

- A recent study in the Nature journal suggests that the melting of Arctic Sea ice in summer is inevitable in the coming decades.
- The **loss of Arctic Sea ice due to global warming (arctic amplification)** has raised concerns about its impact on global climate and the environment.

Note:



What are the New Findings on Arctic Sea Ice?

- **Sea Ice Decline:**
 - **Intergovernmental Panel on Climate Change (IPCC)** reports confirm the decline of Arctic Sea ice.
 - The first “sea-ice free summer” is projected to occur before 2050, due to global emissions driving temperatures beyond 4.5°C.
 - Satellite records indicate a yearly rate of Arctic ice loss at nearly 13%.
- **Insufficient Emission Reductions:**
 - The Nature study indicates that no emission scenario can prevent the loss of Arctic Sea ice in summer.
 - If significant emission reductions are not undertaken, an ice-free summer could occur as early as the 2030s.
- **Underestimated Melting Rate:**
 - Human-induced factors contribute to approximately 90% of ice melting, while natural variability accounts for the rest.
 - Climate models, including those used by the IPCC, underestimated the speed of melting.
 - Correcting for this underestimation reveals the possibility of ice-free Augusts and Octobers by 2080.

What is the Importance of Arctic Sea Ice?

- **Climate Influence:**
 - Arctic sea ice plays a crucial role in influencing global climate patterns.
 - It reflects sunlight, helping to maintain the earth’s energy balance and cool polar regions.
 - Sea ice acts as a barrier, keeping the air cool by separating cold air above from warmer water below.
- **Biodiversity and Indigenous Communities:**
 - Changes in sea ice impact biodiversity, particularly mammals like polar bears and walruses.
 - Indigenous Arctic populations reliant on sea ice for hunting, breeding, and migration are affected.
- **Economic Opportunities and Competition:**
 - Reduced ice cover opens shipping lanes and facilitates access to natural resources in the Arctic.
 - This leads to increased competition among countries for influence and resource exploitation in the region.

What is Arctic Amplification?

- **About:**
 - **Arctic amplification** refers to the phenomenon where changes in surface air temperature and net radiation balance produce larger effects at the poles, specifically in the Arctic region.
- **Causes:**
 - It is a result of global warming caused by anthropogenic forces or human activities since pre-industrial times, leading to a 1.1-degree Celsius increase in the Earth’s average temperature.
 - The primary causes of Arctic amplification include ice-albedo feedback, lapse rate feedback, water vapor feedback, and ocean heat transport.
 - Diminishing sea ice in the Arctic due to global warming plays a significant role in amplifying the warming effect.
 - Sea ice and snow have high albedo, reflecting most solar radiation, while water and land absorb more radiation, leading to increased warming.
 - The reduction of sea ice allows the Arctic Ocean to absorb more solar radiation, further amplifying the warming effect.
 - The lapse rate, which is the rate at which temperature decreases with elevation, decreases with warming, contributing to Arctic amplification.
 - Studies suggest that the ice-albedo feedback and lapse rate feedback account for 40% and 15% of polar amplification, respectively.
- **Consequences:**
 - **Weakening of Polar Jet Streams:**
 - Diminished sea ice weakens polar jet streams, resulting in rising temperatures and heatwaves in Europe.
 - Unseasonal showers in northwest India have also been linked to this weakening.
 - **Melting of Ice:**
 - The Greenland ice sheet’s melting contributes to rising sea levels, with a complete melt potentially causing a seven-meter rise.
 - **Changes in Composition of Sea Water:**
 - Warming of the Arctic Ocean and seas, along with changes in salinity and acidification, affects biodiversity, including marine and dependent species.

Note:

➤ Affects Fauna:

- Increased rainfall due to Arctic amplification affects the availability and accessibility of lichens, leading to starvation and death among Arctic fauna.
 - **Gaseous Emission:**
 - Thawing **permafrost releases carbon and methane, greenhouse gases** responsible for global warming.
 - It may also release **long-dormant bacteria and viruses**, potentially leading to disease outbreaks.

What is Impact on India?

➤ Extreme Rainfall Events:

- Studies found that the reduced sea ice in the Barents-Kara Sea region can lead to extreme rainfall events in the latter half of the monsoons — in September and October in India.

➤ Warming of Arabian Sea:

- The changes in the atmospheric circulation due to diminishing sea ice combined with the warm temperatures in the Arabian Sea contribute to enhanced moisture and drive extreme rainfall events.
 - In 2014, India deployed **IndARC**, India's first moored-underwater observatory in the **Kongsfjorden fjord, Svalbard**, to monitor the impact of the changes in the Arctic Ocean.

➤ Rise in Sea Level along Indian Coast:

- According to the 'State of Global Climate in 2021' report, sea level along the Indian coast is rising faster than the global average rate.

Tracking SDG7: The Energy Progress Report 2023

Why in News?

A recent report, titled "Tracking **SDG7: The Energy Progress Report 2023**," was released through collaboration between the **International Energy Agency (IEA)**, **International Renewable Energy Agency**, **United Nations Statistics Division**, **World Bank**, and the **WHO**.

- The report highlights **various challenges that hinder progress towards achieving United Nations' Sustainable Development Goal 7 (SDG 7)**.

What are the Major Highlights of the Report?

➤ Factors Hindering Achievement of SDG-7:

- Factors such as **high inflation, uncertain macroeconomic outlook, debt distress, and limited financial flows** have contributed to the world falling off-track in achieving SDG 7.
- The report identifies several major economic factors that hinder the realisation of SDG 7 worldwide:
 - Uncertain macroeconomic outlook and high levels of inflation
 - Currency fluctuations and debt distress in many countries
 - Lack of financing and supply chain bottlenecks
 - Tighter fiscal circumstances and soaring prices for materials

➤ Progress Towards Specific Targets:

- **Access to Electricity and Clean Cooking:** Global access to **electricity** increased from **84% to 91% between 2010 and 2021**, but annual growth has slowed.
 - The number of people without electricity **decreased from 1.1 billion in 2010 to 675 million in 2021**.
 - The **goal of universal access to electricity by 2030 remains elusive**.
- **Access to Clean Cooking:** It improved from 2.9 billion people in 2010 to 2.3 billion in 2021, but 1.9 billion people may still lack access by 2030.
 - The report indicates that approximately 100 million people who recently transitioned to **clean cooking** may revert to traditional biomass usage.
 - **Sub-Saharan Africa** is expected to have the **highest number of people without access to clean cooking in 2030 (6 out of 10 people)**.
- **Renewable Energy (Target 7.2):** **Renewable energy** uptake has grown since 2010 but needs substantial scaling up.
 - The **share of renewable energy in total final energy consumption remains low at 19.1% (or 12.5% excluding traditional biomass)**.
 - Meeting international climate and energy goals requires substantial investments of **USD 1.4-1.7 trillion annually in renewable electricity generation and related infrastructure through 2030**.

Note:



- **Energy Efficiency (Target 7.3):** The current rate of improvement in **energy efficiency** is **not on track to double by 2030**.
 - The average annual growth of 1.8% falls short of the targeted increase of 2.6% per year between 2010 and 2030.
- **International Public Financial Flows (Target 7.a):** Financial flows supporting **clean energy** in developing countries have declined since 2020.
 - Financial resources are more than a third lower than the average of the previous decade (2010-2019).
 - The decreasing trend in financial flows is concentrated in a small number of countries, posing challenges for achieving SDG 7, particularly for least-developed countries, landlocked developing countries, and small island developing states.

What is Sustainable Development Goal 7?

➤ About:

- In 2015, all **United Nations Member States came together to adopt the 2030 Agenda for Sustainable Development**, aiming to create a harmonious and prosperous future for both humanity and the planet.
- Central to this agenda are the **17 Sustainable Development Goals (SDGs)**, which serve as a pressing call for action to be embraced by all nations, regardless of their development status.

➤ Background of SDGs:

- In **June 1992**, at the **Earth Summit in Rio de Janeiro, Brazil**, **more than 178 countries adopted Agenda 21**, a comprehensive plan of action to build a global partnership for sustainable development to improve human lives and protect the environment.
- Member States unanimously adopted the **Millennium Declaration at the Millennium Summit in September 2000** at UN Headquarters in New York.
 - The Summit led to the **elaboration of eight Millennium Development Goals (MDGs) to reduce extreme poverty by 2015**.
- 2015 was a landmark year for multilateralism and international policy shaping, with the adoption of several major agreements:
 - **Sendai Framework for Disaster Risk Reduction (March 2015)**

- **Addis Ababa Action Agenda on Financing for Development (July 2015)**
- **Paris Agreement on Climate Change (December 2015)**

➤ Current Status:

- Now, the annual High-level Political Forum on Sustainable Development serves as the central UN platform for the follow-up and review of the SDGs.
- The **Division for Sustainable Development Goals (DSDG) in the United Nations Department of Economic and Social Affairs (UNDESA)** provides substantive support and capacity-building for the SDGs and their related thematic issues.

➤ SDG 7:

- Sustainable Development Goal 7 (SDG7) **calls for “affordable, reliable, sustainable and modern energy for all” by 2030**. Its three core targets are the foundation for our work: By 2030:
 - **Target 7.1:** ensure universal access to affordable, reliable and modern energy services
 - **Target 7.2:** increase substantially the share of renewable energy in the global energy mix
 - **Target 7.3:** double the **global rate of improvement in energy efficiency**
 - **Target 7.a:** **enhance international cooperation to facilitate access to clean energy research and technology**, including renewable energy, energy efficiency and advanced and cleaner fossil-fuel technology, and promote investment in energy infrastructure and clean energy technology
 - **Target 7.b:** expand infrastructure and upgrade technology for supplying modern and sustainable energy services for all in developing countries, **in particular least developed countries, small island developing States**, and land-locked developing countries.

Ground Level Ozone Pollution in Delhi: CSE

Why in News?

According to a new analysis by the **Centre for Science and Environment (CSE)**, parts of the Delhi-NCR region witnessed ground-level ozone exceeding the national standards on **87 out of 92 days** between March and May in 2023.

Note:

- The analysis, based on data from the **Central Pollution Control Board (CPCB)**, highlights the duration and geographical spread of **Ozone Pollution**, its impact during different seasons, and the underlying causes.

Note: CSE is a **public interest research and advocacy organisation** based in New Delhi. It researches into, lobbies for and communicates the urgency of development that is both sustainable and equitable.

What are the Findings?

- **Duration of Exceedance:**
 - While ground-level ozone pollution in Delhi-NCR was **lower in 2023 compared to the past five years**, the duration of its **exceedance has increased**.
 - This phenomenon is of concern as **elevated ozone levels persist even hours after sunset**, contrary to expectations.
 - This summer, at the stations which reported exceedance the rolling 8-hr average stayed above standard for 4.9 hours on average, which is up from 4.6 hours observed last summer.
 - The WHO Air Quality Guidelines for ambient (outdoor) ozone is **100 µg/m³ (~50 ppb) measured as 8-hr maximum** moving average within a day.
- **Not Specific to Seasons:**
 - Ozone pollution is not limited to specific seasons. Even during **winter months, when cold and foggy conditions inhibit** ground level ozone formation, Delhi-NCR experienced **excess ozone levels** on multiple days in January 2023.
 - Ozone levels exceeded the standard **at multiple stations on 26 days** in January 2023.
- **Impact on Specific Areas:**
 - New Delhi and South Delhi areas were the **most affected by ground-level ozone pollution**.

What is Ground-Level Ozone?

- **About:**
 - Ground-level ozone, also known as Tropospheric ozone, is a **colorless and highly irritating gas** that forms near the Earth's surface, typically within two miles above the ground.
 - Ground-level ozone is not directly emitted from any specific source. It is formed through complex

interactions between **Nitrogen Oxides (NO_x)**, **Volatile Organic Compounds (VOCs)**, and carbon monoxide emitted from vehicles, power plants, factories, and other combustion sources. These compounds undergo cyclic reactions in the presence of sunlight to generate ground-level ozone.

- **Impact:**
 - When NO_x and VOCs interact in the presence of sunlight, they undergo complex chemical reactions that lead to the **formation of ground-level ozone**. Ground-level ozone is a significant air pollutant and can have harmful effects on human health, vegetation, and ecosystems.
- **Initiatives:**
 - **The Commission for Air Quality Management in National Capital Region (NCR) and Adjoining Areas.**
 - **Bharat Stage (BS) VI norms.**
 - **Dashboard for Monitoring Air Quality.**
 - **National Clean Air Programme.**
 - **National Air Quality Index (AQI).**
 - **Air (Prevention and Control of Pollution) Act, 1981.**

Sustainable Aviation Fuel

Why in News?

Recently, India has expressed its reservations regarding the global mandates for **Sustainable Aviation Fuel (SAF)** with a target year of 2050, asserting that it is "too early."

- The 41st **ICAO (International Civil Aviation Organisation)** Assembly in South Korea adopted a **Long-Term Global Aspirational Goal (LTAG)** for international aviation of net-zero carbon emissions by 2050 in support of the **UNFCCC Paris Agreement**.

What is India's Stance on SAF Mandates?

- India believes that each country should be allowed to **develop its strategy according to its national plans**.
- India has sought support from the **ICAO** in achieving its carbon net-zero goals, while also addressing other priorities in the aviation sector, **such as meeting the growing aspirations of passengers**.
- It is important to ensure **SAF production, certification, and availability before imposing volumetric mandates**, to align with the ideology of LTAG.

Note:



- India intends to participate in ICAO's **Carbon Offsetting and Reduction Scheme for International Aviation (CORSA)** and the LTAG from 2027.

What is Sustainable Aviation Fuel?

➤ About:

- SAF, also referred to as **Bio-Jet Fuel**, is created using **domestically developed methods** using cooking oil and **oil-rich seeds from plants**.
- The SAF samples produced by the institutes are undergoing strict testing at the US Federal Aviation Administration Clearinghouse to meet the standards required for the **ASTM (American Society for Testing and Materials) D4054 certification** from ASTM International.
 - ASTM certification is a process by which a **product or material is tested and evaluated against** relevant ASTM standards. ASTM International develops **technical standards for products and processes**.
 - ASTM standards are used by industry, governments, and other organizations to ensure **quality, safety and reliability** in products and processes.

➤ Sources of Production:

- The **CSIR (Council of Scientific and Industrial Research)-IIP (Indian Institute of Petroleum)** has created **fuel using different materials**, such as **non-edible and edible oils**, as well as used cooking oil.
- They used various sources, including palm **stearin**, **sapium oil**, **palm fatty acid** distillates, algae oil, karanja, and jatropa.

➤ Significance of SAF Scaling in India:

- Scaling up the production and use of SAF in India can **bring several benefits, including reducing GHG emissions**, improving air quality, enhancing energy security, creating jobs in the renewable energy sector, and **promoting sustainable development**.
- It can also help the **aviation industry** meet its environmental targets and contribute to global efforts to combat climate change.
- **Biofuel for aviation** can be mixed with regular jet fuel and used together. Compared to traditional fuel, it has **lower sulfur content**, which can decrease air pollution and support India's goal of achieving **Net Zero emissions**.

What are India's Climate Commitments and Global Efforts?

➤ India's Commitments Net-Zero:

- India has pledged to achieve net-zero emissions by 2070 and reduce the carbon intensity of its economy by **less than 45% by 2030**.
- Additionally, India has urged developed countries to **provide climate finance of USD 1 trillion at the earliest**, since India needs support and resources from developed nations to achieve these ambitious targets.
 - In April 2023, the European Union reached an agreement to set binding targets for airlines within Europe, requiring **increased usage of SAF**.
 - The deal mandates that 2% of fuel supplies at EU airports be SAF by 2025, reaching 6% in 2030, 20% in 2035, and 70% in 2050.

➤ Indian Initiatives:

- **Biodiesel**
- **Ethanol blending in conventional fuel**
- **Hydrogen Fuel Cell**

➤ Global Efforts:

- **Carbon Offsetting and Reduction Scheme for International Aviation (CORSA)**
- **Clean Skies for Tomorrow Initiative**
- Sustainable Skies Act and SAF Production Incentives

What is International Civil Aviation Organisation?

- ICAO is a **United Nations (UN) specialized agency**, established in 1944, which laid the foundation for the standards and procedures for peaceful global air navigation.
 - The Convention on International Civil Aviation was signed on 7th December 1944 in Chicago commonly as the '**Chicago Convention**'.
 - It established the core principles permitting international transport by air, and also led to the creation of the ICAO.
- Its one of the objectives is to foster the planning and development of international air transport so as to ensure the safe and orderly growth of international civil aviation throughout the world.
- **India is among its 193 members.**
- It is headquartered in **Montreal, Canada**.

Note:

Converting Plastic Waste into Fuel

Why in News?

As the world observes the **50th anniversary of World Environment Day on June 5**, this year's campaign, **#BeatPlasticPollution**, highlights the urgent need for **global solutions to combat the pervasive issue of plastic pollution**.

- The **Department of Science and Technology (DST)** is supporting a range of technologies aimed at addressing the global issue of plastic pollution. By focusing on reducing, reusing, and recycling plastic waste, they developed a **Pilot scale mobile plant that converts plastic waste into fuel**.

What is Plastic?

- **About:**
 - The word plastic is derived from the Greek word **plastikos**, meaning **“capable of being shaped or moulded.”**
 - It refers to a wide range of **Synthetic or semi-synthetic materials derived from polymers**, characterized by their **plasticity and ability to undergo deformation**.
 - Modern plastics primarily originate from **fossil fuel-based chemicals** like natural gas or petroleum but can also be produced from **renewable materials** such as corn or cotton derivatives.
 - Around 70% of global plastic production is concentrated in six major polymer types – referred to collectively as **commodity plastics**.
 - These include
 - **Polyethylene terephthalate or PET**,
 - **High-density polyethylene or HDPE**,
 - **Polyvinyl chloride or PVC**,
 - **Low-density polyethylene or LDPE**,
 - **Polypropylene or PP**,
 - **Polystyrene or PS**,
 - **Other Plastics**.
 - Each of these has different properties and can be identified by their **resin identification code (RIC)** denoted by symbols found on plastic products.

What is Resin Identification Code?

RIC was developed in 1988 by the **Society of the Plastics Industry (SPI)**.

- Created to facilitate **efficient sorting and recycling of plastics**.
- Each **RIC corresponds to a specific type of resin used** in a plastic product.
- Proper recycling according to RIC preserves the value of the product.
- The **American Society for Testing and Materials (ASTM)** an international organization took over the administration of RIC after 20 years.
- RIC specifically applies to plastic, not glass, paper, or other recyclable materials.

➤ Microplastics:

- **Microplastics** are plastic particles **measuring less than five millimeters in diameter**.

Primary microplastics are tiny particles designed for commercial use, such as in cosmetics or textiles, while **secondary microplastics** result from the **breakdown of larger plastic items**.

Microplastics persist in the environment, contaminating the food chain, water sources, and air, and posing health risks due to toxic chemicals they contain.

➤ Decomposition Rate and Impact:

- Plastics have a **slow decomposition rate**, leading to their **accumulation in natural ecosystems**.
- Instead of breaking down into harmless substances, **plastics fragment into smaller particles, contributing to the presence of microplastics**.
- According to the most recent global estimates, an **average human consumes at least 50,000 microplastic particles annually** due to contamination of the food chain, potable water, and air.
- Microplastics contain toxic chemicals, with the biggest health risk being associated with **BPA (Bisphenol A)**.
 - BPA, used to **harden plastic**, contaminates food and drinks, leading to **liver function alterations, insulin resistance, adverse effects on foetal development, reproductive system issues, and impacts on brain function**.

Note: The **Great Pacific Garbage Patch (GPGP)** also known as the **trash vortex**, located in the North Pacific Ocean between California and Japan, is the **largest accumulation of plastic waste, formed by converging ocean currents**.

Note:

How Plastic is Converted into Fuel?

- **Pilot Scale Mobile Plant:** An indigenously designed process has led to the development of a vehicle-mounted mobile plant. The plant **converts various types of plastic waste into carbon-densified HC-Oil (Hydrocarbon Oil)** through a low-stringent process named **ICT-Poly Urja**.
 - ICT Poly Urja is developed by the **Institute of Chemical Technology (ICT)** Mumbai.
 - The presence of a selective, recyclable, reusable, and inexpensive catalyst enables low-cost conversion of plastic waste into fuel.
- **ICT-Poly Urja Process:**
 - Different types of plastic waste, like bottles or packaging materials, are collected and sorted.
 - A special substance called **Cu@TiO₂ catalyst** is added to the plastic waste. This catalyst helps break down the **plastic into smaller molecules**.
 - The mixture of plastic waste and catalyst is **heated up** under moderate conditions. This means it doesn't require extremely high temperatures.
 - As the plastic waste is heated, it undergoes a **chemical transformation called Catalytic Thermo Liquefaction (CTL)**. This process converts the plastic waste into a substance called **Hydrocarbon Oil (HC-Oil)**.
 - The resulting HC-Oil is a type of fuel that can be used for various purposes. It has a high energy content and can be burned to generate heat, steam, or even electricity.
- **Efficient and Mobile:**
 - The CTL process requires **less energy compared to traditional methods like pyrolysis and gasification**.
 - Moderate operating conditions contribute to energy efficiency.
 - The mobile plant mounted on a vehicle **offers operational benefits**.

How is India Addressing the concerns regarding Plastic-Waste?

- [National Dashboard on Elimination of Single Use Plastic and Plastic Waste Management.](#)
- [Plastic Waste Management Amendment Rules, 2022.](#)
- [India Plastics Pact.](#)
- [Project REPLAN.](#)

India's E-cooking Transition on World Environment Day

Why in News?

World Environment Day, observed **annually on June 5th**, serves as a platform to raise awareness about environmental protection and sustainability.

- On the 50th anniversary of this significant day, the **Bureau of Energy Efficiency (BEE)** and the **Collaborative Labeling and Appliance Standards Program (CLASP)**, an international non-governmental organization organized a **"Conference on Consumer-Centric Approaches for E-cooking Transition"** in New Delhi.
- The conference aimed to accelerate the deployment of **energy-efficient, clean, and affordable e-cooking solutions in India**.

What are the Key Highlights About World Environment Day 2023?

- **About:**
 - The **United Nations Assembly** established **World Environment Day on 5th June 1972**, which was the first day of the **Stockholm Conference on the human environment**.
 - It is hosted by a different country each year.
 - **India in 2018 hosted the 45th celebration of World Environment Day under the theme 'Beat Plastic Pollution'.**
 - The year 2023 World Environment Day is hosted by **Côte d'Ivoire** in partnership with the Netherlands.
 - This year marks the **50th anniversary of World Environment Day**.
- **Theme for 2023:**
 - The theme will focus on solutions to **plastic pollution under the campaign #BeatPlasticPollution**.
- **Objective:**
 - Raise awareness, mobilize communities, and encourage collaborative efforts to **address plastic pollution and promote a healthier and more sustainable environment**.

What is E-Cooking?

- **About:**
 - E-cooking involves the use of **electric cooking appliances as a clean and energy-efficient alternative to traditional cooking methods**.

Note:



- It encompasses the adoption of **electric stoves, induction cooktops, and other electric cooking devices in households.**
- **Transition to E-cooking:**
 - India's achievement of **24/7 electricity** access has been a significant driver for the transition to e-cooking.
 - The **Saubhagya Scheme** has played a pivotal role in **providing electricity connections** to millions of households, **eliminating power cuts**, and creating an environment conducive to the adoption of electric cooking.
- **The Role of LiFE:**
 - E-cooking plays a vital role in the **Mission Lifestyle for Environment(LiFE)** initiative.
 - Launched by **Prime Minister Narendra Modi** at the **26th UN Climate Change Conference of the Parties (COP26)** in 2021.
 - Mission LiFE aims to **transform individuals into pro-planet advocates and promote sustainable lifestyles.**
 - Access to **clean cooking energy** is an essential aspect of India's energy transition journey, **aligning with the goals of Mission LiFE.**
- **E-Cooking as the Future of the Indian Kitchen:**
 - With reliable electricity access, e-cooking is poised to become the future of Indian kitchens.
 - The scalability and affordability of electric cooking technology make it a viable option for both urban and rural areas.
- **Affordable E-Cooking Business Models:**
 - Developing affordable business models is crucial to promote widespread adoption of e-cooking solutions.
 - Utilizing **renewable energy sources**, such as **solar and thermal power**, can help reduce costs and make e-cooking more accessible.
 - Implementing aggregation models and price reduction strategies can further enhance affordability, enabling e-cooking to reach a larger population.
- **Minimal Technology Barriers:**
 - E-cooking faces minimal technology barriers, as concerns regarding **appliance faults and compatibility with various dishes have been addressed.**

- Replicating successful e-cooking models at scale and gradually replacing traditional cookers with electric ones can build consumer confidence and facilitate a smooth transition.

➤ **Benefits for the Power Sector and Consumers:**

- E-cooking presents a win-win situation for both the power sector and consumers.
- It aligns with **Sustainable Development Goal 7.1**, ensuring universal access to clean cooking and improving indoor air quality.
- **E-cooking can reduce energy consumption** in reheating and contribute to a cleaner, greener lifestyle.

What are the Other Initiatives Shaping India's Energy Transition?

- **Pradhan Mantri Sahaj Bijli Har Ghar Yojana (SAUBHAGYA)**
- **Green Energy Corridor (GEC)**
- **National Smart Grid Mission (NSGM) and Smart Meter National Programme**
- **Faster Adoption and Manufacturing of (Hybrid & Electric Vehicles (FAME)**
- **International Solar Alliance (ISA)**

What is Bureau of Energy Efficiency?

- The Government of India set up the Bureau of Energy Efficiency in March 2002 under the provisions of the **Energy Conservation Act, 2001.**
- It assists in developing policies and strategies with the primary objective of reducing energy intensity of the Indian economy.
- **Major Programmes:** **State Energy Efficiency Index, Perform Achieve and Trade (PAT) scheme, The Standards & Labeling Programme, Energy Conservation Building Code.**

Great Indian Bustards and Asiatic Lions

Why in News?

As Cyclone Biporjoy approaches the port of Jakhau in Kutch, Gujarat, there are concerns about the impact on the **Great Indian Bustards (GIB)** in Naliya region and the **Asiatic Lions** in the **Gir forest.**

Note:



What are the Concerns?

➤ Asiatic Lions:

- The Gir forest is home to nearly **700 Asiatic lions**, which are found only in this region and are a vital species for conservation.
- Conservationists have raised concerns about the **vulnerability of having the entire lion population concentrated** in one area. Epidemics and natural disasters like the 2018 outbreak of **Babesiosis** and **Cyclone Tauktae** in 2019 pose significant risks to the survival of the lions.
 - In 2013, the **Supreme Court** issued a directive for the transfer of Asiatic lions from Gujarat's Gir forest to Madhya Pradesh's **KNP (Kuno National Park)**.

➤ The Gujarat government's plea to prevent the translocation of lions was rejected by the court, despite their assertion that these animals were a source of pride for the state.

- **Great Indian Bustard:**
- There are only **four remaining females in the grasslands of Naliya**, Gujarat. As birds, they have better mobility and may be able to sense danger and fly away from the cyclone's path.
- However, the impact on their habitat due to **flooding caused by heavy rainfall remains** a concern.
 - Efforts are being made to ensure the safety of wildlife during the cyclone. The authorities have cancelled leaves, deployed rescue teams, and equipped hospitals to provide medical assistance to injured animals.

What are the Key Points Related to Asiatic Lions?

➤ About:

- The **Asiatic Lion** (also known as the **Persian Lion or Indian Lion**) is a member of the ***Panthera Leo Leo*** subspecies that is restricted to India.
- Its previous habitats consisted of **West Asia and the Middle East** before it became extinct in these regions.
 - Asiatic lions are slightly smaller than African lions.

➤ Distribution:

- Asiatic lions were once distributed to the state of West Bengal in the **east and Rewa in Madhya Pradesh**, in central India.

- At present **Gir National Park and Wildlife Sanctuary** is the only abode of the Asiatic lion.

➤ Protection Status:

- **IUCN Red List:** Endangered
- **CITES:** Appendix I
- **Wildlife (Protection) Act 1972:** Schedule I

Gir National Park

- Gir National Park and **Wildlife Sanctuary** is located in the **Junagadh district** of Gujarat.
 - It was declared as a sanctuary in 1965 and a national park in 1975.
- The Gir Forests is the largest compact track of dry deciduous forests in the semi-arid western part of India.
- Gir is often linked with "**Maldharis**" (a **traditional pastoral people**) who have survived through the ages by having a symbiotic relationship with the lion.

What is the Great Indian Bustard?

➤ About:

- The **Great Indian Bustard (*Ardeotis nigriceps*)**, the State bird of Rajasthan, is considered **India's most critically endangered bird**.
- It is considered the flagship **grassland species**, representing the health of the grassland ecology.
- Its population is confined mostly to Rajasthan and Gujarat. Small populations occur in Maharashtra, Karnataka and Andhra Pradesh.

➤ Vulnerability:

- The bird is under constant threats due to collision/electrocution with power transmission lines, hunting (still prevalent in Pakistan), habitat loss and alteration as a result of widespread agricultural expansion, etc.

➤ Protection Status:

- **IUCN red List:** Critically Endangered
- **Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES):** Appendix 1
- **Convention on Migratory Species (CMS):** Appendix I
- **Wildlife (Protection) Act, 1972:** Schedule I

What are the Measures to Protect GIB?

➤ Species Recovery Programme:

- It is kept under the species recovery programme under the **Integrated development of Wildlife**

Note:

Habitats of the Ministry of Environment, Forests and Climate Change (MoEFCC).

- **National Bustard Recovery Plans:**
 - It is currently being implemented by conservation agencies.
- **Conservation Breeding Facility:**
 - MoEF&CC, Rajasthan government and **Wildlife Institute of India (WII)** have also established a conservation breeding facility in Desert National Park at Jaisalmer in June 2019.
- **Project Great Indian Bustard:**
 - It has been launched by the Rajasthan government with an aim of constructing breeding enclosures for the species and **developing infrastructure to reduce human pressure** on its habitats.
- **Eco-Friendly Measures:**
 - Task Force for suggesting eco-friendly measures **to mitigate impacts of power transmission lines** and other power transmission infrastructures on wildlife including the Great Indian Bustard.

Spotted Pond Turtles

Why in News?

Three persons engaged as mahouts (keepers and drivers of an elephant) in the **Kaziranga National Park and Tiger Reserve, Assam**, have been arrested for capturing and consuming **spotted pond turtles, a rare species of a freshwater turtle.**

- The incident has raised concerns about the illegal consumption of protected species by park employees, leading to investigations and arrests.

What are Spotted Pond Turtles?

- **About:** Spotted pond turtles (*Geoclemys hamiltonii*) are named for the yellow or white spots on their black heads, legs and tails. They have large heads and short snouts, and their webbed feet help them swim.
 - They are also known as **Black Pond Turtle, Black Spotted Turtle, Hamilton's Terrapin.**
 - They bask in the sun to regulate their body temperature. Their need for warm water and an intense basking area is important.
 - When they retreat into their shells, spotted pond turtles make a **soft croak.**

- **Range and Habitat:** They are found in large, deep rivers in India, Assam, Pakistan and Bangladesh.
 - In India, the species is distributed across the **north, northeast and a few parts of central India**
- **Diet Requirements:** These turtles are primarily **carnivorous** and eat aquatic invertebrates.
- **Sleep Habits:** Spotted pond turtles are **crepuscular**, meaning they are most active at twilight (dusk and dawn).
- **Conservation Status:**
 - **International Union for Conservation of Nature (IUCN) : Endangered**
 - **CITES : Appendix I**

What are the Key Facts about Kaziranga National Park?

- **Location:** It is in the **State of Assam** and covers **42,996 Hectare (ha)**. It is the single largest undisturbed and representative area in the Brahmaputra Valley floodplain.
- **Legal Status:**
 - It was declared as a **National Park in 1974.**
 - It has been declared a **tiger reserve** since 2007. It has a total tiger reserve area of 1,030 sq km with a core area of 430 sq. km.
- **International Status:**
 - It was declared a **UNESCO World Heritage Site in 1985.**
 - It is recognized as an **Important Bird Area** by **BirdLife International.**
- **Important Species Found:**
 - It is the home of the world's most **one-horned rhinos.** **Pobitora Wildlife Sanctuary** has the **highest density of one-horned rhinos in the world** and second highest number of Rhinos in Assam after Kaziranga National Park.
 - Much of the focus of conservation efforts in Kaziranga are focused on the **'big four'** species— **Rhino, Elephant, Royal Bengal tiger and Asiatic water buffalo.**
 - Kaziranga is also home to 9 of the 14 species of **primates found** in the Indian subcontinent.
- **Rivers and Highways:**
 - The National Highway 37 passes through the park area.

Note:



- The park also has more than 250 seasonal water bodies, besides the **Diphlu River** running through it.
- Other **National Parks in Assam** are:
 - Dibru-Saikhowa National Park,
 - **Manas National Park**,
 - Nameri National Park,
 - Rajiv Gandhi Orang National Park.

Himalayan Brown Bear

Why in News?

The **Himalayan brown bear** (*Ursus arctos isabellinus*) population in **Kashmir** is facing numerous challenges that threaten both their survival and human safety.

- Recent incidents of **bears entering residential areas** and wrecking graveyards have raised concerns among local communities.
- These incidents highlight the urgent need to **address the underlying factors causing this behavior** and safeguard the habitat of this critically endangered species.

What are Himalayan Brown Bears?

- **About:**
 - Himalayan brown bears are a **subspecies of brown bears** that inhabit the high-altitude regions of the Himalayas, ranging from Pakistan to Bhutan.
 - They have **thick fur that is most often sandy or reddish-brown in color**.
 - They can **grow up to 2.2 meters long** and weigh up to 250 kilograms.
- **Status:**
 - **IUCN Red List**- Critically Endangered
 - Brown bear (*Ursus arctos*) is listed as **Least Concern**.
 - **CITES** - Appendix I.
 - Only the populations of Bhutan, China, Mexico and Mongolia; all other populations are included in Appendix II.
 - **Indian Wildlife (Protection) Act of 1972** - Schedule 1.
- **Food:**
 - **Omnivorous**.
- **Behavior:**
 - They are **nocturnal**, and their sense of smell is acutely developed and believed to be their principal means of finding food.

- **Threat:**
 - Human-animal conflict, rapid habitat loss, poaching for fur, claws, and organs, and, in some rare cases, bear baiting.
- **Range:**
 - North-western and central Himalaya, including India, Pakistan, Nepal, the Tibetan Autonomous Region of China, and Bhutan.
- **Challenges:**
 - **Insufficient Food Sources and Altered Behavior:**
 - The bears' peculiar behavior of digging up graves and wandering into residential areas can be attributed to insufficient food in their natural habitats.
 - A study conducted by **Wildlife SOS**, an organization established with the goal of making lasting changes to protect and conserve India's natural heritage, forests, and biodiversity, revealed that a significant portion of the bears' diet in Kashmir consists of **scavenged garbage, including plastic bags, chocolate wrappers, and other edible waste**.
 - This disrupts their **natural foraging patterns and alters their behavior, leading to conflicts with humans**.
 - Improper disposal of kitchen waste by both local residents and hoteliers near bear habitats has provided easy access to food, leading to frequent interactions between bears and humans.
 - This altered behavior, **coupled with complacency in hunting for food**, has created a dependence on human-generated waste, further exacerbating conflicts.
 - **Restricted Distribution and Declining Population:**
 - The restricted distribution of the Himalayan brown bear in the alpine meadows of the Himalayas has made it challenging for researchers to gather comprehensive data on the species.
 - Habitat destruction caused by factors like **habitat encroachment, tourism, and grazing pressure** has contributed to the declining population of bears.

Note:

- With only an estimated **500-750 bears left in India**, urgent conservation efforts are required to ensure their survival.
- **Future Threats and Conservation Recommendations:**
 - The Himalayan brown bear's future remains bleak, as a study predicts a **decline of about 73% of their habitat by 2050** in the **western Himalayas**.
 - **Climate change** poses a significant risk, necessitating preemptive spatial planning of **protected areas to ensure the long-term viability of the species**.
 - Conservation efforts should focus on **habitat preservation, creating biological corridors, and promoting responsible waste management** to minimize human-bear conflicts.
 - Should Strengthen the legal protection and enforcement by implementing the **Wildlife (Protection) Act of 2022** and CITES regulations.

GoI-UNSDCF 2023-2027

Why in News?

Recently, **NITI Aayog** and the **United Nations** in India signed the **Government of India - United Nations Sustainable Development Cooperation Framework (GoI-UNSDCF) 2023-2027**.

- The **United Nations General Assembly** designates this framework as the principal planning and implementation instrument for the UN Development System at country level.
- The framework aligns with India's national vision for development and aims to achieve the **Sustainable Development Goals (SDGs)**, emphasizing gender equality, youth empowerment, and human rights.

What are the Key Points of the Framework?

- **Strategic Pillars and Outcome Areas:**
 - The GoI-UNSDCF 2023-2027 is built upon Four Strategic pillars derived from the **2030 Agenda**:
 - People, Prosperity, Planet, and Participation.
 - The four pillars encompass **Six Outcome Areas**:
 - Health and Wellbeing
 - Nutrition and **Food Security**

- Quality Education
- Economic Growth and Decent Work
- Environment, Climate, **WASH (Water, Sanitation, and Hygiene)**, and Resilience
- Empowering People, Communities, and Institutions.

Focus:

- The GoI-UNSDCF places **specific emphasis on SDG localisation** and **South-South Cooperation**, aligning with India's leadership in implementing and accelerating the SDGs.
 - SDG localization is the process of transforming the SDGs into reality at the **local level, in line with national frameworks** and with communities' priorities.
- India aims to **showcase its development models globally** and actively promotes South-South cooperation.

Implementation and Monitoring:

- The implementation, monitoring, and reporting of the GoI-UNSDCF 2023-2027 will be jointly led by the **Government of India and the United Nations**, India through a Joint Steering Committee.

What are Sustainable Development Goals?

- The **Sustainable Development Goals (SDGs)**, also known as the Global Goals, were adopted by the **United Nations in 2015** as a universal call to action to end poverty, protect the planet, and ensure that by 2030 all people enjoy peace and prosperity.
 - It is a set of **17 SDGs that recognize that action in one area** will affect outcomes in others and that development must balance social, economic, and environmental sustainability.
 - Countries have committed to prioritizing progress for those who are furthest behind.
 - The SDGs are designed to **end poverty, hunger, AIDS**, and discrimination against women.
 - India in recent years has made significant efforts in achieving Goal 13th of the SDGs in particular.
 - The goal calls for taking urgent action to combat climate change and its impacts.

Note:





VAIBHAV Scheme

Why in News?

The **Government of India** has introduced a new fellowship programme called **Vaishvik Bhartiya Vaigyanik (VAIBHAV)** to facilitate collaboration between the **Indian diaspora in Science, Technology, Engineering, Mathematics and Medicine (STEMM)** and Indian academic and research institutions.

- VAIBHAV Summit was also organised as an event dedicated to **connecting the Indian STEMM diaspora with Indian institutions.**

What is the VAIBHAV Fellowship Scheme?

- **About:**
 - The **VAIBHAV Fellowship** aims at improving the research ecosystem of **India's Higher Educational and Scientific Institutions** by facilitating academic and research collaborations between Indian Institutions and the best institutions in the world through mobility of faculty/researchers from overseas institutions to India.
 - It is **implemented by the Department of Science and Technology (DST)**, Ministry of Science and Technology.
- **Key Features of the VAIBHAV Fellowship Programme:**
 - **Knowledge Verticals:** The programme will focus on **18 identified knowledge verticals**, including

quantum technology, health, pharmaceuticals, electronics, agriculture, energy, computer sciences, and material sciences, among others.

- **Eligibility:** The fellowship is open to outstanding scientists and technologists of **Indian origin (Non-resident Indians (NRI)/Persons of Indian Origin (PIO)/Overseas Citizen of India (OCI)** who are actively engaged in research activities in their respective countries.

- **Collaboration Duration:** Selected fellows will have the opportunity to work in collaboration with **Indian Higher Educational Institutions (HEIs)**, universities, and public-funded scientific institutions.

- They may spend up to two months per year, for a maximum of three years, at an Indian institution of their choice.

- **Fellowship Grant:** VAIBHAV fellows will receive a monthly fellowship grant of INR 4,00,000, which will support their research activities during the collaboration period.

- **Travel, Accommodation, and Contingencies:** The fellowship will cover international and domestic travel expenses, accommodation, and contingencies, ensuring a conducive research environment for the fellows.

CPCB's New Guidelines for India's Stone Crusher Sector

Why in News?

Stone crushing units have long been recognized as major contributors to fugitive dust emissions and severe air pollution.

- In response to the growing concern, the **Central Pollution Control Board (CPCB)** recently published the **Environmental Guidelines for Stone Crushing Units.**
- The guidelines are in alignment with the **recommendations made by New Delhi-based non-profit Centre for Science and Environment (CSE).**

What are the Key Guidelines Released By CPCB?

- The CPCB guidelines cover various aspects of stone crushing, such as **source emissions, product storage, transportation, water consumption and**

Note:

legal compliance. Some of the key features of the guidelines are:

- The stone crushers should **obtain consent to establish and consent to operate (CTO) from the State Pollution Control Board (SPCB)** before starting their operations.
- Stone crushing unit shall comply with **emission norms prescribed under the Environment (Protection) Rules, 1986** and conditions laid down in CTO by concerned SPCB/PCC.
- They should install **adequate pollution control devices**, such as **dust suppression systems, covers, screens and sprinklers**, to reduce the dust emissions from crushing, loading and unloading activities.
 - They should also store their products in **covered areas or silos to prevent wind-blown dust.**
- The stone crushers **should use water judiciously and ensure its availability and quality** and procure their raw material from legal sources and maintain proper records of their transactions.
- A **District Level Committee to be constituted** under chairmanship of District Magistrate/Deputy Commissioner so that **surprise inspections for surveillance of stone crushing units located under their jurisdiction** can be carried out on regular basis.
- **Health survey of workers should be carried out** by the stone crusher on half-yearly basis.

What is the Issue Associated with Stone Crushing Units?

➤ **About:**

- **Stone crushing units** are one of the major sources of **air pollution in India.**
 - These units produce **crushed stones that are used as raw material for various construction activities.**
- However, the process of stone crushing also **generates a lot of dust that affects the health of the workers** and the surrounding population.
 - Moreover, stone mining is also associated with this activity, which further degrades the environment.

➤ **Recent Instances:**

- In December 2022, a draft notification by Haryana government proposed **easing of proximity norms for setting up new stone crushers near residential areas.** This was met with criticism by

environmentalists who feared that it would worsen air quality and impact farmland.

- In June 2023, a report by CSE claimed that **many stone crushers in India were operating without consent or environmental clearance from SPCBs.**
- The report also highlighted that most of these units did not have proper pollution control devices or monitoring systems.
- **Steps to Address the Issue:**
 - The **Environment Pollution (Prevention & Control) Authority (EPCA)** banned the **operation of the stone crusher units, along with brick kilns and hot mix plants**, under the implementation of the **Graded Response Action Plan (GRAP).**
 - **GRAP** includes the measures which will be taken by different government agencies to prevent worsening of **Air Quality of Delhi-NCR and prevent PM10 and PM2.5 levels** to go beyond the 'moderate' national **Air Quality Index (AQI) category.**
 - In May 2023, a study by researchers from Pune University revealed that **a model stone crusher unit in Pune had successfully implemented pollution control measures and reduced its dust emissions by 90%.** The study suggested that such units could serve as examples for other stone crushers in India.

What is the Central Pollution Control Board?

- The **CPCB** is a statutory organisation that was established in **September 1974** under the **Water (Prevention and Control of Pollution) Act, 1974.**
 - **Further**, CPCB was entrusted with the powers and functions under the **Air (Prevention and Control of Pollution) Act, 1981.**
 - It is the apex body for environmental protection and pollution control in India. It functions under the **Ministry of Environment, Forest and Climate Change (MoEFCC)** and coordinates with the State Pollution Control Boards (SPCBs) and other agencies.
- The CPCB has various divisions that deal with different aspects of pollution control such as **air quality management, water quality management, hazardous waste management, environmental assessment, laboratory services**, information technology, public participation etc.

Note:



WMC Approves Global Greenhouse Gas Watch

Why in News?

Recently, the 19th **World Meteorological Congress (WMC)** has approved the **Global Greenhouse Gas (GHG) Watch (G3W)**, a **GHG** monitoring initiative, to reduce the heat-trapping gases and combat **Climate Change**.

- The **World Meteorological Organisation (WMO)** in the Collaboration with WHO also framed **2023-2033 Implementation Plan for Advancing Climate, Environment and Health Science and Services** to manage the impact of Climate Change.

Note: The Nineteenth World Meteorological Congress (Cg-19) is currently taking place from 22 May to 2 June 2023 at the International Conference Centre of Geneva (ICCG). It is the supreme body of the World Meteorological Organization (WMO).

What is the World Meteorological Organization (WMO)?

- The WMO is an intergovernmental **organization with a membership of 192 Member States and Territories**.
 - India is a member of WMO.
- It originated from the **International Meteorological Organization (IMO)**, which was established after the **1873 Vienna International Meteorological Congress**.
- Established by the ratification of the **WMO Convention on 23rd March 1950**, WMO became the **specialized agency of the United Nations** for meteorology (weather and climate), operational hydrology and related geophysical sciences.
 - WMO is headquartered in **Geneva, Switzerland**.

What is the Greenhouse Gas Watch (G3W)?

- **About:**
 - It will establish internationally coordinated top-down monitoring of greenhouse gas fluxes to support the provision of actionable information to the **UNFCCC Parties** and other stakeholders.
 - The GHG watch will fill critical information gaps and provide an **integrated and operational framework**. The framework will bring all space-based and surface-based observing systems, as

well as modeling and data assimilation capabilities, under one roof.

➤ Implementation:

- The monitoring infrastructure will build on and expand WMO's long-standing activities in GHG monitoring, implemented as part of the **Global Atmosphere Watch (GAW)** and via its **Integrated Global GHG Information System (IG3IS)**.
 - The GAW of WMO focuses on building a single coordinated global understanding of atmospheric composition, its change, and helps to improve the understanding of **interactions between the atmosphere, the oceans and the biosphere**.
 - IG3IS aims to coordinate an integrated global GHG information system, **linking inventory and flux model based information with atmospheric observations** and modelling, to provide the best possible estimates of greenhouse gas emissions at the national and urban scales.

➤ Components:

- Surface-based and satellite-based observations
- Prior estimates of the GHG emissions based on activity data and process-based models
- Global high-resolution Earth System models representing GHG cycles
- Data assimilation systems associated with models to generate products of higher accuracy

➤ Significance:

- At present, **there is no comprehensive, timely international exchange** of surface and space based GHG observations or modelling products.
- GHG monitoring infrastructure will help improve understanding of the carbon cycle. Understanding the full carbon cycle is **vitaly important for the planning of mitigation activities**.
- Globally consistent, gridded information on GHG and their fluxes with appropriate time resolution **will help in the improved evaluation of sources and sinks of GHG** and indicate their association with the biosphere, the ocean and the permafrost areas.

What is the 2023-2033 Implementation Plan?

➤ Objective:

- The plan aims to achieve "better health and well-being for people facing existing and emerging extreme weather events, climate change and

Note:

environmental risks **through the effective integration of climate, environment and health science** and services across the world”.

- It seeks to promote a **coordinated approach to manage the impact of climate, weather**, air pollution, ultraviolet radiation, extreme events and other environmental factors on health.
- **Need:**
 - By 2030-2050, climate change is **projected to cause approximately 250,000 extra deaths** annually due to **malnutrition, malaria, diarrhoea, and heat stress**.
 - If current emission levels persist, up to **8.4 billion people could be at risk from malaria and dengue**, two major vector-borne diseases, by the end of the century.
 - Concerns arise regarding extreme heat and the importance of strengthening understanding, early warning systems, and risk management for climate-related risks like heat waves, wildfires, and air quality issues.
 - In 2022, India experienced its hottest March, leading to early heat waves across various regions.
 - Extreme heat will expose **600 million Indians to dangerous temperatures by 2030**.

PBR and Biodiversity Management in India

Why in News

The **National Campaign for Updation and Verification of People's Biodiversity Register (PBR)** was launched in **Goa**, marking a significant milestone in the **documentation and preservation of India's rich biological diversity**. It was organised by the Union Ministry of Environment, Forest and Climate Change.

- Till now, **2,67,608 PBRs** have been prepared in the country.

What is the People's Biodiversity Register?

- **About:**
 - The **People's Biodiversity Register** serves as a **comprehensive record of various aspects of biodiversity**, including **conservation of habitats**,

preservation of land races, folk varieties, and cultivars, domesticated stocks and breeds of animals, and micro-organisms.

- **Biodiversity Management Committees (BMC)** are created as per the **Biological Diversity Act 2002** for promoting conservation, sustainable use, and documentation of biological diversity.
 - Local bodies in the states and union territories constitute **BMCs, which are entrusted with the preparation of People's Biodiversity Registers** in consultation with local communities.
- **Importance:**
 - It helps in conserving biodiversity, which is key to maintaining balance in nature. It also enables local communities to share the benefits derived from **genetic resources and associated traditional knowledge**.
 - It supports the **implementation of the provisions of the Biological Diversity Act 2002**, which aims to **regulate access to biological resources** and ensure fair and equitable benefit sharing.
 - Being a **bottom-up exercise**, it is also a means of understanding the **overlap of cultural and natural biodiversity**.
 - It envisages a **decentralised way through an inclusive approach**.
 - It aligns with the concept of "**Lifestyle for the Environment (LiFE)**", introduced by the Indian Prime Minister at **COP26 in Glasgow**.
 - This concept calls upon **individuals and institutions globally to promote mindful and deliberate utilisation of resources** to protect and preserve the environment.

What is the Status of Biodiversity Management in India?

- **About:**
 - With only **2.4% of the earth's land area**, India accounts for **7-8% of the world's recorded species**.
 - **4 of the world's 36 biodiversity hotspots** are located in India: The Himalayas, Western Ghats, Indo-Burma area, and Sundaland.
 - Two of these, the **Indo-Burma area and Sundaland**, are distributed throughout South Asia and are not precisely contained within India's formal borders.

Note:



➤ Biodiversity Governance in India:

- India's Biological Diversity Act (BDA) 2002, is in close synergy with the [Nagoya Protocol](#) and aims to implement provisions of the [Convention on Biological Diversity \(CBD\)](#).
 - The Nagoya Protocol sought to ensure commercial and research utilisation of genetic resources led to sharing its benefits with the government and the community that conserved such resources.
- The BDA was hailed as an important step towards preserving India's vast biodiversity, as it recognised the sovereign right of countries over its natural resources.
 - It seeks to address issues of managing bio-resources in the most decentralised manner possible.
- It also envisages three layered structures:
 - The National Biodiversity Authority (NBA) at the national level.
 - The State Biodiversity Boards (SSBs) at the state level
 - Biodiversity Management Committees (BMCs) at the local level.
- The act also strengthens the country's stand with respect to anyone claiming an intellectual property right over biodiversity-related knowledge.

What is the Convention on Biological Diversity (CBD)?

- The Convention on Biological Diversity (CBD) was negotiated and signed by nations at the [Earth Summit at Rio de Janeiro](#) in Brazil on June 5, 1992.
 - The convention came into force on **December 29, 1993**. India became a party to the convention on **February 18, 1994**. At the present, there are **196 Parties to this Convention**.
- CBD is a legally binding treaty and has 3 main objectives:
 - Conservation of biodiversity.
 - Sustainable use of the components of biodiversity.
 - Fair and equitable sharing of the benefits arising out of the utilisation of genetic resources.
- The **Secretariat of the CBD is based in Montreal, Canada**.

Axolotls and Organ Regeneration

Why in News?

The Axolotl, a species of [salamander](#) (lizard-like [amphibians](#)) possesses an extraordinary ability to regenerate lost body parts, inspiring researchers to delve into the secrets of this **unique regenerative power**.

- The focus of their investigations lies in understanding the **elusive o** (for "ova deficient" gene, which plays a **pivotal role in the axolotl's regenerative process**).

What is Axolotl?

➤ About:

- Axolotl are amphibians that spend their whole lives underwater. They exist in the wild in only one place—[Lake Xochimilco](#) near [Mexico City](#), a network of **artificial channels, small lakes, and temporary wetlands** that help supply water to nearby [Mexico City's 18 million residents](#).
 - [Lake Xochimilco](#) is also a [UNESCO World Heritage site](#)
- Axolotls, like humans, contain two copies of every gene – **one inherited from the father and the other from the mother**.

➤ Prey:

- They feast on a menu of mollusks, worms, insect larvae, crustaceans, and some fish.

➤ Special Feature:

- They have fascinated scientists for their **ability to regenerate lost body parts and for their rare trait of neoteny**, which means **they retain larval features throughout life**.
 - These features are also studied by cancer researchers for their unique **resistance to developing cancerous tissues**.
- Even though they are **amphibians, axolotls remain aquatic throughout their lives but they are now almost extinct in the wild**.

➤ Threat:

- Axolotl populations have declined considerably due to a **combination of habitat loss** (largely driven by [Mexico City's continued urbanisation](#)), **water pollution, and invasive fish species** (such as [carp](#) and [tilapia](#), which **compete with axolotls for food and prey upon them**).

Note:

- **Protection Status:**
 - **International Union for the Conservation of Nature and Natural Resources (IUCN)** has classified the axolotl as a **critically endangered** species since 2006.

The International Day for Biological Diversity 2023

Why in News?

The **International Day for Biological Diversity (IDB)**, celebrated on **22nd May 2023**, raises awareness about the importance of biodiversity for sustaining life on Earth.

- The Global Assessment Report on Biodiversity and Ecosystem Services highlights the **risk of extinction for around one million species**.
- To address the biodiversity crisis, the **Kunming-Montreal Global Biodiversity Framework** was adopted at the **15th Conference of Parties (COP 15)** to the **Convention on Biological Diversity**
 - This framework sets ambitious targets for 2030 and provides a roadmap for conservation, restoration, and sustainable use of biodiversity.

What is International Day for Biological Diversity?

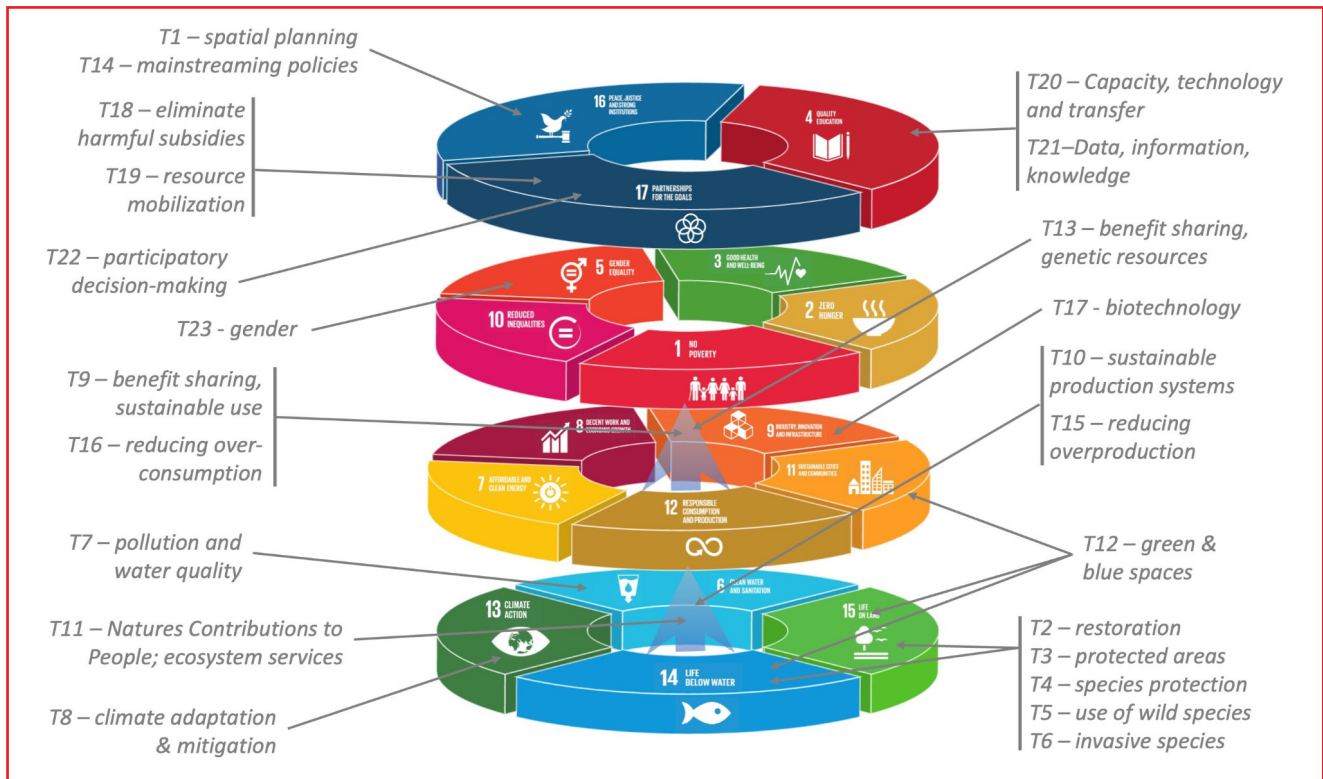
- **About:**
 - The **United Nations General Assembly (UNGA)** in 1993 proclaimed **22nd May** as IDB to increase understanding and awareness of biodiversity issues.
 - The UNGA also declared the period **2011-2020** as the **United Nations (UN) Decade on Biodiversity** to promote the implementation of a strategic plan on biodiversity and its overall vision of living in harmony with nature.
 - It also declared **2021-2030** as the **UN Decade of Ocean Science for Sustainable Development** and the **UN Decade on Ecosystem Restoration**.
- **Theme:**
 - The theme for 2023 is **“From Agreement to Action: Build Back Biodiversity”**, which signifies the **pressing requirement to go beyond mere commitments and transform them into concrete actions** aimed at revitalizing and safeguarding biodiversity.

What is Kunming-Montreal Global Biodiversity Framework?

- **About:**
 - It calls for **urgent and integrated action** to reflect **biodiversity considerations in all sectors of the global economy** but crucial issues - like funding conservation in poorer countries and committing to biodiversity-friendly supply chains have been left to discuss later.
 - It is **not a binding international agreement**.
 - It **calls upon the parties to mainstream biodiversity protection in decision-making** and recognise the importance of conservation in protecting human health.
 - The theme of the declaration is **Ecological Civilization: Building a Shared Future for All Life on Earth**.
 - By adopting this, the **nations have committed themselves to support the development, adoption and implementation** of an effective post-2020 implementation plan, a capacity building action plan for the **Cartagena Protocol on biosafety**.
 - The Protocol seeks to protect biological diversity from the potential risks posed by **living modified organisms** resulting from modern biotechnology.
 - As per the declaration the signatory nations will ensure that the **post-pandemic recovery policies, programmes and plans contribute to the conservation** and sustainable use of biodiversity, promoting sustainable and inclusive development.
- **30 by 30 Target:**
 - The declaration made a reference to the ‘30 by 30’ target which is a **key proposal being debated at the COP15**, that would afford **30% of the Earth’s land and oceans protected status by 2030**.
- **Main targets:**
 - The framework consists of **four goals and 23 targets for 2030**.
 - **The four goals are:**
 - **Conserve and restore biodiversity.**
 - **Ensure sustainable use of biodiversity.**
 - **Share benefits fairly and equitably.**
 - **Enable transformative change.**
 - **The 23 targets are:**

Note:





Groundwater Extraction and Land Subsidence

Why in News?

Cracks in buildings and 'sinking' land in **Joshimath, Uttarakhand** a hill town in Uttarakhand, made the headlines earlier in 2023.

- A similar phenomenon has been playing out for years in the plains of **Punjab, Haryana, Delhi and Faridabad**. According to the data gathered for years by the **Central Ground Water Board (CGWB)**, **excessive groundwater extraction** is identified as the underlying cause of these alarming incidents

What is Land Subsidence?

➤ About:

- Land subsidence refers to the **gradual sinking or settling of the Earth's surface**, usually due to the compaction of underground layers of **soil, rock, or other materials**.
- It occurs when the **support structures beneath the land**, such as **aquifers, underground mines,**

or natural gas extraction, are depleted or when certain geological processes take place.

➤ Impact:

- In urban areas, it can **damage infrastructure, including roads, buildings, and underground utilities**.
- It can also increase the **risk of flooding in coastal regions by reducing the elevation of the land relative to sea level**.
- In agricultural areas, subsidence can affect irrigation systems, disrupt the flow of water in rivers and canals, and cause **permanent damage to farmland**.

What has the CGWB Identified About Groundwater Extraction and Land Subsidence?

➤ Land Subsidence Due to Groundwater Extraction:

- Digging operations conducted for mining activities demonstrated the **occurrence of "soil settlement" or sinking due to voids created from mining**. Similar observations prompted researchers to **investigate the role of groundwater extraction in land subsidence in India**.

Note:

- **Evidence of Land Subsidence in Different Regions:**
 - Unlike land movement from landslides or **earthquakes**, subsidence from groundwater extraction was gradual and barely visible annually.
 - Studies utilizing satellite-based analysis of ground movement have identified **building deformities resulting from groundwater withdrawals**.
 - Using data from the Sentinel-1 satellite shows that the **National Capital Region (NCR) sank an average of 15 mm per year from 2011-2017**.
 - **Urbanization and unplanned growth** exacerbated groundwater withdrawal and contributed to subsidence in the NCR.
 - Kolkata and parts of eastern India also **experience overexploited groundwater blocks and land subsidence**.

What is the Status of Ground Water Extraction in India?

- **About:**
 - Currently, **85% of rural and 50% of urban population** is dependent on groundwater for sustenance, making India the largest groundwater user globally.
 - India's stage of groundwater extraction, which is the percentage of utilization of groundwater against recharge, has **dropped from 61.6% in 2020 to 60.08% in 2022**, according to the report on the **National Compilation of Dynamic Ground Water Resources in India**.
- **Groundwater Depletion in Northwest India:**
 - Agricultural practices in N-W India heavily depend on **groundwater withdrawal due to limited monsoon rain**.
 - Data from the **CGWB** reveals alarming levels of groundwater exploitation:
 - Punjab: **76% of groundwater blocks are 'over exploited.'**
 - Chandigarh: **64% of groundwater blocks are 'over exploited.'**
 - Delhi: **Approximately 50% of groundwater blocks are 'over exploited.'**
- **Issues Associated:**
 - **Unregulated Pumping:** Several states affected by depletion of groundwater provide **free or heavily subsidized power (including solar pumps)** for pumping groundwater for irrigated agriculture.

- This enables **overexploitation and depletion of scarce groundwater resources**.
- **Preference to Water-Intensive Crops:** The **minimum support price** for wheat and rice creates highly skewed incentive structures in **favor of wheat and paddy**, which are water intensive crops and depend heavily on ground water for their growth.
 - This makes **groundwater a heavenly resource for their farming**.
- **Saline Water Intrusion:** In coastal areas, excessive groundwater pumping can cause **saline water intrusion**.
 - As fresh groundwater is depleted, **seawater infiltrates into the aquifers, making the water unsuitable for various uses** and adversely impacting agriculture and ecosystems.
- **Ecological Impacts:** Groundwater depletion affects ecosystems by altering the **flow of water in rivers, lakes, and wetlands**.
 - This **disrupts the natural balance, harming aquatic life and biodiversity**. It also affects the availability of water for plants and animals dependent on groundwater sources.

What are the Government Initiatives Related to Groundwater Conservation?

- **Pradhan Mantri Krishi Sinchayee Yojana**
- **Jal Shakti Abhiyan- Catch the Rain Campaign**
- **Atal Bhujal Yojana**
- **Atal Mission for Rejuvenation and Urban Transformation (AMRUT)**

Sea Butterflies

Why in News?

The population of the sea butterflies in the Southern Ocean is shrinking due to **climate change**, making them extremely vulnerable.

What are Sea Butterflies?

- **About:**
 - Sea butterflies, scientific name *Thecosomata*, are a **suborder of sea snails** known as **shelled pteropods**.
 - They have **muscular feet that allow them to swim in water** instead of gliding on solid surfaces.

Note:



- Sea butterflies are **holoplanktonic** (organisms that pass their whole life floating, drifting, or swimming weakly in the water) and spend their entire life cycle in the water column.
- They are **found in all oceans** but are more diverse and **abundant in colder waters**.
- Sea butterflies have **bilateral symmetry** and a **coiled or uncoiled shell** of various shapes and sizes.
 - **Their shell** is mostly transparent and very fragile and **can be easily dissolved by ocean acidification**.
- They have a pair of wing-like lobes or parapodia for propulsion and a head with eyes, tentacles, and a mouth with a long proboscis to capture prey.
- They have a reduced or absent gill and rely on their body surface for gas exchange.
- **Importance:**
 - They are a major **food source** for many fish, seabirds, whales, and other marine animals.
 - They also play a key role in **transporting carbon from the surface to the deep ocean through their shells and fecal pellets**.

How does Climate Change Impact the Population of Sea Butterflies?

- **Ocean Acidification:**
 - Increased **carbon dioxide absorption by the ocean leads to higher acidity**.
 - **Reduced availability of carbonate ions** necessary for shell formation and maintenance.
 - The ocean is the **most acidic in winter** because **cooler water absorbs more CO₂**. This means, the winter months are the most dangerous for the shelled sea butterflies.
 - Sea butterflies' shells can dissolve, weaken, or deform.
 - Increased vulnerability to predators, infections, and stress.
 - Affects metabolism, growth, reproduction, and survival.
- **Ocean Warming:**
 - **Rising ocean temperatures** due to climate change.
 - Changes in distribution and abundance of sea butterflies.
 - Seek optimal thermal conditions for development and survival.
 - Alters **food availability and quality**.

- Impacts **ocean currents and mixing affecting sea butterfly transport**.
- **Ocean Deoxygenation:**
 - Warmer and stratified ocean leads to decreased oxygen levels.
 - Affects **sea butterflies' respiration and energy balance**.
 - **Alters vertical migration patterns**.
 - Exacerbates effects of ocean acidification by increasing dissolved carbon dioxide concentrations.

How can this Reduced Population Impact Antarctic Marine Ecosystems?

- **Reducing the Food Availability for Higher Trophic Levels:**
 - Sea butterflies serve as a major food source for fish, seabirds, whales, and other marine animals.
 - Population decline of sea butterflies can lead to starvation, malnutrition, or reduced reproduction in their predators and prey.
- **Disrupting the Balance of the Marine Food Web:**
 - Sea butterflies play a crucial role in linking **primary producers (phytoplankton) with secondary consumers (zooplankton)** and higher trophic levels.
 - Decline in sea butterfly population can alter the structure and function of the marine food web.
 - Biodiversity and productivity of the Antarctic marine ecosystem may be affected.
- **Decreasing the Carbon Sequestration Capacity of the Ocean:**
 - Sea butterflies contribute to the **"biological pump,"** transporting carbon from the surface to the deep ocean through their shells and fecal pellets.
 - Population decline **reduces the amount of carbon sequestered (process of capturing and storing atmospheric carbon dioxide)** in the ocean.
 - This results in increased carbon dioxide in the atmosphere and further ocean acidification.

Thawing Permafrost in Arctic and Industrial Contamination

Why in News?

According to a New Study, "Thawing Permafrost poses an environmental threat to thousands of sites

Note:

with legacy industrial contamination”, thawing of **Permafrost** may result in the spread of toxic substances in the **Arctic Region**.

What is Permafrost?

- Permafrost is **essentially any ground that stays frozen** — 0 degree Celsius or lower — for at least **two years straight**.
- These permanently frozen grounds **are often found in Arctic regions** such as Greenland, Alaska (the United States), Canada, Russia and Eastern Europe.
- According to the **National Aeronautics and Space Administration (NASA)**, permafrost is composed of **“a combination of soil, rocks and sand that are held together by ice**. The soil and ice in permafrost stay frozen all year long.
 - However, although the **ground remains perennially frozen**, permafrost regions aren't always covered with snow.

What are the Findings of the Study?

- **Contaminated Sites In the Region:**
 - 4,500 industrial facilities in the permafrost regions **have most likely produced between 13,000 and 20,000 contaminated sites**.
 - As of now, around 1,000 of the known industrial sites and 2,200 to 4,800 of the known contaminated sites **are already at risk of destabilising due to thawing permafrost**.
- **Industrial Waste in Arctic:**
 - Known industrial waste types in the region include **drilling and Mining wastes**, toxic substances like drilling muds and fluids, mine waste heaps, heavy metals, spilled fuels, and **Radioactive Waste**.
- **Rapid Thawing and Destabilizing Industrial Site:**
 - The **Arctic is getting warmer nearly four times as fast as the rest** of the planet due to **Climate Change**, and therefore permafrost is thawing rapidly, which could destabilize not only the industrial sites **but also the contaminated areas**.
 - Nearly 2,100 industrial sites and between **5,600 and 10,000 contaminated sites are under threat of destabilization** by the end of this century.
- **Reasons for building Such Sites:**
 - Once believed to be perennially stable and reliable, the Arctic is far from an uninhabited and untouched region.

- It's dotted with countless **industrial facilities such as oilfields and pipelines**, mines and military bases.
- All this infrastructure is built on permafrost, the toxic waste from these industrial facilities has been buried in the permafrost, on the assumption **that it would stay locked away permanently**.
 - But danger looms as the planet continues to heat up.
- The Arctic region experienced **increased development during the Cold War**, becoming a hub for **resource extraction and military operations**.
 - As a result, industrial and toxic waste accumulated on or within the permafrost, and no measures were taken to remove it.

Meri LiFE App

Why in News?

The **Ministry of Environment, Forest, and Climate Change** has launched a mobile application called “**Meri LiFE**” (My Life) to mobilize youth for climate change ahead of **World Environment Day on 5th June**.

- The Ministry has developed two dedicated portals for LiFE: the **Mission LiFE Portal** and the **Meri LiFE Portal**.

What is the Goal of the Meri LiFE App?

- The Meri LiFE app aims to showcase the power of citizens, especially young people, in **saving the environment by emphasizing the impact of simple actions in daily lives**.
 - The app is intended to catalyze a national movement for **LiFE(Lifestyle for Environment)** by creating a structured way to track the progress being made on **Mission LiFE**.
- It encourages users to participate in a series of LiFE-related tasks under five themes: **Save Energy, Save Water, Reduce Single Use Plastic, Adopt Sustainable Food Systems, and Adopt Healthy Lifestyle**.
 - Upon successful sign-up, users are guided through a gamified experience to take the 5 for 5 challenge and take **five LiFE actions towards June 5th, 2023**.

What is Mission LiFE?

- The idea of LiFE was introduced by the Prime Minister of India during the **26th United Nations Climate Change Conference of the Parties (COP26)** in Glasgow on **1st November 2021**.

Note:



- The LiFE Movement aims to utilize the power of collective action and nudge individuals across the world to undertake simple **climate-friendly actions in their daily lives**.
 - Additionally, it also seeks to **leverage the strength of social networks to influence social norms surrounding climate**.
- The Mission plans to create and nurture a global network of individuals, namely **'Pro-Planet People' (P3)**, who will have a shared commitment to adopt and promote environmentally friendly lifestyles.
 - Through the P3 community, the **Mission seeks to create an ecosystem that will reinforce and enable environmentally friendly behaviors to be self-sustainable**.
- The Mission envisions replacing the prevalent **'use-and-dispose' economy—governed by mindless and destructive consumption—**with a circular economy, which would be defined by mindful and deliberate utilization.

New Butterfly Species Discovered in Kerala

Why in News?

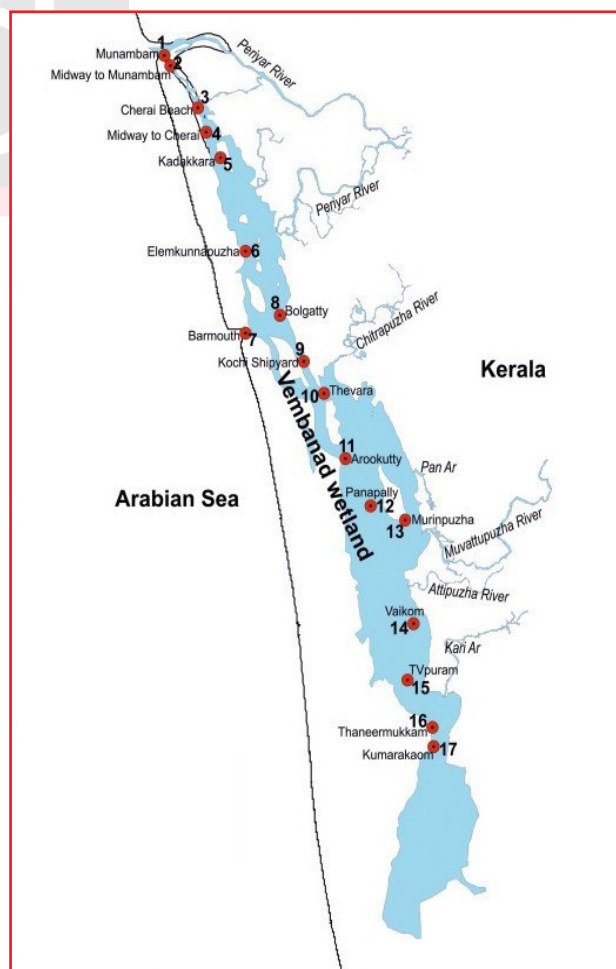
Recently, a butterfly subspecies (*Caltoris bromus sadasiva*) from the fringes of Akkulam and **Vembanad lakes** in Kerala has been discovered.

What are the Key Points Related to the Discovery?

- **About:** It belongs to the skipper butterfly family of Lepidoptera (**moths and butterflies**).
- It is the **first documented** subspecies of the **Bromus swift** (*Caltoris bromus*) butterfly in the **Western Ghats** and Peninsular India.
- **Number of Butterfly Species:** The discovery of *Caltoris bromus sadasiva* brings the **count of butterfly species** in the Western Ghats to **336** and the count of **skipper butterflies to 83**, with the **last skipper butterfly** discovery being almost **75 years ago**.
- **Caltoris:** *Caltoris*, an Indo-Australian genus has over 15 species distributed across south-east Asia. *Caltoris bromus*, one of them, has two other subspecies *Caltoris bromus bromus* and *Caltoris bromus yanuca*.

What are the Key Facts about Vembanad Lakes?

- This is the largest lake in Kerala and the **longest Lake in India**.
- Vembanad Lake is also known as **Vembanad Kayal, Vembanad Kol, Punnamada Lake** (in Kuttanad) and **Kochi Lake** (in Kochi).
- The lake has its **source** in four rivers, **Meenachil, Achankovil, Pampa and Manimala**.
- It is **separated** from the **Arabian Sea** by a narrow barrier island and is a popular backwater stretch in Kerala.
- In 2002, it was **included** in the list of wetlands of international importance, as defined by the **Ramsar Convention**.
- It is the **second-largest Ramsar site** in India only after the **Sundarbans** in West Bengal.



Note:

Invasive Species in Gulf of Mannar Islands

Why in News?

A recent study has revealed that the native vegetation and biodiversity in the **Gulf of Mannar** are under threat from an **alien invasive plant, *Prosopis chilensis***.

- In addition, the **coral reef** has been destroyed in several places despite being outlawed for industrial purposes, and human settlements have impacted some islands.

What are Invasive Species?

➤ About:

- An **invasive species** is an organism that is not indigenous, or native, to a particular area and causes harm to the native species.
 - They are **capable of causing extinctions of native plants and animals**, reducing biodiversity, competing with native organisms for limited resources, and **altering habitats**.
- They can be **introduced to an area by ship ballast water**, accidental release, and most often, by people.

➤ About *Prosopis Chilensis*:

- The Chilean mesquite (*Prosopis chilensis* (Molina) Stuntz) is a small to medium-sized legume tree and has a shallow and spreading root system.
 - It is a common ruderal weed, either growing singly or in groups
- It is found in **arid and semi-arid regions with ground water of between 3 and 10 m** below the surface.
 - It is a drought-resistant plant native to **South American countries namely Argentina, Bolivia, Chile, and Peru**.
- **International Instruments and Programmes on Invasive Species:**
- **Convention on Biological Diversity (CBD):**
 - It was one of the key agreements adopted at the 1992 Earth Summit in Rio de Janeiro.
 - The Rio de Janeiro Convention on Biodiversity (1992) had also **recognised the biological invasion of alien species of plants** as the second-worst threat to the environment after habitat destruction.

○ **Convention on the Conservation of Migratory Species (CMS) or Bonn Convention (1979):**

- It is an intergovernmental treaty that aims to **conserve terrestrial, marine and avian migratory species throughout their range**.
- It also aims to **control or to eliminate already present invasive alien species**.

○ **Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES):**

- It is an international agreement adopted in 1975 that aims to ensure that international trade in specimens of wild animals and plants does not threaten their survival.
- It also considers the **problems of invasive species when it is involved in trade and threatens the survival of live animals or plants**.

○ **Ramsar Convention (1971):**

- The **Ramsar Convention on Wetlands of International Importance** is an international treaty for the conservation and sustainable use of wetlands.
- It also addresses the **environmental, economic and social impact of invasive species on wetlands** within their jurisdictions and to take account of the methods of control and for combating invasive species.

➤ **Gulf of Mannar:**

- It is an **inlet of the Indian Ocean**, between southeastern India and western Sri Lanka.
- It is bounded to the northeast by **Rameswaram (island), Adam's (Rama's) Bridge (a chain of shoals), and Mannar Island**.
- It receives several rivers, including the **Tambraparni (India) and the Aruvi (Sri Lanka)**.
- The gulf is noted for its **pearl banks and sacred chank** (a gastropod mollusk).

➤ **Gulf of Mannar Biosphere Reserve (GoMBR):**

- The **GoMBR is home to 21 islands** that serve as habitats for coastal birds migrating as far as the Arctic Circle.
 - It is India's first marine biosphere reserve.
- **Most of the islands have sand dunes along their coastlines** with salt-dominant plant species.
- **"Corals, seagrass, and mangroves** are among the three unique ecosystems present on the islands

Note:

Bandipur Tiger Reserve

Why in News?

Bandipur Tiger Reserve, located in Karnataka, completed 50 years as a **Project Tiger** Reserve on April 1, 2023. The reserve was launched in 1973 by the then Prime Minister, Indira Gandhi, with the aim to stop the decline in population of tigers.

- Initially, there were 12 tigers in Bandipur when Project Tiger was launched, as a result of protection measures, there are currently 173 tigers using the area.

What are the Key Points of Bandipur Tiger Reserve?

- **About:**
 - **Bandipur Tiger Reserve** lies in one of the richest biodiversity areas of our country representing "**Western Ghats Mountains Biogeography Zone**", surrounded by **Mudumalai Tiger Reserve** (Tamil Nadu) in the South, **Wayanad Wildlife Sanctuary** (Kerala) in the Southwest & on the North West Side the Kabini Reservoir separates the Bandipur and **Nagarahole Tiger Reserve**.
 - The reserve is recognized as one of the **Mega Biodiversity Areas in the country** and is home to rich floral and faunal diversity.
- **Establishment:**
 - It was established in 1973 under **Project Tiger**. In 1985, by including adjacent areas from **Venugopala Wildlife Park**, it was enlarged and named Bandipur National Park.
- **Location:**
 - It is situated in two contiguous districts (Mysore and Chamarajanagar) of Karnataka and is located at the **tri-junction area of the States Karnataka, Tamil Nadu and Kerala**.
- **Biosphere Reserve:**
 - The **Bandipur Tiger Reserve is part of the Mysore Elephant Reserve and is an important component of the country's first biosphere reserve, the Nilgiri Biosphere Reserve**.
 - The landscape spanning Bandipur, Nagarahole, Mudumalai, and Wayanad complex is home not only to the highest number of tigers in the country – about 724, but also to the largest **Asian Elephant population**.

➤ Rivers and the Highest Point:

- The park is located between the **Kabini river** in the north and the **Moyar river** in the south. The **Nugu river** runs through the park. The highest point in the park is on a hill called **Himavad Gopaldaswamy Betta**.

➤ Other Tiger Reserves in Karnataka:

- Bhadra Tiger Reserve
- **Nagarahole Tiger Reserve**
- **Dandeli-Anshi Tiger Reserve**
- Biligiriranganatha Swamy Temple (BRT) Tiger Reserve, Besides, **Malai Mahadeshwara Wildlife Sanctuary** has been proposed to be made a tiger reserve.

Protest of Idu Mishmis over Proposed Tiger Reserve

Why in News?

Recently, **National Tiger Conservation Authority (NTCA)** announced that the **Dibang Wildlife Sanctuary** in Arunachal Pradesh would soon be notified as a tiger reserve.

- This move has caused unrest among the Idu Mishmi tribe who feel that a tiger reserve would "hinder their access" to the forest.

Who are the Idu Mishmis ?

- Idu Mishmi is a **sub-tribe of the Mishmi group** in Arunachal Pradesh and neighbouring Tibet, primarily living in the Mishmi Hills bordering Tibet.
 - Their ancestral homelands are spread over the districts of **Dibang Valley** and Lower Dibang Valley as well as parts of Upper Siang and Lohit.
- They are known for their **weaving and craftsmanship skills** and are **estimated** to comprise around **12,000 people** (as per **census 2011**).
- Their **language**, also called **Idu Mishmi**, is considered **endangered by UNESCO**.
- The tribe has strong ties with the region's rich flora and fauna, and their animist tradition led to unique wildlife conservation practices.
- **Tigers** are particularly important to the tribe, and according to their mythology, tigers are their **elder brothers**.

Note:

What are the Key Facts about Dibang Wildlife Sanctuary?

- **Location:** The Dibang Wildlife Sanctuary is located in the northeastern state of **Arunachal Pradesh** in India.
 - The sanctuary is **named after the Dibang River**, which flows through it.
- **Biodiversity hotspot:**
 - It is considered a biodiversity hotspot and is **part of the Eastern Himalayas Endemic Bird Area**.
- **Flora:**
 - The sanctuary has a diverse range of flora, including **tropical evergreen forests, subtropical broadleaf forests, alpine meadows**, and subalpine **coniferous forests**.
 - Some of the important tree species found here include **oak, rhododendron, bamboo, and fir**.
- **Fauna:**
 - The Sanctuary is home to several rare and endangered species of animals, including the **Mishmi takin, musk deer, goral, clouded leopard, snow leopard**, and **tiger**.
 - It is also home to several bird species such as the **Satyr tragopan, Blyth's tragopan, and Temminck's tragopan**.
- **People:**
 - The sanctuary is home to several indigenous communities, such as **Idu Mishmi**.
- **Conservation efforts:**
 - The Dibang Wildlife Sanctuary was **notified in 1998** to protect its rich biodiversity.
 - Over the years, several conservation efforts have been undertaken, including mapping the tiger habitat and counting tigers in the area.
 - The **proposal to declare** the sanctuary as a **tiger reserve** is part of these efforts.
- **Threats:**
 - The Dibang Wildlife Sanctuary is facing several threats, including **habitat loss, poaching, and human-wildlife conflict**.
 - The **proposed tiger reserve** is expected to provide better protection to the sanctuary's wildlife and their habitat.

What are the Other Protected Areas in Arunachal Pradesh?

- **Pakke Wildlife Sanctuary.**
- **Namdapha National Park**
- **Mouling National Park**
- **Kamlang Wildlife Sanctuary.**
- **Itanagar Wildlife Sanctuary.**
- **Eagle Nest Wildlife Sanctuary.**

State Energy Efficiency Index 2021-22

Why in News?

Recently, the **State Energy Efficiency Index (SEEI) 2021-22** has been released by the Union Minister of Power and New & Renewable Energy.

What is the State Energy Efficiency Index?

- **About:**
 - The index is developed by the **Bureau of Energy Efficiency (BEE)**, a statutory body under the Ministry of Power, in association with **Alliance for an Energy-Efficient Economy (AEEE)**.
 - It assesses the **annual progress of states and UTs in energy efficiency** (energy savings and reduction in emission intensity).
 - The updated framework of **50 indicators is aligned with national priorities, and program-specific indicators** are included to track outcomes and impacts of state-level energy efficiency initiatives.
 - Based on the **progress and accomplishments of states** in energy efficiency implementation, they have been classified into four categories: **Front Runner, Achiever, Contender, and Aspirant**.
- **Significance:**
 - India is committed to achieving **NDC goals** and **transitioning to a net-zero economy by 2070**.
 - This requires collaboration between central and state governments, judicious resource allocation, policy alignment, and **regular progress tracking**.
 - **SEEI tracks progress in managing states' and India's energy footprint**, driving energy efficiency policies and programs at the state and local levels.

Note:

What are the Key Findings from SEEI 2021-22?

- **Front Runner Category (>60 points):**
 - Andhra Pradesh, Karnataka, Kerala, Rajasthan, and Telangana.
 - **Karnataka, Andhra Pradesh, Assam, and Chandigarh are the top-performing states** in their respective state groups, while **Telangana and Andhra Pradesh** showed the **most improvement since the last index**.
- **Achiever Category (50-60 points):**
 - Assam, Haryana, Maharashtra, and Punjab.

What are the Recommendations for States?

- Enabling fiscal assistance for energy efficiency in the focus sectors
- Developing institutional capacity in states and UTs to address emerging needs and challenges in energy efficiency implementation
- Enhancing cross-functional collaborations across financial institutions, energy service companies, and energy professionals in large-scale energy efficiency implementation in states
- Mainstreaming energy data reporting and monitoring across sectors

What is the Bureau of Energy Efficiency?

- **About:**
 - BEE was established on March 1st, 2002, under the provisions of the **Energy Conservation Act, 2001**.
 - The mission of BEE is to **assist in developing policies and strategies for energy efficiency** with the primary objective of reducing the energy intensity of the Indian economy.
- **Functions of BEE:**
 - BEE is responsible for regulatory and promotional functions as outlined in the Energy Conservation Act, 2001.
 - It recognizes, identifies, and utilizes existing resources and infrastructure to perform its functions. BEE works with state governments and utilities to improve energy efficiency implementation.
 - BEE's focus on energy efficiency contributes to India's climate commitments and a sustainable future.

River Rejuvenation

Why in News?

The 7.2 Km Kuttamperoor River in Alappuzha, Kerala has been rejuvenated after over a 6-year effort through public participation and government intervention.

- It was dead for more than a decade due to waste dumping, encroachments, and other human activities.
- It has been rejuvenated through deepening the channel, removing encroachments, constructing bunds on both sides. The revival of the Kuttamperoor river is expected to help **control floods in the region**.

What is River Rejuvenation and its Impact?

➤ About:

- River rejuvenation is the process of reviving or restoring the **natural flow and health of a river that has been damaged due to human activities** such as waste dumping, encroachment, and pollution. The process involves removing pollutants, cleaning up riverbeds, and restoring the natural environment around the river.

➤ Impacts:

- It can help to **restore the natural habitats of plants and animals**, promote biodiversity, and provide cleaner water for drinking and irrigation.
- Reviving rivers can also **boost tourism in the region and improve the livelihoods** of people who depend on the river for their livelihoods.
- Furthermore, river rejuvenation can help to **control floods and reduce the damage caused by them**. A healthy river can absorb excess water during heavy rains and prevent **flooding** in downstream areas. This can save lives and property and reduce the economic impact of floods.

➤ Initiatives:

- In 2022, the Ministry of Environment, Forest and Climate Change released Rs. 19,000–crore Detailed Project Reports (DPRs) on rejuvenation of **13 major rivers through forestry interventions**.
 - These 13 rivers are Jhelum, Chenab, Ravi, Beas, **Sutlej, Yamuna, Brahmaputra, Narmada, Godavari, Mahanadi, Krishna, Cauvery**, and **Luni**.

Note:

What are the Other Examples of River Rejuvenation Project?

- **Rhine River:** The Rhine River in Europe was once highly polluted but has since undergone a **massive clean-up effort that has transformed it** into a vibrant and thriving ecosystem.
- **Singapore River Clean-up:** The Singapore River Clean-up is another successful example of a river rejuvenation project. The project involved cleaning up the highly polluted river and transforming it into a major tourist attraction and a hub of cultural and social activities.
- **Thames River Restoration:** The Thames River Restoration project in London, UK, has led to the revival of the river's ecology and the creation of new habitats for wildlife.
- **Ganga Action Plan:** In India, the Ganga Action Plan is an ongoing project aimed at cleaning up and **rejuvenating the highly polluted Ganga River**. The project involves a range of interventions, including the construction of sewage treatment plants, the creation of green belts along the riverbanks, and the promotion of eco-friendly activities.

Radioactive Materials in Recycling Chain

Why in News?

The **International Atomic Energy Agency (IAEA)**, has released its annual data on **illicit trafficking of nuclear and other radioactive material**.

- The data shows that **radioactive materials or contaminated devices** are entering into the **booming scraps recycling chain**, posing a grave health hazard.

What does the IAEA Data Suggest?

- The IAEA's **Nuclear Security Plan** was established to **report incidents of illicit trafficking of nuclear and other radioactive material**.
- The latest dataset shows that **incidents of unauthorised disposal of radioactive sources** slipping into scrap metal or waste recycling industries are increasing.
 - The occurrence of such incidents indicates deficiencies in the systems to **control, secure and properly dispose of radioactive material**.

- The resulting contaminated metal, if used to **manufacture household goods**, could pose a **potential health problem to unsuspecting consumers**.
 - IAEA reported **146 incidents in 2022**, which is an increase of nearly 38% over the 2021 figure.

What Measures can be Taken to Prevent Radioactive Materials from Entering the Recycling Chain?

- **Strengthen Regulatory Frameworks:** Governments need to strengthen their regulatory frameworks and enforcement mechanisms to ensure **proper handling, storage, and disposal of radioactive materials**.
 - This can include **stricter licensing requirements for facilities that handle radioactive materials**, and penalties for non-compliance.
- **Improve Monitoring and Control Mechanisms:** Governments should also invest in improving monitoring and control mechanisms to **prevent the illicit trafficking of nuclear and radioactive materials**.
 - This can include the **use of radiation detection equipment at borders and other points of entry**, and more **comprehensive tracking and reporting systems**.
- **Encourage the Use of Alternative Materials:** Governments and other stakeholders should encourage the **use of alternative materials that do not pose a risk of radioactive contamination** and promote the development of technologies to extract valuable materials from radioactive waste in a safe and sustainable manner.

What is Radioactivity?

- Radioactivity is the phenomenon of **spontaneous emission of particles or waves from the unstable nuclei of some elements**. There are three types of radioactive emissions: **Alpha, Beta and Gamma**.
 - Alpha particles are positively charged **He (Helium) atoms**, beta particles are negatively charged electrons and gamma rays are neutral electromagnetic radiations.
- Radioactive elements are **naturally found in the earth's crust**. **Uranium, thorium and actinium** are three NORM (Naturally Occurring Radioactive Materials) series that contaminate water resources.
- Radioactivity is measured in **Becquerel (SI unit) or in Curie**. The unit **Sievert** measures the quantity of radiation absorbed by human tissues.

Note:



International Atomic Energy Agency

➤ About:

- Widely known as the world's "Atoms for Peace and Development" organisation within the **United Nations family**, the IAEA is the international centre for **cooperation in the nuclear field**.

➤ Establishment:

- The IAEA was created in 1957 in response to the deep fears and expectations generated by the **discoveries and diverse uses of nuclear technology**.
- Headquarter: **Vienna, Austria**.

➤ Objective:

- The Agency works with its Member States and multiple partners worldwide to promote safe, secure and peaceful use of nuclear technologies.
- In 2005, it was awarded the **Nobel Peace Prize** for their work for a safe and peaceful world.

➤ Functions:

- It is an independent international organisation that reports annually to the **United Nation General Assembly**.
- When necessary, the IAEA also reports to the **UN Security Council** in regards to instances of members' non-compliance with safeguards and security obligations.

Great Nicobar Island Project

Why in News?

The **National Green Tribunal (NGT)** has issued a stay on the **Great Nicobar Island** project worth ₹72,000 crore and created a committee to review the environmental clearance granted by the **Ministry of Environment, Forest and Climate Change**.

What is the Great Nicobar Island Project?

➤ About:

- The **Great Nicobar Island (GNI)** Project is a mega project to be implemented at the southern end of the **Andaman and Nicobar islands**.
- The project includes an **international container transshipment terminal**, a greenfield international airport, township development, and a **450 MVA gas and solar based power plant** over an extent of 16,610 hectares in the island.

➤ Purpose:

○ Economic Reasons:

- As per the **NITI Aayog report**, the proposed port will allow Great Nicobar to **participate in the regional and global maritime economy** by becoming a major player in cargo transshipment.
 - It is equidistant from Colombo to the southwest and Port Klang (Malaysia) and Singapore to the southeast, and positioned close to the **East-West international shipping corridor**, through which a very large part of the world's shipping trade passes.

○ Strategic Reasons:

- The proposal to develop Great Nicobar was first floated in the **1970s**, and its importance for national security and consolidation of the **Indian Ocean Region** has been repeatedly underlined.
- Increasing **Chinese assertion in the Indian Ocean** has added **great urgency to this imperative in recent years**.

Rapidly Melting Antarctic Ice

Why in News?

A study published in *Nature* has revealed that **rapidly melting Antarctic ice** is dramatically **slowing down the flow of water through the world's oceans**, and could have a **disastrous impact on global climate, marine food chain** and on the **stability of ice shelves**.

What are the Key Highlights of the Report?

➤ Impact on World's Ocean:

- As temperatures rise and freshwater from Antarctica's melting ice enters the ocean, the salinity and density of the surface water are reduced, **diminishing the downward flow to the sea's bottom**.
- The study showed that **warm water intrusions in the western Antarctic ice shelf would increase**, but it did not look at how this might create a feedback effect and generate even more melting.
- The report found **deepwater circulation in the Antarctic could weaken at twice the rate of decline in the North Atlantic**.
- Also, deep ocean water flows from Antarctica could decline by 40% by 2050.

Note:

- **Impact on Global Climate:**
 - The findings also suggest the ocean would not be able to absorb as much carbon dioxide as its upper layers become more stratified, leaving more CO₂ in the atmosphere.
- **Impact on Food Chain:**
 - **Ocean overturning** allows nutrients to rise up from the bottom, with the Southern Ocean supporting about **three-quarters of global phytoplankton production**, the base of the food chain.
 - Slowing the sinking near Antarctica **slows down the whole circulation** and hence also **reduces the amount of nutrients that get returned from the deep ocean** back up to the surface.

What are India's Initiatives in Antarctica's Context?

- **Antarctic Treaty:** India officially acceded to the Antarctic Treaty System on **1st August 1983**. On 12 September 1983, India became the fifteenth Consultative Member of the Antarctic Treaty.
- **Research Stations:** The **Dakshin Gangotri station (decommissioned)** and the **Maitri station, Bharti** were established to carry out research in Antarctica.
- **Establishment of NCAOR:** The **National Centre for Antarctic and Ocean Research (NCAOR)** was established to conduct the country's research activities in the Polar and Southern Ocean realms.
- **Indian Antarctic Act 2022:** It envisages regulating visits and activities to Antarctica as well potential disputes that may arise among those present on the continent.
- Other provisions of the act involve **protecting mineral resources, protecting native plants, prohibition on introducing birds not native** to Antarctica and **provisions for Indian tour operators**.

What about Deglaciation in the Rest of the World?

- **Melting of Thwaites Glacier:** Thwaites Glacier is 120 km wide, **fast-moving glacier located in Antarctica**.
 - Because of its size (1.9 lakh square km), **it contains enough water to raise the world sea level by more than half a metre**.
 - Its melting already contributes 4% to global sea-level rise each year.
- **Ice Melting at Mt. Kilimanjaro:** The ice cap on Africa's biggest peak, Tanzania's Mount Kilimanjaro,

is among the famous glaciers predicted to melt by 2050 because of climate change.

- It has **melted more than 80% since 1912**.
- **Retreating Himalayas:** The Himalayan glaciers form the largest body of ice outside the polar caps and are the source of water for the innumerable rivers that flow across the Indo-Gangetic plains.
 - Glaciers in the Himalaya are **receding faster than in any other part of the world**.
 - The glaciers have been **losing the equivalent of more than a vertical foot and half of ice each year since 2000**; double the amount of melting that took place from 1975 to 2000.

Supreme Court Modifies Order on ESZ

Why in News?

The **Supreme Court** modified its previous judgment regarding **Eco-Sensitive Zones (ESZ)** around protected forests, stating that **ESZs cannot be uniform across the entire country**, and instead need to be tailored to the specific protected area.

What was the Earlier SC Judgement on ESZ?

- **Previous Judgement:**
 - In June 2022, the SC ordered that **ESZs of a minimum of one kilometer should be declared around protected forests, national parks, and wildlife sanctuaries across the country**.
 - The court had said that ESZs would act as a **"shock absorber"** for the protected areas and prevent encroachment, **illegal mining, construction, and other activities that could harm the environment and wildlife**.
 - The court had also directed the **Centre and the States to notify the ESZs within 6 months and file compliance reports**.
 - **Arguments by Centre and States for Challenging it:**
 - The June 2022 order affected hundreds of villages in the peripheries of forests. **ESZs cannot be uniform across the country and have to be decided on a case-by-case basis**.
 - Geographical features, population density, land use patterns, and other factors of each protected area need to be taken into account.

Note:

- The order would hamper the development activities and livelihoods of the people living in the ESZs, as well as the conservation efforts of the forest departments.

What did the SC say in its Modified Order?

- The bench led by Justice B.R. Gavai agreed with the submissions of the Centre and the States and modified its previous order by saying that:
 - The purpose of declaring ESZs is **not to hamper the day-to-day activities of the citizens but to protect the environment and wildlife.**
 - A stringent observance of the June 2022 order would **cause more harm than good, as it would increase man-animal conflict**, prevent basic amenities and infrastructure for the villagers, and **hinder eco-development activities** around protected areas.
 - The Centre and the States should notify ESZs as per **their own proposals** or as per recommendations of expert committees within 6 months.
 - However, **mining within the national parks/wildlife sanctuaries** and within an area of **1 km from their boundary shall not be permissible.**

What are Eco-Sensitive Zones?

- **Governing Statute:**
 - The **National Wildlife Action Plan (2002-2016)** of the MoEFCC stipulated that state governments should declare land falling **within 10 km of the boundaries of national parks and wildlife sanctuaries** as eco-fragile zones or **Eco-Sensitive Zones (ESZs)** under the **Environmental (Protection) Act, 1986.**
- **Extent:**
 - While the **10-km rule is implemented as a general principle**, the extent of its application can vary.
 - **Areas beyond 10 km can also be notified by the Union government as ESZs**, if they hold larger ecologically important “sensitive corridors”.
- **Prohibited Activities within ESZs Include:**
 - Commercial mining
 - Sawmills
 - Industries causing pollution
 - **Major hydroelectric projects**
 - Commercial use of wood

- **Permitted Activities:**
 - Agricultural or horticultural practices
 - **Rainwater harvesting**
 - **Organic farming**
 - Use of **renewable energy sources**
 - **Adoption of green technology**
- **Significance:**
 - ESZs help in **in-situ conservation**
 - Minimize forest depletion and man-animal conflict
 - Minimize the negative impact on fragile ecosystems
- **Challenges Associated with ESZ:**
 - Climate change causing **land, water, and ecological stress on ESZs**
 - Impact on the **lives and livelihoods of forest communities** due to **forest rights** dilution

Mass Nesting of Olive Ridley Turtles

Why in News?

The Rushikulya beach in India’s Odisha state recently witnessed the **highest-ever congregation of Olive Ridley sea turtles** in the past few decades.

- Millions of baby turtles have emerged from their eggshells and started their journey towards the Bay of Bengal using vast seawater routes.

Why is this significant?

- The **Rushikulya beach is not a wildlife sanctuary**, yet turtles feel safe to carry out mass nesting.
 - The successful mass nesting and hatching **indicates a healthy marine ecosystem** and a conducive environment for sea turtles to lay eggs.
 - The successful hatching of many Olive Ridley turtles is a **positive sign for their conservation.**

What are Olive Ridley Turtles?

- **About:**
 - The Olive ridley turtles are the **smallest and most abundant of all sea turtles** found in the world.
 - These turtles are **carnivores** and get their name from their **olive-colored carapace.**
 - They are best known for their **unique mass nesting called Arribada**, where thousands of females **come together on the same beach to lay eggs.**

Note:

- **Habitat:**
 - They are found in **warm waters of the Pacific, Atlantic, and Indian oceans.**
 - Odisha's **Gahirmatha Marine Sanctuary** is known as the **world's largest rookery (a colony of breeding animals) of sea turtles.**
- **Protection Status:**
 - **Wildlife Protection Act, 1972:** Schedule 1
 - **IUCN Red List:** Vulnerable
 - **CITES:** Appendix I
- **Initiatives to Protect Olive Ridley Turtles:**
 - **Operation Olivia:**
 - Every year, the **Indian Coast Guard's "Operation Olivia"**, initiated in the early 1980s, helps **protect Olive Ridley turtles as they congregate along the Odisha coast** for breeding and nesting from November to December.
 - It also **intercepts unlawful trawling activities.**
 - **Mandatory use of Turtle Excluder Devices (TEDs):**
 - To reduce **accidental killing in India**, the Odisha government has made it mandatory for trawls to use **Turtle Excluder Devices (TEDs), a net specially designed with an exit cover** which allows the turtles to escape while retaining the catch.
 - **Tagging:**
 - The **tagging of the endangered Olive Ridley turtles** using non-corrosive metal tags is done to enable scientists to chart their movements and know the areas they visit to protect the species and their habitats.

Note:

- **Behler Turtle Conservation Award**, established in 2006, is a major annual international award honoring excellence in the field of tortoise and freshwater turtle conservation. It is considered the **"Nobel Prize"** of Turtle Conservation.
- It is **presented annually by the Turtle Survival Alliance, IUCN Tortoise and Freshwater Turtle Specialist Group, Turtle Conservancy, and Turtle Conservation Fund.**

What are the Threats Faced by Olive Ridley Turtles?

- **Human Activities:** Coastal development, fishing, and pollution along with destruction of their nesting habitats and accidental capture in fishing nets.

- **Predators:** Natural predators such as **dogs, hyenas, and birds of prey** that **often feed on eggs or hatchlings.**
- **Climate Change:** Rising **temperatures and sea levels impact nesting habitats**, making it difficult to lay eggs.
- **Light Pollution:** **Artificial lights** from nearby towns and industries can disorient hatchlings, causing them to move away from the sea and towards nearby villages.

India's Cheetah Translocation Project**Why in News?**

India's ambitious **Cheetah Translocation Project** is facing a new set of challenges as two cheetahs have died, bringing the number of cheetahs left in the project to 18 out of the initial 20.

- **Uday, a six-year-old male cheetah**, died on April 23, 2023, in **Kuno National Park**, and **Sasha, a five-year-old female cheetah**, died on March 27, 2023, in the same park.
- Therefore, the government is now considering alternative conservation models, such as the **South African model of conserving cheetahs in fenced reserves.**

Were these Deaths Expected?

- The project anticipated a high mortality rate, and its short-term goal was to achieve a **50% survival rate for the first year, which is 10 out of 20 cheetahs.**
 - However, experts pointed out that the project had overestimated **Kuno National Park's carrying capacity for cheetahs, and this added pressure on the project staff to look for alternative sites.**
- **Causes of Death:**
 - A South African study found that **predation was the biggest killer**, accounting for 53.2% of cheetah mortality. Lions, leopards, hyenas, and jackals were primarily responsible.
 - **Cheetahs suffer very high cub mortality – up to 90%** in protected areas – mainly due to predation.
 - In Africa, **the lion is the chief predator of cheetahs**; in India, where lions are absent (except in Gujarat), **leopards are likely to slip into that role** in potential cheetah landscapes.

Note:



- Other causes of mortality can be **holding camps, immobilization/transit, tracking devices**, and other wildlife killing cheetah (cubs) including warthogs, baboons, snakes, elephants, crocodiles, vultures, zebras, and even ostriches.
- **South African Model for Conserving Cheetahs:**
 - In South Africa, a conservation strategy called **meta-population management** was used to protect cheetahs.
 - This strategy involved **moving cheetahs from one small group to another** to ensure that they have **enough genetic diversity and to maintain a healthy population**.
 - This approach was successful in maintaining a **viable population of cheetahs in South Africa; in 6 years, the meta-population grew to 328 cheetahs**.

What are the Options Available to the Project?

- The authorities are exploring the possibility of preparing **Gandhi Sagar Wildlife Sanctuary in the Chambal River valley as the second home for cheetahs**.
- Another option is to move a few cheetahs from Kuno to the safety of an 80-sq-km fenced area in **Rajasthan's Mukundra Hills Tiger Reserve**.
- However, both options would mean shifting the project's goal from establishing the cheetah in **an open landscape to managing the African imports as a few pocket populations in fenced-in or restricted areas**.

Mukundra Tiger Reserve

- it is situated near **Kota, Rajasthan**, in a valley formed by **two parallel mountains, Mukundra and Gargola**.
- The valley is bounded by four rivers - **Ramzan, Ahu, Kali, and Chambal** - and drained by their tributaries.
- **Protected area:**
 - Mukundra Hills was declared a Wildlife Sanctuary in 1955 and a National Park (Mukundra Hills (Darah) National Park) in 2004.
 - It was declared a **Tiger Reserve** in 2013, becoming the third in Rajasthan after **Ranthambore and Sariska**.
- **Parks and sanctuaries:**
 - Mukundra TR consists of three Wildlife Sanctuaries - Darrah, Jawahar Sagar, and Chambhal - and covers four districts of Rajasthan: Kota, Bundi, Chittorgarh, and Jhalawar.

Synchronised Survey of Vultures

Why in News?

There are 246 vultures spread across Tamil Nadu, Karnataka and Kerala, **according to the first-ever synchronised census** on the bird carried out in February 2023.

- The survey was conducted by the Kerala Forest and Wildlife department along with its counterparts in Tamil Nadu and Karnataka in the **select regions of the Western Ghats**.

What are the Key Highlights of the Survey?

- The survey was carried out in the **Mudumalai Tiger Reserve (MTR)** and the adjoining landscape consisting of Sathyamangalam Tiger Reserve (STR) in Tamil Nadu, **Wayanad Wildlife Sanctuary (WWS)** in Kerala, **Bandipur Tiger Reserve (BTR)** and **Nagerhole Tiger Reserve (NTR)** in Karnataka.
 - A total of 98 vultures were seen in MTR, two in STR, 52 in WWS, 73 in BTR, and 23 in NTR.
- Volunteers sighted **White-rumped vultures (183), Long-billed vultures (30)**, Red-headed vultures (28), Egyptian vultures (3), Himalayan Griffon (1), and Cinereous vultures (1).
- Vultures are witnessing a catastrophic decline **from the 2000s as these species are being exposed to diclofenac drug** which is mainly used as a painkiller for cattle and experts believe that increasing wild carcass availability was one of the major steps needed to help vultures thrive.

What are Vultures?

- **About:**
 - It is one of the **22 species of large carrion-eating birds** that live predominantly in the tropics and subtropics.
 - They act an **important function as nature's garbage collectors** and help to keep the environment clean of waste.
 - Vultures also play a valuable role in keeping wildlife diseases in check.
 - India is home to **9 species of Vulture** namely the Oriental white-backed, Long-billed, Slender-billed, Himalayan, Red-headed, Egyptian, Bearded, Cinereous and the Eurasian Griffon.

Note:

- Most of these 9 species face dangers of extinction.

- Bearded, Long-billed, Slender-billed, Oriental white-backed are protected in the Schedule-1 of the **Wildlife Protection Act 1972**. Rest are protected under 'Schedule IV'.

➤ **International Union for Conservation of Nature (IUCN):**

➤ **Threats:**

- Loss of Natural Habitats due to anthropogenic activities.
- Food Dearth and Contaminated Food.
- Electrocution by Power lines.

➤ **Conservation Efforts:**

- Recently, the Ministry for Environment, Forests and Climate Change launched a **Vulture Action Plan 2020-25** for the conservation of vultures in the country.

- It will ensure **minimum use of Diclofenac** and prevent the poisoning of the principal food of vultures, the cattle carcasses.

- To study the cause of deaths of vultures in India, a **Vulture Care Centre (VCC)** was set up at Pinjore, Haryana in 2001.

- Later in 2004, the VCC was upgraded to being the **first Vulture Conservation and Breeding Centre (VCBC)** in India.

- At present, there are **nine Vulture Conservation and Breeding Centres (VCBC)** in India, of which three are directly administered by the Bombay Natural History Society (BNHS).

Sr. No.	Name of the Vulture Species	IUCN status	Pictorial Representation
1.	Oriental White-backed Vulture (Gyps Bengalensis)	Critically Endangered	
2.	Slender-billed Vulture (Gyps Tenuirostris)	Critically Endangered	
3.	Long-billed Vulture (Gyps Indicus)	Critically Endangered	
4.	Egyptian Vulture (Neophron Percnopterus)	Endangered	
5.	Red-Headed Vulture (Sarcogyps Calvus)	Critically Endangered	
6.	Indian Griffon Vulture (Gyps Fulvus)	Least Concerned	
7.	Himalayan Griffon (Gyps Himalayensis)	Near Threatened	
8.	Cinereous Vulture (Aegypius Monachus)	Near Threatened	
9.	Bearded Vulture or Lammergeier (Gypaetus Barbatus)	Near Threatened	

Note:

CEA Regulations for Great Indian Bustard Area

Why in News?

The **Central Electricity Authority (CEA)** has issued Draft Central Electricity Authority (Construction of Electric Lines in Great Indian Bustard Area) Regulations, 2023, making mandatory for electric lines to be underground or overhead through the '**Great Indian Bustard (GIB) Area**'.

- The regulations came in light of a case in the **Supreme Court (SC)** on the issue of **threat to the endangered Great Indian Bustards**.
- As per the regulations, all electric lines of 33 kV and below passing through the 'Great Indian Bustard Area' will be underground, while those above 33KV will be overhead lines installed with bird flight diverters.
- These diverters are aimed at improving power line visibility for birds and reducing the risk of collision.

What is GIB?

- **About:**
 - The **Great Indian Bustard (*Ardeotis nigriceps*)**, the **State bird of Rajasthan**, is considered India's **most critically endangered bird**.
 - It is considered the **flagship grassland species**, representing the health of the grassland ecology.
 - Its population is confined mostly to Rajasthan and Gujarat. Small populations occur in Maharashtra, Karnataka and Andhra Pradesh.
- **Vulnerability:**
 - The bird is under **constant threats due to collision/ electrocution with power transmission lines**, hunting (still prevalent in Pakistan), habitat loss and alteration as a result of widespread agricultural expansion, etc.
- **Protection Status:**
 - **IUCN red List:** Critically Endangered
 - **Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES):** Appendix 1
 - **Convention on Migratory Species (CMS):** Appendix I
 - **Wildlife (Protection) Act, 1972:** Schedule I

What are the Measures to Protect GIB?

- **Species Recovery Programme:**
 - It is kept under the species recovery programme under the **Integrated development of Wildlife Habitats** of the Ministry of Environment, Forests and Climate Change (MoEFCC).
- **National Bustard Recovery Plans:**
 - It is currently being implemented by conservation agencies.
- **Conservation Breeding Facility:**
 - MoEF&CC, Rajasthan government and Wildlife Institute of India (WII) have also established a conservation breeding facility in Desert National Park at Jaisalmer in June 2019.
- **Project Great Indian Bustard:**
 - It has been launched by the Rajasthan government with an aim of constructing breeding enclosures for the species and developing infrastructure to reduce human pressure on its habitats.
- **Eco-Friendly Measures:**
 - Task Force for suggesting eco-friendly measures to mitigate impacts of power transmission lines and other power transmission infrastructures on wildlife including the Great Indian Bustard.

Great Seahorse Migration

Why in News?

A study indicated that **extensive fishing off the Coromandel coast could be forcing the great seahorse to migrate towards Odisha**.

- Though, fishing is less intense off the Odisha coastline but **still it may not be the new comfort zone for the Seahorse due to lack of suitable habitat**.

What are the Key Facts about Seahorse?

- **About:**
 - Sea horses are **tiny fish that are named for the shape of their head**, which looks like the head of a tiny horse. They are classified as fish, in the **genus Hippocampus**.
 - There are **46 species** of seahorses reported **worldwide**. The coastal ecosystems of **India house 9 out of 12 species found in the Indo-Pacific**.

Note:

- They are found in **shallow coastal waters** in latitudes from about **52° N to 45°S**.
- Seahorse populations in India are **distributed across diverse ecosystems** such as **seagrass, mangroves, macroalgal beds, and coral reefs**.
- **Distribution in India:**
 - These 9 species are **distributed along the coasts of eight States and five Union Territories from Gujarat to Odisha, apart from Lakshadweep and the Andaman and Nicobar Islands**.
- **Slow Swimmers:**
 - When swimming they maintain a vertical position and propel themselves forward using a soft-rayed dorsal fin.
 - They **migrate by rafting, clinging to floating substrata** such as macroalgae or plastic debris for dispersal by ocean currents.
- **Unique Reproductive Habits:**
 - The **male gives birth to child** as the female uses an ovipositor (egg duct) to place her eggs into a brood pouch located at the base of the male's tail where the eggs are later fertilized.
- **Conservation Status:**
 - **IUCN status-Vulnerable**
 - **CITES: Appendix II**

What are the Reasons for Decline and Migration?

- The population of the Great seahorse is declining due to its **Overexploitation** for
 - Traditional Chinese medicines
 - Ornamental fish
 - General destructive fishing
 - Fisheries bycatch.
- This **creates immense pressure on the seahorse populations** that have a **high dependency on local habitats** to maintain their extensive and long-life history traits.
- The **1,300 km northward migration** of the great seahorse from Palk Bay and the Gulf of Mannar to Odisha is **likely a response to extensive fishing activities** around the southern coast of India.
 - Around **13 million individuals are caught per year** on Coromandel coast.

What are the Challenges with Migration?

- **Lack of Suitable Habitats:** Odisha coast **does not have coral reefs or seagrass meadows** to make a suitable habitat, except within the Chilika region.
 - Thus, it is going to be **difficult for the species, unless the fishing nets that catch them are banned** or the fishing practices such as **Bottom trawling** are stopped.
- **Lack of Conservation Measures:** This highlights the lack of monitoring of the coastal ecosystems of India on the east coast and reaffirms the need better conservation and management of the remaining seahorse populations.

UN Treaty on the High Seas

Why in News?

- Recently, the **UN (United Nations)** members agreed on a **High Seas Treaty** to ensure the protection and sustainable use of marine biodiversity of areas beyond national jurisdiction.
- It was agreed during talks led by the UN during the **Intergovernmental Conference (IGC) on Marine Biodiversity of Areas Beyond National Jurisdiction (BBNJ)** in New York, the US.
- The treaty is **yet to be formally adopted** as members are yet to ratify it. Once adopted, the treaty will be **legally binding**.

What are High Seas?

- **About:**
 - According to the **1958 Geneva Convention on the High Seas**, parts of the sea that are **not included in the territorial waters or the internal waters** of a country are known as the high seas.
 - It is the area beyond a **country's Exclusive Economic Zone** (that extends up to **200 nautical miles (370 km) from the coastline**) and till where a nation has jurisdiction over living and non-living resources.
 - No country is responsible **for the management and protection of resources on the high seas**.
- **Significance:**
 - The high seas **account for more than 60% of the world's ocean area** and cover about **half of the Earth's surface**, which makes them a hub of marine life.

Note:

- They are home to **around 2.7 lakh known species**, many of which are yet to be discovered.
 - They regulate the climate by playing a **fundamental role in planetary stability** by **mitigating the effects of climate change** through its **absorption of carbon** and by **storing solar radiation** and distributing heat around the globe.
 - Therefore, they are fundamental to human survival and well-being.
 - Moreover, the ocean **provides a wealth of resources and services**, including seafood and raw materials, genetic and medicinal resources, air purification, climate regulation, and aesthetic, scientific and cultural services.
- **Threats:**
- They absorb heat from the atmosphere, are affected by phenomena like the **El Nino**, and are also undergoing **acidification** — all of which endanger **marine flora and fauna**.
 - Several thousand marine species are at risk of extinction by 2100 if current warming and acidification trends continue.
 - Anthropogenic pressures on the high seas include **seabed mining, noise pollution, chemical and oil spills and fires, disposal of untreated waste** (including antibiotics), overfishing, introduction of invasive species, and coastal pollution.
 - Despite the alarming situation, **the high seas remain as one of the least-protected areas, with only about 1% of it under protection.**
- What is the High Seas Treaty?**
- **Background:**
- In 1982, the **United Nations Convention on the Law of the Sea (UNCLOS)**, was adopted, which delineated rules to govern the oceans and the use of its resources.
 - However, there was **no comprehensive legal framework that covered** the high seas.
 - As climate change and global warming emerged as global concerns, a need was felt for **an international legal framework to protect oceans** and marine life.
 - The **UNGA (United Nations General Assembly)** decided in 2015 to develop a legally binding instrument within the framework of UNCLOS.
 - Subsequently, the **IGC was convened to frame a legal instrument** on BBNJ.
- There were several hold-ups due to the **Covid-19 pandemic**, hampering a timely global response. In 2022, the European Union launched the High Ambition Coalition on BBNJ to finalize the agreement at the earliest.
- **Key Features:**
- **Access and Benefit-sharing Committee:**
 - It will set up an access- and benefit-sharing committee to frame guidelines.
 - The activities concerning marine genetic resources of areas on high seas will be in the interests of **all States and for the benefit of humanity**.
 - They have to be **carried out exclusively for peaceful purposes**.
 - **Environmental Impact Assessments:**
 - Signatories will have to conduct **environmental impact assessments** before the exploitation of marine resources.
 - Before carrying out a planned activity, the member will have to undertake processes of screening, scoping, carrying out an impact assessment of the marine environment likely to be affected, identifying prevention, and management of potential adverse effects.
 - **Consent from Indigenous Community:**
 - Marine resources in areas beyond national jurisdiction that are held by indigenous people and local communities can only be accessed with their “free, prior and informed consent or approval and involvement”.
 - **No State can claim its right over marine genetic resources** of areas beyond national jurisdiction.
- **Clearing-House Mechanism:**
- Members will have to provide the Clearing-House Mechanism (CHM), established as part of the treaty, with details like the objective of the research, geographical area of collection, names of sponsors, etc.
- **Funding:**
- A special fund will be established as part of the pact which will be fixed by the conference of parties (COP). The COP will also oversee the functioning of the treaty.
- **Significance:**
- The treaty is significant in achieving the 30x30 target set at **UN CBD (Convention on Biological Diversity) COP15** under which the countries agreed to protect 30% of oceans by 2030.

Note:



Rhinoceros

RHINOCEROS
World Rhino Day - 22nd September (declared by WWF in 2010)

5 Main Species of Rhino			
Species	Found in	IUCN Red List Status	Habitat
African White	Africa	NT	Long/short grass Savannah
African Black	Africa	CE	Semi-Desert Savannah
Greater one-horned	Asia	Vu (CITES - Appendix I, WPA - Schedule I)	Tropical grassland
Javan	Asia	CE	Tropical, subtropical forests
Sumatran	Asia	CE	Same as Javan

Ujung Kulon National Park (a UNESCO WHS) is home to the last remaining wild Javan rhinos on Earth

Greater One-Horned Rhino

Only species found in India (aka Indian Rhino)

CHARACTERISTICS

- Largest of the 5 species
- Identified by a single black horn and a grey-brown hide with skin folds

Threats

- Poaching for horns
- Habitat loss
- Decreasing Genetic diversity

Protected Areas (India)

- UP**
 - Dudhwa TR
- West Bengal**
 - Jaldapara NP
 - Gorumara NP
- Assam**
 - Pabitora WLS
 - Orang NP
 - Kaziranga NP (max no. of Rhinos: ~2400)
 - Manas NP

Conservation Efforts (India)

- National Rhino Conservation Strategy
- Indian Rhino Vision 2020 (launched in 2005)

New Delhi Declaration on Asian Rhinos 2019
Signed by 5 rhino range nations (India, Bhutan, Nepal, Indonesia and Malaysia)

Drishiti IAS

➤ MARPOL Convention (1973):

- It covers pollution of the **marine environment by ships** from operational or accidental causes.
- It lists various forms of marine pollution caused by oil, noxious liquid substances, harmful substances in packaged form, sewage and garbage from ships, etc.

India Ranks Fifth in National Contribution to Warming

Why in News?

Recently, the research published in the journal "Scientific Data" ranked **India fifth among the top 10 contributors to global warming**.

What are the Key Highlights of the Report?

➤ Top Contributor:

- The United States topped the list with its emissions causing 0.28°C (17.3%) of rise in temperature.
- China stood second and Russia took third place.

➤ India's Position:

- Since 2005, **India climbed to the fifth spot** from the 10th.
- India is responsible for 0.08 degrees Celsius of warming from the 1850s through 2021.
- India's emissions of carbon dioxide (CO₂), methane (CH₄) and nitrous oxide (N₂O) from 1851-2021 have resulted in 0.04°C, 0.03°C and 0.006°C of global warming over pre-industrial levels, respectively.

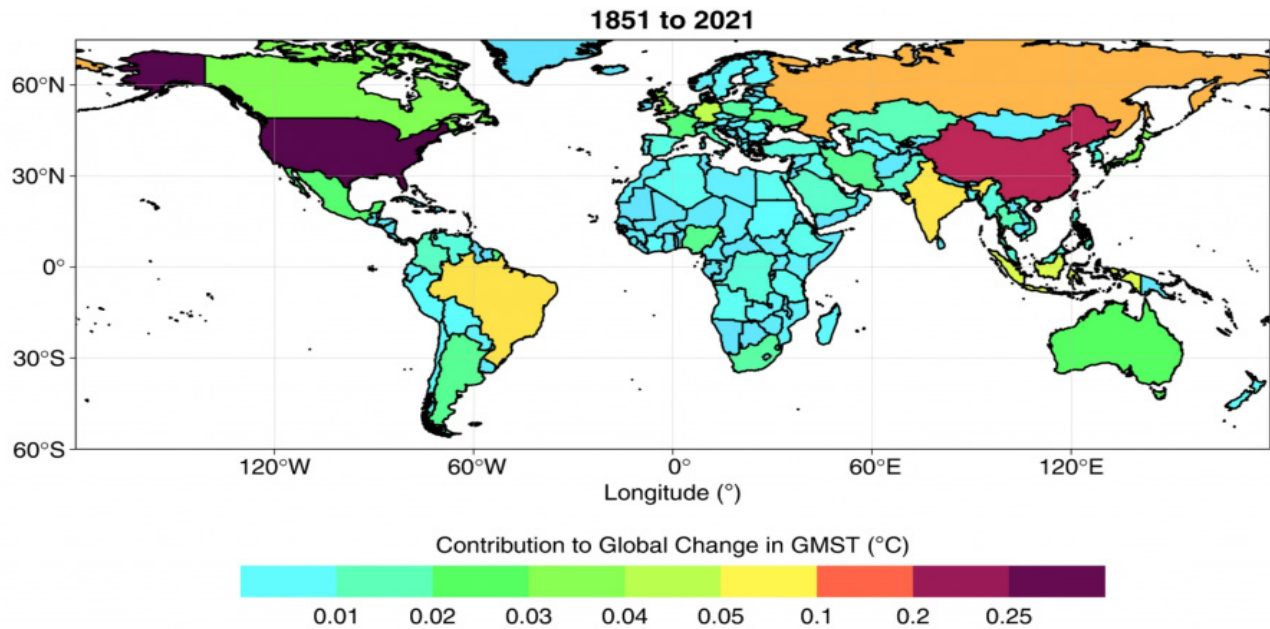
➤ Cause of Warming:

- The land-use and forestry sector is a significant contributor in half the countries.
- CO₂ emissions from **land use, land-use change and forestry (LULUCF) in Brazil led to 0.04°C of warming**.
- Also, the LULUCF sector accounted for 38% of the total warming from CH₄ emissions and 72% from N₂O emissions between 1851-2021.
- The report highlighted emissions linked to historical deforestation and agricultural expansion.
- Fossil fuel remains the biggest contributor. Since 1992, the additional warming caused by global fossil fuel emissions has been **over four times greater than the additional warming caused by land-use change**.

What are the Other Conventions related to Seas?

- **Convention on Continental Shelf 1964:**
 - It defines and **delimits the rights of States to explore and exploit** the natural resources of the continental shelf.
- **Convention on Fishing and Conservation of Living Resources of the High Seas 1966:**
 - It was designed to solve the problems involved in the conservation of living resources of the high seas, considering that because of the development of modern technology some of these resources are in danger of being overexploited.
- **London convention 1972:**
 - Its objective is to promote the effective control of all sources of marine pollution and to take all practicable steps to prevent pollution of the sea by dumping of wastes and other matters.

Note:



What are Greenhouse Gases?

- A **greenhouse gas** (GHG) is a gas that absorbs and emits radiant energy at thermal infrared wavelengths, causing the greenhouse effect.
- The primary GHGs in Earth's atmosphere are water vapor (H₂O), carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), and ozone (O₃).

Government to Re-examine Asiatic Lion Translocation Plan

Why in News?

The **Indian government** is re-examining the long-standing plan to **translocate Asiatic lions** (*Panthera leo persica*) from **Gir National Park** to **Kuno National Park**.

What are the Developments Related to Translocation of Asiatic Lions?

- In 2013, the **Supreme Court** ordered the government to **translocate Asiatic lions** from **Gujarat** to the **Kuno National Park** in Madhya Pradesh. However, the lion translocation remains on paper.
- However, the Centre's 25-year roadmap for Project Lion has **no provision for any translocation outside Gujarat**.

○ Instead, the focus is on assisted **natural dispersal across Saurashtra** by 2047.

- The **National Tiger Conservation Authority (NTCA)** has recently pointed out that the lion population increased by **29% over the past 5 years**.
- In view of the recent introduction of cheetahs in Kuno and NTCA is looking for measures to secure the lion's future beyond Gir.

What are the Key Points Related to Asiatic Lions?

- **About:**
 - The Asiatic Lion (also known as the **Persian Lion** or **Indian Lion**) is a member of the **Panthera Leo Leo** subspecies that is **restricted to India**.
 - Its **previous habitats** consisted of **West Asia** and the **Middle East** before it became extinct in these regions.
 - Asiatic lions are **slightly smaller than African lions**.
- **Distribution:**
 - Asiatic lions were **once distributed to the state of West Bengal** in east and **Rewa** in Madhya Pradesh, in central India.
 - At present **Gir National Park and Wildlife Sanctuary** is the only abode of the Asiatic lion.
- **Protection Status:**
 - **IUCN Red List:** Endangered

Note:

- **CITES:** Appendix I
- **Wildlife (Protection) Act 1972:** Schedule I

Gir National Park

- **Gir National Park and Wildlife Sanctuary** is located in the **Junagadh** district of Gujarat.
 - It was declared as a sanctuary in 1965 and a national park in 1975.
- The Gir Forests is the largest compact tract of **dry deciduous forests** in the **semi-arid western part of India**.
- Gir is often linked with “**Maldharis**” who have survived through the ages by having **sympiotic relationship with the lion**.

Kuno National Park

- **Kuno National Park** is a protected area located in the **Sheopur district of Madhya Pradesh state in India**.
- It has a healthy population of **chital, sambar, nilgai, wild pig, chinkara and cattle**.

Earth Hour

Why in News?

Earth Hour is a worldwide movement organized to encourage individuals, communities and businesses to **turn off non-essential electric lights for one hour**.

- It is organized **on the last Saturday of March** as a symbol of commitment to the planet.

What is an Earth Hour?

- **About:**
 - Earth Hour is the **World Wildlife Fund for Nature (WWF)**'s annual initiative that began in 2007.
 - It encourages people from more than 180 countries to switch off the lights from **8.30 pm to 9.30 pm** as per their local time.
 - The idea is to **refrain from the use of non-essential lighting** to save energy in a symbolic call for environmental protection.
- **Theme:** Invest in Our Planet.
- **Significance:**
 - Earth Hour aims to **increase awareness and spark global conversations on protecting nature, tackling the climate crisis**, and working together to shape a brighter future for humans.

- The symbolic lights-out Earth Hour has become **the world's largest grassroots movement to raise awareness about climate change and energy conservation** and to assure a sustainable, brighter future.

What is the World Wildlife Fund?

- **About:**
 - It is the **world's leading conservation organisation** and works in more than 100 countries.
 - It was **established in 1961** and is headquartered at Gland, Switzerland
- **Mission:**
 - **To conserve nature and reduce the most pressing threats** to the diversity of life on Earth.
- **Other Initiatives of WWF:**
 - **TX2 Goal** (a global commitment to double the world's wild tigers by 2022)
 - **TRAFFIC** (a joint program of WWF and the International Union for Conservation of Nature (IUCN)).
 - **Living Planet Report** .

New Species of Moray Eel

Why in News?

Researchers have recently discovered a new species of **Moray eel** off the Cuddalore coast (Tamil Nadu) and has been named after the state as *Gymnothorax tamilnaduensis*.

What are the Key Highlights of Discovery?

- This is the **first ever record of this genus, Gymnothorax, collected through an exploration survey** conducted along the coastal waters of Cuddalore.
- 4 specimens (total length 272-487 mm) were collected, and the species is notably different from other species of the genus *Gymnothorax*.
 - The distinction point is a series of lines of small dark spots present on the head and a single line of black spots on the midline of the body.
- The name of the species has been registered in ZooBank, the online registration system for the **International Commission on Zoological Nomenclature (ICZN)**.

Note:

What are the Key Points about Moray Eel?

- Moray Eels **occur in all tropical and subtropical seas**, they live in **shallow water** among reefs and rocks.
- They are known for two types of jaws: one is regular (oral) jaws with big teeth and the second jaw is called the **pharyngeal jaw (which drags prey inside the eels stomach)**.
- Their **IUCN red list** status is **Least Concern (LC)**.
- Including the newly discovered species, **29 species of Gymnothorax have been documented in Indian waters so far.**

International Commission on Zoological Nomenclature

- Founded in 1895, ICZN is tasked to create, publish and periodically revise the **International Code of Zoological Nomenclature**.
- It provides and regulates a uniform system of zoological nomenclature ensuring that every animal has a unique and universally accepted scientific name.
- ICZN acts as adviser and arbiter for the zoological community by generating and disseminating information on the correct use of the scientific names of animals.

DNA Profiling of Elephants

Why in News?

While celebrating the 30 years of '**Project Elephant**', the MoEF&CC has announced the completion of the **DNA (Deoxyribonucleic Acid)** Profiling of 270 elephants, aiming at ensuring better protection.

What is the Project?

- The DNA profiling was started in August 2022 for **Gaj Sochna Mobile Application** for forest officials.
 - DNA profiling is the process where a specific DNA pattern, called a profile, is obtained from a sample of bodily tissue.
- The DNA profiling will act as the '**Adhaar card** of captive elephants'.
 - The captive elephants had earlier **been chipped electronically, but the method was not a success.**
- With the mobile app, forest officers can identify each elephant and track it and therefore its transfer, which

often happens in the case of captive elephants, can be recorded.

- After the elephant profiling, more focus can be put on elephant care – with unique information about elephants.
 - Unlike **Project Tiger**, the Project Elephant looks at the **welfare and health of captive elephants as well.**

What is Project Elephant?

- It was launched in **1992** as a **Centrally-Sponsored Scheme** with an aim to protect elephants and improve their habitat and corridors, reduce **Human-elephant conflict** and ensure their welfare.
- As many as 33 elephant reserves, spanning 80,777 sq km, have been notified.
- It provides financial and technical support to wildlife management efforts by states for their **free-ranging populations of wild Asian Elephants**.
- The project aims to ensure the long-term survival of the populations of elephants in their natural habitats by protecting the elephants, their habitats and migration corridors.
- Other goals of Project Elephant are **supporting the research of the ecology and management of elephants**, creating awareness of conservation among local people, and providing improved veterinary care for captive elephants.

What is the Population of Elephants in India?

- **India is home to 20% of the global captive Asian elephant population**, but a census of captive elephants is not done regularly.
- India has the largest and the most stable population of Asian elephants, where more than **60% of wild Asian elephants are in India**.
 - Nilgiri landscape **has the largest single population of the endangered Asian elephant** anywhere in the world.
- The population of 29,964 elephants as recorded in the last elephant census conducted in 2017 speaks volumes of the passion for wildlife conservation ingrained in Indian culture.
 - As per Elephant Census (2017), **Karnataka has the highest number of elephants (6,049)**, followed by Assam (5,719) and Kerala (3,054).

Note:

What are the Key Points Related to Elephants?

- **Asian Elephants:** There are three subspecies of Asian elephant which are the **Indian, Sumatran and Sri Lankan**.
 - **Global Population:** Estimated 20,000 to 40,000.
 - The Indian subspecies has the widest range and accounts for the majority of the remaining elephants on the continent.
 - **IUCN Red List Status:** Endangered.
 - **Wildlife (Protection) Act, 1972:** Schedule I.
 - **CITES:** Appendix I
- **African Elephants:** There are two subspecies of African elephants, the Savanna (or bush) elephant and the Forest elephant.
 - Global Population: Around 4,00,000.
 - IUCN Red List Status: Vulnerable.
 - Earlier in July 2020, **Botswana (Africa) witnessed the death of hundreds of elephants.**
- **Concerns:**
 - Escalation of poaching.
 - Habitat loss.
 - Human-elephant conflict.
 - Mistreatment in captivity.
 - Abuse due to elephant tourism.

What are Elephant Conservation Efforts?

- Cleaning areas from lantana and eupatorium (**invasive species**) as they prevent the growth of grass for elephants to feed on.
- **Gaj Yatra** is a nationwide awareness campaign to celebrate elephants and highlights the necessity of securing elephant corridors.
- The **Monitoring the Illegal Killing of Elephants (MIKE) programme**, launched in 2003, is an international collaboration that tracks trends in information related to the illegal killing of elephants from across Africa and Asia, to monitor effectiveness of field conservation efforts.
- Even mahouts (people who work with, ride and tend to elephants) and their families play an important part in the welfare of elephants.
- Recently, the **Supreme Court (SC)** upheld the 2011 order of the Madras High Court (HC) on the Nilgiris elephant corridor, affirming the **right of passage** of the animals and the closure of resorts in the area.

CAMPA Policy at odds with IPCC Report

Why in News?

Recently, The **Intergovernmental Panel on Climate Change (IPCC)** has released its Synthesis Report, where it has raised concerns about the ongoing policy of **Afforestation in India** that allows forests to be cut down and replaced elsewhere.

What is the Background?

- Afforestation is part of India's climate pledges. The government has committed to adding "an additional carbon sink of **2.5-3 GtCO₂e** through **additional forest and tree cover by 2030**".
 - GtCO₂e stands for **gigatonnes of carbon-dioxide-equivalent**.
- Afforestation is also codified in the **Compensatory Afforestation Fund Management and Planning Authority (CAMPA)**, a body created on the **Supreme Court's** orders in 2002.
- CAMPA is meant to **promote afforestation and regeneration activities** as a way of compensating for forest land diverted to non-forest uses.
- When forest land is diverted to non-forest use, such as a dam or a mine, that land can **longer provide its historical ecosystem services** nor host biodiversity.
- According to the **Forest (Conservation) Act 1980**, the project proponent that wishes to divert the land must identify land elsewhere to afforest, and pay the land value and for the afforestation exercise. That land will thereafter be stewarded by the forest department.

Why does CAMPA matter?

- In 2006-2012, the fund grew from Rs 1,200 crore to Rs 23,600 crore, but the Comptroller and Auditor General (CAG) found in 2013 that most of the **money had been unspent**.
- CAMPA has also come under **fire for facilitating the destruction of natural ecosystems** in exchange for forests to be set up in other places.
 - In October 2022, the Haryana government said it **would develop the "world's largest curated safari"** using CAMPA funds received from deforestation in Great Nicobar for development projects, **2,400 km** away and of very different topography.

Note:



What are the IPCC's Recommendations?

- Since the natural ecosystems provide biodiversity, local livelihoods, hydrological services and sequester carbon.
- The IPCC recommended that Renewable energy projects like wind and solar plants must be promoted to mitigate the adverse impacts of natural ecosystem diversion.
- Reducing conversion of natural ecosystems could be more expensive than wind power, **yet still less expensive than "ecosystem restoration, afforestation, restoration"**, for every GtCO₂e.

State of India's Environment Report 2023

Why in News?

Recently, **State of India's Environment report 2023** was launched by **Centre for Science and Environment (CSE)** and **DTE (Down to Earth)** magazine, covering an extensive gamut of subject assessments, ranging from climate change, agriculture and industry to water, plastics, forests and biodiversity.

- The report is the annual publication, focusing on **climate change**, migration, health and food systems. It also covers biodiversity, forest and wildlife, energy, industry, habitat, pollution, waste, agriculture and rural development.
- CSE is a public interest research and advocacy organisation based in New Delhi.

What are the Key Highlights of the Report?

- **Encroachment:**
 - Over 30,000 water bodies have been encroached on in the country and India is generating **150,000 tonnes of Municipal Solid Waste (MSW) every day** — more than half of which is either **dumped in landfills** or remains unattended.
- **Air Pollution:**
 - Four years and 11 months is the **average duration of life lost to air pollution** in India.
 - Rural India is losing **more years due to air pollution-related health issues** than the urban belt.
 - Rural India needs 35 % more community health centers.

Environmental Crimes:

- Environmental crimes continue unabated — courts need to decide **on 245 cases every day to clear the backlog.**

Extreme Weather Events:

- Between January and October 2022, India witnessed **extreme weather events** on 271 days.
- These extreme weather events **claimed over 2,900 lives.**

SDGs:

- Over the past five years, India's overall global rank in meeting the United Nations-mandated **Sustainable Development Goals (SDGs)** has slipped by nine places — ranking 121 in 2022.
- India ranks below four south Asian countries — Bangladesh, Bhutan, Sri Lanka and Nepal.
 - India is facing challenges in 11 of the 17 SDGs, including SDG 2 (zero hunger), SDG 3 (good health and wellbeing), SDG 5 (gender equality) and SDG 11 (Sustainable cities).

Plastic Waste:

- While the magnitude of the problem related to Plastic Waste remains gargantuan, a **plethora of policies and urgency** are on the right path.
- Cities are becoming waste-wise, learning to segregate at source, minimise plastics and reuse reprocess waste into wealth.

Agriculture:

- In agriculture, strong evidence is emerging of the efficacy of traditional and **regenerative farming** methods.
- On the issue of forests and biodiversity, losses of forests are a dark truth, but at the same time more and more communities are demanding rights over forests — what is more, these rights are being granted.

What are the Recommendations?

- We need to have a common minimum programme that brings all countries together on the only issues that matter for humanity: how to avert the existential crisis we face today and how to build a just and inclusive world order.
- In fact, the **pandemic treaty** is a welcome development in this direction.

Note:

Heat Index

Why in News?

The **India Meteorological Department (IMD)** is planning to introduce a 'heat index' warning system in Delhi and other parts of the country.

What are Recent Studies of IMD Suggests?

- The IMD has conducted a study on the impact of meteorological factors on **heatwaves** and the "heat wave hazard zonation" of the country.
- According to "Hot Weather Analysis over India," IMD revealed that the mechanism by which **heat impacts humans is complex**; it is a **result of the interactions between temperature, radiation, wind, and humidity**.
 - There is strong experimental evidence that **physiologic stress from high temperatures is greater if humidity is higher**.

What is the Proposed Heat Index?

- **About:**
 - Heat Index will **calculate the temperature along with the humidity levels** to provide a more **accurate measure** of what the **temperature** actually feels like.
 - In the US, the **heat index is color-coded to provide warnings** based on the impact of the heat index.
 - The **IMD is planning to introduce a similar color-coded warning system** in India.
- **Significance:**
 - Heat Index has important considerations for the human body's comfort.
 - When the body gets too hot, it **begins to perspire or sweat to cool itself off**. If the perspiration is not able to evaporate, the **body cannot regulate its temperature**. Evaporation is a cooling process. When perspiration is evaporated off the body, it effectively reduces the body's temperature.
 - When the atmospheric moisture content (i.e., relative humidity) is high, the rate of evaporation from the body decreases. The **human body feels warmer in humid conditions**. The opposite is

true when the **relative humidity decreases because the rate of perspiration increases**. The body actually feels cooler in arid conditions.

- There is **direct relationship between the air temperature and relative humidity** and the heat index, meaning as the **air temperature and relative humidity increase (decrease), the heat index increases (decreases)**.

What is a Heatwave?

- A **heatwave is a period of abnormally high temperatures**, a common phenomenon in India during the months of **May-June** and in some rare cases even extends till July.
- The Heatwave is considered when the maximum temperature of a station reaches at least **40°C for Plains and at least 30°C for Hilly regions**.
- In 2016, the **National Disaster Management Authority (NDMA)** issued comprehensive guidelines to prepare national level key strategies for mitigating the impact of heatwaves.

What are the Factors Responsible for Delhi's Higher Temperature than its Actual Value?

- **Urban Heat Island Effect:** Delhi is a highly urbanized area, with **large amounts of concrete, buildings, and asphalt**. These surfaces absorb and retain heat, creating an **urban heat island effect**. This can make the temperature feel hotter than it actually is.
- **Air Pollution:** Delhi experiences high levels of air pollution, because of **stubble burning in Punjab and Haryana region, vehicular and industrial emissions, dust from construction activities**.
 - This pollution can **trap heat and create a blanket effect, keeping the city warmer**.
 - **Also**, Delhi's high humidity can also exacerbate air pollution levels.
- **Lack of Water Bodies in Close Proximity:** Delhi is **not located near any large water bodies, such as a sea or a lake**. This means that there is **no source of cool air coming from the water**, which can make the air feel hotter.

Note:



Bharat 6G Project

Why in News?

Recently, the Prime Minister has unveiled a Vision Document to roll out high-speed **6G Communication Services by 2030** and also launched **Bharat 6G Project** to identify and fund research and deployment of the next-generation technology in India.

- The Government has also launched the '**Call Before You Dig (CBuD)**' app to facilitate coordination between excavation agencies and underground utility owners to prevent damage to utilities due to digging.

What is Bharat 6G Project ?

➤ About:

- India's 6G project will be implemented in two phases, the first one from 2023 to 2025 and the second one from 2025 to 2030.
- The government has also appointed an **apex council to oversee the project** and focus on issues such as **standardization, identification of the spectrum for 6G usage**, create an ecosystem for devices and systems, and figure out finances for research and development, among other things.
 - A key focus of the council will be on new technologies such as **Terahertz communication, radio interfaces, tactile internet, artificial intelligence** for connected intelligence, new encoding methods and waveforms chipsets for 6G devices.

➤ Phases:

- In phase one, **support will be provided to explorative ideas**, risky pathways and proof-of-concept tests.
- Ideas and concepts that show promise and potential for acceptance by the global peer community will be adequately supported to develop them to completion, establish their use cases and benefits, and **create implementational IPs and testbeds leading to commercialisation** as part of phase two.

➤ Objective:

- It aims to enable India to **become a leading global supplier of intellectual property**, products and solutions of affordable 6G telecom solutions and identify priority areas for 6G research based on India's competitive advantages.

➤ Significance:

- The project will provide an R&D platform to start-ups, researchers, industry and other broadband wireless applications in India like e-Governance, smart cities, rural Broadband or other Digital India initiatives under **Atmanirbhar Bharat**.

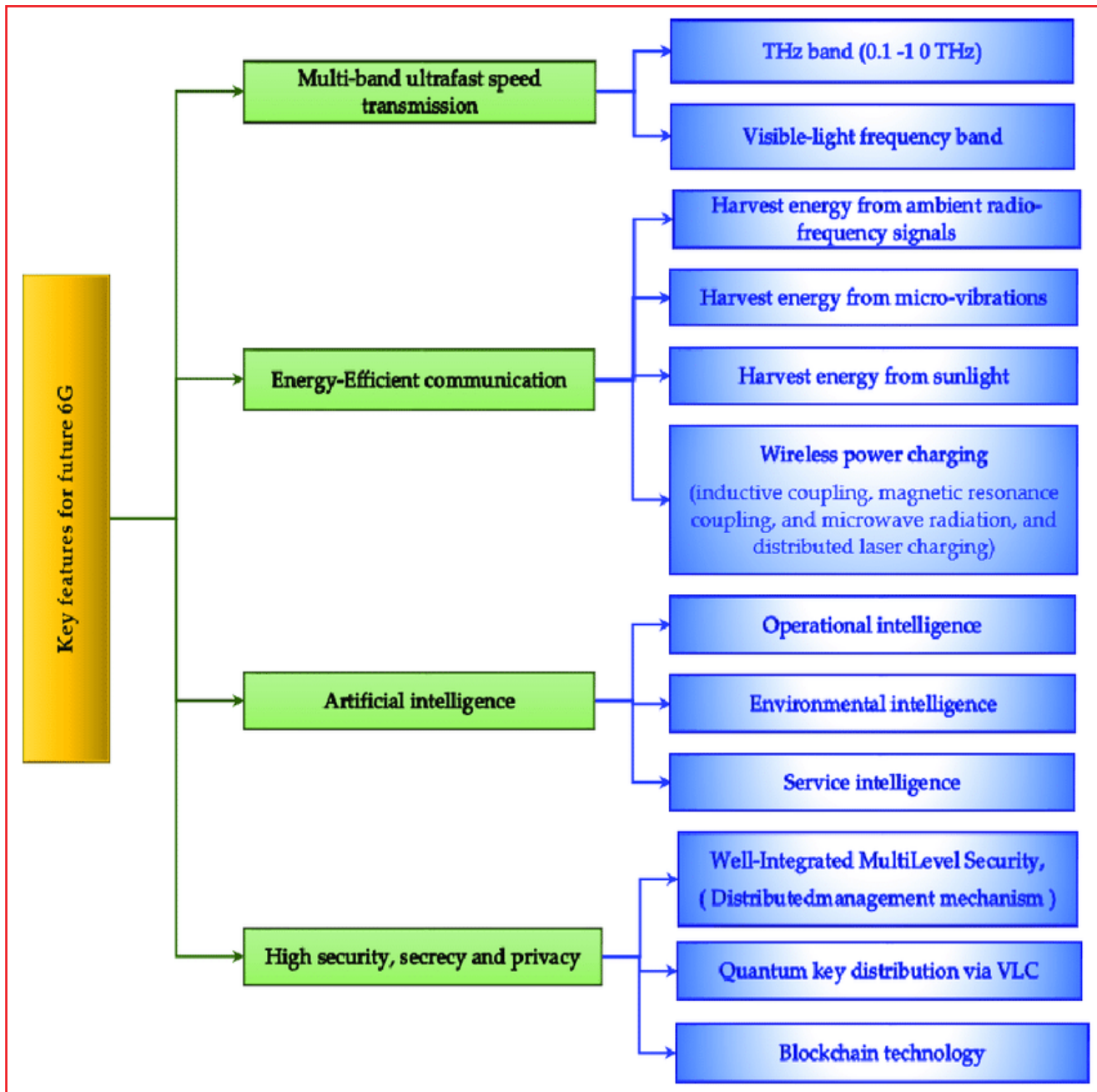
How is India's Digital Ecosystem Scenario?

- India is the **2nd-largest telecom market** globally with 1.2 billion digital subscribers.
- The past nine years witnessed an unprecedented digital leap, whereby **India's digital economy grew 2.5 times faster** than the national economy.
 - Over this period, the number of broadband users rose to 800 million, from 60 million, and the number of internet connections rose to 850 million from 250 million. The government and private sector together have laid over 2.5 million km of **Optical Fiber**.
- India is the most connected democracy in the world, where **70 million e-authentications are done every day**, and 8 billion **UPI (Unified Payment Interface)** transactions are made every month.
- India has sent upwards of ~28 lakh crore directly to its citizens through direct benefit transfers.

What is 6G Technology?

- **6G (Sixth-Generation Wireless)** is the successor to **5G cellular technology**.
- It will be able to use **higher frequencies than 5G networks** and provide substantially higher capacity and much lower latency (delay).
- One of the goals of 6G internet will be to support one **microsecond-latency communication (delay of one-microsecond in communication)**.
 - This is 1,000 times faster - or 1/1000th the latency - than one millisecond throughput.
- It seeks to utilize the **terahertz band** of frequency which is currently unutilized.
 - Terahertz waves fall between infrared waves and microwaves on the electromagnetic **spectrum**.
 - These waves are extremely tiny and fragile, but there's a huge amount of free spectrum up there that would allow for spectacular data rates.

Note:



Magnetite Pollution

Why in News?

Recently, some Geologists have found the presence of Magnetite Pollution on the roadside Dust of Kolkata.

- The frequency of pollutants is **higher in areas with heavy vehicular traffic** and other polluting sources. The amount of magnetite is proportional to the traffic on a given road.

What is Magnetic Pollution?

➤ About:

- Magnetite pollution refers to the presence of a magnetic mineral called **Magnetite (Fe_3O_4) in the environment**, as a result of **human activities such as mining, steel production and industrial processes**.
 - Magnetite is an oxide of iron. It is the **most magnetic of all the naturally occurring minerals** on earth. It is a natural magnet.

Note:



- Magnetite contains about **72% metallic iron** in it. It is found in Karnataka, Andhra Pradesh, Rajasthan, Tamil Nadu, Goa and Kerala.

➤ **Impact:**

○ **Ecological Impacts:**

- Magnetic particles can **interfere with the migratory patterns of birds** and other animals, affecting their survival and reproduction.

○ **Soil and Water Contamination:**

- Magnetite particles **can settle in the soil and water, contaminating these environments** and affecting the growth of plants and the health of aquatic life.

➤ **Human Health:**

- Inhaling magnetic particles can **cause respiratory problems and other health problems**, such as lung cancer, cardiovascular disease, and central nervous system damage.

➤ **Building and Infrastructure Damage:**

- Magnetic particles can **cause corrosion of steel structures and other metal objects**, leading to damage over time.

○ **Electronic Equipment Damage:**

- Magnetic pollution can also interfere with the operation of electronic equipment, such as **compasses and navigation systems**.

World Likely to See 2°C Warming by 2050

Why in News?

Recently, a study published titled “**contradicted projections from the Intergovernmental Panel on Climate Change (IPCC)**”, states that the planet is **likely to warm up by two degrees Celsius by 2050**, even under a low-emission scenario.

- The researchers used **artificial intelligence** called **Artificial Neural Networks (ANN)** to predict the time for reaching the 1.5 °C and 2°C thresholds.
- The world has recorded a **1.1°C rise in temperature compared with the average in 1850-1900**.

What are the Key Findings?

➤ **Projection:**

- There is a higher likelihood that 2°C will be reached under the low emission scenario compared with

the **IPCC AR6 (Sixth Assessment Report) synthesis assessment**, and may **fail to uphold the Paris Agreement**.

- The Paris Agreement aims to limit the rise to below 2°C while pursuing efforts to limit the increase to 1.5°C.

- The IPCC estimated that the 1.5°C threshold could be attained as early as the 2030s under all emission scenarios.

- Global warming is already on the verge of crossing the 1.5°C threshold, even if the **climate forcing pathway is substantially reduced** in the near term.

- The threshold of 1.5°C will reach somewhere between 2033 and 2035 in the **high, intermediate and low forcing scenarios**.

- The **world could touch 2°C by 2050 under the high-emission scenario**, 2049 and 2054 in the intermediate and low-emission scenarios, respectively.

- In contrast, the IPCC estimated the likelihood of touching 2°C of global warming during the **mid-21st century is high under a high-emission scenario**.

➤ **Significance of Limiting Warming:**

- Limiting warming to 1.5°C will **reduce the number of people frequently exposed to extreme heat waves** by about 420 million.

- It can also **reduce the probability of drought and risks related to water availability**.

➤ **Implications:**

- Warming above the threshold of 1.5°C can cause a **broad range of climate risks** — such as impacts on human health, economic growth, crop yields, coastal and small island communities, terrestrial and marine ecosystems, as well as the **frequency, intensity and cost of extreme climate events**.

What are Artificial Neural Networks?

- ANN is a vital **subset of machine learning** that helps computer scientists in their work on complex tasks, such as, strategizing, making predictions, and recognizing trends.

- It is a **computational model that mimics the way nerve cells work in the human brain**. It is designed to simulate the way the human brain analyzes and processes information.

Note:



Global Sea-level Rise and Implications: WMO

Why in News?

According to the **World Meteorological Organisation's (WMO)** Report "Global Sea-level Rise and Implications", **India, China, Bangladesh and the Netherlands** face the **highest threat of sea-level rise globally**.

- Several big cities on all **continents are threatened by the rise in sea level**.
- These include Shanghai, Dhaka, Bangkok, Jakarta, Mumbai, Maputo, Lagos, Cairo, London, Copenhagen, New York, Los Angeles, Buenos Aires and Santiago.

What are the Highlights of the Report?

- **Trends and Projections:**
 - Between 2013 and 2022, Global mean sea-level was 4.5 mm/year and **human influence** was likely the **main driver of these increases since at least 1971**.
 - Global mean sea-level increased by 0.20m between 1901 and 2018,
 - **1.3 mm/ year between 1901 and 1971,**
 - 1.9 mm/year between 1971 and 2006
 - 3.7 mm/year between 2006 and 2018.
 - Even if global heating is limited to 1.5 degrees Celsius over pre-industrial levels, there will still be a **sizable sea level rise**.
 - But every fraction of a degree counts. If temperatures rise by 2 degrees, that level rise **could double, with further temperature increases bringing exponential sea level increases**.
- **Contributors to Sea Level Rise:**
 - Thermal expansion contributed to **50% of sea level rise during 1971-2018**, while ice loss from glaciers contributed to **22%, ice-sheet loss to 20% and changes in land-water storage 8%**.
 - The rate of ice-sheet loss increased by a factor of four between 1992-1999 and 2010-2019. Together, icesheet and **glacier mass loss were the dominant contributors** to global mean sea level rise during 2006-2018.
- **Impacts:**
 - At sustained warming levels between 2-3 degree Celcius, the Greenland and West **Antarctic ice**

sheets will be almost completely and irreversibly lost over multiple millennia causing potentially multimeter sea-level rise.

- Sea-level rise will bring cascading and compounding impacts resulting in losses of **coastal ecosystems and ecosystem services**, groundwater salinization, flooding and damage to coastal infrastructure that cascade into risks to livelihoods, settlements, health, well-being, food, displacement and water security, and cultural values in the near to long-term.

What is the Scenario for India?

➤ Rate of Sea Level Rise:

- According to the Ministry of Earth Sciences, on average, the sea level along the Indian coast was observed to be rising at a rate of about **1.7 mm/ year during the last century (1900-2000)**.
- A 3 cm sea level rise could cause **the sea to intrude inland by about 17 meters**. At future rates of 5 cm/decade, this could be 300 metres of land taken by the sea in a century.

➤ India is more Susceptible:

- India is most **vulnerable to compounding impacts** of sea level rise.
- In the Indian ocean half of sea level rise is **due to the volume of water expanding since the ocean is warming** up rapidly.
- The contribution from glacier melt is not as high.
- The **Indian Ocean is the fastest warming ocean** in terms of surface warming.

➤ Implications:

- India is facing compound extreme events along our coastline. Cyclones are intensifying rapidly due to **more moisture and heat from ocean warming**.
- The amount of flooding also increases because storm surges **are compounding sea level rise** decade by decade.
- Cyclones are bringing more rain than earlier. Super **Cyclone Amphan (2020)** caused large-scale **flooding** and inundated tens of kms inland with saline water intruding.
- Over time, the Indus, **Ganga** and Brahmaputra rivers may shrink, and rising sea levels combined with a deep intrusion of saltwater **will make large parts of their huge deltas simply uninhabitable**.

Note:



What are the Recommendations?

- There is a need to **address the climate crisis and broaden our understanding** of the root causes of insecurity.
- It is imperative to actively support **grassroots resilience efforts to tackle climate change** and improve **Early Warning Systems**.

What is the World Meteorological Organization (WMO)?

- The WMO is an **intergovernmental organization with a membership of 192 Member States and Territories**.
 - India is a member of WMO.
- It originated from the International Meteorological Organization (IMO), which was established after the **1873 Vienna International Meteorological Congress**.
- Established by the ratification of the WMO Convention on **23rd March 1950, WMO became the specialized agency of the United Nations** for meteorology (weather and climate), operational hydrology and related geophysical sciences.
- WMO is headquartered in **Geneva, Switzerland**.

Keoladeo National Park

Why in News?

The Rajasthan Government has proposed to construct a zoo inside **Keoladeo National Park, a World Heritage Site** popularly known as **Bharatpur bird sanctuary**, to display a range of wetland species.

- The purpose of this zoo, called Wetland ex-situ Conservation Establishment (WESCE), is to display a **range of wetland species**, including **rhinos**, water buffaloes, crocodiles, dolphins and exotic species.

What is the Purpose of WESCE?

- The WESCE aims to rejuvenate the **biodiversity of Keoladeo National Park**, thereby boosting its outstanding universal values.
- The WESCE plan is part of the ambitious **Rajasthan Forestry and Biodiversity Development Project (RFBDP)** for which Agence Française de Développement (AFD), the overseas development arm of the French government, has agreed to **fund up to Rs 12 crore over eight years**.

- Several facilities are **planned inside Keoladeo National Park, including**,
 - A breeding and reintroduction centre for locally extinct species (otters, fishing cats, **blackbucks**, hog deer, etc).
 - An aquarium for indigenous species like **Gangetic Dolphin, crocodiles**; enclosures for the display of large wetland species like Indian Rhino, Water Buffalo, Barasingha (swamp deer); etc.

What are the Key Points of Keoladeo National Park?

- **About:**
 - Keoladeo National Park is a **wetland and bird sanctuary located** in Bharatpur, Rajasthan. It is a **UNESCO World Heritage Site** and one of the most important bird-watching areas in the world.
 - **Chilika Lake** (Orissa) and Keoladeo National Park (Rajasthan) were recognized as the first **Ramsar Sites of India** in 1981.
 - Currently, Keoladeo National Park and **Loktak Lake (Manipur)** are in **Montreux record**.
 - It is known for its **rich avian diversity and abundance of waterbirds**. The park is home to **over 365 species of birds, including several rare and threatened species**, such as the Siberian crane.
 - Different species from far-flung areas of the northern hemisphere visit the Sanctuary for breeding. The Siberian crane is one of the rare species that can be spotted here.
- **Fauna:**
 - Animals such as Jackals, Sambar, Nilgai, wild cats, hyenas, wild boar, porcupine and mongoose can be found in the region.
- **Flora:**
 - The principal vegetation types are tropical dry deciduous forest dominated by Acacia nilotica intermixed with dry grassland.
- **River:**
 - **Gambhir and Banganga** are two rivers that flow through this National Park.

What are Protected Areas in Rajasthan?

- **Tiger Reserves:**
 - **Ranthambore Tiger Reserve (RTR)** in Sawai Madhopur

Note:



- **Sariska Tiger Reserve (STR)** in Alwar
- **Mukundra Hills Tiger Reserve (MHTR)** in Kota
- **National Park:**
 - **Desert National Park**, Jaisalmer
- **Wildlife Sanctuary:**
 - **Sajjargarh wildlife sanctuary**, Udaipur
 - National Chambal Sanctuary (on tri-junction of Rajasthan, Madhya Pradesh and Uttar Pradesh).

International Marine Protected Areas Congress

Why in News?

Recently, the 5th International Marine Protected Areas Congress (IMPAC5) was held in Canada in order **to discuss the solutions to address the Funding Gap of Marine Protected Areas (MPAs)**.

- This meeting is crucial since nations agreed to protect 30% of Earth's lands and oceans by 2030 at the **15th Conference of the Parties to the Convention on Biological Diversity** held in 2022.

Note: Canada is bordered by three oceans - the Pacific, Arctic and Atlantic - and has the longest coastline in the world.

What are the Highlights of the Meet?

- **Sustainable and Resilient MPA networks:**
 - As many as **70% of MPAs are underfunded**. A well-managed and sufficiently funded MPA can restore good health to vulnerable ecosystems.
 - Achieving sustainable and resilient MPA networks depends **on an overall commitment to protection, leadership**, engagement from stakeholders, institutions, governments and organizations, Indigenous peoples, coastal communities, and individuals in an inclusive **and equitable manner to advance ocean protection**.
 - IMPAC5 aims to **provide a forum for sharing knowledge, successes and best practices in an open and respectful environment** for the exchanging of ideas among a diversity of views.
- **Significance of MPAs:**
 - MPAs can generate sustainable revenues for their own management.

- Revenue can be generated from statutory and non-statutory MPA fees for tourism programmes, **blue carbon credits generated from mangrove conservation** and avoided deforestation as well as seaweed farming and sustainable coastal fisheries.

Green Steel

Why in News?

Ministry of Steel seeks to reduce carbon emissions in steel industry through promotion of **Green Steel**.

What is Green Steel?

- **About:**
 - Green Steel is the **manufacturing of steel without the use of fossil fuels**.
 - This can be done by using **low-carbon energy sources such as hydrogen, coal gasification, or electricity** instead of the traditional carbon-intensive manufacturing route of coal-fired plants.
 - It eventually **lowers greenhouse gas emissions, cuts cost and improves the quality of steel**.
 - **Low-carbon hydrogen (blue hydrogen and green hydrogen)** can help **reduce the steel industry's carbon footprint**.
- **Ways of Production:**
 - **Substituting the Primary Production Processes with Cleaner Alternatives:**
 - **Carbon capture, utilization and storage (CCUS)**.
 - Replacing conventional sources of energy with low-carbon hydrogen.
 - Direct electrification through electrolysis of iron ore.
- **Significance:**
 - The steel industry is the largest industrial sector in terms of intensive energy and resource use. It is **one of the biggest emitters of carbon dioxide (CO₂)**.
 - In view of commitments made at the **Conference of the Parties (COP26)** climate change conference, the Indian steel industry **needs to reduce its emissions substantially by 2030 and hit net-zero carbon emissions by 2070**.

Note:



What is the Status of Steel Production in India?

- **Production:** India is currently the **world's 2nd largest producer of crude steel**, producing 120 Million Tonnes (MT) crude steel during financial year 2021- 2022.
- **Reserves: More than 80% of the country's reserves** are in the states of Odisha, Jharkhand, West Bengal, Chhattisgarh and the northern regions of Andhra Pradesh.
 - **Important steel-producing centers** are Bhilai (Chhattisgarh), Durgapur (West Bengal), Burnpur (West Bengal), Jamshedpur (Jharkhand), Rourkela (Odisha), Bokaro (Jharkhand).
- **Consumption:** India is the **2nd largest consumer of finished steel** in 2021 (106.23 MT), preceded by China as the largest steel consumer as per World Steel Association.

What are the Related Government Initiatives?

- **Steel Scrap Recycling Policy, 2019:**
 - **Steel Scrap Recycling Policy, 2019** enhances the availability of domestically generated scrap to reduce the consumption of coal in steel making.
- **National Green Hydrogen Mission:**
 - Ministry of New and Renewable Energy (MNRE) has announced **National Green Hydrogen Mission** for green hydrogen production and usage. The steel sector has also been made a stakeholder in the Mission.
- **Motor Vehicles (Registration and Functions of Vehicles Scrapping Facility) Rules September 2021:**
 - It shall increase availability of scrap in the steel sector.
- **National Solar Mission:**
 - Launched by MNRE in January 2010, it promotes the use of solar energy and also helps reduce the emission of steel industry.
- **Perform, Achieve and Trade (PAT) Scheme:**
 - **PAT Scheme** incentivizes steel industry to reduce energy consumption.
- **NEDO Model Projects:**
 - **Japan's New Energy and Industrial Technology Development Organization (NEDO) Model Projects** have been implemented in steel plants for Energy Efficiency Improvement.

Limiting Warming Below 1.8°C

Why in News?

According to a recent study published in **Nature Communications**, limiting global temperature rise to the **UN-mandated Paris Agreement target of 2 degrees Celsius** is probably **insufficient to prevent an accelerated sea level rise** over the next century.

What Does the Recent Study on Rising Temperature Suggest?

- The study suggests that **if global temperatures rise above 1.8°C, the world could see an irreversible loss of the west Antarctic and Greenland ice sheets**, leading to a rapid sea level rise.
- Scientists studying **Antarctica's vast Thwaites Glacier (Doomsday Glacier)** say **warm water is seeping into its weak spots**, worsening melting caused by rising temperatures.
 - Using an **underwater robot vehicle known as Icefin**, mooring data and sensors, they monitored the **glacier's grounding line**, where ice slides off the glacier and meets the ocean for the first time.
- The study highlights that **reaching net-zero carbon emissions before 2060 is critical to avoid this catastrophe.**
- By 2150, **global sea level rise is estimated to increase by roughly 1.4, 0.5, and 0.2 metres** under **high, mid, and low-emission scenarios**, respectively.

What are the Steps taken to tackle Climate change?

- **National:**
 - **NAPCC:**
 - To counter the emerging threats from climate change, India released its **National Action Plan to Combat Climate Change (NAPCC)**.
 - It has 8 sub missions including **National Solar Mission, National Water Mission** etc.
 - **India Cooling Action Plan:**
 - It provides an **integrated approach towards cooling and related areas** including reduction in the cooling demand.
 - This would help reduce emissions thereby combating global warming.

Note:

- **Global:**
 - **Paris Agreement:**
 - It seeks to keep the rise in global temperatures “well below” 2°C from pre-industrial times, while “pursuing efforts” to limit it to 1.5°C.
 - **UN SDGs:**
 - These are **17 broad goals for achieving sustainable development** in the society. Amongst them Goal 13 exclusively focuses on tackling climate change.
 - **Glasgow Pact:**
 - It was finally adopted by **197 parties in 2021** during the **COP26 negotiations**.
 - It has emphasised that stronger action in the current decade was most critical for achieving the **1.5-degree target**.
 - **Sharm-El-Sheikh Adaptation Agenda (at COP 27):**
 - It outlines **30 Adaptation Outcomes** to enhance resilience for **4 billion people** living in the most climate vulnerable communities by 2030.

Deep Sea Mining and its Threats

Why in News?

Recently, a study suggested that commercial-scale Deep seabed mining operations can potentially harm the oceans and endangered species, such as cetaceans including blue whales and several dolphin species.

- The evaluation emphasizes the need for continued conservation efforts to protect these species.

What is Deep Sea Mining?

- **About:**
 - **Deep-sea mining** is the process of retrieving mineral deposits from the deep seabed, the ocean below **200 metres** and covers **two-thirds of the total seafloor**.
 - According to **International Seabed Authority (ISA)**, an agency under the **United Nations Convention on the Law of the Sea (UNCLOS)** for monitoring all activities related to mineral resources in the deep sea, the **international seabed is the area that lies beyond the limits of national jurisdiction** and represents around 50% of the total area of the world's oceans.

- ISA has issued 32 contracts to explore deep sea mineral deposits. More than **1.5 million square kilometres of the international seabed** have been set aside for mineral exploration.

➤ Governance:

- ISA is required by UNCLOS to put in place the **governance infrastructure including rules, regulations and procedures governing the contours of deep-sea mining within 2 years**.
- In case of failure, the ISA must **at least evaluate the mining proposal by the end of two years**.
- The **11th Annual Deep Sea Mining Summit 2023** is to be held in **London, United Kingdom**. Agenda includes the “**economic landscape and growth for deep sea mining and technological developments associated with commercialising**”.

➤ Reasons for Growing Interest:

- **Depleting Terrestrial Deposits:** Depleting stocks of metals such as **copper, nickel, aluminium, manganese, zinc, lithium and cobalt** caused shift in focus towards Deep Sea Deposits.
 - Mineral resources are extracted from **Polymetallic nodules** found in various deep ocean regions including deep pacific and Indian oceans.
 - The nodules are approximately **potato-sized** and sit on the sediment surface across abyssal plains in the **Clarion-Clipperton Zone (CCZ)**, a region spanning 5,000 kilometres (3,100 miles) across the central Pacific Ocean at depths of 4,000 - 5,500 metres.
- **Increasing Demand:** Demand for these metals is also increasing to **produce smartphones, wind turbines, solar panels and batteries**.

What are the Cetaceans?

- Cetaceans are **exclusively aquatic placental mammals (including Whales, Dolphins, Porpoises, etc.) constituting the order Cetacea**. They are **found in oceans worldwide** and in **some freshwater environments**.
- They have a tapered body, no external hind limbs, and a tail ending in a horizontal blade of two lobes, or flukes.
- Cetaceans must **come to the water's surface to breathe** through blowholes located on top of their head.

Note:



What are the Threats?

- Commercial-scale mining is expected to operate 24 hours a day, causing **noise pollution**.
 - It can **overlap with the frequencies at which cetaceans communicate**, which can cause **auditory masking and behaviour change** in marine mammals.
- **Settlement of sediment plumes** generated by mining vehicles **could harm/kill the species at the bottom of the ocean (benthic species)** in the vicinity.
- Sediment discharged from processing vessels can also **increase turbidity in the water column**. Also, far from sight impacts could go largely unquantified.

What is India's Deep Ocean Mission?

- Deep Ocean Mission **seeks to develop the technologies required for exploring and then, extracting minerals** in the deep seabed.
- **Ministry of Earth Sciences (MoES) will be the nodal Ministry** implementing this multi-institutional ambitious mission.
- It would develop a **manned submersible (MATSYA 6000)** that can carry **three people to a depth of 6,000 meters** in the ocean with a suite of scientific sensors and tools.
- It will pursue **technological innovations for exploration and conservation of deep-sea biodiversity** through “**bioprospecting of deep-sea flora and fauna** and studies on **sustainable utilization of deep-sea bio-resources**.”
- The mission will seek to explore the prospects of **deriving energy and freshwater from the ocean** through “**studies and detailed engineering design for offshore ocean thermal energy conversion (OTEC)-powered desalination plants**.”

What are other Blue Economy Initiatives?

- **India-Norway Task Force on Blue Economy for Sustainable Development:**
- **Sagarmala project**
- **O-SMART**
- **Integrated Coastal Zone Management**
- **National Fisheries policy**

Deep Sea Fish Conservation

Why in News?

- **Supreme Court (SC)** has given **permission to fishermen using Purse Seine Fishing gear to fish beyond territorial waters (12 nautical miles) and within the Exclusive Economic Zone (EEZ)** (200 nautical miles) of Tamil Nadu but observing certain restrictions.
- This comes in the **backdrop** against the **banning of purse seine fishing by the Tamil Nadu Government** in February 2022.
- SC has **restricted the purse seiner to fish on two days**, Monday and Thursday from 8am to 6pm revoking the complete ban imposed by Tamil Nadu government.

What are the Concerns?

- **Insufficient Conservation Efforts:**
 - Court's order **seems to be more concerned about regulating fishing** with administrative and transparency measures **than about the conservation measures** and obligations under the **United Nations Convention on the Law of the Sea (UNCLOS)**.
 - Under **UNCLOS**, coastal states have sovereign rights to **ensure that the living and non-living resources of the EEZ are used, conserved and managed, and not subject to overexploitation**.
 - In order to prevent overexploitation, coastal States must determine the **total allowable catch (TAC)** in the EEZ.
 - **Restricting the purse seiner to fish on two days is not sufficient** without regulating fishing methods.
- **Threatens Livelihood of Traditional Fishers:**
 - **Purse seiners tend to overfish**, unlike traditional fishermen using traditional fish gear, thus **endangering the livelihood of the traditional fisher**.
 - It is a **non-targeted fishing gear** and **catches all sorts of fishes** which come in the way of the net, **including juveniles**. Hence, they are very much detrimental to marine resources.
- **Threat to Food Security:**
 - A major concern is the **dwindling availability of oil sardines**, a favourite of Kerala fish eaters.
 - In 2021, Kerala recorded a catch of just 3,297 tonnes of sardine, a sharp decrease from the haul of 3.9 lakh tonnes in 2012.

Note:

- **Threatens Endangered Species:**
 - Non-selective fishing methods by purse seiners resulting in the **by-catch of other marine living species** (which could include **endangered species too**) may threaten with a potential trade embargo.

What is UNCLOS?

- The **UNCLOS, 1982** is an international agreement that establishes the legal framework for marine and maritime activities.
- It is also known as **Law of the Sea**. It divides marine areas into **five main zones** namely- **Internal Waters, Territorial Sea, Contiguous Zone, Exclusive Economic Zone (EEZ)** and the **High Seas**.
- It is the only international convention which **stipulates a framework for state jurisdiction in maritime spaces**. It provides a different legal status to different maritime zones.
- It provides the **backbone for offshore governance by coastal states and those navigating the oceans**.
- It not only zones coastal states' offshore areas but also **provides specific guidance for states' rights and responsibilities** in the five concentric zones.

What is Purse Seine Fishing?

- A purse seine is made of a **long wall of netting framed with floating and leadline and having purse rings hanging from the lower edge of the gear**, through which runs a purse line made from steel wire or rope which allow the pursing of the net.
- The technique is **considered to be an efficient form of fishing** and has been widely deployed on India's western coasts.
- It is used in the open ocean to **target dense schools of single-species pelagic (midwater) fish** like tuna and mackerel.

What are the Conservation Efforts for Marine Animal Resources?

- The **United Nations General Assembly** passed **Resolutions in 1989 and 1991:**
 - It called for a moratoria on all large-scale pelagic drift net fishing vessels in high seas.
- **UN (United Nations) Ocean Conference 2022:**
 - To ensure global cooperation towards protection and **sustenance of the Ocean ecosystem** of the world.

- **One Ocean Summit:**
 - Combating illegal fishing, decarbonising shipping and reducing plastic pollution.
- **Convention for the Conservation of Southern Bluefin Tuna 1993 (SBT):**
 - The objective of this Convention is to ensure, through appropriate management, the conservation and optimum utilisation of southern bluefin tuna
- **Convention for the Prohibition of Fishing with Long Drift Nets 1989:**
 - It is a regional convention in the South Pacific to restrict port access for drift net fishing vessels.
- **Tarawa Declaration 1989:**
 - It is a declaration of the **South Pacific Forum** to prohibit the use of large drift nets or at least call for their prohibition.

Gross Domestic Climate Risk Ranking

Why in News?

According to **Gross Domestic Climate Risk ranking** by **Cross Dependency Initiative (XDI)**, **India has nine states in the 50 high risk states** including Punjab, Bihar, Uttar Pradesh, Maharashtra, Rajasthan, Tamil Nadu, Gujarat, Kerala and Assam.

- XDI is a global organisation **specialising in climate risk analysis** for regions, banks and companies.

What is this Report About?

- The index calculated the **'Physical climate risk' to built environments** such as buildings and properties across 2,600 States and provinces globally in 2050.
- The index assigned an **Aggregated Damage Ratio (ADR)** to each region, which signifies the **total amount of damage a region's built environment would sustain in 2050**. A high ADR signifies more peril.

What are the Findings?

- **Vulnerabilities:**
 - Risk originates from **8 climate change Hazards:** Riverine and surface flooding, coastal inundation (coastal flooding), extreme heat, forest fire, soil movement (drought-related), extreme wind and freeze thaw.

Note:



- Most damage posed to built infrastructure globally is caused by “**riverine and surface flooding**” or flooding combined with **coastal inundation**.

➤ **Global Findings:**

- According to report the vast majority (**80%**) of **50 provinces** facing the highest climate risk to their physical infrastructure by 2050 are **in China, the US, and India**.
- Two of China’s largest sub-national economies – Jiangsu and Shandong – top the global ranking; followed by the U.S. which has 18 regions in the top 100 list.
- **Asia dominates the list** with 114 of the top 200 regions falling in the continent, including **Pakistan, Indonesia and most South East Asian countries**.
 - **Devastating flooding in 2022 affected 30% of the area of Pakistan** and has partially or fully damaged more than 9 lac houses in Sindh province.

➤ **India Specific Findings:**

- Under high emissions scenarios such as the **Representative Concentration Pathway (RCP) 8.5**, high risk provinces will witness an average of **110% increase in damage risk by 2050**.
 - **Currently, with 0.8 degrees rise in temperature**, India’s 27 states and more than three-quarters of its districts are extreme event hotspots accounting for a **5% loss in GDP**.
- If global warming is not limited to 2-degree thresholds, **climate-vulnerable states in India will lose more than 10% of their gross state domestic product (GSDP)**.
- **Bihar, Assam, and Tamil Nadu had the highest ADR among other Indian States**. Assam, in particular, would witness the maximum increase of climate risk: rising up to 330% by 2050.
 - **Assam has witnessed an experienced exponential increase in flood events** since 2011, and it had **15 of India’s 25 districts most vulnerable to climate change**.
- **11 of the 36 districts in Maharashtra** were found to be “**highly vulnerable**” to **extreme weather events, droughts** and dwindling water security.

Biodiversity Beyond National Jurisdiction

Why in News?

India has urged the member nations to **stay dedicated to the conservation and preservation of the oceans and its biodiversity** during the ongoing session (Feb-March 2023) Of Intergovernmental Conference (IGC) i.e., **IGC-5 of Biodiversity Beyond National Jurisdiction (BBNJ)**.

- India supported the high ambition coalition for the **early conclusion** of the International **Legally Binding Instrument of BBNJ** under **United Nations Convention on the Law of the Sea (UNCLOS)**.

What is the BBNJ Treaty?

- The “BBNJ Treaty”, also known as the “**Treaty of the High Seas**”, is an international agreement on the conservation and sustainable use of marine biological diversity of areas beyond national jurisdiction **within the framework of the UNCLOS**.
- BBNJ encompasses the high seas, beyond the exclusive economic zones or national waters of countries.
 - According to the **International Union for Conservation of Nature (IUCN)**, these areas account for “**almost half of the Earth’s surface**”.
 - These areas are **hardly regulated and also least understood or explored** for its biodiversity - only 1% of these areas are under protection.
- Launched at the **One Ocean Summit** in February 2022, the **High Ambition Coalition on Biodiversity Beyond National Jurisdiction** brings together many delegations engaged in the BBNJ negotiations on a common and ambitious outcome at the highest political level.
- The negotiations are **centered around a package of elements** agreed upon in 2015, namely:
 - the conservation and sustainable use of marine biological diversity of areas beyond national jurisdiction, in particular, together and as a whole, marine genetic resources, including questions on the sharing of benefits
 - area-based management tools, including marine protected areas
 - environmental impact assessments
 - capacity-building and the transfer of marine technology

Note:

Adi Ganga Revival Plan

Why in News?

Recently, plans to **revive Adi Ganga (the original channel of River Ganga passing through the city of Kolkata)** have been announced.

- The **National Mission for Clean Ganga** has allocated **around Rs 650 crore** to revive the ancient river and it has been included in a **multi-country South Asian River project on combating pollution.**

What is the National Mission for Clean Ganga (NMCG)?

- **About:**
 - On August 12, 2011, the **NMCG** was listed as a society under the **Societies Registration Act, 1860.**
 - The NMCG is implemented by the **National Council for Rejuvenation, Protection and Management of River Ganga** also known as the **National Ganga Council.**
- **Objective:**
 - The objective of the NMCG is to reduce pollution and ensure rejuvenation of the Ganga river.
 - This can be achieved by **promoting intersectoral coordination for comprehensive planning & management** and maintaining minimum ecological flow in the river, with the aim of **ensuring water quality and environmentally sustainable development.**
- **Organization Structure:**
 - The Act envisages five tier structure at national, state and district level to take measures for prevention, control and abatement of environmental pollution in river Ganga as below:
 - **National Ganga Council** under chairmanship of **Hon'ble Prime Minister of India.**
 - **Empowered Task Force (ETF) on river Ganga** under chairmanship of **Hon'ble Union Minister of Jal Shakti** (Department of Water Resources, River Development and Ganga Rejuvenation).
 - **National Mission for Clean Ganga (NMCG).**
 - **State Ganga Committees**
 - **District Ganga Committees** in every specified district abutting river Ganga and its tributaries in the states.

Lead Poisoning

Why in News?

The widespread use of **Lead** has resulted in **extensive environmental contamination**, human exposure and significant **public health problems** in many parts of the world.

What is Lead Poisoning?

- **About:**
 - Lead poisoning is a type of poisoning **that occurs when lead accumulates in the body**, often over a period of months or years.
 - It is caused by the **absorption of Lead in the system and is characterised especially by fatigue, abdominal pain, nausea, diarrhoea, loss of appetite, anaemia, a dark line along the gums, and muscle paralysis or weakness of limbs.**
 - Children are **particularly vulnerable to lead poisoning because their bodies are still developing.**

What are the Implications of Lead Poisoning?

- **High Blood Lead Levels:**
 - According to a 2020 report by the **UN Children's Fund (UNICEF)** and Pure Earth, half the children in India report **high blood lead levels.**
 - The report says 275 million children in India record blood lead levels beyond the tolerable limit of 5 µg/dL.
 - Of these, **64.3 million children's blood lead levels exceed 10 µg/dL.**
 - In terms of average blood lead levels among the population, **some 23 states exceed the 5 µg/dL margin;** levels in the remaining 13 states and Union Territories cannot be determined as there is a lack of research and screening mechanisms to collect data.
- **Disability-Adjusted Life Years:**
 - According to a 2016 analysis by the Institute for Health Metrics and Evaluation (IHME), Lead toxicity in India **contributes to 4.6 million Disability-Adjusted Life Years** (number of years lost due to disease burden) and 165,000 deaths annually.
 - IHME is an independent population health research center at the University of Washington School of Medicine.

Note:

- **Adverse Health Impact:**
 - Once lead enters the bloodstream, it goes **directly to the brain**, particularly in children.
 - It can be **transferred to the foetus during pregnancy**, leading to low birth weight and slow growth. Lead poisoning can cause anemia and various illnesses in children and adults, **affecting neurological, skeletal, and neuromuscular systems**.

Aztec Hummingbirds and Indian Sunbirds

Why in News?

Recently a study found that the **loss of a key gene, *FBP2*** makes hummingbirds more **efficient at breaking down sugar** to use it for energy.

- Hummingbirds' hovering flight, a seemingly effortless suspension in air, is achieved by burning sugar in their flight muscles at a blisteringly fast rate.

What are Hummingbirds?

- **About:**
 - Hummingbird, **native to American continent**, has approximately **350 species which are found in Iridescent colours**. These birds are **comparable to India's Sunbirds**.
 - Aztecs referred to them as **Huitzilin or 'A ray of sun'**.
- **Size:**
 - These are small birds, barely 5cm long and weigh 2 grams.
- **Humming:**
 - Their signature '**Hum**' is **created by beating the wings upto 50 times per second**.
- **Manoeuvrability:**
 - They can **hover majestically** as they sip nectar from a flower (mostly Tubular flowers such as Lantana and **rhododendron**), and even fly backward.
 - Relative to their body mass, hummingbirds have the **highest metabolic rate** (calories burnt per minute) **among vertebrates**. Most of this energy comes from nectar.
 - **Rapid sugar uptake by their digestive system** ensures that they utilise energy from nectar ingested just a few minutes ago.

- **Mimicry and Dance:**
 - Hummingbirds are **capable of vocal mimicry** like parrots and some songbirds.
 - They are also able to **align their muscular movements with auditory sensations** that come to their ears creating a **dance**.

How are Hummingbirds similar to Sunbirds?

- **About:**
 - Indian Sunbirds, though **unrelated to Hummingbirds** share many **common features** through convergent evolution. They are part of **Nectariniidae family**.
 - Though slightly larger, the sunbirds can **hover briefly**, and go for bright, tubular flowers. They are **critical pollinators of the 'Flame of the Forest'**.
 - As the energy demands of hovering is very high, **sunbirds need to 'perch' while feeding, unlike Hummingbirds**.
- **Habitat:**
 - They live in **tropical forests, inland wetlands, savannas, and scrubland in Africa, southern Asia, the Middle East, and northern Australia**.

Note: Flame of the forest is a leguminous tree, *Butea frondosa*, native to Eastern India and Myanmar, having hanging clusters of scarlet flowers.

What is the Significance of Recent Research?

- Recent genome studies have shown that hummingbirds lost the **gene (*FBP2*)** for a key enzyme involved in gluconeogenesis around the time when hovering appeared.
- While **intense exercise in humans can lead to a spike in blood glucose** levels due to **gluconeogenesis**. That is not the case in hummingbirds.
 - **They have a unique metabolism** that allows them to efficiently use energy from nectar.
- This study **could lead to new insights into energy metabolism** and potential therapeutic applications for humans.

Rhododendron

Why in News?

Recently, the **Botanical Survey of India** has published a new report titled '**Rhododendrons of Sikkim and Darjeeling Himalaya- An Illustrated Account**', which lists **45 taxa of rhododendrons**.

Note:

What is Rhododendron?

- Rhododendron is a **genus of flowering plants** that includes about **1,000 species**, primarily native to the **temperate regions of Asia, North America, and Europe**, as well as to the tropical regions of southeast Asia and northern Australia.
- They are known for their **showy clusters of large, brightly coloured flowers**, and many species are popular ornamental plants in gardens and parks.
- Rhododendrons are **evergreen or deciduous shrubs or small trees**, with **woody stems and broad, leathery leaves**.
- In India, **Pink Rhododendron** is the state flower of Himachal Pradesh, while Rhododendron arboreum is the **state flower of Nagaland** and the official **State Tree of Uttarakhand**.

What are the Major Highlights of the Report?

- The report reveals that the **Darjeeling and Sikkim Himalayas** are home to more than one-third (34%) of all rhododendron types found in India, despite the region comprising only 0.3% of India's geographical area.
- There are **132 taxa (80 species, 25 subspecies and 27 varieties)** of rhododendrons found in India.
- Of the 45 taxa listed in the report, **five are facing high threats due to anthropological pressures** and climate change.
 - **Rhododendron edgeworthii**, **Rhododendron niveum**, **Rhododendron baileyi**, **Rhododendron lindleyi**, and **Rhododendron maddenii** are among the threatened species.
- Rhododendron is considered an **indicator species for climate change** as the flowering season for rhododendrons has been found to begin as early as **January for some species**.

Pangolin

Why in News?

- A new report by **TRAFFIC** and **World Wide Fund for Nature-India** revealed that **1,203 pangolins were poached for illegal wildlife trade in India from 2018-2022**.
- These were recovered in **342 seizure incidents across 24 states and one Union territory of India**. The highest number of seizure incidents and pangolins seized were in **Odisha**.

What are the Characteristics of Pangolin?

- **About:**
 - **Pangolins are nocturnal mammals that dig burrows and feed on ants and termites**, and play a vital role in **ecosystem management**, mostly in **aerating and adding moisture to the soil**.
 - Pangolins are known for their unique appearance. They have **scales made of keratin that cover their entire body**.
 - When threatened, they **can roll into a ball to protect themselves**.
- **Pangolin Species:** There are eight species of pangolin:
 - **4 Species in Africa:** Black-bellied pangolin, White-bellied pangolin, Giant Ground pangolin and Temminck's Ground pangolin.
 - **4 Species in Asia:** Indian pangolin, Philippine pangolin, Sunda pangolin and the Chinese pangolin.
- **Habitat:**
 - It is adaptable to a wide range of habitats including **primary and secondary tropical forests, limestone and bamboo forests, grasslands** and agricultural fields.
 - The Indian Pangolin is found across the Indian subcontinent; **Bihar, West Bengal, and Assam also have the presence of Chinese pangolin**.
- **Threats:**
 - Once known to be found in large numbers, **its population is rapidly declining in its range due to habitat loss and rampant poaching for its skin, scales, and meat**.
 - Pangolins are **among the most trafficked wild mammals**, globally, traded mostly in **Asia**, where their **scales are considered to be medicinal** and their meat a delicacy.
- **Protection Status:**
 - In the red list of animals published by the **International Union for Conservation of Nature (IUCN)**, Indian Pangolin is listed in the **Endangered (EN)** category.
 - The Chinese pangolin has been listed as **"critically endangered"**.
 - In India, pangolins, both **Indian and Chinese**, are protected under **Schedule 1 of the Wildlife (Protection) Act 1972** that prohibits its **hunting, trade or any other form of utilisation**.

Note:



- All pangolin species are listed in **Convention on International Trade in Endangered Species (CITES) Appendix I**.

Global Risks Report 2023

Why in News?

Recently, the **World Economic Forum (WEF)** has released the **18th Edition of Global Risks Report 2023** which seeks that the world be prepared for 'Natural disasters and extreme weather events' in the next two years.

- The WEF report has been released ahead of its flagship Davos 2023 Meeting, which is titled as **Cooperation in a Fragmented World**.

What are the Findings of the Report?

- **Most Severe Risks:**
 - 'Failure to Mitigate Climate Change' and 'Failure of Climate Change Adaptation' are the two **most severe risks facing the world** in the next decade, followed by 'natural disasters and **extreme weather events**' and 'Biodiversity loss and ecosystem collapse'.
 - Today, atmospheric levels of carbon dioxide, methane and nitrous oxide have all **reached record highs**.
 - Emission trajectories make it **very unlikely that global ambitions to limit warming to 1.5°C** will be achieved.
- **Climate Action and Biodiversity Loss:**
 - The world has struggled to make the required progress on climate change despite **30 years of global climate advocacy and diplomacy**.
 - Failure on climate action to address climate change' **has continued to figure among the top risks in the report since 2011**.
 - Biodiversity within and between ecosystems is already declining **faster than at any other point during human history**.
 - But unlike other climate-related risks, 'Biodiversity loss and ecosystem collapse' has **not been perceived to be of concern over** the short term.
 - It has been **ranked as the 4th most severe risk** in the long term or over the next ten years (by 2033).

➤ Reversal of Climate Mitigation Progress:

- Growing demands on public- and private-sector resources from the socio-economic short-term crises **attributed to geopolitical tensions**, will likely reduce the speed and scale of mitigation efforts over the next two years.
- These have, in some cases, also **reversed progress on climate change mitigation**, at least over the short term.
 - For example, the European Union spent at least 50 billion euros on new and expanded fossil-fuel infrastructure and supplies.
 - Some countries including Austria, Italy, the Netherlands and France **restarted coal power stations**.

➤ Apprehensions and Threats:

- Over the next 10 years or by 2033, the interconnections between biodiversity loss, pollution, natural resource consumption, climate change and socioeconomic **drivers will make for a dangerous mix**.
- In the meantime, the current **global pandemic and war in Europe has been held responsible for the energy, inflation and food crises**. In fact, 'cost of living' ranks as the top most serious global risk in the short term (over the next two years).
- Failure to mitigate climate change is also a significant global risk that the world is least prepared for.
 - 70% of the respondents in the WEF report said existing measures to prevent or prepare for climate change have been **"ineffective" or "highly ineffective"**.

Joshimath Land Subsidence

Why in News?

Due to land subsidence, Joshimath - a key transit point for tourists travelling to Badrinath and Hemkund Sahib - developed cracks, **causing panic and protests among the local population**.

- Joshimath has been declared a **landslide-subsidence zone** and over 60 families living in uninhabitable houses in the sinking town have been evacuated to temporary relief centres.

Note:

Where is Joshimath Located?

- Joshimath is a hilly town located on the **Rishikesh-Badrinath National Highway (NH-7)** in Chamoli district of Uttarakhand.
- The city serves as a **tourist town as it acts as an overnight rest stop for people visiting Badrinath, Auli, Valley of Flowers, and Hemkund Sahib, among other important religious and tourist locations** in the state.
- Joshimath is also of great strategic importance to **the Indian armed forces and is home to one of the Army's most important cantonments.**
- The town (fall in **high-risk seismic Zone-V**) is traversed by running streams with a high **gradient from Vishnuprayag, a confluence of the Dhauliganga and the Alaknanda rivers.**
- It is home to one of the **four cardinal maths or monasteries established by Adi Shankara - Sringeri in Karnataka, Dwarka in Gujarat, Puri in Odisha and Joshimath near Badrinath in Uttarakhand.**

Why is Joshimath Sinking?

- **Background:**
 - Cracks on walls and buildings were **first reported in 2021**, as Chamoli district of Uttarakhand experienced frequent landslides and flooding.
 - As per reports, the Uttarakhand government's expert panel in 2022 found that several pockets of Joshimath are **"sinking" owing to man-made and natural factors.**
 - It was found that a gradual settling or sudden sinking of the earth's surface due **to the removal or displacement of subsurface materials** — has induced structural defects and damage in almost all wards of the city.
- **Reasons:**
 - **Site of an Ancient landslide:** According to the **1976 Mishra Committee report**, Joshimath lies on a deposit of sand and stone, it's not on the main rock. It lies on an ancient landslide. The report added that undercutting by river currents of Alaknanda and Dhauliganga are also playing their part in bringing landslides.
 - The committee had recommended that **restrictions be placed on heavy construction work, blasting or digging to remove boulders for road repairs and other construction, felling of trees.**

- **Geography:** Scattered rocks in the area are **covered with old landslide debris comprising boulders, gneissic rocks, and loose soil, with a low bearing capacity.**
 - These gneissic rocks are highly weathered and have a low cohesive value with a tendency of high pore pressure when saturated with water, especially during monsoons.
- **Construction Activities:** Increased construction, hydroelectric projects, and the widening of the NH have made the slopes highly unstable in the last couple of decades.
- **Land Erosion:** Due to the running streams from Vishnuprayag and sliding along the natural streams are the other reasons behind the city's fate.
- **Impact:**
 - At least **66 families have fled the town while 561 houses have reported cracks.** A government official said that over 3000 people have been affected so far.

Bird Species Count in Deepor Beel

Why in News?

Recently, Guwahati Wildlife Division of the Assam Forest Department conducted the 2nd Bird Species Count Exercise after February 2022 in **Deepor Beel Wetland**, which is the only **Ramsar Site** in Assam.

- Altogether 26,747 birds belonging to 96 species were recorded during a bird count at the **Deepor Beel wetland**. There were 10,289 individuals across 66 species in 2022.
- The bird count revealed **greater species diversity and an increase in the total number of species.**

What is Deepor Beel?

- **About:**
 - It is one of the largest freshwater lakes in Assam and an **Important Bird Area** by Birdlife International.
 - Deepor Beel has been designated as a **Ramsar Site in November, 2002**
 - It is located towards the southwest of Guwahati city, Assam and is the erstwhile water channel of **River Brahmaputra.**

Note:

- The lake expands up to 30 sq. km in summer and reduces to about 10 sq. km in the winter.
- The Assam Forest Department manages the 4.1 sq km Deepor Beel Wildlife Sanctuary in the central part of the greater wetland named Deepor Beel.

➤ Importance:

- It constitutes a **unique habitat for aquatic flora and avian fauna**.
- It has both biological and environmental importance besides being the only major storm-water storage basin for Guwahati city.
- It provides a means of livelihood for a number of local families.
 - In 2021 six young girls from the fishing community from Assam have developed a biodegradable and compostable yoga mat called '**Moorhen Yoga Mat**'.
- Deepor Beel adjoins the Rani Reserve Forest from where herds of elephants come periodically to forage in the wetland.

➤ Concerns:

- Deepor Beel has also suffered contamination because of a garbage dump on its edge at Paschim Boraogan.
- Its water has become toxic and it has lost many of its aquatic plants that **elephants would feed on**.
- It has for decades been threatened by a railway track — set to be doubled and electrified — on its southern rim, a garbage dump, and encroachment from human habitation and commercial units.

What are the Other Protected Areas in Assam?

- Assam has **7 national parks** and 17 wildlife sanctuaries.

Wayanad Wildlife Sanctuary

Why in News?

Recently, a **Human-Animal Conflict** occurred where a local man was attacked by an **Elephant** and a herd of elephants raided a field of 500 plantains near **Wayanad Wildlife Sanctuary**, Kerala.

- Human-animal conflict has become a **serious wildlife management problem in Kerala in the last few years**. People living on the fringes of reserve forests and sanctuaries have a heightened sense of insecurity now.

What are the Key Points of Wayanad Wildlife Sanctuary?

- Located in Kerala, Wayanad Wildlife Sanctuary (WWS) is an integral part of the **Nilgiri Biosphere Reserve**. It was established in 1973.
 - Nilgiri Biosphere Reserve was the first from India to be included in the **UNESCO designated World Network of Biosphere Reserves** (designated in 2012).
 - Other wildlife parks within the Reserve are: Mudumalai Wildlife Sanctuary, Bandipur National Park, Nagarhole National Park, Mukurthi National Park and Silent Valley.
- Spread over 344.44 sq km, Wayanad Wildlife Sanctuary is contiguous to the tiger reserves of Nagerhole and **Bandipur of Karnataka and Mudumalai** of Tamil Nadu.
- Kabini river (a tributary of **Cauvery river**) flows through the sanctuary.
- The forest types include **South Indian Moist Deciduous forests**, West coast semi-evergreen forests and plantations of teak, eucalyptus and Grewelia.
- Elephant, Gaur, Tiger, Panther, Sambar, Spotted deer, Barking deer, Wild boar, Sloth bear, Nilgiri langur, Bonnet macaque, Common langur, Wild dog, **common otter**, **Malabar giant squirrel** etc are the major mammals.

Increase in Blackbuck Population

Why in News?

According to a **new study from the Indian Institute of Science (IISc)**, **blackbucks** in India have adapted well to natural and human-induced challenges to their survival.

- In spite of immense losses in grassland habitats across India, the **data showed an increasing trend in blackbuck population numbers** as compared to the recent past.

What are Blackbucks?

- **About:**
 - The Blackbuck (*Antelope cervicapra*), or the **Indian Antelope**, is a species of antelope native to India and Nepal.

Note:

- It is **widespread in Rajasthan, Gujarat, Madhya Pradesh, Tamil Nadu, Odisha, and other areas throughout peninsular India.**
- It is considered as the **epitome of grassland.**
- The **blackbuck is a diurnal antelope** (active mainly during the day).
- **Recognition:**
 - It has been **declared as the State Animal of Punjab, Haryana, and Andhra Pradesh.**
- **Cultural Importance:**
 - It is a **symbol of purity for Hinduism** as its skin and horns are regarded as sacred objects. For **Buddhism, it is a symbol of good luck.**
- **Protection Status:**
 - **Wildlife Protection Act 1972:** Schedule I
 - **IUCN Status:** Least Concern
 - **CITES:** Appendix III
- **Threat:**
 - Habitat Fragmentation, **Deforestation, Natural Calamities**, Illegal Hunting.
- **Related Protected Areas:**
 - Velavadar Blackbuck Sanctuary - Gujarat
 - Point Calimere Wildlife Sanctuary - Tamil Nadu
 - In 2017, the Uttar Pradesh State Government approved the plan of setting up the Blackbuck **Conservation Reserve** in the trans-Yamuna belt near Prayagraj. **It would be the first conservation reserve dedicated to the blackbuck.**
 - **Tal Chhapar Sanctuary**- Rajasthan

Senna Spectabilis

Why in News?

Kerala has come out with a management plan to eradicate ***Senna spectabilis***, the exotic invasive plant that is posing a **severe threat to the State's wildlife habitat.**

- The management plan stipulates that **there should not be an attempt to kill the trees before a detailed reforestation programme** and the resources for implementing it are in place.

What is Senna spectabilis?

- *Senna spectabilis* is a **deciduous tree native to tropical areas of America.**

- It grows up to **15 to 20 metres in a short period of time** and distributes thousands of seeds after flowering.
- The thick foliage of the tree **arrests the growth of other indigenous tree and grass species.** Thus, it causes food shortage for the wildlife population, especially herbivores.
- It also adversely affects the germination and growth of the native species.
- It is categorised as '**Least Concern**' under **IUCN Red List.**

Indian Star Tortoise

Why in News?

A new study on the **Indian Star Tortoise (*Geochelone elegans*)** has found that **illegal trade and unscientific translocations** are causing major losses to the species' **genetic diversity and habitat.**

- The research calls for proper conservation strategy to combat the **fragmented distribution and recommends intensive genetic screening** of the species to implement **scientific breeding.**

What are the Key Facts about Indian Star Tortoise?

- **Habitat:**
 - **Indian star tortoises** are found across the Indian subcontinent, more specifically, in the **Central and Southern parts of India**, in **West Pakistan and in Sri Lanka.**
 - It is typically found in **dry, open habitats such as scrub forests, grasslands, and rocky outcroppings.**
- **Threat:**
 - The species is facing **twin challenges of a threat to its habitat** at one level and loss of its **genetic diversity** at the other.
 - Their highly fragmented habitat of the species is greatly influenced by an **increased level of urbanization** and agricultural practices.
 - Due to **subsequent hybridisation** of these species over the years, Indian star tortoises have **lost genetic diversity.**
 - Also, according to the **Wildlife Crime Control Bureau, 90% of the trade of Star Tortoise** occurs as part of the international pet market.

Note:



- **Protection Status:**
 - **IUCN Red List:** Vulnerable
 - **Wild Life Protection Act 1972:** Schedule IV
 - **Schedule IV:** This list is for species that are not endangered. It includes protected species but the **penalty for any violation is less compared to the Schedules I and II.**
 - **Convention on International Trade in Species (CITES):** Appendix I

Spot Bellied Eagle Owl

Why in News?

Recently, **Spot Bellied Eagle Owl (*Bubo Nipalensis*)** was spotted for the first time in **Seshachalam forest**, and for the third time in **Andhra Pradesh**.

- It was sighted twice earlier at **Nagarjunasagar Srisailem Tiger Reserve(NSTR)**.

What is a Spot-bellied Eagle Owl?

- **About:**
 - The **Spot-bellied Eagle Owl**, also known as the **Forest eagle-owl** is a large owl species typically found in wooded areas, such as **forests and rocky hillsides**, and are known for their **distinctive spots on their belly**.
 - The spot-bellied eagle-owls are **large, very powerful and bold predatory birds**.

The bird makes a strange scream similar to humans and it is hence called the **'Ghost of the Forest'** in India.

- **Distribution:**
 - These eagle-owl species are distributed in **India, Sri Lanka, Nepal, Bhutan, Bangladesh, Myanmar, China, Thailand, Laos, Cambodia and Vietnam**.
- **Prey:**
 - They are known to prey on large birds and also on mammals like **golden jackals, hares, civets and chevrotains**.
- **IUCN and CITES Status:**
 - **International Union for Conservation of Nature(IUCN)** Red list: "Least Concern".
 - **CITES (the Convention on International Trade in Endangered Species of Wild Fauna and Flora):** Appendix II.

Nagarjunasagar Srisailem Tiger Reserve

- The Nagarjunsagar-Srisailem Tiger Sanctuary was declared officially in 1978 and has been recognized by the Project Tiger in 1983.
- **Nagarjunsagar-Srisailem Tiger Reserve** is the largest tiger reserve in India.
- In 1992, it was retitled as **Rajiv Gandhi Wildlife Sanctuary**.
- The Tiger reserve is spread over 5 districts in Andhra Pradesh and Telangana. The area consists mostly of the **Nallamala Hills**.
- The multipurpose reservoirs- **Srisailem and Nagarjunasagar** are located in the reserve.
- The **Krishna River** cuts the basin of this reserve.

Note:

