VISIONIAS
INSPIRING INNOVATION

ENVIRONMENT

Classroom Study Material

(May 2021 to January 2022)

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ENVIRONMENT

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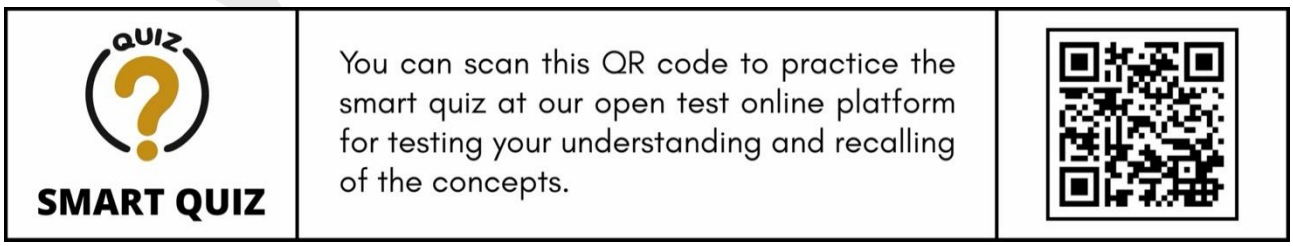
Note:

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

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

1. **Different colors** have been used in the document for easy classification and recollection of a variety of information.
2. **QR based Smart quiz** has been added to test the aspirant's learnings and understanding.
3. **Infographics** have been added to ease understanding, provide for smoother learning experience and ensure enhanced retention of the content.



1. CLIMATE CHANGE

1.1. GLOBAL SCENARIO

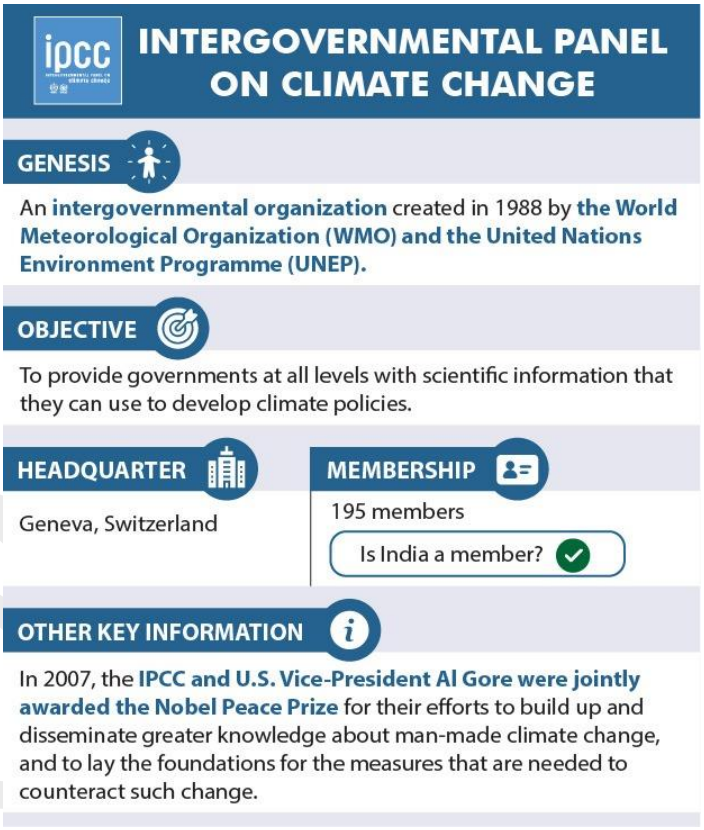
1.1.1. IPCC'S SIXTH ASSESSMENT REPORT

Why in News?

The Intergovernmental Panel on Climate Change (IPCC) recently released its report of Working Group I of the Sixth Assessment Report (AR6) titled- 'AR6 Climate Change 2021: The Physical Science Basis'.

About the report

- The IPCC prepares comprehensive Assessment Reports about the **state of scientific, technical and socio-economic knowledge on climate change,** its impacts and future risks, and options for reducing the rate at which climate change is taking place.
- So far, five assessment reports have been produced, the first one being released in 1990.
- This AR6 will be an update of the **AR5 released in 2013.**
- **Improvements since AR5:**
  - **Improvements in observation-based estimates and information from paleoclimate archives** provide a comprehensive view of each component of the climate system and its changes to date.
  - **New climate model simulations, new analyses, and methods combining multiple lines of evidence lead** to improved understanding of human influence on a wider range of climate variables, including weather and climate extremes.



Key Findings

Observations	Related Data and Statistics
Current State of the Climate	

Human influence has unequivocally warmed the atmosphere, ocean and land:
• Observed increases in well-mixed greenhouse gas (GHG) concentrations since around 1750 are unequivocally caused by human activities.
• Human influence has been linked with widespread and rapid changes in the atmosphere, ocean, cryosphere and biosphere such as-
  ○ Global retreat of glaciers.
  ○ Sea level rise.
  ○ Drop in oxygen levels in many upper ocean regions.
  ○ Observed precipitation changes.
  ○ Changes in near-surface ocean salinity.
  ○ Global acidification of the surface open ocean.
  ○ Decrease in Northern Hemisphere spring snow cover.
	• **Global surface temperature was 1.09 °C higher in 2011– 2020 than 1850–1900,** with larger increases over land (1.59 °C) than over the ocean (0.88 °C).
	• Each of the last four decades has been successively warmer than any decade that preceded it since 1850.
	• **Human-caused global surface temperature increase** from 1850–1900 to 2010–2019 is estimated to be **1.07°C.**
	• The **Arctic Sea ice area has decreased (about 40%** in September and about 10% in March) in between 1979–1988 and 2010–2019.
	• **Global mean sea level increased by 0.20 m between 1901 and 2018.**
	• **Climate zones have shifted poleward in both hemispheres,** and the **growing season has on average lengthened by up to two days per decade since the 1950s** in the Northern Hemisphere extratropics.

Scale of recent changes across the climate system are unprecedented.

- Concentrations of CO_2 unmatched for at least 2 million years.
- Glacial retreat unmatched for 2,000+ years.
- Sea level rise faster than any prior century for 3,000 years.
- Summer Arctic ice coverage smaller than smaller than any time in the last 1,000 years.
- Ocean warming faster at any time since end of the last ice age.
- Ocean acidification at highest level in the last 26,000 years.

Human-induced climate change is already affecting many weather and climate extremes in every region across the globe:

- It has been linked to extreme weather events such as heatwaves, heavy precipitation, droughts, and tropical cyclones etc.

- **Hot extremes (including heatwaves) have become more frequent** and more intense across most land regions since the 1950s.
- Marine heatwaves have approximately doubled in frequency since the 1980s.
- The frequency and intensity of heavy precipitation events have increased since the 1950s over most land area.
- Tropical cyclone occurrence has increased over the last four decades.

- **Human-caused net positive radiative forcing causes an accumulation of additional energy (heating) in the climate system.**
  - Radiative forcing is the change in energy flux in the atmosphere caused by natural and/or anthropogenic factors of climate change. Positive radiative forcing means Earth receives more incoming energy from sunlight than it radiates to space.
- Heating of the climate system has caused global mean sea level rise through ice loss on land and thermal expansion from ocean warming.
  - **Ocean warming accounted for 91% of the heating in the climate system,** with land warming, ice loss and atmospheric warming accounting for about 5%, 3% and 1%, respectively.
  - **Thermal expansion explained 50% of sea level rise** during 1971– 2018, while ice loss from glaciers contributed 22%, ice sheets 20% and changes in land water storage 8%.
  - The **equilibrium climate sensitivity** (the global mean surface air temperature increase that follows a doubling of atmospheric carbon dioxide) is estimated to be 3°C.

- **Global surface temperature will continue to increase until 2050 under all emissions scenarios** and target of 1.5°C and 2°C will be exceeded during the 21st century unless deep reductions in carbon dioxide (CO_2) and other greenhouse gas emissions occur in the coming decades.
- With every increment of global warming, changes get larger in regional mean temperature, precipitation and soil moisture.
- **Continued global warming is projected to further intensify the global water cycle**, including its variability, global monsoon precipitation and the severity of wet and dry events.
- With increase in CO_2 emissions, the ocean and land carbon sinks will become less effective at absorption of CO_2 from the atmosphere.
- **Many changes due to past and future greenhouse gas emissions are irreversible**, especially changes in the ocean, ice sheets and global sea level.

Climate Information for Risk Assessment and Regional Adaptation

- **Multiple climatic impact-drivers are projected to change in all regions of the world** with changes being more widespread at 2°C compared to 1.5°C global warming.
  - Climatic impact-drivers (CIDs) are physical climate system conditions (e.g., means, events, extremes) that affect an element of society or ecosystem.
- With every increment of Gloval Warming, changes get larger in regional mean temperautee, precipitation and soil moisture.
- **Low-likelihood outcomes**, such as ice sheet collapse, abrupt ocean circulation changes, some compound extreme events and warming **substantially larger than the assessed very likely range of future warming** cannot be ruled out and are part of risk assessment.

Regional findings for India

Following impacts are likely to be seen in India (South Asian region)-

- **Heatwaves and humid heat stress will be more intense and frequent** during the 21st century all over South Asia.
- **Both annual and summer monsoon precipitation will increase** during the 21st century, with enhanced interannual variability.
- **Increases in precipitation and rivers floods**.
- **Fire weather seasons are projected to lengthen and intensify**.

- **Covered areas and snow volumes will decrease in most regions of the Hindu Kush Himalaya** during the 21st century and **snowline elevations will rise and glacier volumes are likely to decline** with greater mass loss in higher CO_2 emissions scenarios.
- **Regional-mean Sea level continues to rise** and will contribute to more **frequent coastal flooding** and higher Extreme Total Water Level (ETWL) in low-lying areas and **coastal erosion** along sandy beaches.

1.1.2. EMISSIONS GAP REPORT

Why in news?

Emissions Gap Report 2021 was recently released by United Nations Environment Programme (UNEP).

About the report

The report in an **annual series** that provides an overview of the Emission gap- **difference between where greenhouse emissions are predicted to be in 2030 and where they should be** to avert the worst impacts of climate change.

Key highlights

- **Limited impact of New or updated NDCs and announced pledges for 2030**: Projected to reduce 2030 emissions **by only 7.5 per cent**, resulting in **warming of 2.7**°C (slightly less than the 3°C UNEP forecast in its last report).
- **Emission reductions needed**: A **30% cut** to limit warming to 2°C and a **55% cut** to limit to 1.5°C.
- **Current net-zero targets** could limit global warming to around **2.2°C by century's end**.
- The **reduction of methane emissions** from the fossil fuel, waste and agriculture sectors **could help close the emissions gap and reduce warming** in the short term.
- The **COVID-19 pandemic** led to an unprecedented **5.4 per cent drop in global fossil carbon dioxide (CO2) emissions** in 2020.
  - A strong rebound in emissions is expected in 2021.

1.1.3. THE ADAPTATION GAP REPORT 2021: THE GATHERING STORM

Why in news?

The report was recently released by UN Environment Programme (UNEP).

Related News: First Movers Coalition (FMC)

- It is a **public-private partnership launched by World Economic Forum** in partnership with US and over 30 global businesses.
- It brings together global companies**,** with supply chains across carbon-intensive sectors, **to invest in innovative green technologies** so they are available for massive scale-up by 2030 **to enable net-zero emissions by 2050**.

About the report

- Report **assesses national and global progress on adaptation,** covering 3 central elements of adaptation process: **planning, financing and implementation.**
- **Key findings of the report**
  - **Climate change adaptation is increasingly being embedded in policy and planning**.
    - ✓ Around 79% of countries have adopted at least one national-level adaptation planning instrument (an increase of 7% since 2020).
  - **Adaptation costs** and financing needs **in developing countries are 5 to 10 times greater** than current finance flows.
    - ✓ Adaptation finance gap is **larger than indicated in 2020** and widening.
  - **Opportunities provided by COVID-19 recovery stimulus packages**, for green and resilient recoveries, **are not currently being realized.**

Related terms	
Adaptation	It is the **process of reducing countries' and communities' vulnerability to climate change** by increasing their ability to absorb impacts and remain resilient.
Adaptation Gap	It is defined as the **difference between actually implemented adaptation and a societal set goal**, determined largely by preferences related to tolerated climate change impacts, and reflecting resource limitations and competing priorities.
Adaptation costs	**Costs of planning, preparing for, facilitating, and implementing adaptation measures**, including transaction costs.

UN Environment Programme

Genesis

- An **intergovernmental organization** established in June 1972 as **an outcome from the United Nations Conference on the Human Environment** (Stockholm Conference, 1972).
  - It works **under the umbrella of the UN 2030 Agenda for Sustainable Development,** identifying and addressing the most relevant environmental issues of our time.

Objective

- It **sets the global environmental agenda,** promotes the coherent implementation of the environmental dimension of sustainable development and serves as an authoritative advocate for the global environment.

Headquarter

- **Nairobi, Kenya.**

Membership

- **193 Member States**

Is India a member? ✓

Other key information:

- **Structure:** Chaired by its Executive Director.
- UNEP depends on voluntary contributions for 95% of its income.
- It **administers, or provides secretariat functions** for many multilateral environmental agreements (MEAs) and other entities

01 Convention on International Trade in Endangered Species of Wild Fauna and Flora **(CITES), 1973**

02 Convention on the Conservation of Migratory Species of Wild Animals **(CMS or Bonn Convention), 1979**

03 **Vienna Convention** for the Protection of the Ozone Layer, 1985

04 **Basel Convention** on the Control of Transbound ary Movements of Hazardous Wastes and their Disposal, 1989

05 Convention on Biological Diversity **(CBD), 1992**

06 **Rotterdam Convention** on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade, 1998

07 **Stockholm Convention** on Persistent Organic Pollutants, 2001

08 **Minamata Convention** on Mercury, 2013

Major Reports

- Global Environment Outlook (GEO) Report
- Adaptation Gap Report
- Triple Emergency
- Cooling Emissions And Policy Synthesis Report (published by UNEP in association with Cooling Emissions And Policy Synthesis Report)

1.1.4. GREENHOUSE GAS BULLETIN

Why in news?

World Meteorological Organization (WMO) recently released Greenhouse Gas Bulletin.

Key Highlights

- Concentration of carbon dioxide (CO_2): Reached **413.2 parts per million in 2020 and is 149% of the pre-industrial level.**
- **Methane (CH_4) is 262% and nitrous oxide (N_2O) is 123%** of the levels in 1750.
- From 1990 to 2020, **radiative forcing** – the warming effect on our climate - by long-lived greenhouse **gases increased by 47%,** with CO_2 accounting for about **80% of this increase.**
- The numbers are based on monitoring by WMO's **Global Atmosphere Watch network.**

1.1.5. GLOBAL METHANE ASSESSMENT

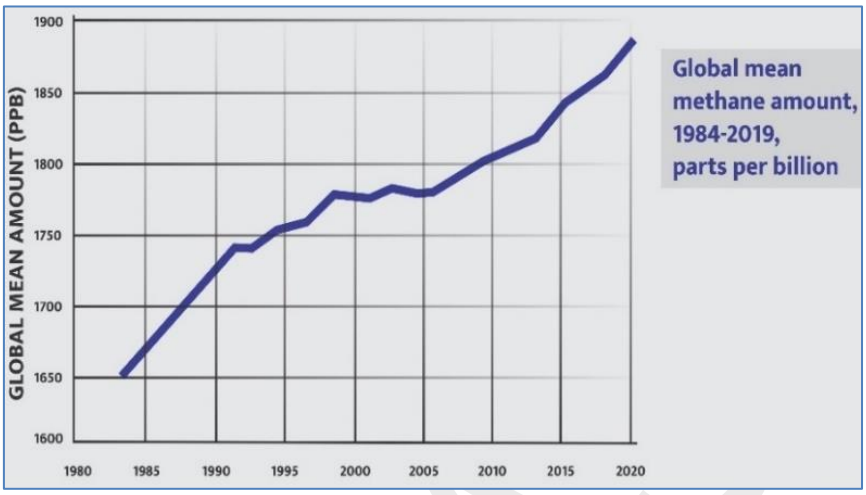
Why in news?

"Global Methane Assessment: Benefits and Costs of Mitigating Methane Emissions" was published by the **United Nations Environment Programme in association with the Climate and Clean Air Coalition.**

Key findings of the report

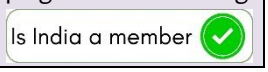
- **Increasing Concentration of Methane:** Methane's atmospheric **concentration has more than doubled since pre-industrial times.**
  - **Second only to carbon dioxide** in driving climate change.
  - **Methane in the atmosphere reached record levels last year** even though CO2 levels dropped during the pandemic.
- **Reducing anthropogenic emissions: Reduction** of anthropogenic emissions **by 45%** would prevent a rise in global warming by up to **0.3 degrees Celsius by 2045.**

- **Varying mitigation potential:** The **mitigation potential varied between countries and regions.** For example, China's mitigation potential was best in coal production and livestock, India's in the waste sector.
  - The **fossil fuel industry had the greatest potential for low-cost methane cuts**.
- **Recommendations to reduce Methane Emissions:**
  - **Behavioural change measures** (to prevent emissions from agriculture) like:
    - ✓ **reducing food waste** and loss,
    - ✓ improving **livestock management**
    - ✓ adoption of **healthy diets** (vegetarian or with a lower meat and dairy content)
  - **Other measures like:**
    - ✓ Improved treatment and disposal of solid waste.
    - ✓ Transition to renewable energy,
    - ✓ A global tax on methane emissions



Related News
Global Methane Initiative (GMI)

- **India recently co-chaired** GMI Steering Leadership Meeting.
- GMI is a **voluntary Government and an informal international partnership created to achieve global reduction in anthropogenic methane emission** through partnership among developed and developing countries having economies in transition.
  - It was **created in 2004** and has **membership from 45 countries.**



About Methane

- Methane is a **short-lived climate pollutant (SLCP)** with an atmospheric lifetime of roughly a decade.
- **Sources of methane:**
  - **Natural:** Wetlands, Inland waters, geological oceans, termites, wild animals, permafrost, and vegetation.
  - **Anthropogenic:** Fossil fuel production and use, agriculture, and waste.
- Methane contributes to the **formation of ground-level ozone,** a dangerous air pollutant.
  - Ozone attributable to anthropogenic methane emissions causes **approximately half a million premature deaths per year globally** and harms ecosystems and crops by suppressing growth and diminishing production.
- Methane's short atmospheric lifetime means **taking action now can quickly reduce atmospheric concentrations** and result in similarly rapid reductions in **climate forcing** (an imbalance in radiation at the top of the Earth's atmosphere) and ozone pollution.

About Short-lived climate pollutants

- They are powerful climate forcers that remain in the atmosphere for a much shorter period of time than carbon dioxide (CO_2), yet their potential to warm the atmosphere can be many times greater.
- Certain short-lived climate pollutants are also dangerous air pollutants that have harmful effects for people, ecosystems and agricultural productivity.
- The short-lived climate pollutants- **black carbon, methane, tropospheric ozone, and hydrofluorocarbons** are the most important contributors to the man-made global greenhouse effect after carbon dioxide, responsible for up to 45% of current global warming.
  - **Black carbon is the second-largest contributor** to warming the planet behind carbon dioxide (CO_2).

1.1.6. INDIA ON COURSE TO EXCEED PARIS CLIMATE CHANGE COMMITMENTS

Why in News?

At India-ISA (International Solar Alliance) Energy Transition Dialogue 2021, Union Minister of Power and New & Renewable Energy highlighted **gains made by India in energy transition.**

India's NDC

- To achieve **40%** of **cumulative electric power installed capacity** from non fossil fuel **by 2030,**

- **Reducing emissions intensity** of its GDP by **33-35%** from **2005 levels by 2030**, and
- To create an **additional carbon sink of 2.5-3 billion tonnes of CO_2** equivalent through additional forest and tree cover.

India's achievements so far

- Achieved coveted milestone of **100 GW of installed Renewable Energy Capacity.**
  - **38.5%** of India's installed power generation capacity is based on clean renewable energy source.(**4th position in the world in terms of installed RE capacity and 5th in Solar.)**
- India has achieved emission reduction of **28% over 2005 levels, against the target of 35% by 2030 committed in its NDC (Nationally determined contributions).**

Related News:
- Only 110 countries that are party to the Paris **accord have submitted updated NDCs for limiting their carbon emissions.**
- **China and India have missed U.N. deadline.**

1.2. INTERNATIONAL CONVENTIONS AND INITIATIVES

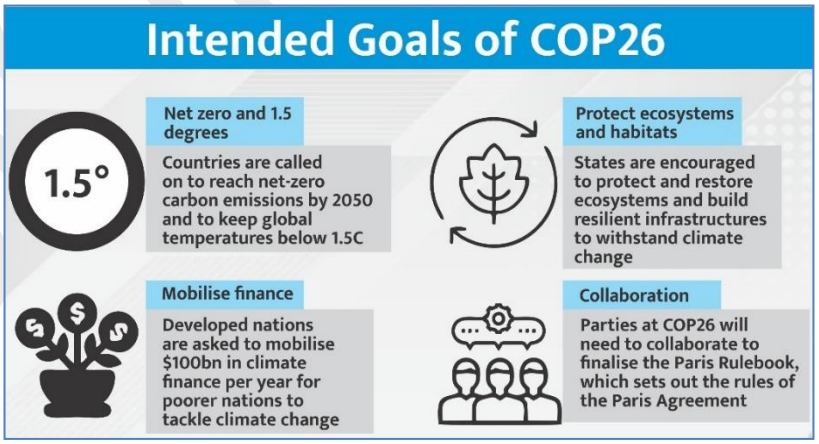
1.2.1. COP26

Why in News?

The 26th Conference of the Parties (COP) of the United Nations Framework Convention on Climate Change (UNFCCC) in Glasgow, hosted by the UK, recently concluded.

More on the news

- The Conference also included the 16th session of the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol (CMP 16), and the third session of the Conference of the Parties serving as the meeting of the Parties to the Paris Agreement (CMA 3).
- The COP26 holds significance as it aims to **finalize the Paris rulebook**, following the 2019 COP25 summit in Madrid, where many issues had not been agreed and had been pushed into the next year under the **"Rule 16" of the UN climate process**.
- The conference ended with all 197 parties to the UNFCCC agreeing to **Glasgow Climate Pact (GCP)**, the global agreement which will accelerate action on climate this decade and completes the Paris Rulebook.
  - The pact aims to **limit global warming to 1.5 degree Celsius by 2030,** as agreed under the 2015 Paris Agreement and **cut Global greenhouse gas emissions by 45 per cent by 2030 and to zero overall by 2050.**



Key Outcomes of the COP26

Areas of discussion	Important Decisions and Developments
Ambition	• By the end of COP26, 153 countries had submitted **new climate plans (known as nationally determined contributions, or NDCs)** to slash their emissions by 2030. • Countries requested to revisit and **strengthen their climate pledges by the end of 2022.**
Target action against fossil fuels	• **First-ever COP decision to explicitly target action against fossil fuels,** calling for a "phasedown of unabated coal" and "phase-out" of inefficient fossil-fuel subsidies.
Adaptation	• Countries have been urged to **at least double their collective provision of climate finance for adaptation from 2019 levels by 2025.** • **$352 million were pledged for the UN's Adaptation Fund,** the highest single mobilisation to the fund. ○ The fund has the advantage of being focused exclusively on adaptation projects and also being 100% grant-based rather than providing loans to poorer nations.

	• **Sharm el-Sheikh Work Programme on the Global Goal on Adaptation** to reduce vulnerability, strengthen resilience and increase the capacity of people and the planet to adapt to the impacts of climate change.
International Carbon Markets under Article 6	• **Article 6**, which covers Market- and non-market-based mechanisms of the Paris Agreement, **was finalized.** Key decisions regarding the Article include- o **Carbon credits generated under the Kyoto Protocol since 2013** (amounting to ~ 320m tonnes of CO_2 equivalent), **will be carried over** into the Paris mechanism but must be used by 2030. o **5% of proceeds** under traditional market mechanisms (Article 6.4), **must mandatorily go toward funding adaptation**. o Contributing funds toward adaptation under bilateral trading of credits between countries (Article 6.2) is voluntary. o **Avoidance of double counting**, in which more than one country could claim the same emissions reductions as counting toward their own climate commitments. o Exclusion of the use of credits generated historically, between 2015 and 2021, from reduced deforestation and forest degradation, under the UN scheme known as REDD+.
Loss and damage	• **Glasgow Dialogue** created on funding for loss and damage. • **Developed countries pledged to support the Santiago network**, a website set up by the UNFCCC, with links to organisations such as development banks that could support loss and damage.
Rules on transparency of climate action and support	• All countries agreed to submit information about their emissions and financial, technological and capacity-building support using a common and standardized set of formats and tables.
Common Time Frames	• Countries were encouraged to use common timeframes for their national climate commitments. o This means that new NDCs that countries put forward in 2025 should have an end-date of 2035, in 2030 they will put forward commitments with a 2040 end-date, and so on.

Glossary

- **Loss and Damage**: It refers to impacts of climate change that cannot be adapted to, and where losses are permanent. It covers both slow-onset processes like sea-level and temperature rise, and extreme events such as floods, hurricanes and tropical cyclones.
- **Market- and non-market-based mechanisms under Article 6**: It contains three separate mechanisms for "voluntary cooperation" towards climate goals, with the overarching aim of raising ambition. Two of the mechanisms are based on markets and a third is based on "non-market approaches".
  - **Article 6.2** governs bilateral cooperation via **"internationally traded mitigation outcomes" (ITMOs),** which could include emissions cuts measured in tonnes of CO_2 or kilowatt hours of renewable electricity.
    - ✓ It could see countries link their emissions trading schemes, for example, or buying offsets towards their national climate goals.
  - **Article 6.4** will lead to the creation of a new international carbon market for the trade of emissions cuts, created by the public or private sector anywhere in the world, also known as the **"Sustainable Development Mechanism" (SDM)**.
  - **Article 6.8** offers a formal framework for climate cooperation between countries, where no trade is involved, such as development aid.

United Nations
Framework Convention on
Climate Change

United Nations Framework Convention on Climate Change

Genesis

- Intergovernmental teraty established in 1992 which entered into force in 1994.
  - It is a "Rio Convention", **one of two opened for signature at the "Rio Earth Summit" in 1992.**
    - The Rio Conventions derive directly from the United Nations Conference on Environment and Development (UNCED), also known as the 'Earth Summit', held in Rio de Janeiro, Brazil, in 1992.
    - Its sister Rio Conventions are the UN Convention on Biological Diversity (UNCBD) and the Convention to Combat Desertification (UNCCD).

Objective

- To stabilize greenhouse-gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system, within a time-frame sufficient to allow ecosystems to adapt naturally to climate change;
- to ensure that food production is not threatened;
- to enable economic development to proceed in a sustainable manner.

Location of UNFCCC secretariat: Bonn, Germany.

- The secretariat provides technical expertise and assists in the analysis and review of climate change information reported by Parties and in the implementation of the Kyoto mechanisms.
- UNFCCC secretariat is part of the United Nations.
- It also maintains the registry for Nationally Determined Contributions (NDC) established under the Paris Agreement.

Membership

- Has near-universal membership,**197 countries that have ratified the Convention are called Parties to the Convention.**

Is India a Party? ✓

Other key information:

- **Key Agreements established under the Convention:** Kyoto Protocol and Paris Climate Agreement

Operating Mechanism of UNFCCC

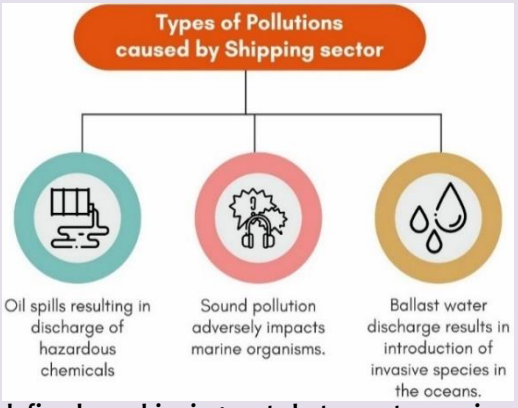
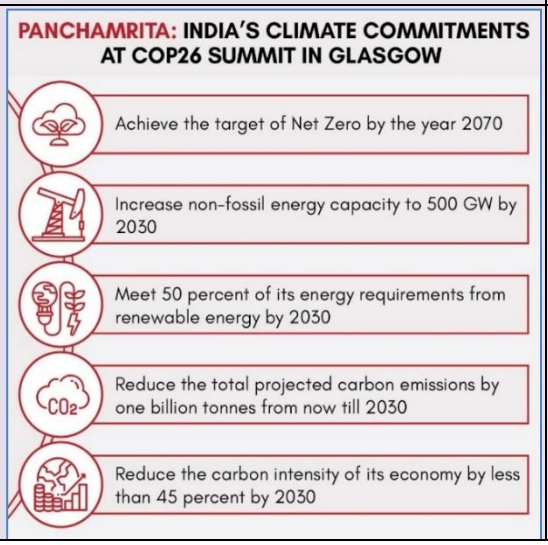
- **Conference of the Parties (COP):** The supreme decision-making body of the Convention.
- All States that are Parties to Convention are represented at COP.
- It meets every year, unless the Parties decide otherwise.

- **Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol (CMP):**
- Oversees implementation of Kyoto Protocol and takes decisions to promote its effective implementation.
- All States that are Parties to the Kyoto Protocol are represented at the CMP, while States that are not Parties participate as observers.

- **Conference of the Parties serving as the meeting of the Parties to the Paris Agreement (CMA):**
- Oversees the implementation of the Paris Agreement and takes decisions to promote its effective implementation.
- All States that are Parties to the Paris Agreement are represented at the CMA, while States that are not Parties participate as observers.

1.2.2. PLEDGES/DECLARATIONS/AGENDAS RELEASED AT COP26

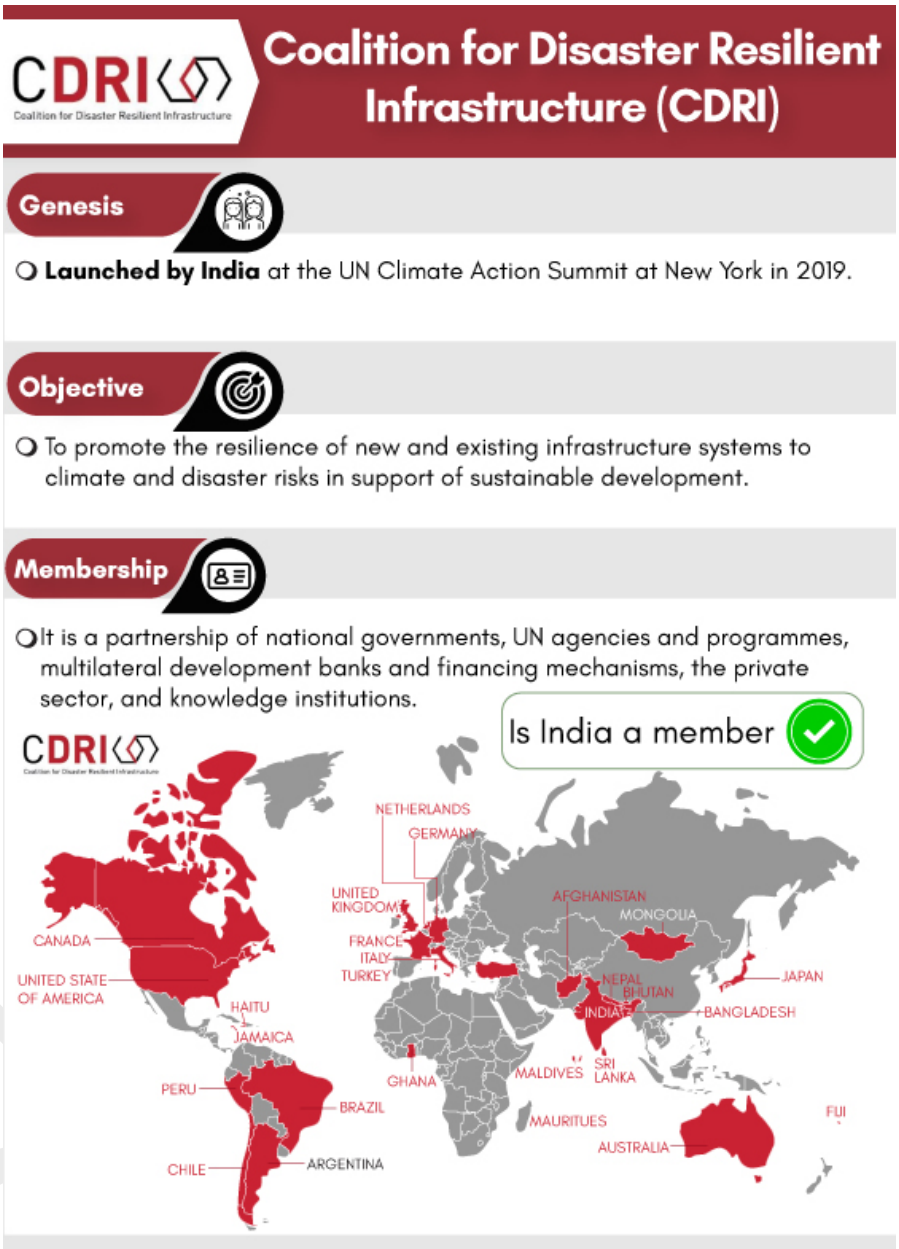
Name	Details	Is India a signatory?
Breakthrough Agenda	• It commits countries to work together to **make clean technologies and sustainable solutions the most affordable, accessible and attractive option in each emitting sector** (power, road transport, steel, agriculture etc.) globally before 2030.	✓
Global Methane Pledge	• A **voluntary non-binding agreement** under which signatory countries have promised to **cut their methane emissions by at least 30 per cent by 2030.**	✗
Glasgow Leaders' Declaration on Forests and Land Use	• Voluntary declaration signed among countries committed to working collectively to **halt and reverse forest loss and land degradation by 2030** while delivering sustainable development and promoting an inclusive rural transformation.	✗

Forest, agriculture and commodity trade (FACT) statement	• **Jointly led by the UK and Indonesia**. • **Aim:** to support sustainable trade between commodity-producing and -consuming countries.	✗
Sustainable Agriculture Policy Action Agenda for the Transition to Sustainable Agriculture and Global Action Agenda for Innovation in Agriculture	• Signatories have agreed to urgent action and investment to protect nature and shift to more sustainable ways of farming. • **Policy Action Agenda** sets out pathways and actions that countries can take to repurpose public policies and support to food and agriculture, to deliver these outcomes and enable a just rural transition. • **Global Action Agenda** is supported by World Bank, WWF, World Food Programme, UN Foundation, Columbia Climate School, Bayer, Rainforest Alliance, World Economic Forum, Asian Development Bank, European Bank for Reconstruction and Development, etc.	✗
Declaration on "accelerating the transition to 100% zero-emission cars and vans"	• Non-binding agreement among governments, automotive manufacturers, financial institutions, and civil society organisations. • **Aim**: To work towards **all sales of new cars and vans being zero emission globally by 2040**, and by no later than 2035 in leading markets.	✓
Beyond Oil and Gas Alliance (BOGA)	• Led by: the governments of **Denmark and Costa Rica**. • It is an **international alliance of governments and stakeholders** working together to facilitate the managed phase-out of oil and gas production. • **Aim:** To elevate the issue of oil and gas production phase-out in international climate dialogues, mobilize action and commitments, and create an international community of practice on this issue.	✗
Clydebank Declaration for Green Shipping Corridors	• **A coalition of 22 countries** have agreed to create zero emissions shipping trade routes between ports to speed up the decarbonisation of the global maritime industry. • The signatory countries signed the **'Clydebank Declaration for Green Shipping Corridors'** (launched at the COP26 climate summit in Glasgow) and agreed to support the establishment of at least **6 green corridors by 2025.** o A green corridor is **defined as a shipping route between two major port hubs** on which the **technological, economic and regulatory feasibility of zero-emissions ships** is **accelerated by public and private action.** 	✗
India's Panchamrita	• Prime Minister of India laid out India's climate change action plan **(panchamrita)** at the 26th United Nations Framework Convention on Climate Change's Conference of Parties (COP26) in Glasgow. 	-

1.2.3. MAJOR INITIATIVES LAUNCHED DURING COP26

1.2.3.1. GLOBAL RESILIENCE INDEX INITIATIVE (GRII)

- Launched by: 10 global organisations.
- **Partners of GRII:** Insurance Development Forum (IDF); Coalition for Climate Resilient Investment; Coalition for Disaster Resilient Infrastructure; GEM Foundation; UK Centre for Greening Finance and Investment and the United Nations Office for Disaster Risk Reduction.
- **Goals of GRI:**
  - Offer global open reference risk data using metrics built on insurance risk modelling principles;
  - Provide shared standards and facilities applicable to a wide range of uses, including corporate climate risk disclosure, national adaptation planning and reporting, and the planning of pre-arranged humanitarian finance.



1.2.3.2. GLASGOW FINANCIAL ALLIANCE FOR NET ZERO (GFANZ)

- Launched by: **UN Special Envoy for Climate Action and Finance**, along with UNFCCC Climate Action Champions, and the COP26 Presidency.
- GFANZ was originally unveiled in **2021 as a forum for leading financial institutions to accelerate transition to a net-zero global economy** through de-carbonization of the economy **i**n line with the Paris agreement.
  - **The Objective of 'net Zero' is to reach net-zero emissions by 2050.**
- **The target is in line with Race to Zero campaign of UN** that rallies non-state actors, including companies, cities, regions, financial and educational institutions to take rigorous and immediate action to halve global emissions by 2030.
- Members under GFANZ include **net zero banking alliance, net zero asset managers initiative, net zero asset owners alliance, net zero insurance alliance,** Net Zero Financial Service Providers Alliance etc.
  - **The Net-Zero Banking Alliance (NZBA),** hosted by United Nations Environment Programme-Finance Initiative (UNEP FI) is the **newest net zero alliance.**
  - **Other net zero alliances include** - the Net Zero Asset Managers Initiative and the UN-convened Net-Zero Asset Owner Alliance etc.

- **Earlier, in 2019, the UN General Assembly had also launched its principles of responsible banking (PRBs)** whereby banks had agreed to "work with their clients to encourage sustainable practices" and to align business strategy to UN sustainable development goals.

1.2.3.3. INFRASTRUCTURE FOR RESILIENT ISLAND STATES (IRIS)

Is India a member

- Launched by: **India, along with Australia, UK, Fiji, Jamaica and Jamaica.**
- It has been co-created by the **Coalition for Disaster Resilient Infrastructure (CDRI)** with support from Member Countries and organizations and Small Island Developing States (SIDS) representatives.
- It is a dedicated initiative that will provide technical support on the multifaceted issues posed by infrastructure systems and **promote disaster and climate resilience of infrastructure assets in SIDS**, and share latest knowledge and learnings targeted to specific infrastructure sectors.
- While contributing to the **SAMOA Pathway (SIDS Accelerated Modalities of Action),** IRIS targets to deliver three intended outcomes as
  - **Improve resilience of SIDS infrastructure to climate change and disaster risk.**
  - **Strengthen knowledge and partnerships for integrating resilience in SIDS infrastructure.**
  - **Promote gender equality and disability inclusion through resilient SIDS infrastructure.**
- **SIDS,** comprising countries in the Caribbean, Pacific, Atlantic, Indian Ocean, Mediterranean and South China Sea regions, **are among the most vulnerable to geophysical and hydro-meteorological hazards.**
  - SIDS accounts for two-thirds of the countries that **suffer the highest relative losses due to disasters.**

1.2.3.4. THE GREEN GRIDS INITIATIVE-ONE SUN ONE WORLD ONE GRID PROJECT

Is India a member

- It was a **multi-layered dialogue** between the OSOWOG initiative by India in partnership with COP26 Presidency, **International Solar Alliance (ISA), World Bank, UK government and Wilton Park**.
- OSOWOG is **India's initiative to build a global ecosystem of interconnected renewable energy resources** that connects 140 countries through a common grid.
  - The blueprint for the OSOWOG has been developed under the **World Bank's technical assistance programme** that is implemented to accelerate the deployment of grid connected rooftop solar installations.
  - Vision behind the OSOWOG mantra is **"the Sun never sets"** and is a constant at some geographical location, globally, at any given point of time.
  - Implementation is **divided into three main phases**
    - ✓ Phase 1 ensures interconnectivity in the **Asian continent**.
    - ✓ Phase 2 connects the functional first phase to the pool of **renewable resources in Africa**.
    - ✓ Phase 3 aims to achieve a **global interconnection.**
- **Significance of OSOWOG**
  - **Assist all its participating bodies to attract effective investments in renewable energy** sources by utilising technology, finance and skill.
  - **Global collaboration will bring in increased investment** into research and development centres.

1.2.3.5. OTHER INITIATIVES

E-Amrit Portal	• Launched by: **India at the COP26 Summit** • It is a **web portal** functioning as a **one-stop destination for all information on electric vehicles**—busting myths around the adoption of EVs and complement initiatives of government on raising awareness on EVs. • The portal has been **developed and hosted by NITI Aayog** under a collaborative knowledge exchange programme **with the UK government** and as part of the UK–India Joint Roadmap 2030.
COP26 Charter of Actions	• Launched by: **Energy and Resources Institute (TERI)** ahead of the Glasgow climate change conference. • It **assimilates questions and challenges concerning key themes for India** such as equity, green finance, adaptation & resilience, nature-based solutions, energy, clean transport, and business and industry.
Global Landscapes Forum Climate	• The event was **co-organised by TMG Think Tank for Sustainability, the German Federal Ministry of Economic Cooperation and Development,** and others. • It highlighted that **infestation of desert locusts was closely linked to climate change.**

hybrid conference (GLF climate 2021)	• **TMG called for a paradigm shift including the following measures:** ○ A well-functioning early warning system ○ Counting the environmental and human costs through True Cost Accounting ○ Developing an efficient governance model.

1.2.4. KIGALI AMENDMENT TO MONTREAL PROTOCOL

Why in News?

Recently, the Union Cabinet approved the ratification to the Kigali Amendment of the Montreal Protocol.

About Montreal Protocol on Substances that Deplete the Ozone Layer

- It is a multilateral environmental agreement **that regulates the production and consumption of** nearly 100 man-made chemicals referred to as **ozone depleting substances (ODS).**
- It was **adopted in 1987** and entered into force in **1989.**
- It is the **only UN treaty to be ratified by all UN members.**
- It is based on the regulatory framework provided by the **Vienna Convention on Protection of Ozone Layer**.
- Under the protocol, **developing and developed countries have equal but differentiated responsibilities** reflected in different timetables, but both groups of countries have **binding, time-targeted and measurable commitments.**
- The Montreal Protocol also led to the adoption of a **Multilateral Fund** to **aid developing countries in implementation of the protocol.**
- In 1990 the **Technology and Economic Assessment Panel (TEAP) was established as the technology and economics advisory body** to the Montreal Protocol Parties.
- Several Amendments have been made to the protocol since its adoption (see infographic).

UV, ANNEXES TO MONTREAL PROTOCOL AND SPECIAL SITUATION DEVELOPING COUNTRIES

Types of UV Radiation	Susbstances Controlled by Protocol	Classification of Countries
1. UVA- long wavelength (315-400 nm), Good for Health and pass through atmosphere. **2. UVB-** Medium wave-length (280-315), harmful for skin, most of it is filter-ed by atmosphere. **3. UVC-** Short wavelength (100-280 nm), most dama-ging and competely abso-rbed by Ozone.	**1. Annexes A** (CFCs, halons) **2. Annexes B** (other fully halogenated CFCs, carbon tetrachloride, methyl chloroform). **3. Annexes C** (HCFCs). **4. Annexes F** (HFCs or Hydrofluorocarbons).	**1. Non-Article 5 parties:** Developed Countries. **2. Article 5 parties:** Developing Country and whose annual calculated level of consumption of the controlled substances in Annex A is less than 0.3 kilograms per capita on the date of the entry into force of the protocol for it.

Is India a Party?

About Vienna Convention on Protection of Ozone Layer

- The **Vienna Convention for the Protection of the Ozone Layer** was a multilateral environmental agreement signed in 1985 (entered into force in 1988), aimed at:
  - Promoting research and monitoring of human activities on the ozone layer.
  - Taking concrete action against activities with adverse effects on ozone layer.

TARGETS FOR REDUCTION

	As parties (Developing countries) - Group 1	As parties (Developing countries) - Group 2	Non parties (Developing countries)
Baseline formula	Average HFC consump-tion levels for 2020-2022 + 65% of hydrochloro-flucarbon (HCFC) baseline	Average HFC consump-tion levelsfor 2024-2026 + 65% of hydrochloro-flucarbon (HCFC) baseline	Average HFC consump-tion levels for 2011-2013 + 65% of hydrochloro-flucarbon (HCFC) baseline
Freeze	2024	2028	-
1st step	2029 - 10%	2032 - 10%	2019 - 10%
1nd step	2035 - 30%	2037 - 20%	2024 - 40%
3rd step	2040 - 50%	2042 - 30%	2029 - 70%
4th step			2034 - 80%
Plateau	2045 - 80%	2047 - 85%	2036 - 85%

*For Belarus, Russian Federation, Kazakhstan, Tajikistan, Uzbekistan, 25% HCFC component of baseline and different initial two steps (1) 5% reduction in 2020 and (2) 35% reduction in 2025.

Notes:

1. **Group 1:** Article 5 parties not part of Group 2
2. **Group 2:** Bahrain, India, the Islamic Republic of Iran, Iraq, Kuwait, Oman, Pakistan, Qatar, Saudi Arabia and the United Arab Emirates.
3. Technology review in 2022 and every five years.
4. Technology review four to five years before 2028 to consider the compliance deferral of two years from the freeze of 2028 of Article 5 Group 2 to address growth in relevant sectors above certain threshold.

About Kigali Amendment to Montreal Protocol

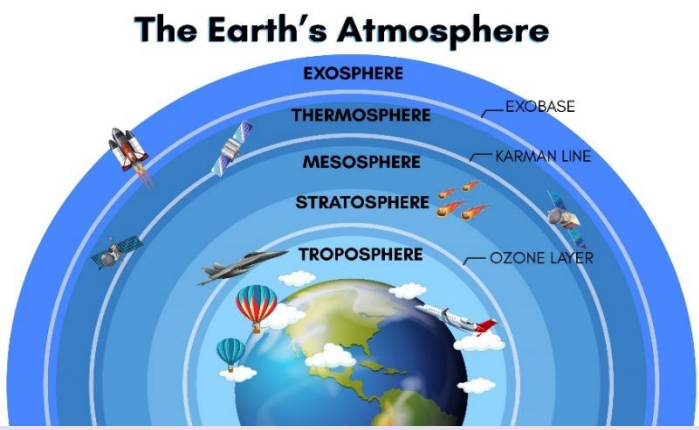
- The **Kigali Agreement** was adopted in **2016 to phase-down hydrofluorocarbons (HFCs).**
- It **entered** into **force** in **2019.**
- It divides nations into **3 groups** with a **four-step path** to achieve 80% reduction in HFCs consumption by 2047 (see infographic).
  - It is a **legally binding agreement** designed to create rights and obligations in international law.
  - Up till July 2021, **122 countries have ratified** the Kigali amendment.
- Being under **Group 2**, India will develop its **national strategy** for phasing down of **Hydrofluorocarbons by 2023** (after consultation with industry stakeholders).

India and Montreal Protocol

- India became Party to the **Vienna Convention and the Montreal Protocol in 1991 and 1992** respectively.
- India has **proactively phased out the production and consumption of CFCs** except use in Metered Dose Inhalers (MDIs) used for treatment of Asthma and Chronic Obstructive Pulmonary Disease (COPD) ailments from 2008.
  - Subsequently, the **use of CFCs in MDIs has been phased out from 2012.**
- An **Ozone Cell has been setup** (under the Environment Ministry) **as a National Ozone Unit (NOU)** to render necessary services for effective and timely implementation of the Montreal Protocol and its ODS phase-out program in India.

About Ozone layer and ozone depleting substances

- **Ozone (O_3) layer** is a high ozone concentration region in the **stratosphere** (**15-35 km** above earth surface), protecting life on earth by absorbing harmful ultraviolet radiations from the Sun.
- **Ozone depletion**, i.e., thinning of the ozone layer by ozone depleting substances was **confirmed in 1985** through formation of ozone hole over the **Antarctic** during the **Southern Hemisphere spring**.
- Major ozone depleting substances
  - chlorofluorocarbons (CFCs)
  - halon
  - carbon tetrachloride (CCl_4)
  - methyl chloroform (CH_3CCl_3)
  - hydrobromofluorocarbons (HBFCs)
  - hydrochlorofluorocarbons (HCFCs)
  - methyl bromide (CH_3Br)
  - bromochloromethane



About hydrofluorocarbons (HFCs)

HFCs are a group of industrial chemicals primarily used for cooling and refrigeration as replacements for ozone-depleting substances.

Though they are not ozone depleting substances, they are part of Short-Lived Climate Pollutants (SLCPs) with high global warming potential (ranging from 12 to 14,000 of carbon dioxide Global Warming Potential).

Related news: Quito Adjustment

- **Adjustment to the Montreal Protocol** agreed in 2018 in Quito (13th Meeting of the Parties) called for:
  - **Strengthening enforcement mechanisms** of the Protocol **in response to an unexpected rise in global emissions** of the banned chemical **trichlorofluoromethane (CFC-11),**
  - **Arrangements for the implementation of the Kigali Amendment** (to cut projected production and consumption of climate change-inducing hydrofluorocarbons/HFCs).

1.2.5. INTERNATIONAL SOLAR ALLIANCE

Why in News?

UN General Assembly (UNGA) confers Observer Status on the International Solar Alliance (ISA)

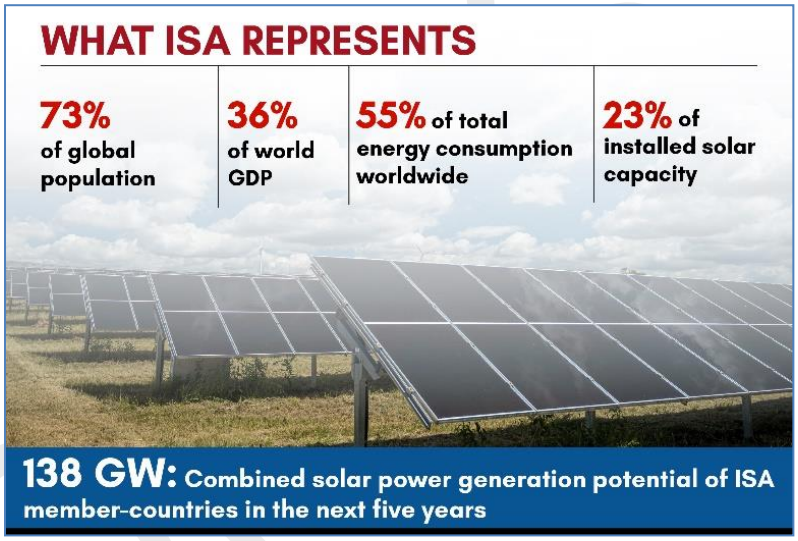
More on the news

- Granting of the status would help provide for a **well-defined cooperation between the Alliance and UN** that would benefit global energy growth and development.
  - It will also provide **choice to ISA to have permanent office** in the UN HQ (New York).

- **About Observer status of UN**
  - It started in **1946** with the **Swiss Government as first permanent observer**, a number of regional and international organizations are given observer status by UNGA.
  - Other observers include non-member states (e.g. **Holy See**); Intergovernmental and other organizations (e.g. **ISA** by resolution 76/123); and Specialized Agencies (e.g. **FAO**).

About ISA

- It was **launched at Paris Climate Change Conference in 2015** by the President of France and the Prime Minister of India.
- It is a multi-country partnership organization with **membership from solar resource rich countries between the two tropics,** where the global community can make a positive contribution towards increasing the use of solar energy.
  - It has now been decided to **extend the membership of the alliance to all the UN member states.**
- The body aims to **scale up solar energy applications**, take coordinated action through programmes and activities launched on a voluntary basis and facilitate collaborative research and development activities in solar energy technologies.
  - **Each Member shares and updates, for those solar applications** for which it seeks the benefits of collective action under the ISA.



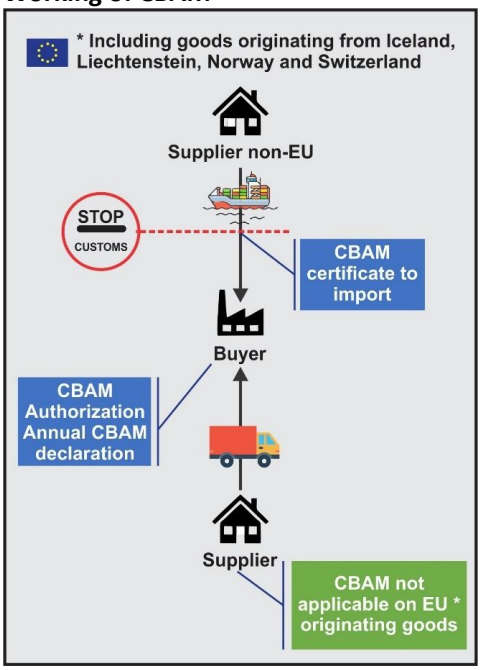
- Till October 2021, **101 countries have signed the ISA Framework Agreement and 80 countries have signed and ratified** the ISA Framework Agreement.
  - At the **COP26 in Glasgow, US announced joining the ISA as its 101st member.**
- ISA is the **first international organization headquartered in India.**

Initiatives taken by ISA

- **Green Grids Initiative - One Sun, One World, One Grid (OSOWOG):** It is **launched by India** at the global climate conference COP26 with an aim to harness solar energy wherever the Sun is shining, ensuring that generated electricity flows to areas that need it most.
- **ISA partnered with Bloomberg Philanthropies to mobilize $1 trillion** in global investments for solar energy across ISA's member countries.
- **Global Energy Alliance for People and Planet (GEAPP)** launched at COP26 with USD10 billions of committed capital to accelerate investment in green energy transitions and renewable energy solutions in developing and emerging economies.
- ISA's Programme on **Scaling Solar Applications for Agriculture Use (SSAAU)** focuses on **providing greater energy access and a sustainable irrigation solution** to farmers through deployment of Solar Water Pumping Systems in member countries.

1.2.6. OTHER INITIATIVES IN NEWS

Forest Carbon Credit Stamps	• **China** has issued its **first batch of forest carbon credit stamps** to use **market mechanisms** to **reduce carbon emissions**. • Forest carbon credits stamps are **permits for companies to emit a certain amount of carbon dioxide**. They are converted from added forest areas and the amount of carbon they can capture. • These credits can also **serve as collateral for bank credit and loans**. • The forest carbon credit system harbors great potential amid China's pursuit of peaking carbon emissions by 2030 and achieving carbon neutrality by 2060.

Carbon Border Adjustment Mechanism (CBAM)	• **As part of the European Union (EU) ambitious target** of reducing 55% of carbon emissions compared to 1990 levels by 2030 (**Fit for 55 Initiative**), it **is pushing for the world's first carbon border tax on imported goods**- Carbon Border Adjustment Mechanism (CBAM) from 2026. ○ It **seeks to address carbon leakages** i.e. companies decamp to places with cheaper pollution costs and looser climate regulations. • A **carbon border tax is a tax on carbon emissions imposed on imported goods from countries with less strict climate policies.** It aims to **create a level playing field** between imports and domestic production. **Working of CBAM** 

Climate Action and Finance Mobilization Dialogue (CAFMD)	• CAFMD is **one of the two main tracks** (other track is strategic clean energy partnership) **of the US-India Agenda 2030 partnership** that was announced in April 2021.
	• **CAFMD will have three pillars:**
	  ○ **Climate action pillar** to look at ways to reduce emissions in the next decade.
	  ○ Pillar for setting out a **roadmap to achieve 450GW renewable energy (RE)** in transportation, buildings and industry.
	  ○ Finance Pillar to collaborate on attracting finance to deploy 450 GW of RE and demonstrate at scale clean energy technologies.

Climate Resilience Information System and Planning (CRISP-M) Tool	• Union **Minister of Rural Development & Panchayati Raj** jointly launched CRISP-M tool.
	  ○ It helps in **integration of climate information in Geographic Information System (GIS) based watershed planning** under Mahatma Gandhi National Rural Employment Guarantee Act (NREGA).
	• This tool will be **used in seven states** where in the Government of UK and India is jointly working towards climate resilience.
	  ○ The states are Bihar, Jharkhand, Uttar Pradesh, Madhya Pradesh, Chhattisgarh, Odisha and Rajasthan

Forum for Decarbonizing Transport	• NITI Aayog and World Resources Institute (WRI) India Jointly Launch 'Forum for Decarbonizing Transport' in India.
	• It is part of the **Nationally Determined Contribution-Transport Initiative for Asia (NDC-TIA) project.**
	  ○ **NDC-TIA** is a joint programme of seven organisations that will engage **China, India, and Vietnam** with the objective to **facilitate a paradigm shift to zero-emission transport across Asia.**
	  ✓ The project is part of the International Climate Initiative (IKI) and NITI Aayog is the implementing partner for India.
	• Transport in India is **the third most CO_2 emitting sector.**

Clean Energy Ministerial's (CEM) – Industrial Deep Decarbonization Initiative (IDDI)	• **Launched by-** India and UK
	• IDDI is a global **coalition of public and private organisations** who are working **to stimulate demand for low carbon industrial materials.**
	• It is coordinated by UNIDO and countries like Germany and Canada have also joined the initiative.
	• **It works to**
	  ○ **Standardise carbon assessments**
	  ○ Establish ambitious **public and private sector procurement targets**
	  ○ **Incentivise investment into low-carbon product** development and design industry guidelines.

	• It brings together a strong **coalition of related initiatives and organizations to tackle carbon intensive construction materials** such as steel and cement like- o The Mission Possible Platform o The Leadership Group for the Industry Transition o The International Renewable Energy Agency (IRENA) o World Bank
Climate Equity Monitor	• It is an **online dashboard for assessing**, at the international level, **equity in climate action, inequalities in emissions, energy and resource consumption** across the world. o It is developed by independent researchers from India. • It is **aimed at monitoring the performance of Annex-I Parties under UNFCCC** (developed countries) based on equity and the principle of common but differentiated responsibilities and respective capabilities (CBDR-RC). • **Performance and policies of Non-Annex-I Parties (developing countries) will also be provided** for comparison.
Water and Climate Coalition	• The Water and Climate Coalition is a **multi-stakeholder initiative** to provide tangible action, activities and policy support, for **an integrated water and climate agenda** with a special focus on data, information, monitoring systems and operational capacity. • WCC is open for a wide range of members from **scientific organizations, private sector, NGOs, UN Organizations, governments and the civil society** that are on equal footing to generate momentum through implementing concrete hydrological activities at national, regional and global scale. • Its **Secretariat is hosted within the World Meteorological Organization (WMO).**
Cotton 2040 initiative	• According to study by **Cotton 2040 initiative**, climate change could expose **half of all global cotton-growing regions, including India, to increased risk from at least one climate hazard by 2040**. o Climate hazards include **temperature increases, changes in rainfall patterns and extreme weather events.** • **Cotton 2040** is an initiative by **forum for the future (an NGO)** that aims to create a resilient cotton industry in an increasingly climate-disrupted world.
Earthshot Prize 2021	• **Indian agri-waste recycling project has** won Prince William's Earthshot Prize 2021. • The Earthshot Prize is an award set up by **Prince William and the Royal Foundation, the charity founded by the Duke and Duchess of Cambridge**, and historian David Attenborough to honour five finalists between 2021 and 2030 **for developing solutions to fight the climate crisis.** o Established in 2020, **2021 was the first year when awards were handed out to finalists for their contributions towards the five UN Sustainable Development Goals** — restoration and protection of nature, air cleanliness, ocean revival, waste-free living and climate action.
Prime Minister's Council on Climate Change (PMCCC)	• PMCCC **has not met in almost 7 years.** • Initially constituted in 2008, PMCCC chaired by Prime Minister, **was formed to coordinate national action for assessment, adaptation and mitigation of climate change.** o PMCCC includes both government as well as non-government members. o PMCCC **was reconstituted in 2014.** • **Committee focuses on the following tasks:** o Evolve a **coordinated response to issues relating to climate change** at the national level. • **Provide oversight for formulation of action plans** in the area of assessment, adaptation and mitigation of climate change.

1.3. CLIMATE MITIGATION AND ADAPTATION

1.3.1. CLIMATE FINANCE MECHANISMS

Why in News?

During COP26, India has demanded a trillion dollars of climate finance over the next decade from developed countries to adapt to, and mitigate, the challenges arising from global warming.

About Climate Finance

- Climate finance refers to **local, national or transnational financing**—drawn from public, private and alternative sources of financing—that seeks to support mitigation (reducing GHG emissions) and

adaptation (adapting to the adverse effects and reduce the impacts of a changing climate) actions that will address climate change.

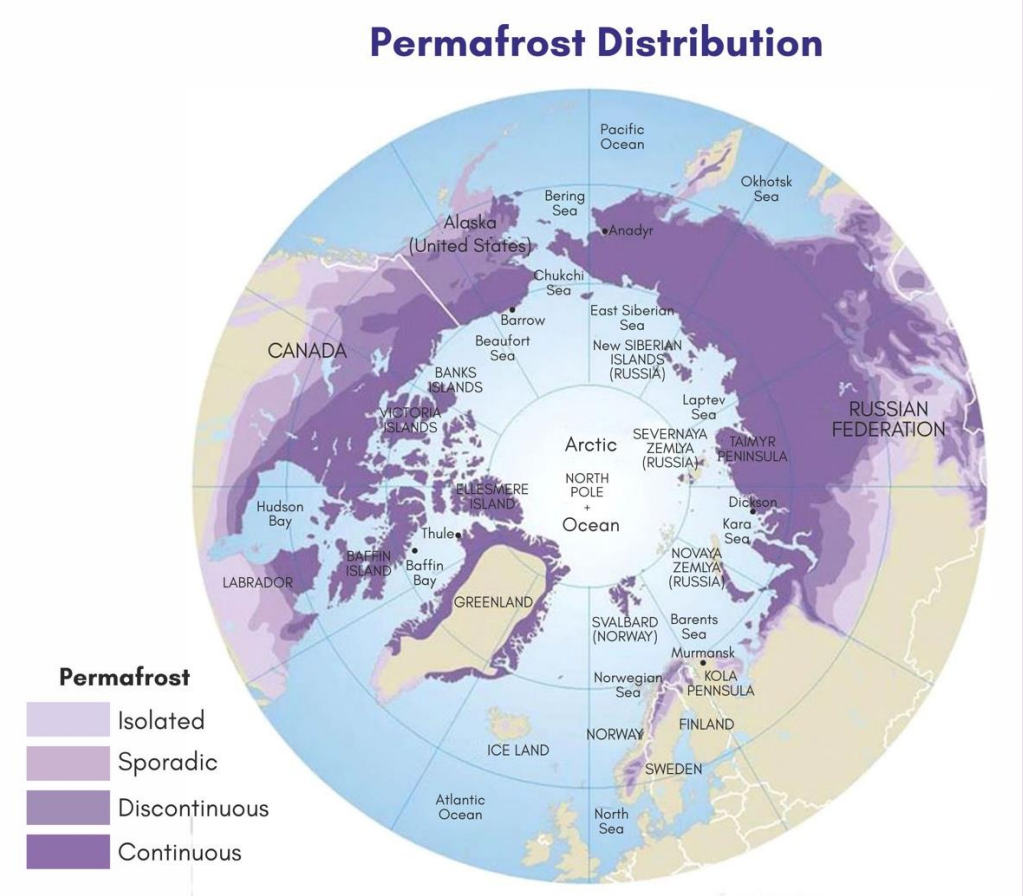
- Climate financing will essentially help the world to reach the target of limiting global warming to an increase of 1.5°C above pre-industrial level.
- The **United Nations Framework Convention on Climate Change (UNFCCC), the Kyoto Protocol** and the **Paris Agreement** call for financial assistance from Parties with more financial resources to those that are less endowed and more vulnerable.

Financial mechanisms established UNFCCC and related Agreements	
Global Environment Facility (GEF)	• It has served as an operating entity of the financial mechanism since the Convention's entry into force in 1994. It manages two funds- o **Special Climate Change Fund (SCCF)**, established in 2001, to finance projects relating to: adaptation; technology transfer and capacity building; energy, transport, industry, agriculture, forestry and waste management; and economic diversification. o **Least Developed Countries Fund (LDCF)**, established to support a work programme to assist Least Developed Country Parties (LDCs) carry out the preparation and implementation of national adaptation programmes of action (NAPAs).
Adaptation Fund (AF)	• It was established in 2001 to finance concrete adaptation projects and programmes in developing country Parties to the **Kyoto Protocol** that are particularly vulnerable to the adverse effects of climate change.
Green Climate Fund (GCF)	• It was established in COP 16, in 2010 and developed countries had pledged to **mobilise US$ 100 billion per year** by 2020 through this fund to support developing countries raise and realize their Nationally Determined Contributions (NDC) ambitions towards low-emissions, climate-resilient pathways.
Other Funds and instruments of financing	
UN-backed international climate funds	• **Clean Technology Fund (CTF):** It aims at empowering transformation in developing countries by providing resources to scale up low carbon technologies. • **Climate Investment Funds (CIFs):** It aims to accelerate climate action by empowering transformations in clean technology, energy access, climate resilience, and sustainable forests in developing and middle-income countries. • **UN- Reducing emissions from deforestation and forest degradation (REDD):** It aims to protect forests, a pre-eminent nature-based solution to the climate emergency. • **Net Zero Asset Owner Alliance**: It has 29 members, including pension funds, insurance companies, and sovereign wealth funds, and is working on substantial methodologies to align portfolios with net zero Paris targets.
Other international funds	• **Climate Change Fund of Asian Development Bank (ADB):** It was established in 2008 to facilitate greater investments in developing member countries (DMCs) to effectively address the causes and consequences of climate change, by strengthening support to low-carbon and climate-resilient development. • **Forest Carbon Partnership Facility (FCPF):** It is a global partnership of governments, businesses, civil society, and Indigenous Peoples focused on reducing emissions from deforestation and forest degradation, forest carbon stock conservation, the sustainable management of forests, and the enhancement of forest carbon stocks in developing countries, activities commonly referred to as REDD+.
Other National and local Sources of raising finances	• **Allocations from National Governments:** For example, National Adaptation Fund for Climate Change (NAFCC) is a Central Sector Scheme which was set up in the year 2015-16 to support concrete adaptation activities which mitigate the adverse effects of climate change. • **Carbon pricing instruments**: These include a carbon market approach (where an Emissions Trading Scheme is established, and carbon credits are bought and sold based on a market price per tCO_2e); Carbon emissions tax approach (that can also be in the form of a fossil fuel tax or removal of fossil fuel subsidies) etc.

1.4. CONCEPTS IN BRIEF

Carbon intensity	• Carbon intensity is measured as carbon dioxide emissions per unit of gross domestic product.
Micro-Climatic Changes	• Recently, Council on Energy, Environment and Water (CEEW) report finds that **rise in cyclone intensity, frequency in India is due to micro-climatic changes.** • **Micro-climates are the local interplays between factors such as** soil temperature, air temperature, wind directions, soil moisture and air humidity—affected by day-night effects and seasonal effects.

	• The effects of **microclimate may either provide a buffer against climate change or they may amplify its effects** in the form of temperature peaks, droughts, irregular rains or delayed rainfall.
'Net zero' carbon targets	• Net zero emissions, also referred to as carbon neutrality, **are achieved when anthropogenic emissions of greenhouse gases to the atmosphere are balanced by anthropogenic removals** over a specified period. o It is even possible for a country (Ex: Bhutan) to have negative emissions, if the absorption and removal exceed the actual emissions. o Some of the strategies to achieve carbon neutrality are **using Renewable energy in the electricity sector (single largest source of CO_2 emissions), Carbon capture, utilisation and storage (CCUS)** etc.
Karakoram anomaly	• **Karakoram anomaly** is termed as **stability or anomalous growth of glaciers in the central Karakoram range,** in contrast to retreat of glaciers in other nearby mountainous ranges of Himalayas and other mountainous ranges of the world.
Transboundary fish stocks	• A recent study has attempted to assess impact of climate change on transboundary stocks of fisheries operating within exclusive economic zones (EEZ). • **About Shared stock** • The concept of shared stocks was developed following the ratification of the UN Convention on the Law of the Sea (UNCLOS) and the claiming of Exclusive Economic Zones (EEZs) by Coastal States. • As per Food and Agriculture Organization, shared stocks can be classified into four non-exclusive categories: o **Transboundary stocks**, which cross neighbouring EEZs; o **Straddling stocks** that, in addition to neighbouring EEZs, also visit the adjacent high seas (i.e., areas beyond national jurisdiction); o **Highly migratory stocks**, that migrate across vast oceanic regions including both the high seas and EEZs; and o **Discrete stocks** that are only present on the high seas.
Orca plant- World's largest Direct air capture plant	• World's largest plant capturing carbon from air recently started in **Iceland**. • **Swiss start-up Climeworks AG**, which specialises in capturing carbon dioxide directly from the air, has partnered with **Icelandic carbon storage firm Carbfix** to develop a plant that sucks out up to 4,000 tons of CO_2 per year. o The isolated carbon is then mixed with water and pumped deep underground, where it slowly turns into rock. Both technologies are powered by renewable energy sourced from a nearby geothermal power plant. • Direct air capture is one of the few technologies **extracting carbon dioxide from the atmosphere**.
Permafrost Thawing	• The latest IPCC report has warned that **increasing global warming will result in reductions in Arctic permafrost and the thawing of the ground** is expected to release greenhouse gases like methane and carbon dioxide. o It is believed that some bacteria and viruses can lie dormant for thousands of years in permafrost. o Defreezing of permafrost may release these microbes into the environment which may have potential to cause new diseases. • **About Permafrost** o Permafrost is defined as ground (soil, rock and any included ice or organic material) that **remains at or below zero degree Celsius for at least two consecutive years**. o Permafrost is spread across an area of over 23 million square kilometers, covering about 15% of the land area of the globe. o In terms of area, permafrost can be characterized as continuous, discontinuous, sporadic, or isolated. o Most permafrost in the **Northern Hemisphere occurs between latitudes of 60°N and 68°N.** (North of 67°N, permafrost declines sharply, as the exposed land surface gives way to the Arctic Ocean.) o In the Northern Hemisphere, 24% of the ice-free land area, is more or less influenced by permafrost. Most of this area is found in **Siberia, Canada, Alaska and Greenland.** • **Other impacts of permafrost thawing** o A reduction in bearing capacity (the ability of frozen ground to carry structural loads) of the structural foundations in the Arctic.

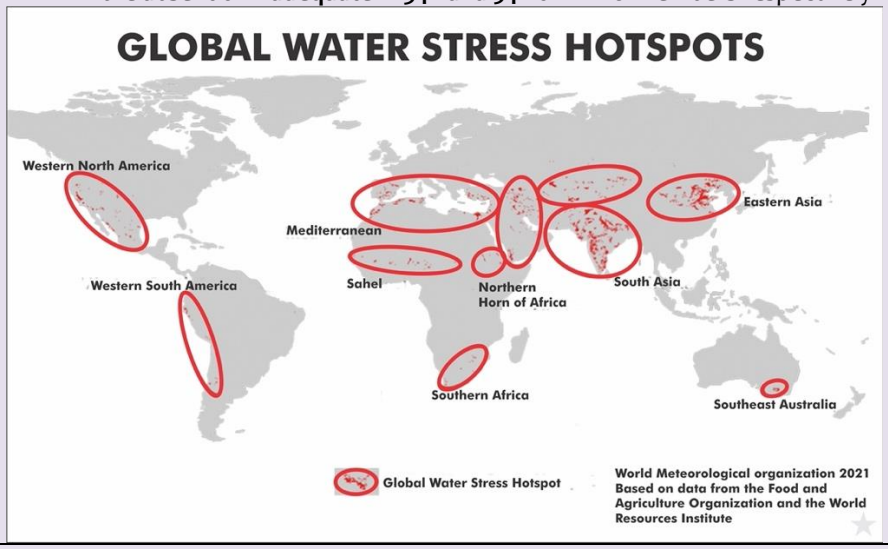
	○ Water released may cause soil collapse and increase transport of solutes, including organic matter, nutrients and pollution, which may be carried long distances by river or sea water. 

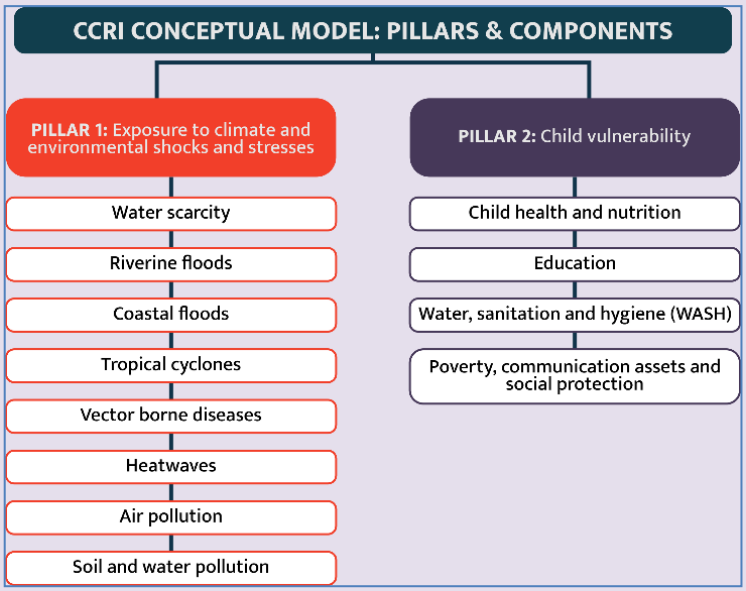
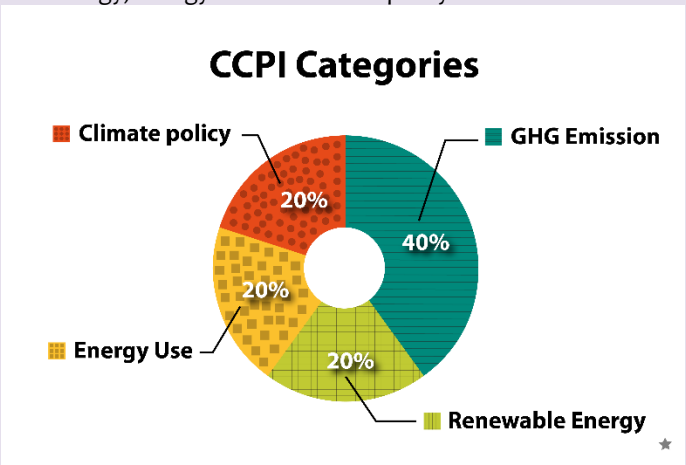
1.5. REPORTS AND INDICES

Report/Index	Details

The State of Cities Climate Finance
THE WORLD BANK
CITIES CLIMATE FINANCE LEADERSHIP ALLIANCE
	• **Released by:** Cities Climate Finance Leadership Alliance and the World Bank.
	• **About Cities Climate Finance Leadership Alliance**
	  • It is a coalition of leaders committed to deploying finance for city level climate action at scale by 2030.
	  • It is the only multi-level and multi-stakeholder coalition aimed at closing the investment gap for urban subnational climate projects and infrastructure worldwide.
	• **Key Highlights of the report**
	  ○ Urban climate finance flows are heavily concentrated in OECD countries and China.
	  ○ Vastly insufficient amounts of urban climate finance were invested in many developing economy regions, including South Asia and sub-Saharan Africa.
	  ○ Finance for adaptation projects amounted to 9 per cent of investments tracked at the project level in 2017-2018, representing, against the 91 per cent for mitigation and dual uses.

Glaciers of the Himalayas: Climate Change, Black Carbon, and Regional Resilience THE WORLD BANK	• **Released by:** World Bank • According to the research paper full implementation of current policies to mitigate Black Carbon (**BC) can achieve a 23% reduction but enacting new policies and incorporating them through regional cooperation among countries can achieve enhanced benefits.** ○ Report covers the Himalaya, Karakoram and Hindu Kush (HKHK) mountain ranges, where, it says, **glaciers are melting faster than the global average ice mass**.
Groundswell Report	• **Released by:** World Bank • **Key findings**

THE WORLD BANK	○ **Hotspots of internal climate migration can emerge as early as 2030** and continue to spread and intensify by 2050. ○ **Sub-Saharan Africa will have the largest number of internal climate refugees** by 2050.
The State of the Climate in Asia 2020 Report WORLD METEOROLOGICAL ORGANIZATION	• **Released by:** World Meteorological Organization (WMO) and other United Nations agencies. • It highlights **lessons for climate action in Asia** and **identifies pathways for addressing critical gaps** and challenges. • According to the report, the **carbon dioxide levels surged** to 413.2 parts per million in 2020, rising **more than the average rate over the last decade** despite a temporary dip in emissions during COVID-19 lockdowns.
The Atlas of Mortality and Economic Losses from Weather, Climate and Water Extremes (1970–2019) WORLD METEOROLOGICAL ORGANIZATION	• **Released by:** World Meteorological Organization (WMO). • **Key findings:** ○ Over the last 50 years, **50% of all recorded disasters, 45% of related deaths and 74% of related economic losses** were due to **weather, climate and water hazards.** ○ **More than 91% of all deaths** occurred in **developing countries.** ○ **The number of disasters had risen** by a factor of five. But the number of **deaths decreased.** • **There were gaps in weather observations.** Only half of the 193 WMO members have multi-hazard early warning systems (**MHEWSs).**
The state of Climate services report, 2021 WORLD METEOROLOGICAL ORGANIZATION	• **Released by:** World Meteorological Organization (WMO) • These **annual reports focus on the state of climate services** for assessing adaptation needs in climate-sensitive socio economic sectors. **2021 edition focuses on water.** • **Key findings** ○ **3.6 billion people had inadequate access to water** at least one month per year in 2018. **By 2050**, this is expected to rise to **more than five billion.** ○ Since 2000, f**lood-related disasters have risen by 134% and duration of droughts also increased by 29%** compared with the two previous decades. ○ **End-to-end riverine flood and drought forecasting** and warning systems are **absent or inadequate in 34% and 54% of WMO Members** respectively. 
The Climate Crisis is a Child Rights Crisis: Introducing the Children's Climate Risk Index' (CCRI) unicef	• **Released by:** UNICEF • The report presents a **conceptual framework, a tool and an initial assessment** at a global level of **children's exposure** and **vulnerability to climate and environmental hazards** in order to help prioritize action for those most at risk. • Report introduces CCRI which **ranks countries based on how vulnerable children are to environmental stresses and extreme weather events.** ○ CCRI is structured according to **two central pillars** (Refer infographic).

	○ **Central African Republic tops the index** of 163 countries.  ○ Pakistan(14th), Bangladesh (15th), Afghanistan(25th) and India(26th) are among **four South Asian countries where children are at extremely high risk of the impacts of the climate crisis.** • **Key Highlights:** ○ **Children are more vulnerable than adults.** ○ Globally, approximately **1 billion children (nearly half of all children) are at 'extremely high risk'** of the impacts of climate change.
Climate Change Performance Index (CCPI)	• **Developed by: Germanwatch** • **Aim:** Increasing transparency in international climate change policy. • **India has retained its spot in the top 10** best performing countries in CCPI. ○ **Denmark is the highest ranked country** (top three places remained empty). • CCPI **evaluated 60 countries and European Union** (which together generate 90%+ of global GHG emissions) **in four categories** — GHG emissions, renewable energy, energy use and climate policy. 
Production Gap Report 2021	• **Released by:** United Nations Environment Programme (UNEP) • Report measures the **gap between governments' planned production of fossil fuels and the global production levels** consistent with meeting the Paris Agreement temperature limits (limiting warming to 1.5°C or 2°C). • **Key Findings** ○ **As countries set net-zero emission targets,** and increase their climate ambitions under the Paris Agreement, **they have not explicitly recognized or planned for the rapid reduction in fossil fuel production** that these targets will require. ○ **World's governments plan to produce around 110% more fossil fuels in 2030** than would be consistent with limiting warming to 1.5°C, and 45% more than consistent with 2°C.

Mission 2070: A Green New Deal for a Net-Zero India	• **Released by-** World Economic Forum (WEF) • Paper by WEF argues that India's transition to a net-zero economy could create over 50 million jobs and contribute more than $1 trillion in economic impact by 2030 and around $15 trillion by 2070. • It also lists decarbonizing strategies for major sectors that contribute to almost all greenhouse gas (GHG) emissions in India.

Mapping India's Climate Vulnerability Report and Climate Vulnerability Index	• **Released by:** Council on Energy, Environment and Water (CEEW)
	• **It analysed 640 districts in India for their vulnerability to extreme floods, droughts and cyclones.**
	  ○ It **ranks districts on Climate Vulnerability Index**, based on its exposure, sensitivity, and adaptive capacity using spatio-temporal analysis.
	• **Key findings**
	  ○ **More than 80% of Indians live in districts vulnerable to climate risks**, out of which every five Indians live in areas that are extremely vulnerable.
	  ○ The most vulnerable districts are **Dhemaji and Nagaon** (Assam), **Khammam** (Telangana), **Gajapati** (Odisha), **Vizianagaram** (Andhra Pradesh), **Sangli** (Maharashtra) and **Chennai** (Tamil Nadu).

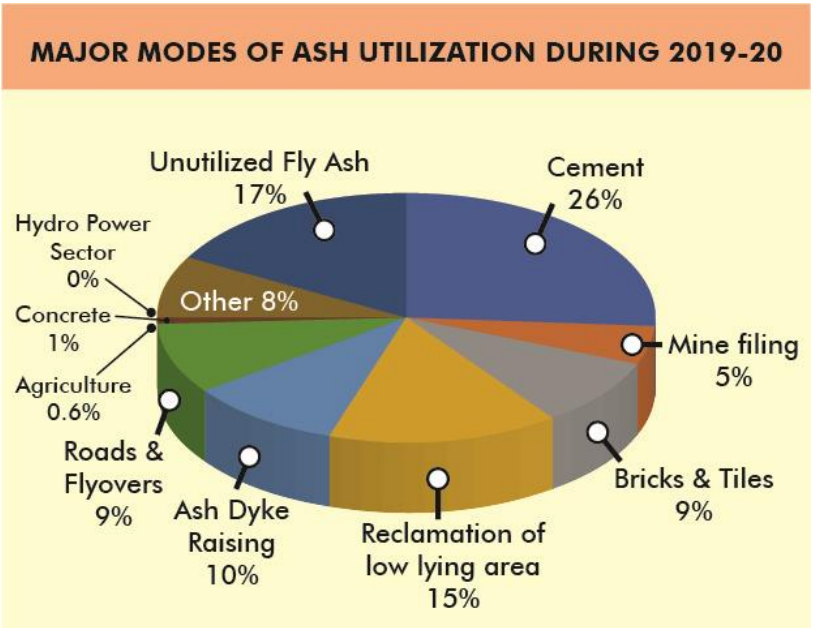
2. POLLUTION

2.1. AIR POLLUTION

2.1.1. NEW FLY ASH UTILIZATION RULES FOR COAL AND LIGNITE BASED THERMAL POWER PLANTS

Why in News?

The **Ministry of Environment, Forests and Climate Change (MoEFCC)** has extended fly ash utilization deadline for thermal power plants with the introduction of **penalties for non-compliance**.



Composition, Generation and Utilization of Fly Ash in India

- Fly ash is a **by-product of coal-based power generation**.
  - It is a **fine powder with substantial amounts of oxides of silica, aluminium and calcium.**
  - It also contains **traces of Arsenic, Boron, Chromium, lead etc.** which leads to air and water pollution if disposed on land.
- With low grade of Indian coal, its ash content is as high as **30-45%** in comparison to imported coal with **10-15%**.
- With nearly **55%** of our total power production through **coal and lignite based Thermal Power Plants** (TPP), the fly ash generation in India is very high.
- **About 83% of Fly Ash is utilized. (Refer infographic for the sectoral utilization of Fly Ash).**

Key Highlights of the New Notification

First fly ash notification was issued in 1999 to ensure **100% fly ash utilization** in India by 2009. This was followed by a **similar notification in 2016.** The current notification aims to achieve the objective of **100% utilization in 3 to 5 years.**

- **Shorter Fly-ash utilization cycle:** Existing provisions allow TPPs to fully utilize fly ash in a four-year cycle in a staggered manner. The new policy will follow a **three-year cycle for 100% utilization of Fly-ash** with a grace period of a year if the percentage of ash utilization is between 60-80% and two years if it is below 60%.
  - In the near future, all TPPs will have to stick to average ash utilization of 100% in a 3-year cycle.
- **Legacy Fly Ash Utilization:** The progressive utilization of legacy fly ash has been extended by another 10 years.
  - Fly ash which **remains unutilized and consequently gets accumulated** is referred to as **legacy ash.**
- **Introduction of Polluter Pays Principle:** A fine of Rs 1,000 per tonne of unutilized ash has been introduced if the plant does not achieve at least 80% ash utilization annually or in three years.
- **Construction and Transportation:** The non-complying power plants will provide ash **free-of-cost** to agencies engaged in construction activities within a **300 km radius** with all transportation cost to be borne by TPPs.
- **Role of Central Pollution Control Board:** A committee under the chairmanship of CPCB chairman will examine, review and recommend eco-friendly ways on fly ash utilization. Also, **CPCB will have real-time data on ash availability.**

Related News: National Mission on use of Biomass in coal based thermal power plants

- It has been proposed **by the Ministry of Power to address the issue of air pollution due to farm stubble burning** and to reduce carbon footprints of thermal power generation.
- Once launched, it will help in achieving **objectives** of:
  - **Increasing the level of co-firing** (combustion of two different fuels in the same combustion system) from present 5% to higher levels for carbon neutral power generation by TPPs.
  - **Taking up R&D activities in boiler design** to handle the higher amount of silica, alkalis in the biomass pellets.
  - **Facilitating overcoming the constraints** in supply chain of biomass pellets and agro- residue and its transport upto to the power plants.
  - **Addressing regulatory issues in biomass co-firing.**
- There are **three different concepts** for co-firing biomass in coal boilers.
  - **Direct co-firing**: The biomass and the coal are burned in the **same furnace**.
  - **Indirect co-firing**: In this concept, the solid biomass is **converted to a clean fuel gas**, using a **biomass gasifier**. The gas can be burnt in the **same furnace as the coal.**
  - **Parallel co-firing**: It is also possible to **install a completely separate biomass boiler** in addition to the conventional boiler.

2.1.2. COMMISSION FOR AIR QUALITY MANAGEMENT (CAQM)

Why in news

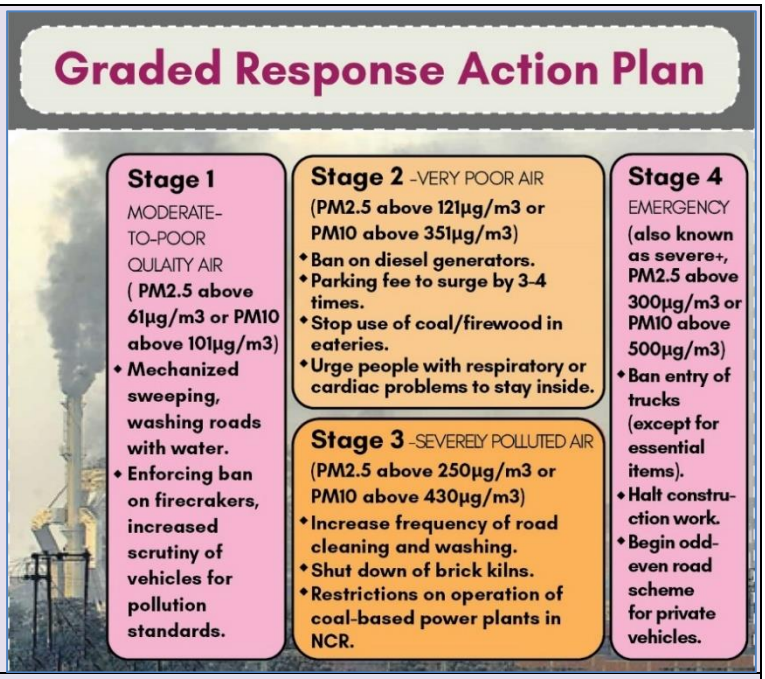
The Commission for Air Quality Management in the National Capital Region and Adjoining Areas Bill, 2021, was recently passed by both Houses of the Parliament. It replaces the Ordinance that was promulgated in April 2021.

Key highlights of the Act

- **Functions of the commission:** To have better co-ordination, research, identification, and resolution of problems related to air quality in the National Capital Region (NCR) and adjoining areas **(Haryana, Punjab, Rajasthan, and Uttar Pradesh, adjoining the National Capital Territory of Delhi and NCR).**
  - The Commission will be the **sole authority** with jurisdiction over matters defined in the Bill (such as air quality management).
  - **In case of conflicts, directions of the Commission will prevail** over the orders of the respective state governments, the Central Pollution Control Board (CPCB), state PCBs, and state-level statutory bodies.
- **Composition:** The Commission will consist of a Chairperson, an officer of the rank of a Joint Secretary as the member-secretary and Chief Coordinating Officer, a full time member and 3 independent technical members, 3 members from NGOs among others.
- **Powers of the Commission:**
  - Restricting activities influencing air quality,
  - Investigating and conducting research related to environmental pollution impacting air quality,
  - Preparing codes and guidelines to prevent and control air pollution,
  - Issuing directions on matters including inspections, or regulation which will be binding on the concerned person or authority.
- **Penalties:** Contravention of provisions of the Bill, or orders and directions of the Commission will be punishable with imprisonment of up to **five years, or fine of up to one crore rupees, or both.**
  - The Bill **excludes farmers from the scope of these penalties**. However, the Commission may collect an environmental compensation from farmers causing pollution by stubble burning.
- **Appeals** against the Commission's orders will **lie with the National Green Tribunal (NGT).**
- **Selection Committee for full-time members:** The Committee will be headed by the Minister in charge of the Ministry of Environment, Forest, and Climate Change.

Other Steps taken to tackle pollution in Delhi NCR

Graded Response Action Plan (GRAP)	• Recently, States in the National Capital Region were directed to be ready to implement actions under the 'emergency' category of the Graded Response Action Plan (GRAP) to control air pollution. • **GRAP is essentially a step-by-step guide** for what to do when air in Delhi-NCR gets heavily polluted (see infographic). • It was approved by the Supreme Court in 2016 in pursuance to **Supreme Court order in M. C. Mehta vs. Union of India.** and notified by the **Union Environment Ministry in 2017**.

	• It includes extreme measures such as shutting down schools and implementing the odd-even road-space rationing scheme in case of severe degradation of air quality. • It is based on **different National Air Quality Index (AQI) categories** namely, Moderate & Poor, Very Poor, and Severe and "Severe+ or Emergency". 
ISRO protocol to track stubble burning data	• Ahead of the harvesting season, the **Commission has asked Delhi and Adjoining states (Punjab, Haryana, Rajasthan, and Uttar Pradesh) to ensure the uniform adoption and application of a standard protocol** developed by Indian Space Research Organisation (ISRO) for estimation of crop residue burning fire events using satellite data. ○ Protocol developed by ISRO is based on **remote sensing technology** by which all states can collect data in a cohesive manner to provide a better picture of ground realities.
Banned firecrackers and e Green Crackers	• SC, in **2018 judgement on firecrackers banned manufacture, sale and use of joined firecrackers** (series crackers or 'laris') as they caused air, noise and solid waste problems. • Also, SC **banned certain chemicals in composition of firecrackers** - Barium (imparts green colour), lithium (red), arsenic, antimony (for glitters), lead or mercury and Strontium Chromate. • However, SC allowed the **manufacture and sale of only "green"** (safe water and air sprinklers that emit less sound and light) **or "improved" crackers** (avoid the use of ash as filler material). **About Green Crackers** • They are **made using less polluting raw materials.** Their chemical formulation **ensures reduced particle emission** into the atmosphere by suppressing the dust produced. • Green crackers were **researched and developed by CSIR-NEERI.** • **Different types of green crackers available in India:** Safe Water Releaser (SWAS), Safe Thermite Cracker (STAR) and Safe Minimal Aluminium (SAFAL) crackers.
PUSA Bio-Decomposer	• Developed by ICAR, it is a low-cost **microbial bio-enzyme solution** which accelerates the decomposition of crop residue, including stubble from paddy **crops into manure within 15-20 days.** • It is emerging as a potent solution towards curbing stubble burning. • Also, it provides additional manure through decomposed stubble, **improving the soil quality as well.**

Related News: India at top in Emissions related to Crop Burning Report

- The report is released by climate tech startup Blue Sky Analytics, which is also part of global coalition "Climate TRACE".
  - Climate TRACE accelerates climate action by providing independent high-resolution and near-real-time (GHG) emissions data.

2.1.3. WORLD HEALTH ORGANISATION (WHO) AIR POLLUTION STANDARDS

Why in news?

The World Health Organisation (WHO) in its first-ever update since 2005 has **tightened global air pollution standards.**

About World Health Organisation (WHO) air pollution standards

Pollutant	Averaging time	2005 AQGs	2021AQG level
$PM_{2.5}$ µg/m^3	Annual	10	5
	24-hour	25	15
Pm_{10}, µg/m^3	Annual	20	15
	24-hour	50	45
O_3, µg/m^3	Annual	-	60
	Peak season	100	100
NO_2, µg/m^3	Annual	40	10
	24-hour	-	25
SO_2, µg/m^3	24-hour	20	40
CO, µg/m^3	24-hour	-	4

- Since 1987, WHO has **periodically issued health-based air quality guidelines (AQG)** to assist governments and civil society to reduce human exposure to air pollution.
- The WHO air quality guidelines were **last published in 2006: Air quality guidelines – global update 2005.** Since then, there has been a marked increase in **evidence on the adverse health effects** of air pollution, built on advances in air pollution measurement and exposure assessment.
- The overall **objective of the updated global guidelines is to offer quantitative health-based recommendations** for air quality management, expressed as **long or short-term concentrations** for a number of key air pollutants.
- In this guideline update, recommendations on AQG levels are formulated, together with interim targets, as can be seen in the table:
- The guidelines also highlight **good practices for the management** of certain types of particulate matter (for example, black carbon/elemental carbon, ultrafine particles, and particles originating from sand and dust storms) for which there is **currently insufficient quantitative evidence** to set air quality guideline levels.
- The present guidelines are applicable to **both outdoor and indoor environments globally**. However, these guidelines **do not cover occupational settings**, owing to the specific characteristics of the relevant exposures and risk reduction policies.

DID YOU KNOW?

OpenAQ is a non-profit-making effort to maintain an **open-source database** of aggregated current and archived **air quality data gathered in real time from government agencies.**

Whilst **not legally-binding,** like all WHO guidelines, AQGs are an **evidence-informed tool** for policy-makers to guide legislation and policies, in order to **reduce levels of air pollutants** and **decrease the burden of disease** that results from exposure to air pollution worldwide.

Air pollution measurement in India and comparison with international standards

- **Air monitoring network and agencies involved:** Central Pollution Control Board (CPCB) initiated **National Ambient Air Quality Monitoring (NAAQM) programme in the year 1984** with 7 stations at Agra and Anpara. Subsequently the programme was renamed as **National Air Quality Monitoring Programme (NAMP).**
  - The network currently consists of **804 operating stations covering 344 cities/towns** in 28 states and 6 Union Territories of the country.
  - The monitoring is being carried out with the help **of Central Pollution Control Board; State Pollution Control Boards; Pollution Control Committees; National Environmental Engineering Research Institute (NEERI), Nagpur.**
  - CPCB co-ordinates with these agencies to **ensure the uniformity, consistency of air quality data and provides technical and financial support to them** for operating the monitoring stations
- **Air quality standards:** CPCB air quality standards in form of NAAQS (National Ambient Air Quality Standards) are notified for **12 parameters** (carbon monoxide (CO) nitrogen dioxide (NO2), sulphur dioxide (SO2), particulate matter (PM) of less than 2.5 microns size (PM2.5), PM of less than 10 microns size (PM10), Ozone (O3), Lead (Pb), Ammonia (NH3), Benzo(a)Pyrene (BaP), Benzene (C6H6), Arsenic (As), and Nickel (Ni)).

Pollutant	SO_2	NO_2	$PM_{2.5}$	PM_{10}	O_3		CO(mg/m^3)		Pb	NH_3
Averaging time (HR)	24	24	24	24	1	8	1	8	24	24
Standard	80	80	60	100	180	100	4	2	1	400

- NAAQS doesn't meet the **WHO's existing standards (2005 guidelines)** and considerably differ from updated guidelines. For instance, NAAQS specify an **annual limit of 60 microgram per cubic metre for PM 10 and 100 for a 24-hour period which are 15 and 45 respectively in revised WHO guidelines.**

Related News:

National air quality index (NAQI)

- NAQI is tool that uses numbers to **simplify air quality data by classifying pollution levels into 6 categories—good, satisfactory, moderate, poor, very poor and severe—and denotes a color code** on the basis of how harmful the pollution in a specific area is.
- Each of the pollutants— PM10, PM2.5, NO2, SO2, CO, O3, NH3—are assigned an air quality index (AQI).
- AQI **informs the public about environmental conditions.** It is especially useful for people suffering from illnesses aggravated or caused by air pollution.

Categorization of Air Quality under AQI

AQI	Remark	Color Code	Possible Health Impacts
0-50	Good		Minimal impact
51-100	Satisfactory		Minor breathing discomfort to sensitive people.
101-200	Moderate		Breathing discomfort to the people with lungs, asthma and heart diseases.
201-300	poor		Breathing discomfort to most people on prolonged exposure.
301-400	Very Poor		Respiratory illness on prolonged exposure.
401-500	Severe		Affects healthy people and seriously impacts those with existing diseases.

Air Quality Early Warning System (AQEWS)

- The **Indian Institute of Tropical Meteorology** (IITM), Pune, has developed a new **Decision Support System** (DSS) and **extended the ability of the existing AQEWS** to have decision-making capability for air quality management.
  - IITM is an **autonomous Institute of Ministry of Earth Sciences.**
- Air warning System integrated with DSS will become a user-friendly tool for air-quality **management in and around Delhi.**

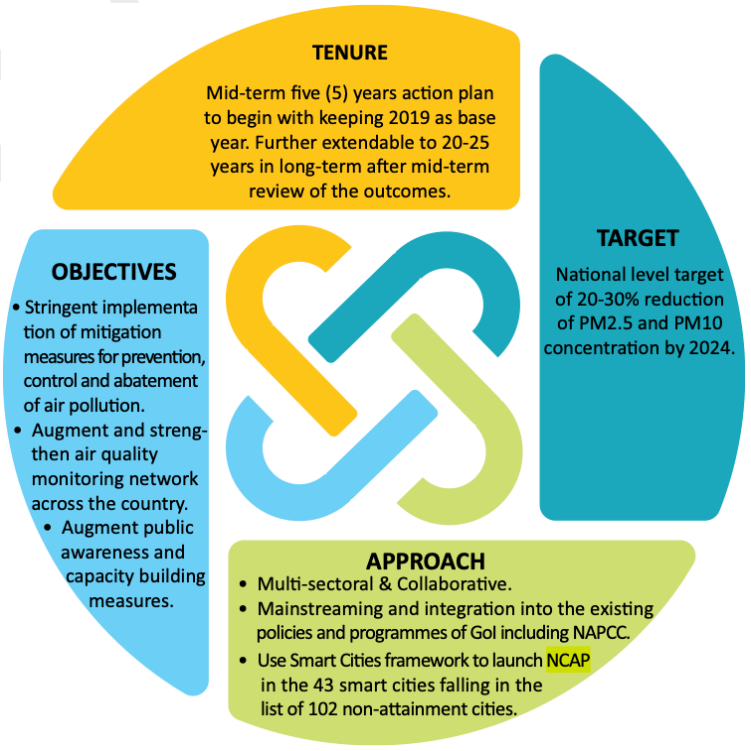
2.1.4. NATIONAL CLEAN AIR PROGRAMME (NCAP)

Why in News?

First meeting of National Apex Committee under National Clean Air Programme (NCAP) held.

Key highlights of meet

- **Adopting airshed approach to deal with air pollution:** Under this, **policymakers will plan actions keeping in view geographical, meteorological and other factors** which pollute air within the airshed **instead of making policies guided by states' boundaries.**
  - Currently, airshed approach is being implemented for "Delhi-NCR and adjoining areas".
- **'Clean Air for All' Mission:** To be launched in 2022, objective is to **increase the target of reducing levels of particulate matters (PM2.5 and PM10), from 20-30% by 2024 over 2017 levels to 35-50% by 2025-26** in cities identified under NCAP.



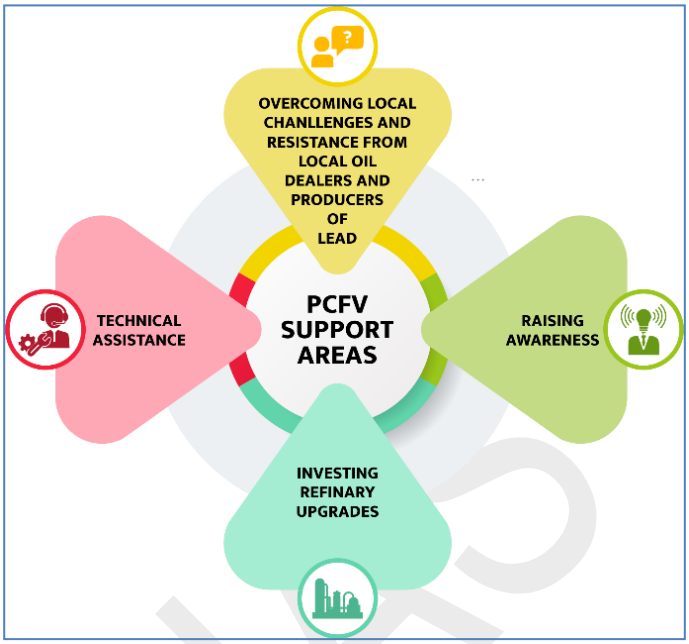
About NCAP

- Launched by **Ministry of Environment, forest and climate change** in 2019.
- It seeks to **reduce concentration of PM 10 and PM 2.5 by at least 20%by 2024, with 2017 as the base year for comparison. (Refer infographic).**
- It is **being implemented in targeted 132 cities which did not confirm to national ambient air quality standards (NAAQS)** consecutively for five years.
  - NAAQs are the **standards for ambient air quality** with reference to identified pollutant **notified by CPCB under Air (Prevention and Control of Pollution) Act, 1981.**

2.1.5. PARTNERSHIP FOR CLEAN FUELS AND VEHICLES (PCFV)

Why in News?

Recently, **leaded petrol has been eradicated** from the world as **Algeria**- the last country to use this fuel, exhausted its supplies following the two decades long campaign by the UNEP-led global Partnership for Clean Fuels and Vehicles (PCFV).



About Partnership for Clean Fuels and Vehicles (PCFV) initiative

- PCFV is a **global public-private** initiative launched in **2002** at the World Summit on Sustainable Development **by UNEP**.
- Aim: to reduce vehicular air pollution through **promotion of cleaner fuels and vehicles** in developing countries.
- PCFV worked towards **global elimination** of leaded petrol (**graduated decline of Sulphur** as well) by providing support in different areas. (In India, it was phased out in **2000**).

About Leaded Petrol

- **Tetraethyl lead** (TEL), or Organic lead, is used as a petrol additive in leaded petrol to improve engine performance.
- TEL is a colorless liquid whose **antiknock properties** were first found in 1921.
- It improves the **octane rating** of fuel as compared to unleaded petrol.
- As a result, it became a popular **additive in petrol and jet fuels** as knocking in engine causes **loss of power** with risks of **damage to the engine.**
- **Health Impacts of Leaded Petrol**
  - **Tetraethyl lead** is toxic in nature, and it is **absorbed rapidly** by the skin, the lungs, and the gastrointestinal tract.
  - It **contaminates** the air, dust, soil, water, and crops on release through exhaust fumes, evaporation losses and accidental spills.
  - Exposure to it can cause **Heart disease**, **Cancer**, **stroke,** and **lower IQ** (especially in children) by impacting brain development.

About Octane Rating

- **Octane rating, also known as Octane number or Octane Value,** is defined as the percentage or volume fraction of isooctane in a mixture of isooctane and normal heptane fuel where knock is initiated at the same compression ratio as in the fuel.
- It measures the **fuel's ability to resist unwanted sounds due to auto-ignition with higher octane number**. E.g., adding ethanol to petrol helps in reducing knocking as ethanol octane rating is around 109.
- For diesel fuel, **Cetane number** is used to measure the ignition delay property of the fuel, with higher cetane number meaning reduced ignition delay to avoid knocking.

2.2. WATER POLLUTION AND CONSERVATION

2.2.1. CAPACITY BUILDING INITIATIVE ON 'MAKING WATER SENSITIVE CITIES IN GANGA BASIN'

Why in News?

It has been **launched** by **National Mission for Clean Ganga** (NMCG) in association with the **Centre for Science and Environment** (CSE).

About the initiative

- A **water sensitive city** is based on the idea of **holistic management of the water cycle** to **deliver basic services of supply and sanitation**, while **mitigating flood risk** and **protecting and enhancing the health of receiving waterways.**

National Mission for Clean Ganga (NMCG)
It is a **society under the Societies Registration Act, 1860** working with National Ganga Council and other Union, State and District committees for prevention, control and abatement of environmental pollution and **rejuvenation** of river Ganga.

- **It forms part of the ongoing efforts by NMCG aimed to ensuring convergence of the Namami Gange Mission with national flagship urban mission**s (AMRUT, Smart Cities etc.).
    - Namami Gange is a **comprehensive river rejuvenation program** including all rivers in **Ganga basin**, to ensure **AviralDhara(Continuous Flow)**, **NirmalDhara(Unpolluted Flow)**.

- It is to be **implemented in 3-4 pilot cities** in the Ganga basin.
- **Training programs, field visits, webinars and technical support to urban local bodies** (ULBs) to be provided.

Related News:

Capacity Building on Integrated River Basin Management with a focus on Geospatial Technology in Riverine Ecosystem

- **National Mission for Clean Ganga (NMCG)** signed a MoU with **South Asian Institute for Advanced Research and Development (SAIARD)** to strengthen river basin management by using geospatial technology.
- **Application of geospatial technology in India's water sector**
    - **Indian Remote Sensing Portals for the Water Sector**
        - ✓ **Bhuvan–WBIS (Water Bodies Info System):** Sensor derived water bodies information is utilized to generate spatial map of surface water bodies.
        - ✓ **National Information System for Climate and Environment Studies (NICES)** provides national level accurate and long- term climate database generation.
        - ✓ **India-WRIS (Water Resources Info System):** Contains information related to Water Resources through dashboards as well as modules on water resources projects and tools for GIS layer editing.
    - **JalJeevan Mission -** For GIS Mapping of Water Supply and Sewerage Infrastructure etc.
    - **NamamiGange -** Preparation of base maps and 3D Models.
    - **Dam Rehabilitation and improvement project** - Remote Sensing and GIS for dam site selection and monitoring progress.
    - **National River Linking Project (NRLP)** - Understand the characteristic of rivers during monsoon and non-monsoon season

Geospatial technology

- It allows tracking a questioned object and referring it to a specific location.
- It helps in **studying real earth geographic information using Geographical Information System (GIS), Remote Sensing, Artificial intelligence, Internet of things (IoT) etc.**

Continuous Learning and Activity Portal (CLAP)

- **CLAP was launched** on the inaugural day of 'Ganga Utsav – the River Festival 2021'.
- CLAP is an **interactive portal** that is working towards initiating **conversations and action around the rivers in India.**
    - **It is an initiative by Namami Gange,** created and executed by TREE Craze Foundation and funded and supported by World Bank.
- Portal is also a platform to facilitate debates and discussions and **express ideas on various issues pertaining to environment, water, rivers etc.**
- Also, **National Mission for Clean Ganga got registered in the Guinness Book of World Records** for most photos of handwritten notes uploaded to Facebook in one hour.

2.2.2. WATER COMMODIFICATION

Why in news?

Recently, the Special Rapporteur on the human rights to safe drinking water and sanitation for the United Nations (UN) informed the UN General Assembly (UNGA) that Water is not a commodity and financial asset to be exploited.

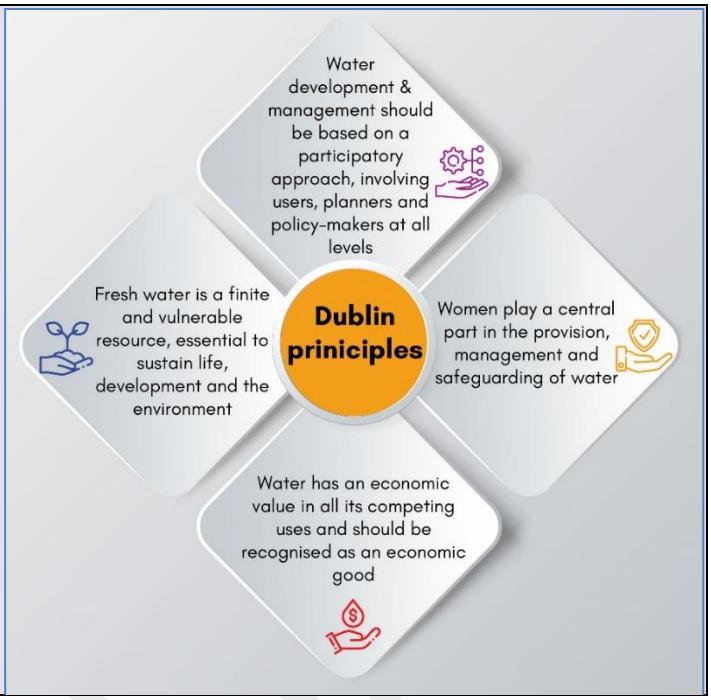
About water commodification

- "Commodification" of water refers to **water handled as a commodity under supply and demand market dynamics** as a way of setting the price of market transactions between users.
    - In December 2020, for the first time in history, a **tradable water price futures index was launched on the Chicago Stock Exchange** on the Nasdaq Veles California Water Index (NQH2O). Nasdaq developed the NQH2O Index in partnership with Veles Water Limited.
- It is mentioned in the fourth principle of the **Dublin Statement on Water and Sustainable Development of 1992** (refer infographic) that **water should be recognized as an economic good** – an approach that serves

as a basis for its consideration as a financial asset, as has been done with economic goods in general, within the dynamics of the financialization of the economy.

Dublin Statement on Water and Sustainable Development, 1992

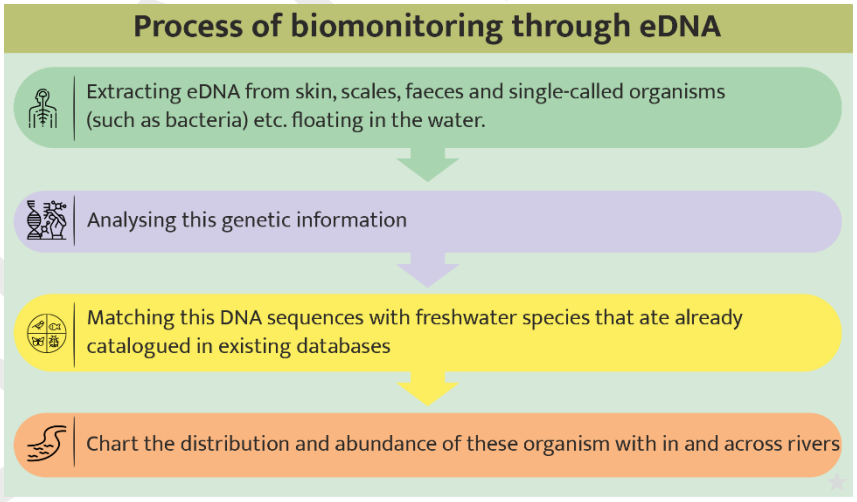
- In 1992 the **International Conference on Water and the Environment** was held in Dublin, Ireland.
- The output from this conference was a **declaration regarding water** that was presented to the United Nations Conference on Environment and Development (UNCED) that was held in Rio de Janeiro in June 1992 also known as the **"Earth Summit".**
- The inclusion of the Dublin Principles in the conference debate helped to **highlight the importance of water as a resource for environmental protection and human development.**
- The Dublin Principles remain the standard for consideration of the issues surrounding water resource use and protection.



2.2.3. BIO-MONITORING USING ENVIRONMENTAL DNA (EDNA)

Why in News?

Researchers in ecology **are testing a new method** that can **vastly expand bio-monitoring using eDNA,** in rivers to catalogue and count species.



About bio-monitoring

- Biomonitoring is defined as the **act of observing and assessing the state and ongoing changes in ecosystems,** components of biodiversity and landscape, including the types of natural habitats, populations and species.
  - Biomonitoring has become an **indispensable tool for studying occupational and environmental exposure to chemicals, including persistent organic pollutants (POPs).**
- **eDNA is isolated from environmental samples,** in contrast to genomic DNA that is extracted directly from specimens.
  - It **originates from cellular material shed by organisms** (via skin, excrement, etc.) **into aquatic or terrestrial environments** that can be sampled and monitored using new molecular methods.
- **Potential benefits:** restore water quality, save dwindling species from extinction, early detection of invasive species as well as the detection of rare and cryptic species
- **Advantages of eDNA**
  - **Collecting eDNA is easy.** One 4-ounce water sample can capture remnant DNA from thousands of aquatic species.
    - ✓ **Traditional bio monitoring methods, scientists count individual species** and their abundance at just a few sites.
  - This method **doesn't require killing wildlife** for identification.
  - It is **labour and cost effective.** This process requires just a **cheap filter, a syringe and vials,** and anyone can do it.

2.2.4. INITIATIVES IN NEWS FOR WATER CONSERVATION AND MANAGEMENT

AIM-ICDK Water Innovation Challenge	• Atal Innovation Mission (AIM), NITI Aayog in partnership with Innovation Center Denmark (ICDK) concluded the global finals of the Next Generation Water Action (NGWA) Water Innovation Challenge.
	• Innovative ideas were invited in following **challenge areas**:
	  ○ **Digital water management** solutions,
	  ○ Solutions for **monitoring and prevention of leakage** in city water supply,
	  ○ **Waste water management** across rural belts and urban settlements,
	  ○ **Rainwater harvesting** in rural and urban settlements, and
	  ○ Safe and sustained **drinking water.**

United Nations Global Compact's CEO Water Mandate	• **NTPC Ltd has become a signatory** to the prestigious United Nations Global Compact's CEO Water Mandate. • The Mandate was **formed in 2007 to mobilize business leaders to advance water stewardship, sanitation, and the Sustainable Development Goals** in partnership with United Nations, governments, peers, civil society, and others. ○ The Mandate develops tools and resources, convenes stakeholders, and facilitates meaningful partnerships and on-the-ground collective actions that improve conditions in at-risk river basins around the world.
Ocean Clean-up	• **Ocean Clean-up**, a Netherlands based non-profit organization aims at eliminating the Great Pacific Garbage Patch. • Also known as the Pacific trash vortex, it is a **collection of marine debris/ garbage in the North Pacific Ocean**. • This garbage patch is actually two distinct collections of debris bounded by the **massive North Pacific Subtropical Gyre** (gyre as a large system of swirling ocean currents). • It is composed of the **Western Garbage Patch, located near Japan, and the Eastern Garbage Patch,** located between the U.S. states of Hawaii and California. 
Indore- First Water Plus City	• Indore, the country's cleanest city, has now been **declared as the first 'water plus' city of India** under the Swachh Survekshan 2021. • A city can be declared as Water Plus provided, **all wastewater** released from households, commercial establishments etc. is **treated to a satisfactory level** before releasing the treated wastewater to the environment. ○ Swachh Survekshan is an **annual survey of cleanliness, hygiene and sanitation** in cities and towns across India launched as part of the Swachh Bharat Mission.
River Cities Alliance (RCA)	• Recently, **Minister for Jal Shakti launched RCA.** • RCA is a **dedicated platform for river cities to ideate, discuss and exchange information** for sustainable management of urban rivers. ○ It will focus on three broad themes- **Networking, Capacity Building and Technical Support.** • RCA includes cities from **both Ganga basin and non-Ganga basin states.** • RCA gives opportunities to these cities **to strengthen governance aspects for river cities and improves their liveability** to attract external economic investments.
Puducherry becomes 'HarGharJal' Union Territory (UT)	• **Puducherry** has achieved the target of **100% piped water connection** in rural areas under the **JalJeevan Mission.** ○ With this, the **UT became the fourth State/UT after Goa, Telangana and Andaman and Nicobar Islands** to provide assured tap water supply to every rural home. • **JalJeevan Mission (JJM)** envisages supply of **55 litres of water per person per day** to every rural household through **Functional Household Tap Connections (FHTC) by 2024.**

	○ FHTC is defined as having infrastructure, i.e. household tap connection providing at least **55 lpcd (litre per capita per day), of prescribed quality, i.e. BIS:10500 standard, on regular basis.** ○ It also aims to **provide functional tap connection to Schools**, Anganwadi centres, Health centres, wellness centres, etc. ○ **Fund sharing pattern:** 90:10 for Himalayan and North-Eastern States; 50:50 for other States and 100% for UTs.
SWASTIIK technology for disinfecting water	• SWASTIIK (Safe Water and Sustainable Technology Initiative from Indian Knowledgebase) is a **hybrid technology that combines Modern technology and Indian traditional knowledge to bring safe & healthy drinking water**. • The technique used ---**hydrodynamic cavitation combines chemistry, biology, and chemical engineering along with natural resources in the form of natural oils and plant extracts.** • Disinfection of water is essential for removing pathogenic microorganisms that are responsible for causing a number of water-borne diseases. • However, the common drawbacks of chemical **methods such as chlorination include formation of harmful/ carcinogenic disinfection by-products.**
WMO Vision and Strategy for Hydrology and Action Plan	• It identifies **target outcomes to WMO's eight long-term ambitions** including Better understanding of flood risk, **flood forecasting and warning, reducing adverse impacts of drought,** and use of high-quality hydrological and hydrometeorological data etc.
India Young Water Professional	• Recently, the first edition of the India Young Water Professional Programme was launched virtually. • This program has been taken up under the **National Hydrology Project, a Central Scheme and supported by the Australian Water Partnership.** • It will be implemented by the **Australia India Water Centre (a consortium of Australian and Indian universities).** • **Objective of the programme**: To equip water professionals with the necessary skills, knowledge, behaviors, and networks that will better enable them to contribute to the development and management of water resources in India.
Recirculatory Aquaculture System (RAS)	• Recently, RAS was established at Awantipora, J&K. • RAS is **a technology where water is recycled and reused after mechanical and biological filtration** and removal of suspended matter and metabolites. • It is used for **high- density culture of various species of fish,** utilizing minimum land area and water. • Instead of the traditional method of growing fish outdoors in open ponds and raceways, in this system **fish are typically reared in indoor/outdoor tanks in a controlled environment.** • **Advantages:** Reduced dependency on antibiotics, Reduction of direct operational costs, Risk reduction due to climatic factors, disease and parasite etc.
Saryu Canal National Project	• Prime Minister inaugurated the **Saryu (tributary of Ghaghara) Canal National Project** which will provide **assured water for irrigation** to over 14 lakh hectares of land and benefit about **29 lakh farmers**. ○ The work on the project **started in 1978** and in 2016, the project was brought under **Pradhan Mantri Krishi Sinchayee Yojana** with the target of completing it in a **time-bound manner.** • The project also involves **interlinking of five rivers (Ghaghara, Saryu, Rapti, Banganga and Rohini)** to ensure optimum usage of water resources.

2.3. LAND DEGRADATION

Why in news?

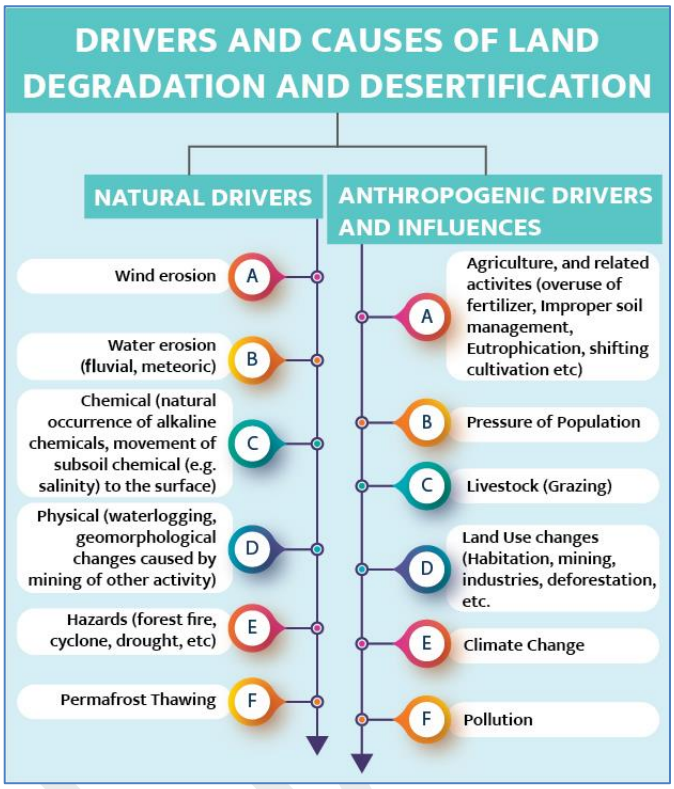
The Desertification and Land Degradation Atlas of India for the year 2018-19 was recently released by Space Applications Centre (SAC), Ahmedabad (Indian Space Research Organization).

Land degradation and Desertification

- Land degradation is **defined as a negative trend in land condition, caused by direct or indirect human-induced processes** including anthropogenic climate change, expressed as long-term reduction or loss of at least one of the following: **biological productivity, ecological integrity, or value to humans**.
  - Forest degradation is land degradation that occurs in forest land.
  - **Land degradation within dryland regions (arid, semi-arid and dry sub-humid regions) is termed as Desertification,** which turns fertile land into desert.

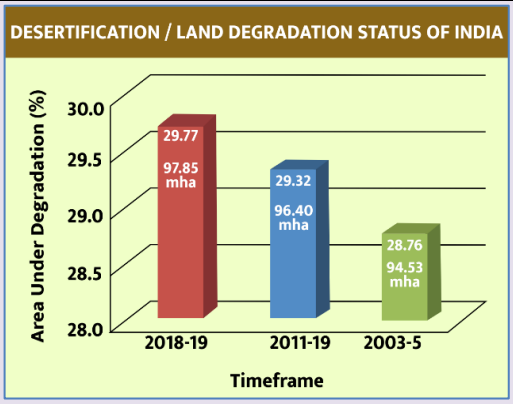
Impacts of Land Degradation and Desertification

- **Socio-Economic impacts:**
  - **Reduces land productivity threatening food security and livelihoods** of indigenous populations, small farmers etc.
  - **Reduces the land's ability to store water** resulting in water scarcity.
  - **Exacerbates existing societal tensions and forces migration.**
- **Impact on Human health:**
  - **Creates ground for zoonotic disease, water- and food-borne diseases and respiratory diseases.**
  - Higher threats **of malnutrition from reduced food and water supplies.**
- **Environmental impacts:**
  - **Causes extreme weather events, accelerates biodiversity loss** and disruption of ecosystem services.
  - **Contributes to Climate Change:** Land degradation is a driver of climate change through emission of greenhouse gases (GHGs) and reduced ability of land to act as a carbon sink.
    - ✓ Since climate change also exacerbates the rate and magnitude of several ongoing land degradation processes and introduces new degradation patterns, this creates a **positive feedback cycle.**



Related Concept: Land Degradation Neutrality (LDN)
A state whereby the amount and quality of land resources, necessary to support ecosystem functions and services and enhance food security, remains stable or increases within specified temporal and spatial scales and ecosystems.

Status of Land degradation and Desertification in India: Key Findings of Desertification and Land Degradation Atlas of India



- **Increase in Area under Degradation and desertification:** Around 97.85 million ha, (29.77% of the Total Geographic Area (TGA) of the country) is undergoing land degradation during 2018-19, an increase from the findings for the years 2011-13 (see figure).
  - Also, 83.69 million ha area is observed as undergoing desertification for the years 2018-19, which is a cumulative increase of 1.05 million ha area from the timeframe 2011-13.
- **Prevalent processes responsible for desertification/ land degradation in the country: Water Erosion** (11.01% in 2018-19), followed by Vegetation Degradation (9.15% in 2018-19) and Wind Erosion (5.46% in 2018-19).
- **State wise findings:** In 2018-19, around 23.79% of the area undergoing desertification/land degradation was contributed by Rajasthan, Maharashtra, Gujarat, Karnataka, Ladakh UT, Jharkhand, Odisha, Madhya Pradesh and Telangana (in descending order).
  - States like Jharkhand, Rajasthan, Delhi, Gujarat, and Goa are showing more than 50% area under desertification/land degradation.

International efforts to combat Land degradation

- **United Nations Convention to Combat Desertification (UNCCD):** Established in 1994, it is the sole legally binding international agreement linking environment and development to sustainable land management.
  - It addresses specifically the arid, semi-arid and dry sub-humid areas, known as the drylands, where some of the most vulnerable ecosystems and peoples can be found.
  - India has signed and ratified the agreement.
  - At COP 14 in 2019, the **Delhi Declaration** was adopted to focus on better access and stewardship over land, with gender-sensitive transformative projects.

United Nations Convention to Combat Desertification

Is India a Party? ✓

- **Initiatives launched under the UNCCD to combat land desertification and degradation-**
  - **Land Degradation Neutrality (LDN) Target Setting Programme**: UNCCD in collaboration with multiple international partners, are supporting interested countries with their national LDN target setting process. To date, over 120 countries, **including India, have committed to setting LDN targets**.
  - **Land Degradation Neutrality Fund (LDN Fund):** Officially launched at UNCCD COP 13 in Ordos, China, it is the first-of-its-kind investment vehicle leveraging public money to raise private capital for sustainable land projects.
  - **Global Land Outlook (GLO)** is a strategic communications platform and associated publications of the UNCCD secretariat that demonstrates the central importance of land quality to human well-being.
  - **Land for Life Programme** was launched at the tenth UNCCD Conference of the Parties (COP10) in 2011 as part of the **Changwon Initiative**. The Programme seeks to address the challenges of land degradation, desertification and mitigation of drought.
- **Other initiatives:**
  - **Bonn Challenge:** Launched by the Government of Germany and IUCN in 2011, it is a global goal to bring 150 million hectares of degraded and deforested landscapes into restoration by 2020 and 350 million hectares by 2030. India has pledged to restore 21 million ha of degraded and deforested land by 2030.
  - **Global Initiative on Reducing Land Degradation**: It aims to strengthen the implementation of existing frameworks to prevent, halt, and reverse land degradation within G20 member states and globally.
  - **Reducing emissions from deforestation and forest degradation (REDD+):** It is a mechanism developed by Parties to the United Nations Framework Convention on Climate Change (UNFCCC).
    - ✓ It creates a financial value for the carbon stored in forests by offering incentives for developing countries to reduce emissions from forested lands and invest in low-carbon paths to sustainable development.

Steps taken by India to tackle the issue of land degradation

- **India is a party to UNCCD** and has pledged to reach land degradation neutrality targets by 2030 as a part of the Convention's Land Degradation Neutrality Strategy.
- India promotes **sustainable land management practices in agriculture sector** through schemes such as Pradhan Mantri Fasal Bima Yojana (PMFBY), Soil Health Card Scheme, Soil Health Management Scheme, Pradhan Mantri Krishi Sinchayee Yojna (PKSY), Per Drop More Crop, etc. which are helping to reduce land degradation.
- Ministry of Environment Forests and Climate Change (MoEFCC) consolidated the intervention on **participatory forest management** through the National Forest Policy, 1988, and then through enabling guidelines in 1990 on **Joint Forest Management (JFM).**
  - JFM is a partnership involving both the forest departments and local communities in natural forest management.
- MoEFCC is implementing three major schemes for development of forest areas i.e., **National Afforestation Programme (NAP)** scheme**, National Mission for a Green India (GIM)** and **Forest Fire Prevention & Management Scheme (FFPM).**

Related News:

Bamboo Oasis on Lands in Drought (BOLD) Project

- **Khadi and Village Industries Commission (KVIC)** launched Bamboo Oasis on Lands in Drought (BOLD) Project in **Rajasthan.**
- Project BOLD seeks **to create bamboo-based green patches in arid and semi-arid land zones** to reduce land degradation and prevent desertification.
- **Bamboo is a grass**, fast growing, and typically woody. It is distributed in tropical, subtropical and mild temperate zones.
  - India is **second only to China in terms of bamboo diversity.**
- **Benefits of bamboo cultivation:**
  - Conserves water and **reduce evaporation of water** from the land surface.
  - **Ideal for rehabilitating degraded soil** with its unique ability to stitch and repair damaged soils.

Great Green Wall (GGW) programme

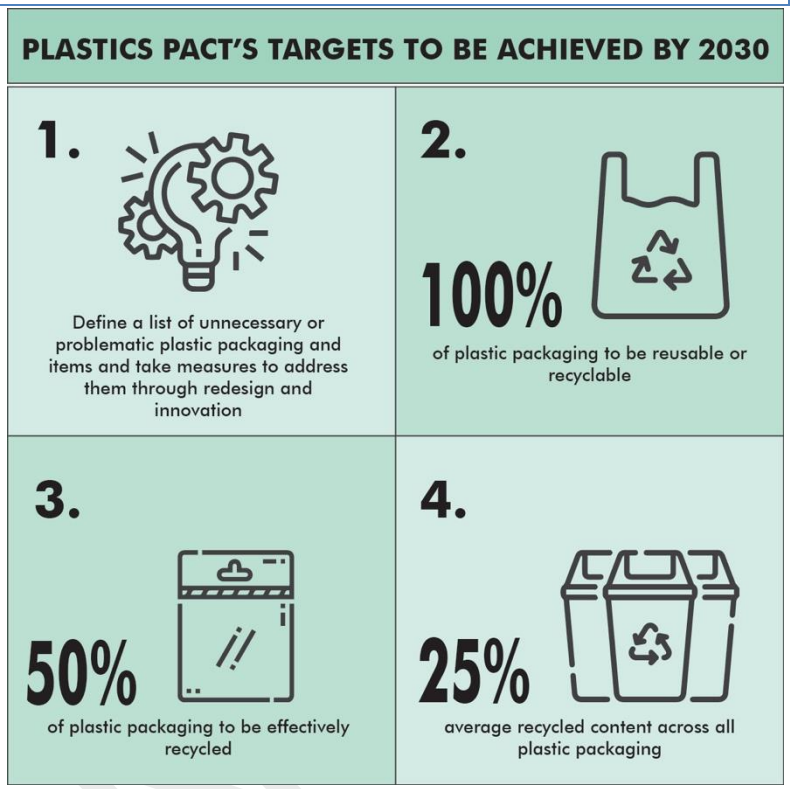
- **GGW is an African-led initiative** with the UN Convention **to Combat Desertification as** a key partner**.**
- It aims to **restore the degraded landscapes of the Sahel** from **Senegal in the West to Djibouti in the East** (11 countries).
  - According to the FAO, **for every dollar** invested into land restoration, through the GGW programme, yields **investors can expect an average return of $1.20.'**
- Once complete, the **GGW will be the largest living structure on the planet, 3 times the size of the Great Barrier Reef, Australia.**

2.4. PLASTIC POLLUTION

2.4.1. INDIA PLASTICS PACT

Why in news?

India has become the first Asian country to develop a **plastics pact** for building a circular system for plastics.



About India Plastics Pact

- The India Plastics Pact (IPP) has launched as a **collaboration between WWF India and the Confederation of Indian Industry (CII).**
- The initiative brings together all stakeholder across the whole value chain to set **time-bound target-based commitments** to transform the current linear plastics system into a circular plastics economy.
- The vision, targets and ambition of the IPP are **aligned with the circular economy principles of the Ellen MacArthur Foundation's New Plastics Economy** in which *'plastic never becomes waste'.*
- **Plastic pact model** is currently implemented in number of countries such as UK, South Africa, Australia.
    - The **first Plastics Pact** was launched in the **U.K. in 2018**
- The pact is **supported by UK Research and Innovation (UKRI) and WRAP** (Worldwide Responsible Accredited Production) in providing new technologies and endorsed by the British High Commission in India.

2.4.2. PLASTIC WASTE MANAGEMENT AMENDMENT RULES, 2021

Why in news?

Recently, the **Ministry of Environment, Forest, and Climate Change (MoEF&CC)** has notified the **Plastic Waste Management Amendment Rules, 2021,** which **prohibits identified single use plastic items** which have low utility and high littering potential by 2022.

About Single-use plastics (SUP)

- India has defined SUP as **"a plastic commodity intended to be used once for the same purpose before being disposed of or recycled"** in its Plastic Waste Management Amendment Rules, 2021.
    - These include plastic bags, straws, coffee stirrers, soda and water bottles and most food packaging.
    - The assessment of SUP was conducted by comparing **two pillars** — the **utility index of a particular type of SUP** and the **environmental impact of the same**.
    - The **product that scores low on utility and high on environmental impact** should be considered for immediate phase out.

Key Provisions of Plastic Waste Management (PWM) Amendment Rules, 2021

The new rules will **replace the existing Plastic Waste Management Rule, 2016** (PWM Rules, 2016) that was amended in 2018.

- **Prohibition on Manufacture, import, stocking, distribution, sale and use of single-use plastic,** including polystyrene and expanded polystyrene, commodities **with effect from 1st July 2022.**
    - The ban will **not apply to commodities made of compostable plastic.**

- **Thickness of plastic carry bags increased** from 50 microns to 75 microns with effect from **30th September 2021**and to 120 microns with effect from the 31st December, 2022.
- **Extended Producer Responsibility (EPR):** Plastic packaging waste not covered under present notification shall be collected and managed in an environmentally sustainable way through **EPR of the producer, importer and brand owner (PIBO)** as per PWM Rules, 2016.
    - **EPR Guidelines have been given legal force** through PWM Amendment Rules, 2021.
- **Implementing agency:** Along with state pollution bodies, **Central Pollution Control Board (CPCB)** will monitor the ban, identify violations, and impose penalties already prescribed under the Environmental Protection Act, 1986.
- **Task Force:** States and UTs had constituted the **special task force for elimination of SUP and effective implementation of the PWM Rules, 2016.**
    - Environment Ministry has also set up a **national-level task force** for making coordinated efforts in this direction.
    - State /UT Governments and concerned Central Ministries/Departments have also been requested to **develop a comprehensive action plan for elimination of SUP** and its implementation in a time bound manner.

About Extended Producer Responsibility (EPR)

- It is a policy approach in which producers take responsibility for management of the disposal of products they produce once those products are designated as no longer useful by consumers.
- The concept was **introduced by the Plastic Waste Management (Amendment) Rules 2018.**
- MoEFCC recently released **draft notification for regulations for EPR for waste tyres.**

2.4.3. OTHER INITIATIVES IN NEWS TO TACKLE PLASTIC WASTE

Un-Plastic Collective (UPC)	• It is a voluntary initiative launched by the UN-Environment Program-India, Confederation of Indian Industry and WWF-India to drive corporate action toward solutions on plastic leakage.
GloLitter Partnerships Project	• It was launched by the **International Maritime Organization (IMO) and the Food and Agriculture Organization** (FAO) of the United Nations to assists developing countries to **prevent and reduce marine plastic litter from the maritime transport and fisheries sectors** and identifies opportunities for the reduction of plastic uses in both fisheries and maritime transport sectors.

United Nations Development Programme (UNDP) Plastic Waste Management (PWM) (2018-2024) programme	• It aims to almost **triple its PWM to 100 cities in India by 2024**.
	• UNDP launched this project, in partnership with Hindustan Coca-Cola Beverages Private Limited, Hindustan Unilever Limited among others, **for building on existing systems to reduce the impact of plastic waste on the environment in India.**
	• It promotes collection, segregation, and recycling of all kinds of plastics **to move towards a circular economy.**
	  ○ So far, **83,000 metric tonne of plastic waste has been collected.**
	  ○ The project has **reached out to 5500 SafaiSathis**, in an effort to **institutionalize workers from the informal sector.**
	  ○ **"Utthaan"**, a social protection programme was launched to help 9000 safaisathis.

Uronema Africanum Borge (UAB)	• Recently, researchers from University of Madras and Presidency College, Chennai isolated UAB as a **potential biodegradation agent for plastic sheet.** • **UAB is a variety of microalga** which **produce different kinds of extracellular polysaccharides, enzymes, toxins** such as cyanotoxins, hormones **to react with polymer sheets and break them into simpler monomers.** • UAB is commonly **found in Africa, Asia and Europe.** • It provides a **safe and environment friendly** process to dispose plastics **over existing incineration, land-filling and recycling.**
Zero Waste Cities Challenge	• The "WasteAid" has chosen **two winners** (entrepreneurs from Shree Guru Plastic and Inside Out) **from Guwahati** for their work on promoting **circular economy and reducing the usage of plastics.**

	• **Guwahati was among the three cities chosen by WasteAid**, a United Kingdom-based non-profit, to launch a Zero Waste Cities Challenge.
	  ○ Other two are **Johannesburg and Ho Chi Minh City**
	  ○ The aim was to **find entrepreneurs with innovative business ideas that can help reduce or recycle waste** and create green employment opportunities.

Bubble curtain	• This technology is being used for **the first time in India to stop plastic from entering the river Yamuna**. It is a non-invasive solution to stop plastic from entering the oceans. • **Ships and fish can pass through the air bubbles, but plastics will be stopped.** • The bubble screen is created by a specially designed **air tube** which is placed diagonally on the bed of the canal or river. It **brings waste to the surface, channels the plastic onto the banks** where it can be extracted.

2.5. CONCEPTS IN BRIEF

Virtual Water (VW)	• IIT-Guwahati team recommends Virtual Water analysis for better water management policies in India. • Virtual Water (VW) is the **water involved in the production and trade of food and non-food commodities and services.** It is that "invisible" water that has been consumed throughout the lifecycle of the product or service. ○ For ex: On an average, **3000 liters of water is required for producing 1 kg of rice.** • Owing to its sizable agricultural exports, **India has been losing water thereby putting its water sustainability at risk**. VW analysis could help India in defining its trade characteristics.

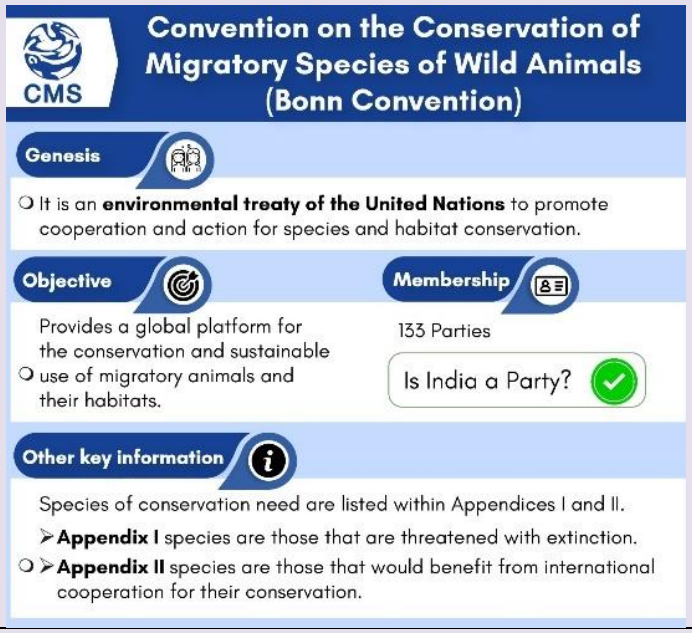
The Right To Repair Movement	• **Right to Repair electronic products** is a reference to the **need for government legislation** that is intended to allow consumers the ability to repair and modify their own electronic devices.
	  ○ The movement traces its roots back to 1950s.
	  ○ The concept **originated from USA** from the automotive industry.

Zero Liquid Discharge (ZLD)	• In the backdrop of World Water Week 2021, **National Mission for Clean Ganga hosted a session on 'Zero Liquid Discharge Cities'.**
	• **ZLD** is an engineering approach to **water treatment where all water is recovered and contaminants are reduced to solid waste**.
	  ○ The focus of ZLD is to **reduce wastewater economically and produce clean water that is suitable for reuse (e.g. irrigation).**
	  ○ It **employs advanced wastewater/desalination treatment technologies** to purify and recycle virtually all of the wastewater produced.

2.6. REPORTS AND INDICES

Report	Details
State of the world's land and water resources for food and agriculture (SOLAW 2021) Food and Agriculture Organization of the United Nations	• **Released by:** Food and Agriculture Organisation (FAO) • Report aims **to take stock of implications for agriculture and recommend solutions** for transforming the combined role of land and water in global food systems.

Impacts of Plastic Pollution on Freshwater Aquatic, Terrestrial and Avian Migratory Species
CMS
	• **Released by: Conservation of Migratory Species and the UN Environment Programme** as part of the **Japan-funded Counter MEASURE II project** to identify sources and pathways of plastic pollution in river systems in Asia.
	• It identifies the impacts of plastic pollution on land and freshwater migratory species **protected by the Convention on the Conservation of Migratory Species of Wild Animals (CMS).**
	• **Key highlights**
	  ○ Study noted that **53 million tonnes of plastic could enter aquatic systems annually by 2030,** which could eventually increase to 90 million tonnes.
	  ○ **Major threats highlighted by report include** - entanglement in plastic waste such as fishing nets; ingestion of plastic impacting food web; Space constraint and hindrance for species living on air-water interface owing to plastic waste etc.
	  ○ Migratory birds such as the **Black-faced Spoonbill and the Osprey had been observed making nests out of plastics,** often resulting in the entanglement of their chicks.



From Pollution to Solution: A Global Assessment of Marine Litter and Plastic Pollution

- **Released by:** UNEP
- It provides a scientific basis for the need to urgently act to control plastic emissions into the environment.
- **Key findings**
  - **Emissions of plastic waste into aquatic ecosystems are projected to nearly triple by 2040 without meaningful action.**
  - Marine litter and plastic pollution present serious **threats to the livelihoods of coastal communities as well as to shipping and port operations.**
  - The **main sources of marine litter and plastic pollution are land-based.**
  - **Plastic recycling rates are less than 10%** and plastics-related greenhouse gas emissions are significant, but some solutions are emerging.

3. BIODIVERSITY

3.1. 15TH COP TO THE CONVENTION ON BIOLOGICAL DIVERSITY

Why in News?

Recently, first part of 15th meeting of the Conference of the Parties (COP) to the United Nations Convention on Biological Diversity (CBD) was held virtually in Kunming, China.

More on the News

- The main objective of the COP 15 was to develop and adopt a post-2020 "**Global Biodiversity Framework**" to replace and update the **Strategic Plan for Biodiversity (SPB) 2011-2020** and **Aichi Biodiversity Targets**.
  - According to the findings of **Fifth Global Biodiversity Outlook (GBO-5) report,** at the global level **none of the 20 targets have been fully achieved.**
- **Parties will reconvene in** at the resumed session of COP-15, in Kunming, China in mid-2022 for further negotiations and to come to a final agreement on the **post-2020 Global Biodiversity Framework**.

SPB 2011-2020

- It was adopted by the parties to the CBD, during the tenth meeting of the Conference of the Parties **(COP10)** in 2010 in **Nagoya, Japan**, with the purpose of inspiring **broad-based action in support of biodiversity** over the next decade by all countries and stakeholders.
- It was comprised of a shared vision for 2050, a mission and **20 targets organized under 5 strategic goals,** collectively known as the **Aichi Biodiversity Targets (ABTs).**
- **Vision:** Living in Harmony with Nature where by **2050, biodiversity is valued, conserved, restored and wisely used,** maintaining ecosystem services, sustaining a healthy planet and delivering benefits essential for all people.

Key Outcomes of the conference

- **Adoption of Kunming Declaration:** The declaration called for urgent and integrated action to reflect biodiversity considerations in all sectors of the global economy.
  - **More than 100 nations, including India,** made commitments to-
    - ✓ ensure the development, adoption and implementation of an effective post-2020 global biodiversity framework.
    - ✓ reverse the current loss of biodiversity.
    - ✓ ensure that biodiversity is put on a path to recovery by 2030 at the latest.

  - It also noted the efforts and commitment of many countries **to protect 30 percent of their land and sea areas by 2030 (30 by 30 target)**, which is critical for reversing a major driver of nature's decline.
- **Kunming Biodiversity Fund:** China established the Fund with approximately USD 230 million to support projects for protecting biodiversity in developing countries.
- **Open letter to Private sector:** The conference called for increased involvement of the private sector, including an open letter from business CEOs to world leaders, urging for bold action.
- **Global Environment Facility, the UN Development Programme and the UN Environment Programme,** committed to fast-tracking financial and technical support to developing countries for GBF implementation.

United Nations Convention on Biological Diversity (CBD)

Convention on Biological Diversity

Genesis

- An **international legally binding multilateral treaty,** opened for signature in 1992 at the **Rio "Earth Summit".**

Objective

- Conservation of biological diversity.
- Sustainable use of the components of biological diversity.
- Fair and equitable sharing of the benefits arising out of the utilization of genetic resources.

Signatories

- **196 parties.**

Is India a Party? ✓

Supplementary agreements of CBD (India has signed and ratified all 3 of these protocols)

Cartagena Protocol on Biosafety	Nagoya Protocol on Access and Benefit-sharing	Nagoya – Kuala Lumpur Supplementary Protocol on Liability and Redress to the Cartagena Protocol on Biosafety
Aim: To ensure the safe handling, transport and use of living modified organisms (LMOs) resulting from modern biotechnology that may have adverse effects on biological diversity and human health	**Aim:** Sharing the benefits arising from the utilization of genetic resources in a fair and equitable way.	**Aim:** To contribute to the conservation and sustainable use of biodiversity by providing international rules and procedures in the field of liability and redress relating to LMO.
Established- • **Advance informed agreement (AIA) procedure** for ensuring that countries are provided with the information necessary to make informed decisions before agreeing to the import of such organisms into their territory. • **Biosafety Clearing-House** to facilitate the exchange of information on living modified organisms.	**Established-** • **Access and Benefit-sharing Clearing-House** platform for exchanging information on access and benefit-sharing.	• **Applies to damage** resulting from living modified organism which find their origin in a transboundary movement

Related News:

New Global Framework for Managing Nature Through 2030

- Released by UN Convention on Biological Diversity (CBD), the framework **guides actions worldwide to preserve and protect nature and its essential services** to people.
  - It **includes 21 targets for 2030** and 4 Goals to achieve **humanity "living in harmony with nature," vision by 2050.**
  - It will undergo further refinement at CBD's COP-15 scheduled for Kunming, China in October 2021.
- **Targets includes:**
  - At least **30% of global land and sea areas to be conserved.**
  - **50% of greater reduction in the rate of introduction of invasive alien species** and their impact.
  - **Reducing nutrients lost to the environment by at least half,** and **pesticides by at least two third**s, and eliminating the discharge of plastic waste.
  - **$US 200 billion increase** in international financial flows from all sources to developing countries for managing nature.
- **Four goals :**
  - To **halt the extinction and decline of biodiversity.**
  - To **enhance and retain nature's services to humans** by conserving.
  - To **ensure fair and equitable benefits to all** from use of genetic resources.
  - To **close the gap** between available financial and other means of implementation.

High Ambition Coalition (HAC) for Nature and People

- **India officially joined the High Ambition Coalition for Nature and People.**
- India is the first of the BRICS bloc of major emerging economies (Brazil, Russia, India, China and South Africa) to join the HAC.

Is India a member ✓

- It is an intergovernmental group of **70 countries** co-chaired by Costa Rica and France and by the United Kingdom as Ocean co-chair, championing a global deal for nature and people with the central goal of **protecting at least 30 percent of world's land and ocean by 2030**.
- The **30x30 target** is a global target which aims to halt the accelerating loss of species, and protect vital ecosystems that are the source of our economic security.

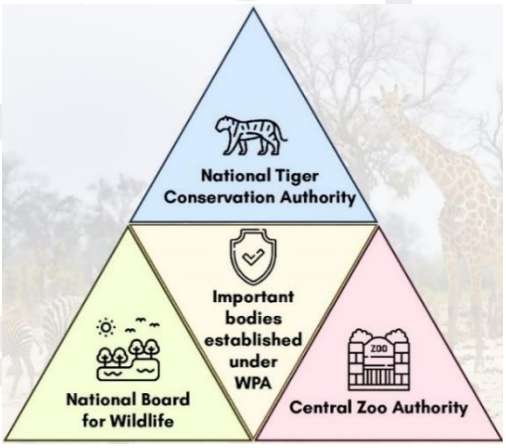
International Conference on Sustainability Science (ICSS)

- 8th ICSS was held recently.
- It will **facilitate creative discussions** between academics, policy-makers and practitioners **on how biodiversity-based solutions can contribute to sustainable development.**
- Outcomes of the conference are **expected to feed into the current international discourse of the post-2020 agenda on biodiversity.**
  - This framework will define **targets and pathways for** conservation and management of **biodiversity for the next decade and beyond.**
- ICSS conference is **co-organized by various institutes/organizations** including Convention on Biological Diversity Secretariat, Institute of Future Initiatives, Tokyo university, Future Earth etc.

3.2. BIOLOGICAL DIVERSITY (AMENDMENT) ACT, 2021

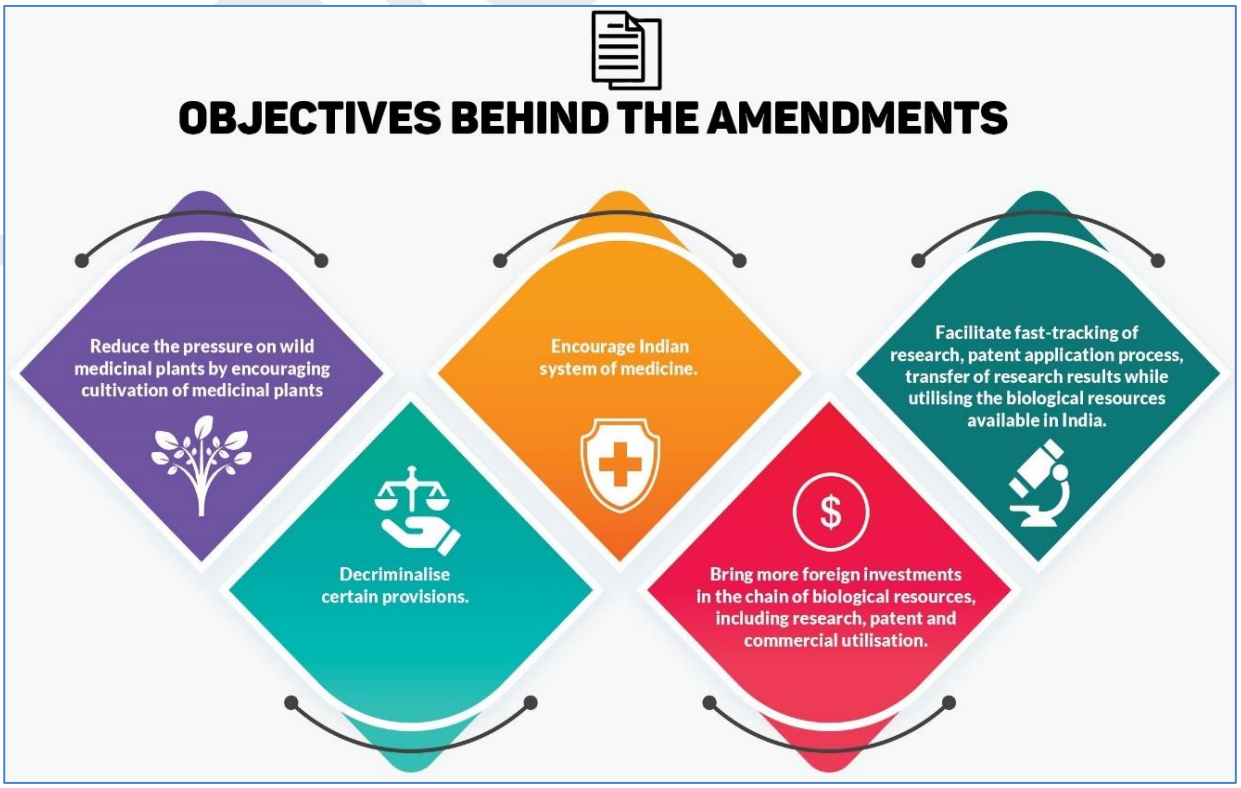
Why in News?

The Biological Diversity (Amendment) Act, 2021 was recently introduced in Lok Sabha and then referred to a joint parliamentary committee (JPC).



About Biological Diversity Act, 2002

- It was enacted to provide for the conservation of biological diversity, sustainable use of its components and fair and equitable sharing of the benefits arising out of the use of biological resources and knowledge.
- **Aim:** To fulfill India's obligations under the **Convention of Biological Diversity and Nagoya Protocol on Access and Benefit Sharing**.
- It provides for a decentralized three-tiered mechanism (see infographic) for implementation of the Act.
- **Biodiversity Management Committees (BMC) are responsible for preparing People's Biodiversity Registers** which keep a record of all flora and fauna including details of traditional knowledge available in their region.



Key Provisions of the Proposed Amendments

- **Extension of Exemptions**: Registered **AYUSH medical Practitioners, people accessing codified traditional knowledge, cultivated medicinal plants and its products, people who are practicing indigenous medicine including Indian systems of medicine** are exempted from giving prior intimation to SBB for accessing biological resource from certain purposes.
- **Simplifying access to biological resources and intellectual property rights (IPR):**
  - Certain entities must seek approval from the NBA for obtaining biological resources, including organizations registered in India, with any non-Indian shareholding or management, which has been **changed to any foreign-controlled company registered in India**.
  - Applicants can now obtain **NBA's approval before the grant of IPR** and not before applying for IPR.
  - Anyone who does not need approval from NBA to access biological resources must give prior intimation to the concerned SBB. Further, they must- register with the NBA before the grant of IPR, and get prior approval of the NBA before commercializing the granted IPR.
- **Reduction of certain offences:** The provision which made offences under the act cognizable and non-bailable was deleted. However, penalties may extend up to ₹1 crore.
- **Provisions related to BMC:** State government will prescribe the composition of BMCs, whose strength has been fixed between seven to eleven members. Further, state governments may also constitute BMCs at the intermediate or district Panchayat level.
- **States can declare Threatened species:** Central government can delegate the power to notify any species which is near-extinction as a threatened species to the state government.
  - However, before notifying any threatened species, the state government must consult the NBA.
- **Expansion of NBA:** 11 additional members to be added to NBA, including:
  - 6 ex-officio members dealing with wildlife, forestry research, and Panchayati Raj
  - **4 representatives from SBBs** (on a rotational basis), and
  - 1 **Member-Secretary** (must have experience in biodiversity conservation), who **will be the chief coordinating officer of the NBA.**
- **Changes in Definitions:** For example, 'bio-utilisation' has been removed, and 'bio-survey' has been redefined.

What is Access and Benefit-Sharing?

- When an Indian or foreign company or individual accesses biological resources such as medicinal plants and associated knowledge, it has to take prior consent from the national biodiversity board.
- The board can impose a benefit-sharing fee or royalty or impose conditions so that the company shares the monetary benefit from commercial utilisation of these resources with local people who are conserving biodiversity in the region.

3.3. WILDLIFE (PROTECTION) AMENDMENT BILL, 2021

Why in News?

A bill to amend the Wildlife (Protection) Act, 1972 was recently introduced in Lok Sabha.

About Wildlife (Protection) Act, 1972 (WPA)

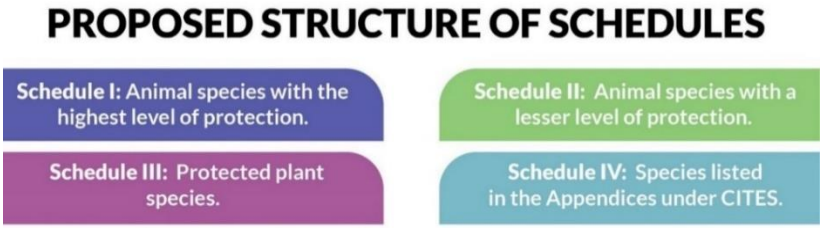
- The act provides for the protection of wild animals, birds, and plants with a view to ensure the ecological and environmental security of the country.

Schedules of Wildlife Protection Act

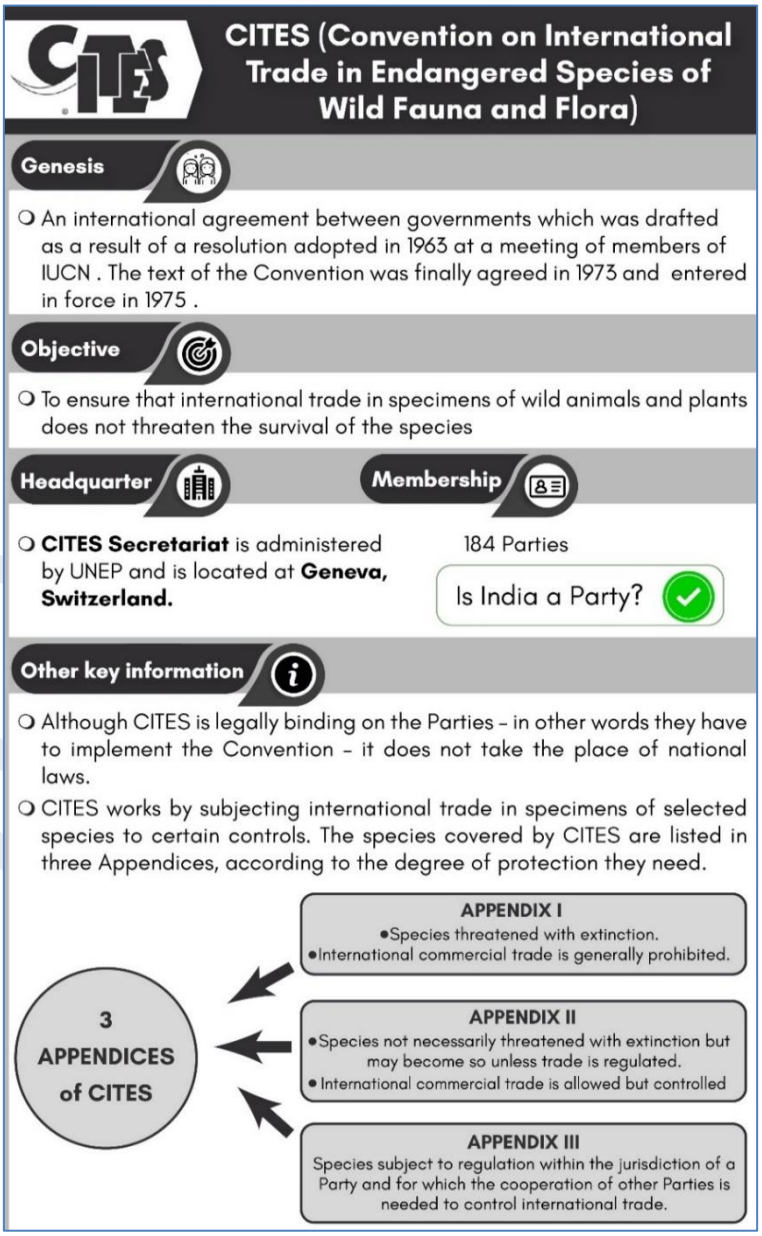
Schedule I	**Part I**	Wild animals listed under Mammals	■ Covered under definition of **Scheduled animal and Scheduled animal articles.** Scheduled animals are accorded absolute protesction and highest penalties for violation of Act's provisions. ■ Dealing in these along with their articles and trophies is prohibited under Section 49 of Wild Life (Protection) Act, 1972. ■ Hunting of these animals is Prohibited.
	Part II	Amphibians and Reptiles	
	Part III	Bird	
	Part IV	Crustacea and Insects	
Schedule II	**Part I**	Wild animals listed under Mammals and reptiles	■ Dealing in Part I Schedule articles requires licence. ■ Part II covered under definition of scheduled animal and scheduled animal articles.
	Part II	Beetles	
Schedule III		Wild animals under mammals	■ Dealing in these items and animal articles and tropies requires licence. ■ Hunting Prohibited.
Schedule IV		Wild animals under mammals, birds	■ Dealing in these items and animal articles and tropies requires licence. ■ Hunting Prohibited.
Schedule V		Vermins	■ Can be hunted.
Schedule VI		List of plants notified under Section C	■ Licence from Chief Wild Life Warden for dealing in specified plants. ■ Cultivation also requires a licence. ■ Prohibition of picking, uprooting, etc.

- It empowers the State to declare protected areas, under four categories- **National Parks, Wildlife Sanctuaries, Community Reserves** and **Conservation Reserves**.
- The act has created **6 schedules for specially protected plants (one), specially protected animals (four), and vermin species (one),** which gave varying degrees of protection to classes of flora and fauna.

Proposed Amendments in the Wildlife (Protection) Amendment Bill, 2021



- **Rationalization of the Schedules:** The Bill reduces the total number of schedules from 6 to 4 by:
  - reducing the number of schedules for specially protected animals to two,
  - removing the schedule for vermin species, and
  - inserting a new schedule for specimens listed in the Appendices under CITES (scheduled specimens).
- **Wild animals to be declared as Vermin by the way of notification** by the Central Government for any area and for a specified period.
- **Controlling Invasive alien species:** Empowers the central government to regulate or prohibit the import, trade, possession or proliferation of invasive alien species. An officer can be authorised to seize and dispose the invasive species.
- **New Chapter VB for implementation of CITES:** with following provisions-
  - **Designation of authorities** by the Central government:
    - ✓ **Management Authority,** which grants export or import permits for trade of scheduled specimens.
    - ✓ **Scientific Authority,** which gives advice on aspects related to impact on the survival of the specimens being traded.
  - **Identification mark:** As per CITES, the Management Authority may use an identification mark for a specimen. Modification or removal of the identification mark is prohibited.
  - **Registration certificate:** Person possessing live specimens of scheduled animals must obtain a registration certificate from the Management Authority.



- **Control of sanctuaries:** Chief Wild Life Warden shall control, manage and maintain all sanctuaries in accordance with the management plan prepared as per guidelines issued by the Central Government.
- **New section 42A for Surrender of captive animals:** Any person to voluntarily surrender any captive animals or animal products to the Chief Wild Life Warden.
  - No compensation will be paid to the person for surrendering such items and the surrendered items become property of the state government.

- **Penalties:** The Bill increases fines for violating the provisions of the Act.
- **Relaxation of certain restrictions:**
  - **Including film-making** (without making any change in the habitat or causing any adverse impact to the habitat or wildlife) **as one of the purposes for which permits may be granted** to enter or reside in a sanctuary.
  - **Allow for transfer or transport of live elephants by person having ownership certificates** in accordance with conditions prescribed by the Central Government.
  - **Certain activities such as,** grazing or movement of livestock, bona fide use of drinking and household water by local communities, etc., **shall be considered as non-prohibitive under section 29** i.e. allowed without a permit in a sanctuary.

Type of Violation	1972 Act	2021 Bill
General violation	Up to Rs 25,000	Up to Rs 1,00,000
Specially protected animals	At least Rs 10,000	At least Rs 25,000

- **Other changes:**
  - **State Board for Wildlife permitted to constitute a Standing Committee.**
  - The Preamble to the Act amended to include the aspects of 'conservation' and 'management' of wildlife.
  - **Allow the Central Government to declare conservation reserves** in areas leased or otherwise transferred to it by the State Government.
  - **Enable the Central Government to call for information and issue directions** for proper implementation of the Act.
  - **No renewal of any arms licenses shall be granted to any person residing within ten kilometers of a sanctuary** except under the intimation to the Chief Wildlife Warden or the authorized officer.

Related News: Wildlife Action Plan

- **Maharashtra** became the **first state to release its own Wildlife Action plan (2021-30).**
  - The plan has suggested **integrating climate change adaption** in wildlife conservation.
- The **plan focuses on 12 areas**— Conservation of the species, Control of Poaching and Illegal Wildlife Trade, Wildlife Health Management etc.
  - It has approved an extension of the boundary **of Tadoba- Andhari Tiger Reserve.**

3.4. PROTECTION OF PLANT VARIETIES AND FARMERS' RIGHTS ACT, 2001

Why in news?

Protection of Plant Varieties and Farmers' Rights Authority (PPV&FRA) under the PPV&FR Act has revoked a plant variety protection certificate granted to PepsiCo India Holding on FC-5 potato variety (also called as FL-2027) on multiple grounds.

About the Protection of Plant Varieties and Farmers' Rights (PPV&FR) Act

- PPV&FR Act was **enacted in 2001 under Article 27(3) (b) of the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS).**
- The act is in conformity with **International Union for the Protection of New Varieties of Plants (UPOV), 1978.**
  - UPOV is an intergovernmental organization, to provide and promote an effective system of plant variety protection, with the aim of encouraging the development of new varieties of plants, for the benefit of society.
- The Act **introduced intellectual property protection in Indian agriculture** and is the **world's only IPR legislation which grants intellectual property rights** not only to the plant breeders but also **to the farmers.**
- **Objectives of the Act**
  - **To recognize and protect the rights of farmers** in respect of their contributions in conserving, improving and making available plant genetic resources for the development of new plant varieties.
  - **To accelerate agricultural development in the country,** protect plant breeders' rights; stimulate investment for research and development both in public & private sector for the development new of plant varieties.
  - **Facilitate the growth of seed industry** in the country, to ensure the availability of high quality seeds and planting material to the farmers.

- **Institutional Mechanism:**
  - **Protection of Plant Varieties and Farmers' Rights Authority (PPV&FR Authority):** To implement the provisions of the Act by Department of Agriculture and Cooperation, Ministry of Agriculture. General Functions of the Authority include:
    - ✓ **Registration of new plant varieties**
    - ✓ **Developing DUS (Distinctiveness, Uniformity and Stability) test guidelines** for new plant species,
    - ✓ **Facilitate development and commercialisation of new varieties** through formal linkages with agricultural universities, research institutions and Krishi Vigyan Kendras,
    - ✓ **Recognizing and rewarding farmers**, community of farmers, particularly tribal and rural community engaged in conservation and improvement;
    - ✓ **Maintenance of National Gene Bank** to store the seed material
    - ✓ **Preservation of plant genetic resources** of economic plants and their wild relatives
  - **Plant Varieties Protection Appellate Tribunal (PVPAT):** The decisions of the PVPAT can be challenged in High Court. The Tribunal shall dispose of the appeal within one year.
  - **Eligibility criteria:** A variety of seed is eligible for registration under the Act if it fulfils the criteria of Distinctiveness, Uniformity and Stability (DUS). The protection period is for 15 years for trees and 18 years in the case of vines.
  - The Act prescribes the registrable plant varieties that can be registered for protection, namely:
    - ✓ New varieties
    - ✓ Extant variety
    - ✓ Farmers' variety
    - ✓ Essentially derived variety
- **Rights under the Act:**

Breeders' Rights	• **Exclusive rights to produce, sell, market, distribute, import or export the protected/ registered variety.** • Can appoint agent/ licensee and may exercise civil remedy in case of infringement of rights.
Researchers' Rights	• **Can use any of the registered variety under the Act for conducting experiment or research.** • This includes the use of a variety as an initial source of variety for the purpose of developing another variety but repeated use needs prior permission of the registered breeder.
Farmers' Rights	• A farmer who has evolved or developed a new variety is **entitled for registration and protection** in like manner as a breeder of a variety. • **Section 39(1) of the Act** allows all farmers cultivating a registered new variety the right to "save, use, sow, resow, exchange, share or sell farm produce including seeds" except the branded seeds. • **Section 39 (2) of the Act provides for compensation** to the farmers for non-performance of variety. • Farmer shall **not be liable to pay any fee** in any proceeding before the Authority or Registrar or the Tribunal or the High Court under the Act. It will be paid through **National Gene Fund**.

3.5. WILDLIFE AND CONSERVATION

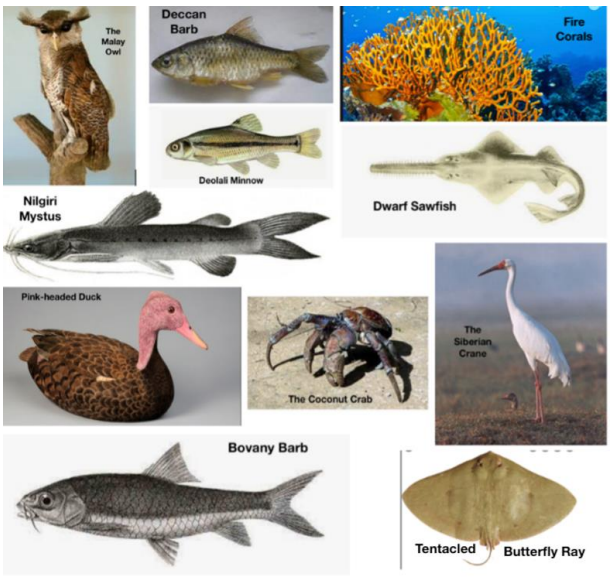
3.5.1. POSSIBLY EXTINCT SPECIES

Why in news?

A number of animals and plants have been **listed as 'possibly extinct'** in the latest edition of the International Union for the Conservation of Nature (IUCN)'s Red List of Threatened Species.

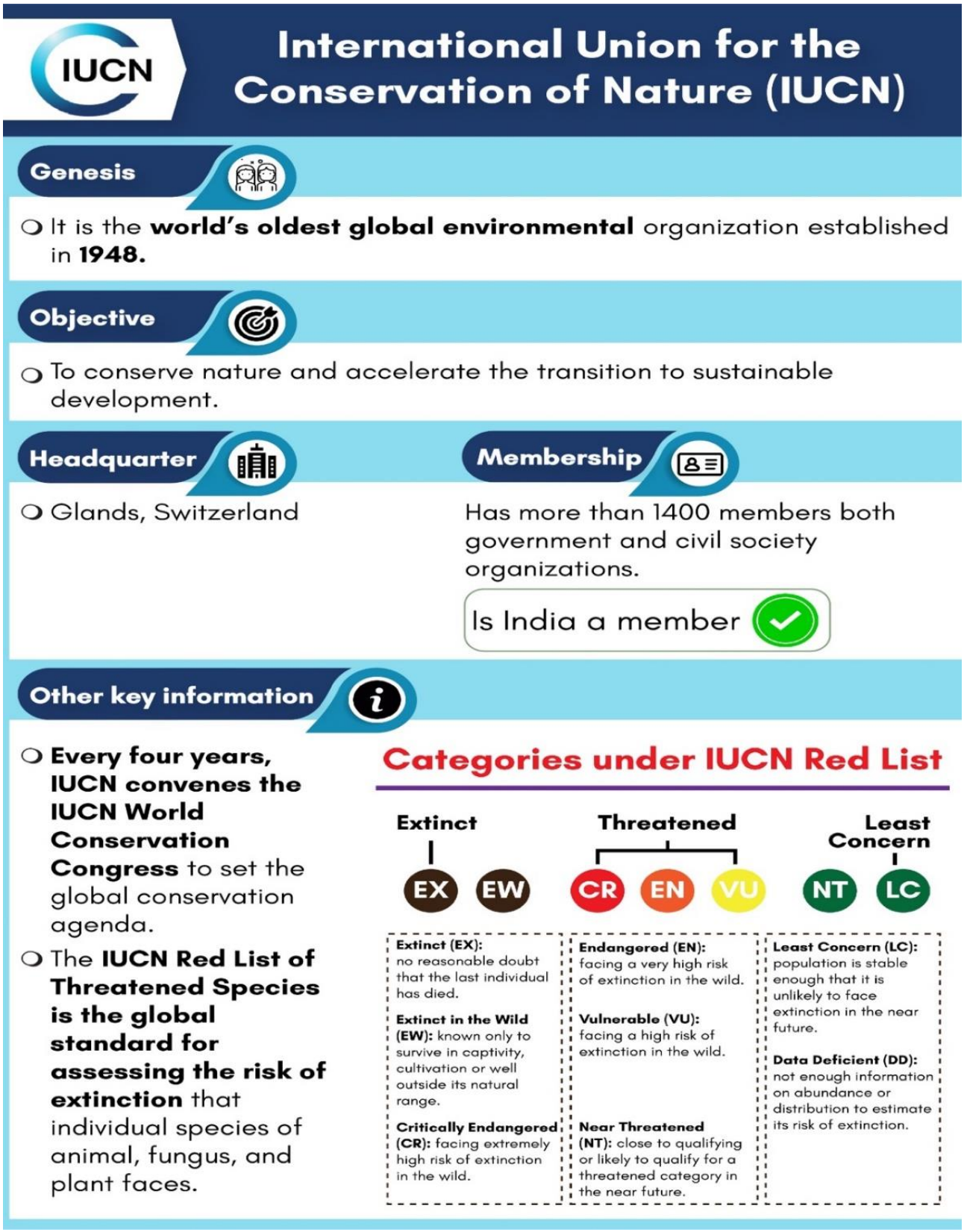
What does it mean by 'Possibly Extinct'?

- The term is taken as a marker to **estimate when the presence / population** of the species has declined.
- Species marked as **'possibly extinct'** have been **last assessed in the 1900s** post which their presence and updates to their population has not been found.
- Those marked 'Extinct Post-1500' include Green peafowl, Cheetah, Hairy-nosed Otter, Banteng, a



bovid found today in southeast Asia, the Sumatran and Javan rhino and the **Osteobrama Belangeri, a fish species endemic to Manipur**.

- **Indian Species that are possibly extinct:**
  - Tentacled butterfly ray**;** Dwarf sawfish; Fire coral**;** Coconut crab (the largest terrestrial arthropod in the world)**;**
  - **Fishes:** Bovany barb (native to the Cauvery river system), Deolali minnow, the Deccan barb and the Nilgirimystus (all 3 are found in the Deccan)**;**
  - **Birds:** Pink-headed duck, Siberian crane, Buffy fish-owl or Malay owl.



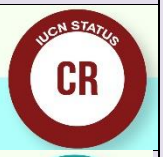
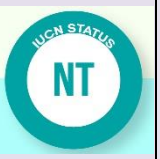
Other Key updates by IUCN

- Over 900 species of animals have become extinct.
- IUCN also officially launched its **"green status"** -- the first global standard **for assessing species recovery and measuring conservation impacts.**
  - They are **represented by a Species Recovery Score**, and by **four conservation impact metrics** (Conservation Legacy, Conservation Dependence, Conservation Gain, Recovery Potential).
  - These metrics are **quantified as differences between the Green Score of the species in different time steps** or under different scenarios.
  - **Some of the green status Species: Pink pigeon** (Mauritius); **Burrowing bettong** (Australia); **Sumatran rhino** (Indonesian islands of Sumatra and Borneo).

Species whose statuses changed:

- **Komodo dragon** (world's largest living lizard, endemic to Indonesia) has been moved from vulnerable to **endangered.**
- **Albacore Tuna** and **Yellowfin Tuna** were moved from near threatened **to least concern**.
- **Yeracud Day Gecko** was moved from least concern **to endangered.**
- **Satara Gecko** was moved from vulnerable **to critically endangered**.
- **Yellow Monitor** was moved from least concern **to endangered.**

Recently there has been a change in IUCN status of 5 bird species.

Finn's weaver	• **IUCN status**: Endangered (Earlier Vulnerable). • Primarily found in **Terai grasslands in Uttarakhand and western Uttar Pradesh, apart from a few pockets in Assam**. • **Destruction of terrai habitat** is the primary reason for the sharp decline. • There are merely 1,000 birds remaining in the world, **half of which are in India.**	
Lesser Florican	• **IUCN status**: Critically Endangered (Earlier Endangered). • It is only found in India, **particularly in Rajasthan and Gujarat.** • It **survives in dry grasslands of lowland areas**, but rapid conversion of grassland into agriculture land is the cause of its rapid decline.	
Nicobar Imperial-pigeon	• **IUCN status**: Near Threatened (Earlier Least Concerned). • It is found only in the **evergreen forests of the Nicobar Islands**.	
Green Imperial pigeon	• **IUCN status**: Near Threatened (Earlier Least Concerned). • It is distributed in **India, Sri Lanka, Bhutan, Bangladesh, China and southeast Asia**. • They are found in **forests, mangroves and grasslands**. • They are distributed in the **states along the coasts, north east India & Andaman Nicobar Islands**.	
Mountain Hawk-eagle	• **IUCN status**: Near Threatened (Earlier Least Concerned). • It is distributed in **Indian subcontinent, Indochina, Southeast Asia, China, Japan and Indonesia.** • They have been observed **in mountains at altitude of 4,000 meters i.e. mainly in Himalayan region.**	

3.5.2. CONSERVATION ASSURED TIGER STANDARDS (CATS)

Why in news?

On the occasion of **Global Tiger Day, 2021, Ministry of Environment, Forest & Climate Change (MoEFCC)** announced **Conservation Assured Tiger Standards (CATS) accreditation** for 14 out of **India's 51 tiger reserves.**

More on the news

- The 14 reserves are **Manas, Kaziranga, and Orang** (Assam); **Sundarbans** (West Bengal); **Valmiki**(Bihar); **Dudhwa** (Uttar Pradesh); **Panna, Kanha, Satpura and Pench** (Madhya Pradesh); **Anamalai and Mudumalai** (Tamil Nadu); **Parambikulam** (Kerala) and **Bandipur** (Karnataka).
- The **theme** for this year International Tiger Day is- **"Their Survival is in our hands"**.

About CATS

- CATS are **globally accepted conservation tool** that **sets best practices and standards to manage tigers and assessments** to benchmark progress.

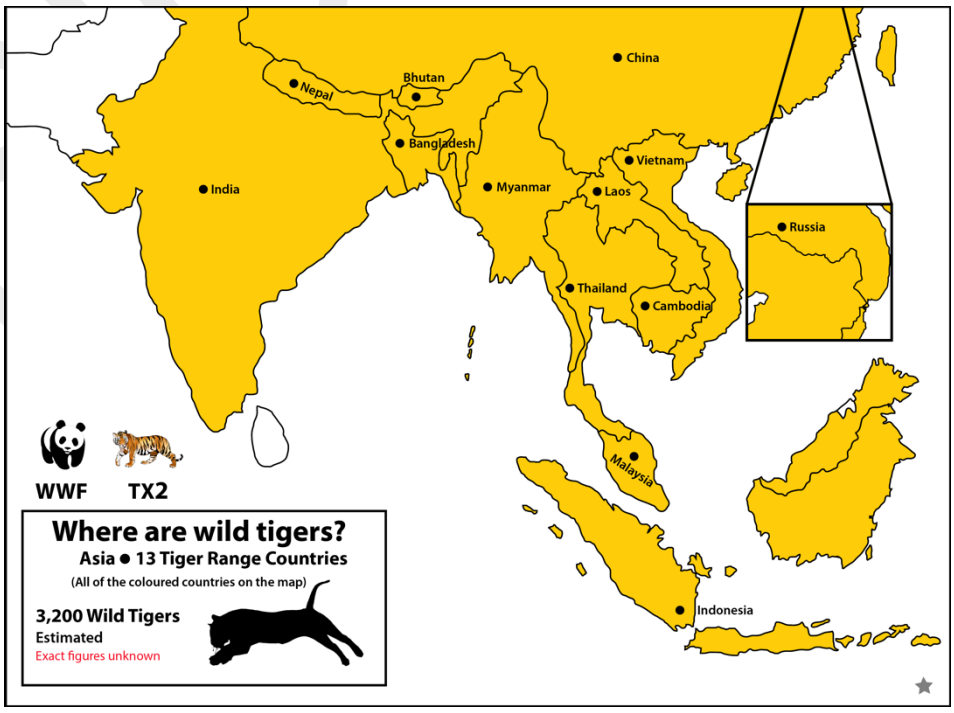
- **Tigers are the first species selected for the initiative.**
- It was **launched in 2013,** implemented across 125 sites, including 94 in India.
  - **Global Tiger Forum and WWF India** are implementing partners of the National Tiger Conservation Authority (NTCA) for CATS assessment in India.
- **It is being adopted for use beyond tigers,** including potentially jaguars, lions and freshwater dolphins.

About Indian Tiger or Royal Bengal Tiger (Panthera tigris)

Protection status:

- It is the **tiger species native to India.**
- **Habitat:** The largest populations of Bengal tigers are in India, but there are some smaller groups in **Bangladesh, Nepal, and Bhutan.** It may also be present in areas of **China and Burma.**
  - India is home to about **70 per cent of global tiger population.**
- **Distribution of Tiger population in India:**
  - **Madhya Pradesh has the maximum number of tigers** followed by Karnataka and Uttarakhand.
  - **Largest contiguous tiger population** in the world of about 724 tigers was found in the Western Ghats (**Nagarhole-Bandipur-Wayanad - Mudumalai- Satyamangalam-BRT block**).
  - **Corbett TR in Uttarakhand has highest tiger density in the world.**
- **Characteristics:** Tigers are both **a Flagship and Umbrella species.** As a Flagship species they are important for conservation and as Umbrella species, tiger conservation leads to conservation of other species.

- **Conservation measures:**
  - **India:** Centrally Sponsored Scheme- **Project Tiger**, **M-STrIPES** (Monitoring System for Tigers – Intensive Protection and Ecological Status), declared as the **National Animal of India** etc.
  - **Global:**
    - ✓ **Global Tiger Initiative (GTI)** led by **Tigers inhabit 13 countries** – Bangladesh, Bhutan, Cambodia, China, India, Indonesia, Lao PDR, Malaysia, Myanmar, Nepal, Russia, Thailand, and Vietnam.
      - In 2010, these **countries pledged to double the number of tigers by 2022** (Chinese Year of the Tiger) **under Petersburg Declaration.**
      - **India already achieved the target of doubling the count.**
    - ✓ Global Tiger Forum (GTF), Integrated Tiger Habitat Conservation Programme (ITHCP). Global Tiger Recovery Program (GTRP) etc.



Related News: Black Tigers

- **They are found only in Simlipal tiger reserve in Odisha**.
- According to a recent study, from the National Centre for Biological Sciences, **a single genetic mutation** in (in Transmembrane Aminopeptidase Q/Taqpep) in these tigers **caused black stripes to broaden or spread.**
  - Simlipal's small and isolated tiger population led to **inbreeding and the anomalous phenotype characterised by wide, merged stripes.**
  - **The loss of genetic diversity** is evident from the **low heterozygosity** (chances of inheriting different forms of a particular gene from each parent) in Simlipal (28%) compared to Central India (36%).

3.5.3. ALL INDIA ELEPHANT AND TIGER POPULATION ESTIMATION EXERCISE

Why in News?

On occasion of World Elephant Day, Minister for Environment, Forest and Climate Change **has announced joint exercise for the All-India elephant and tiger population estimation in 2022.**

More on the news

- Current population estimation techniques for elephants are largely based on States directly counting the number of elephants.
- **MSTrIPES (Monitoring System for Tigers: Intensive Protection and Ecological Status) uses GPS, remote sensing, GPRS technologies for tiger estimation.**
- **Other techniques used - Camera sightings and trappings, counting footmarks, etc.**

About Asian Elephants

Protection status of Asian Elephants:

- There are **three subspecies** of Asian elephant which are **Indian, Sumatran and Sri Lankan.**
- It is the National Heritage Animal of India.
- **Conservation measures**:
  - **Project Elephant,** a centrally sponsored scheme and was launched in 1992 for the protection of elephants, their habitats, and corridors.
  - **Elephant census** is conducted **once in 5 years**
  - There are around **32 Elephant Reserves** in India.
- **Distribution of Elephant population in India:** India has more than 60% population of Asian Elephant.
  - **Southern region** (comprising Tamil Nadu, Kerala, Karnataka, Andaman and Nicobar Islands, Andhra Pradesh and Maharashtra) **accounted for the highest population** — 14,612 elephants.
  - **Highest Population- Karnataka followed by Assam and Kerala respectively.**
- **Characteristics:** Asian elephants are highly intelligent animals characterised by strong family bonds, sophisticated forms of communication and complex behaviour, including tool use and the ability to feel grief and compassion.
  - They form herds of related females that are led by the oldest female, the 'matriarch'.
  - They have longest gestation period of all mammals (18 to 22 months).
  - Adult male Asian elephants are less social than females. They enter musth -- a mate-searching strategy for old (above 30 years of age) males, annually.

Difference between Asian and African Elephants

Difference between Asian and African Elephants		
	Asian Elephants	African Elephants
Pictorial representation		
IUCN Status	Endangered	⬡ Savanna elephant- Endangered ⬡ Forest elephant- Critically Endangered
Size	Smaller in size weighing in at between 3000 and 6,000kg	Larger in size weighing between 4,000 and 8,000kg
Ears	Smaller rounded ears	Large fan-shaped ears
Forehead	Twin-domed head with an indent running up the center of their head	Single dome shape
Skin	Comparatively smoother skin	Skin is more wrinkled
Tusks	⬡ Only some male Asian elephants have tusks. ⬡ Tusks are absent in females (only rudimentary tusks found).	Both male and female African elephants grow tusks.
Back shape	Convex shape-Asian elephant's tallest point is its back.	Concave dip in back-African elephant is tallest at the shoulder.

Related News:

Project RE-HAB (Reducing Elephant-Human Attacks using Bees)

- **Khadi and Village Industries Commission (KVIC)** has replicated the project in **Assam** (after its success in Karnataka).
- Under Project RE-HAB, Bee-fences are created by setting up bee boxes in the passageways of elephants to block their entrance to human territories.
  - Boxes are connected with a string so that when elephants attempt to pass through, a tug or pull causes the bees to swarm the elephant herds and dissuade them from progressing further.
- It is a cost-effective way of reducing human-wild conflicts without causing any harm to the animals.

Lemru Elephant Reserve, Chhattisgarh

- Recently, the Chhattisgarh government has proposed to **reduce the area of Lemru Elephant Reserve from 1,995 sq km to 450 sq km.**
- Lemru Elephant reserve was proposed to prevent human-animal conflict in the Korba region of Chhattisgarh as elephants regularly move from Jharkhand and Odisha to Chhattisgarh.
- The area proposed under this reserve is part of the Hasdeo Aranya forests, a very diverse biozone that is also rich in coal deposits.

3.5.4. NATIONAL DOLPHIN RESEARCH CENTRE (NDRC)

Why in news?

India's and Asia's first National Dolphin Research Centre (NDRC) is coming up in the premises of Patna University, Bihar.

More on news

- The centre is being set up on banks of Ganges, as per recommendation of a steering committee constituted for implementation of **Project Dolphin.**
- As per the committee, **Bihar had a natural advantage** as it accounted for **50% of the world's river dolphin population.**
- It was first time proposed in 2011.

About Gangetic Dolphin

Protection status:

- The Gangetic River dolphin is **India's national aquatic animal** (declared in 2009).
- It is **one of four freshwater dolphin species in the world.** The other three are:
  - 'Baiji' in Yangtze River in China (Functionally extinct since 2006)
  - 'Boto' in Amazon River
  - 'Bhulan' in Indus River in Pakistan
- **Habitat:** The **Gangetic Dolphin is endemic to the Indian sub-continent** and has a fairly extensive distribution range. It is found in the **Ganga -Brahmaputra - Meghna** and **Karnaphuli-Sangu river systems** of **India** and **Bangladesh**, while a few individuals survive in the **Karnali, and the Sapta Kosi Rivers** in **Nepal.**
- **Characteristics:**
  - **Reliable indicator** of the **health of the entire river ecosystem.**
  - It is **blind** and **finds its way and prey** in river waters through **echolocation.**
    - ✓ Echolocation is a technique used by bats, dolphins and other animals to **determine the location of objects using reflected sound.**
  - Usually **found in turbulent waters,** where there are **enough fish for them to feed on.**
  - **Live in a zone where there is little or no current, helping them save energy.**
  - If they **sense danger,** they can **dive into deep waters.** They swim from the **no-current zone to the edges to hunt for fish** and return.

  - 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 **'Souns/Susu/Sushuk/Seho'**.
  - Generally, **Females are larger than males** and give birth once every two to three years to only one calf.
- **Conservation measures:**
  - National Mission for Clean Ganga (NMCG) implemented Ganges River Dolphin Conservation Action Plan 2010-2020.
  - **Project Dolphin**

- ✓ Announced in 2020 has been envisaged along lines of 'Project Tiger' to enhance dolphin population.
- ✓ It will be **implemented by Ministry of Environment, Forest and Climate Change.**
- ✓ It involves conservation of dolphins and aquatic habitat through **use of modern technology** especially in **anti-poaching activities**.
- ✓ It will **engage fishermen and other river/ ocean dependent population** and will strive for **improving the livelihood of the local communities.**

Other dolphins found in India		
Indus River Dolphin	• IUCN Status: **Endangered** • They can only be found in the **lower parts of the Indus River in Pakistan and in River Beas**, a tributary of the Indus River in Punjab, India. • They have adapted to life in the muddy river and are functionally blind. • The dolphin is the **state aquatic animal of Punjab**	
Indian Ocean humpback dolphin	• IUCN Status: **Endangered** • They prefer the shallow, near shore waters of countries in the Indian Ocean, ideally with a freshwater input. • They can be found not far from shore in the coastal waters of **South Africa in the south, northwards around the coast of East Africa, throughout the Middle East, and the west coast of India.**	
Irrawaddy Dolphin (Snubfin dolphin)	• IUCN Status: **Endangered** • Besides the Irrawaddy River, it is also found in India's **Ganges, Chilika Lake and Southeast Asia's Mekong River.** • They prefers to live in estuaries and brackish water near coasts.	

3.5.5. CHEETAH REINTRODUCTION PLAN

Why in News?

Recently, the Government of India has decided to reintroduce Cheetahs in National Parks over five years, under 'Action Plan for Introduction of Cheetah in India'.

About Action Plan for Introduction of Cheetah in India

- It was launched at the **19th meeting of the National Tiger Conservation Authority (NTCA).**
- **Action Plan** aims to establish **viable cheetah metapopulation in India that allows the cheetah to perform its functional role as a top predator** and **provides space for the expansion of the cheetah** within its historical range thereby contributing to its global conservation efforts.
- As per the action plan, a cohort of around **10-12 young African Cheetahs- a different subspecies** (**Acinonyx jubatus)** will be sent **from Namibia or South Africa** to the grassland habitats that the Asiatic cheetahs occupied in the past as a founder stock during the first year.

Why is India reintroducing African Cheetah instead of Asiatic Cheetah?

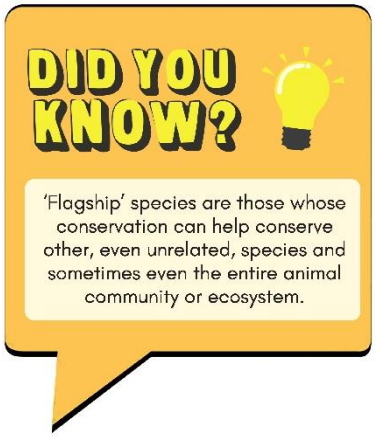
The **locally extinct cheetah-subspecies of India is found in Iran** and is categorized as **critically endangered**. Since it is **not possible to source the critically endangered Asiatic cheetah from Iran without affecting this sub-species**, India will source cheetahs from Southern Africa, which can provide India with substantial numbers of suitable cheetah for several years.

Where will cheetahs be relocated in India?

- **Kuno National Park (NP) in Madhya Pradesh** will get 13 cheetahs next year, who can co-exist with leopards.
  - Move is being described as **the world's largest intercontinental animal translocation.**
  - KNP is 748 sq. km. in area, **devoid of human settlements, forms part of Sheopur-Shivpuri deciduous open forest landscape** and is estimated to have a capacity to sustain 21 cheetahs.
  - It has a suitable habitat and adequate prey base.
  - Kuno also offers the prospect of housing four big cats of India - tiger, lion, leopard and cheetah - and allowing them to coexist as in the past.
- The other sites recommended for holding and conservation breeding of cheetah in India, in controlled wild conditions are:
  - **Nauradehi Wildlife Sanctuary** (1,197 sq. km, habitat 5,500 sq.km), Madhya Pradesh

- **Gandhi Sagar Wildlife Sanctuary - Bhainsrorgarh Wildlife Sanctuary complex** (~2500 sq.km), Madhya Pradesh
- **Shahgarh bulge in Jaisalmer**, Rajasthan (4,220 sq.km)
- **Mukundara Tiger Reserve** as fenced enclosure (~80 sq.km), Rajasthan.

- **Importance of relocation**
  - Cheetah's conservation, being **flagship species**, will **revive grasslands and its biomes and habitat.**
  - **Grasslands are a hugely neglected habitat in country** despite largest number of Schedule I protected animals under Wildlife Protection Act residing in these grasslands.



About Cheetah

- **Characteristics:**
  - They are the fastest mammal on land.
  - Cheetahs don't need much water and **can survive in dry forests, grasslands, open plains and desert regions**.
  - Cheetah is the **only large carnivore that got completely wiped out from India in 1952**, mainly due to **over-hunting and habitat loss**.

	African Cheetah	Asiatic Cheetah
Pictorial Representation		
IUCN Status	Vulnerable	Critically Endangered
CITES Status	Appendix I	Appendix I
Distribution	Africa (Northwest Africa, East Africa, and Southern Africa)	Only few left in Iran
Physical Characteristics	Bigger in size as compared to Asiatic Cheetah, slightly bigger build and sturdy legs and neck.	Slightly smaller and slender than the African Cheetah. Their neck is much smaller and slender. Also, their legs are slender.
Food Intake	Diverse diet due to bigger habitat	Limited source especially medium sized prey like Chinkara, Gazelle etc.

3.5.6. RED SANDERS

Why in news?

Recently, Red Sanders (Red Sandalwood) has fallen back into the **'Endangered' category** in the International Union for Conservation of Nature's (IUCN) Red List.

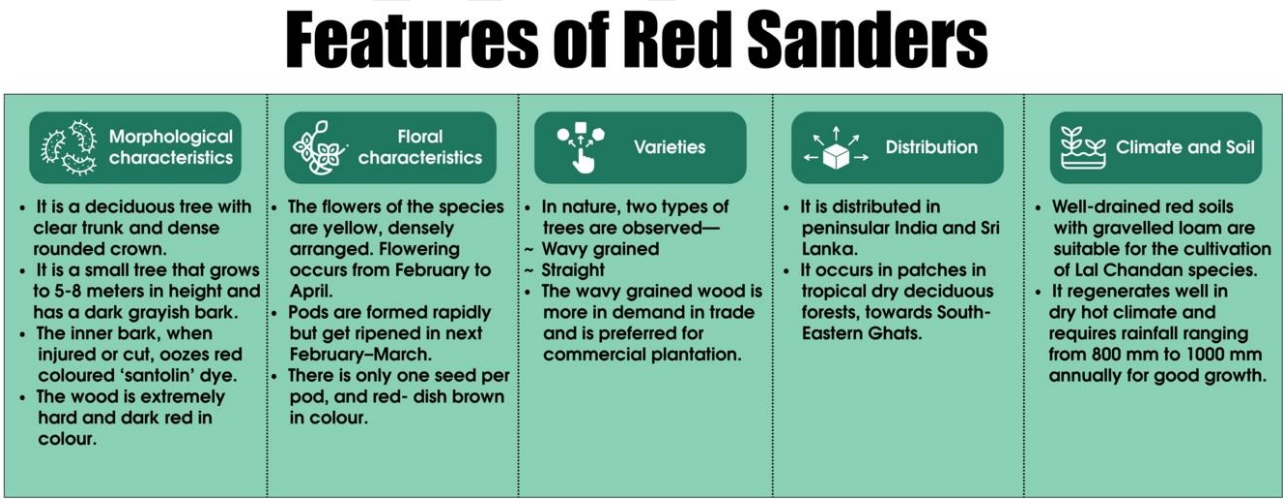
More about news

- It was earlier classified as **'Near Threatened' in 2018** and has **again been classified as Endangered**.
- The **IUCN has assessed that over the last three generations**, the species has experienced a population **decline of 50-80 per cent**.
  - In 2019, the Directorate General of Foreign Trade, an agency of the Ministry of Commerce and Industry, revised **its export policy to permit the export of red sander timber, if it is obtained from cultivated land**.

About Red Sanders (Pterocarpus santalinus)

Protection status:

- It is a **non-fragrant variety of sandalwood** that mostly grows in **rocky, hilly regions**
- **Habitat:** It is an **Indian endemic tree species**, with a restricted **geographical range in the Eastern Ghats of India**.
  - It is **endemic to a distinct tract of forests in Andhra Pradesh**.
- It is also known as: **Almug, Saunderwood, Red Sanders, Red Sanderswood, Red Saunders,** Yerra Chandanam, **Rakta chandana (Indian), Lal Chandan, Ragat Chandan, Rukhto Chandan, Undum**.
- **Significance of Red Sanders**
  - **Timber industry:** The timber of Red Sanders is **highly demanded** for making furniture, woodcraft and musical instruments **domestically and internationally**.
    - ✓ The **rare wavy grain variant is highly valued in Japan** for its acoustic properties.
  - **Medicinal value:** The **wood at the center of the trunk (heartwood) is used as medicine.** It is used for **treating digestive tract problems, fluid retention, cough and for blood purification**.
    - ✓ It can be **used for removal of tan, blemishes, dullness and acne.**
    - ✓ **In Ayurveda,** it is used to **treat eye disorders**.
    - ✓ It can be used as an **antipyretic, anti-inflammatory, anthelmintic** addition.
  - The **timber is also exploited for the extraction of santalin** (a red pigment used as dye and colorant in food).
- **Threats:** over-harvesting (**less than 5 per cent of the trees remaining in the wild),** Anthropogenic habitat loss, **illegal trade, invasive species and diseases etc.**



3.5.7. MAHSEER

Why in news?

The Blue-Finned Mahseer, which was on the International Union for Conservation of Nature's (IUCN) red list as **'critically endangered'**, has now moved to the **'least concern'** status.

About Mahseer

- The Mahseer (roughly translates as **mahi – fish and sher – tiger**, is also referred as "**tiger among fish**"). It is **important indicator** of freshwater ecosystems.
- **Habitat:** Out of **47 subspecies** of Mahseer **15 are found in India** and rest in other range countries in South Asia.
- **Characteristics:** Mahseer **prefers clean, fast flowing and well oxygenated waters** for breeding and migration.
  - They are **omnivorous**.
- **Threats faced:**
  - Sensitive to dissolved oxygen levels, water temperature and sudden climatic changes
  - Pollution, habitat loss, over-fishing, construction of dams (impacting migration patterns) etc.
  - Wildlife (Protection) Act 1972 **does not explicitly draw attention to fish** under the **definition of 'wild animal'.**

Major Types of Mahseer		
Golden Mahseer	Found in the Himalayan streams and rivers. IUCN status: **Endangered**	
Blue Fin / Deccan Mahseer	Found in rivers of Deccan Plateau and South India. IUCN status: **Least Concern**	
Orange-Finned / Humpback Mahseer	Found in Cauvery River and its tributaries. IUCN status: **Critically endangered**	
Others	**Red Finned Mahseer** found in the rivers of central India. **Chocolate Mahseer** found in the North Eastern region	

Project Mahseer

- It was started in **1971** as a collaborative effort between **Tata Power and Central Institute of Fisheries Education**.
- Around **5 lakh mahseer** are **bred at the Walvan Hatchery** in **Lonavala**, **Maharashtra**. An artificial lake has been created for the purpose by the Walvan Dam project under Tata Power.
- The project has finally borne fruit after an effort spanning 50 years by getting the fish de-listed from Red list of IUCN.

3.5.8. INDIA'S FIRST CRYPTOGAMIC GARDEN

Why in news?

India's first cryptogamic garden housing nearly 50 species of lichens, ferns and fungi was inaugurated in Uttarakhand's Dehradun district at Deoban recently.

What are Cryptogams?

- The word cryptogamic originates from the Greek word, 'Kryptos meaning "hidden" and "gameein" meaning "to marry". Thus, cryptogamic refers to "hidden reproduction".
- Cryptogams are one of the oldest groups of plant species, existing since the Jurassic era.
- A cryptogamic species **does not produce any seed or flower.**
- These non-seed-bearing plants include **algae, bryophytes, lichens, ferns, and fungi**.
- Deoban in Uttarakhand was chosen because of low pollution levels and moisture needed for these species, otherwise also it is a good natural habitat of these species.
- **Importance of cryptogams**

Algae	• Food ingredient • Used as a liquid fertilizer
Bryophytes (mosses, liverworts)	• Monitors air pollution • Prevents soil erosion • Helps in soil formation over the bare rocky surface • Indicators of mineral deposits. • Used for transportation and packaging of plants due to their High water retention capacity
Ferns	• Ornamental plants • Indicators of the moisture regime of the area
Lichens	• Pollution monitors • Source of nutrition for snails, termites, caterpillars, slugs, etc. • Source of drugs, medicines, perfumery, foodstuff, dyes, bio-monitoring, and other useful compounds

3.5.9. ASIAN WATERBIRD CENSUS (AWC)

Why in News?

AWC is being carried out across **7 wetlands in the NCR**- Hastinapur Wildlife Sanctuary; Dhanauri and Surajpur wetlands in Greater Noida; Delhi Zoo and Sanjay Lake; Okhla Bird Sanctuary; Najafgarh Jheel; and Yamuna River.

About AWC

- It is **conducted in January** each year and is coordinated by the **Wetlands International South Asia and the Bombay Natural History Society**(a NGO).
- It is an integral part of the global waterbird monitoring programme, the **International Waterbird Census (IWC),** coordinated by **Wetlands International.**
  - IWC is a **monitoring programme** to collect information on the **numbers of waterbirds at wetland sites**.
- It runs in **parallel with other regional programmes** of the International Waterbird Census in **Africa, Europe, West Asia, the Neotropics and the Caribbean.**
- It is also an important part of the environment ministry's **National Action Plan for conservation of Migratory Birds and their habitats** along the Central Asian Flyways.
- **Objectives of the census:**
  - To obtain **information on an annual basis of waterbird populations** at wetlands in the region during the **non-breeding period** of most species (January).
  - To **monitor on an annual basis** the status and condition of wetlands,
  - To encourage **greater interest in waterbirds** and wetlands amongst citizens.

3.5.10. WORLD'S FIRST 5-COUNTRY BIOSPHERE RESERVE

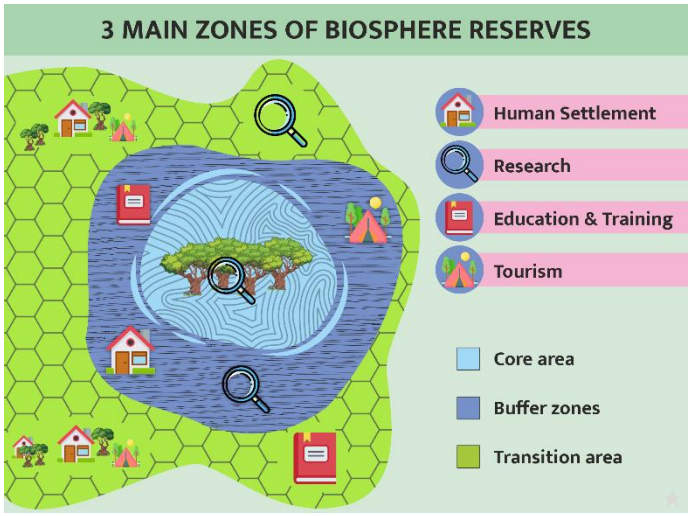
Why in News?

UNESCO declares world's first 5-country biosphere reserve in "Amazon of Europe".

More on the news

- Biosphere reserve **covers 700 kilometres of the Mura, Drava and Danube (MDD) rivers and stretches across Austria, Slovenia, Croatia, Hungary and Serbia.**
  - Reserve is home to floodplain forests, gravel and sand banks, river islands, oxbows and meadows.
  - It is home to continental Europe's highest density of breeding white-tailed eagle, as well as endangered species such as the little tern, black stork, otters, beavers and sturgeons.

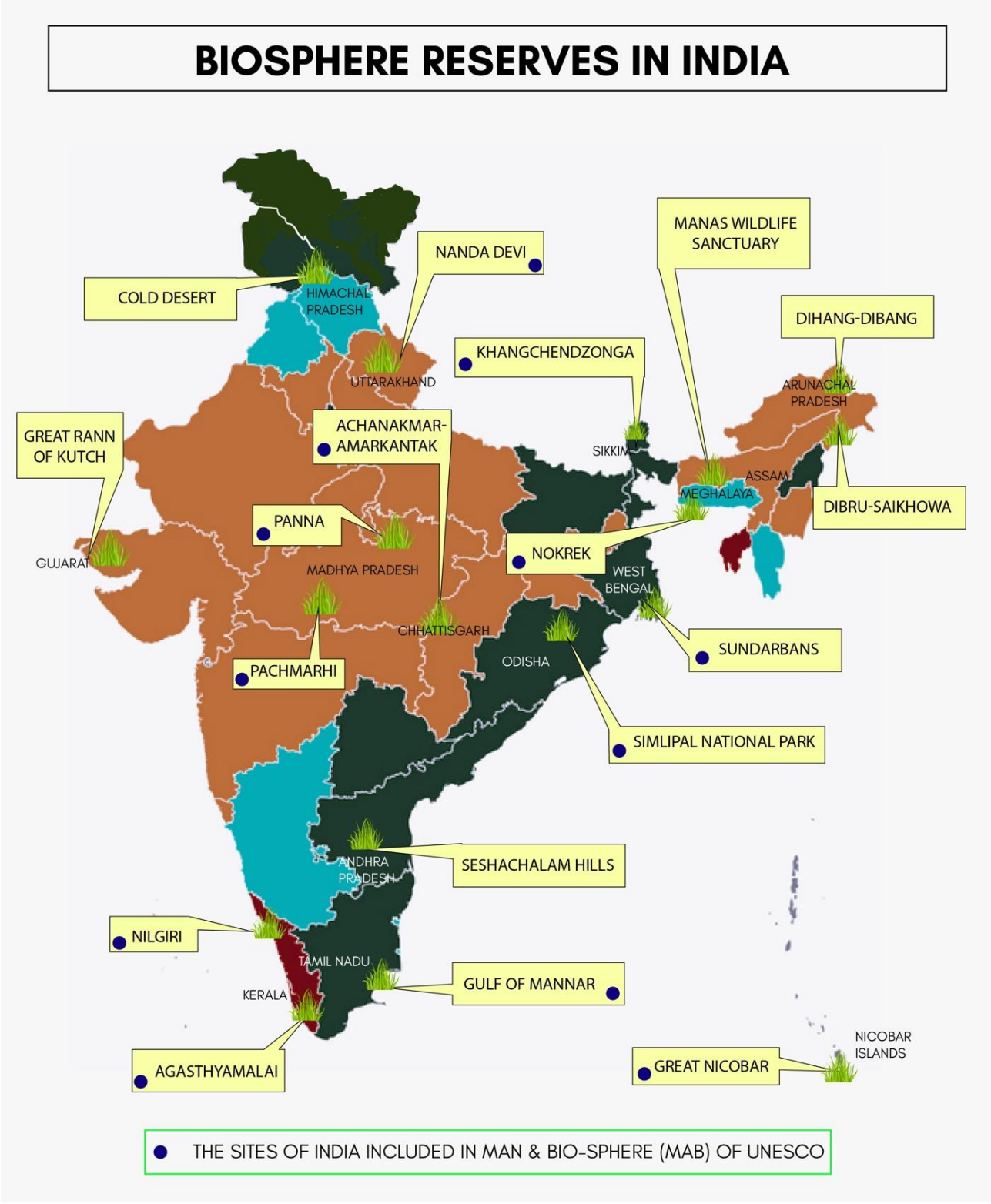
About Biosphere reserves



- **Biosphere reserves are areas of terrestrial and coastal ecosystems** promoting solutions to reconcile the conservation of biodiversity with its sustainable use.
- Biosphere Reserves **involve local communities and all interested stakeholders in planning and management.** They **integrate three main functions:**
  - Conservation of **biodiversity and cultural diversity**
  - **Economic development** that is socio-culturally and environmentally sustainable
  - **Logistic support,** underpinning development through research, monitoring, education and training
- Biosphere Reserves are **designated under intergovernmental Man and Biosphere (MAB) Programme** by UNESCO.
  - MAB programme aims to establish a scientific basis for **enhancing the relationship between people and their environments.**
  - The **World Network of Biosphere Reserves** (WNBR) of the MAB Programme consists of a dynamic and interactive network of sites of excellence.

- WNBR includes **727 biosphere reserves in 131 countries, including 22 transboundary sites**; building international, regional, sub-regional and ecosystem-specific cooperation.

- **Biosphere reserves in India:** Presently, there are 18 notified biosphere reserves in India of which 12 are recognised under MAB Program.



3.5.11. GEO-TOURISM SITES

Why in News?

Geological Survey of India lists Geo-tourism sites in Northeast to visit after 'unlock'.

More on the News

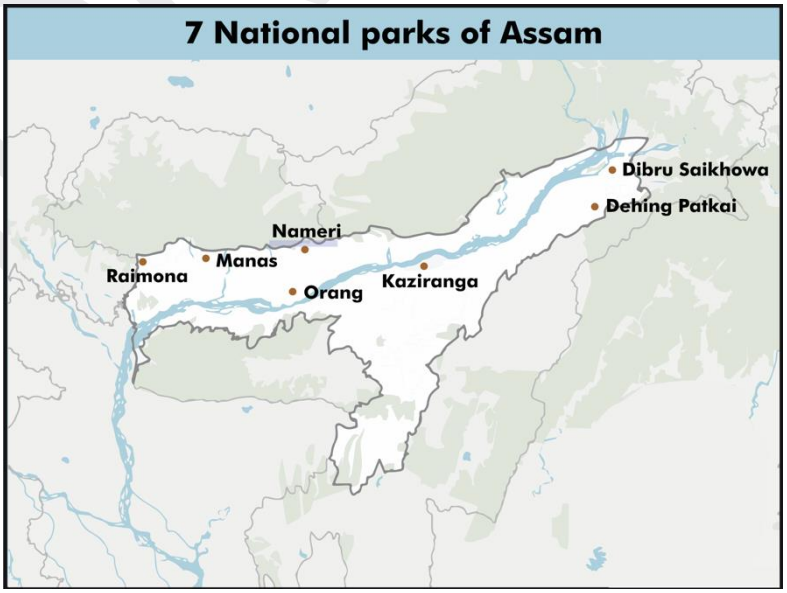
- Twelve locations in Northeast are included in 32 approved **geo-tourism or geo-heritage sites in the country.**
- **About the sites**
  - **Majuli, Assam** - River "island", among world's largest, Majuli in river Brahmaputra.
  - **Sangetsar Tso, Arunanchal** - Famous for Madhuri Lake formed due to damming of river during major earthquake in 1950.
  - **Loktak Lake, Manipur** - largest freshwater lake in Northeast which hosts 'phumdis' or floating biomass and 'phumsangs' or huts of fishermen on them.
    - ✓ **KeibulLamjao National Park**, only floating wildlife habitat on earth, is on southwestern part of lake and is **last natural habitat of sangai or brow-antlered dancing deer**.
  - **Mawmluh Cave, Meghalaya** - Stalagmite caves providing important records of Holocene paleo-climate and paleo-monsoon.
  - **Mawblei or God's Rock, Meghalaya** - huge balancing sandstone rock slanting at angle of 45 degrees in south-southeast direction on hill slope overlooking Wahrashi River valley.
- **Other significant sites include -** Stromatolite Park (Sikkim), Naga Hill Ophiolite, Reiek Tlang (Mizoram), Sangetsar Tso (Arunanchal), Unnakoti and Chabimura (Tripura), Umananda (Assam) and Theriaghat (Meghalaya).
- **Globally too, UNESCO declares Global geoparks.** Currently, there are **no Global geo parks in India.**
  - Geological Survey of India (GSI) declares geo-heritage sites/ national geological monuments for protection and maintenance. GSI or the respective State governments take necessary measures to protect these sites.

3.5.12. DIHING PATKAI NATIONAL PARK

Why in news?

The Assam government has notified **Dihing Patkai as the 7th National Park** (NP) of the state.

More on the news



- Assam (7) now has the **third most National Parks** after **Madhya Pradesh (12)** and **Andaman and Nicobar Islands (9).**
- **Earlier, the State** government has also notified **Raimona Reserve Forest** (422-sq. km) **as the 6th National Park** in western Assam's Kokrajhar district.
  - With **Phipsoo wildlife sanctuary in Bhutan to its north, Buxa tiger reserve in West Bengal to its west and Manas national park in Assam to its east**, it is home to the **Golden langur, Clouded leopard and Indian gaur**.
- Assam has **five older National Parks- Kaziranga, Manas, Nameri, Orang and Dibru-Saikhowa.**
  - Kaziranga and Manas are UNESCO World Heritage Sites. They are also tiger reserves along with Nameri and Orang.

About Dihing Patkai NP

- The Dihing Patkai NP **forms the "last remaining stretches" of the Assam Valley tropical wet evergreen forests.**
  - It is located across eastern Assam's Dibrugarh and Tinsukia districts.
  - It encompasses erstwhile **Dehing Patkai Wildlife Sanctuary, the Jeypore Reserve Forest** and the western block of the **Upper Dihing Reserve Forest.**

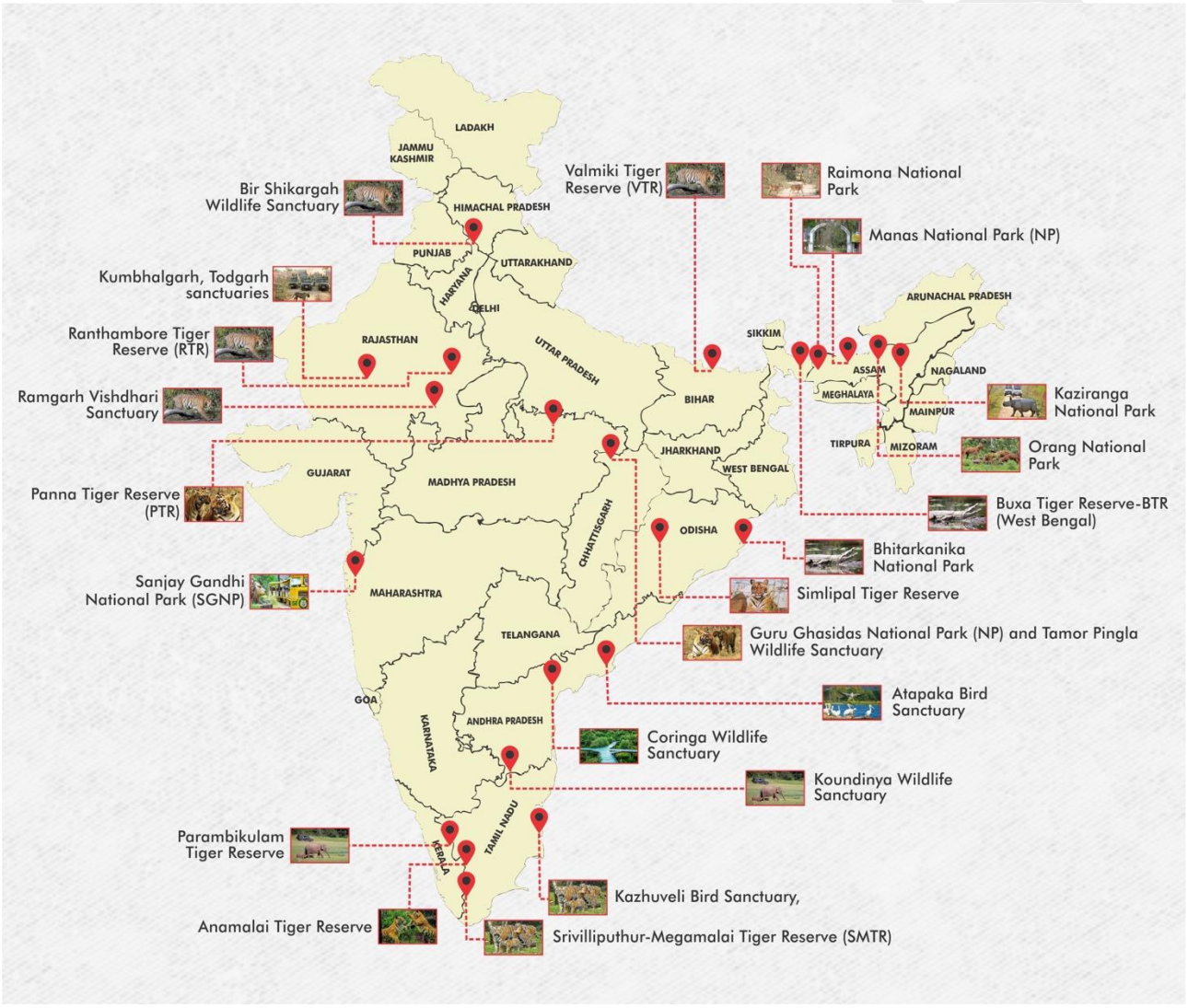
- **Rivers:** Stretches of the **Dirak and Buri Dihing rivers.**
- **Flora and Fauna**:
  - Besides being part of the **Dehing Patkai Elephant Reserve**, the park is home to important species like **Tiger, Chinese pangolin, Slow loris, Clouded leopard** etc.
  - It also has the **highest concentration of the rare endangered White Winged Wood Duck**.

Types of Protected Areas in India

Protected Area	Details
Wildlife Sanctuary	• A wildlife sanctuary is an area where animal habitats and their surroundings are protected from any sort of disturbance. • Any area other than area comprised with any reserve forest or the territorial waters can be notified by the State Government, under **Wildlife (Protection) Act (WPA) of 1972**. • Some restricted human activities are allowed inside the Sanctuary area details of which are given in WPA, 1972. • There are more than 500 wildlife sanctuaries in India.
National Park	• A national park is a park in use for conservation purposes. It is more protected vis-a-vis protection in wildlife sanctuaries. • **Wildlife (Protection) Act of 1972 gives both Central and State Government power to declare certain areas as national parks**. • **No human activity is permitted** inside the **national park except for the ones permitted by the Chief Wildlife Warden** of the state under the conditions given in WPA 1972. • There are more than 100 national parks in India.
Community Reserve or Conservation Reserves	• It is a category of protected areas defined under the **'Wildlife (Protection) Act, 1972'** (**introduced in the Wildlife (Protection) Amendment Act of 2002**). • It is an inhabited area which typically act as buffer zone to or connectors and migration corridors between established national parks, wildlife sanctuaries and reserved and protected forests of India. Parts of the land in this area are privately owned. • Such areas are designated as conservation areas if they are uninhabited and completely owned by the Government of India but used for subsistence by communities. • State Government after consulting with the central government and the local communities, declares any area as community or conservation reserve. • Currently there are 127 community reserves in India and **maximum in the state of Meghalaya**.
Tiger Reserve	• A National Park or Wildlife Sanctuary that is considered significant for protecting tigers can be additionally designated as a Tiger Reserve. • They are governed **by Project Tiger which is administrated by the National Tiger Conservation Authority (NTCA).** • A Tiger Reserve consists of a **'Core' or 'Critical Tiger Habitat'**, which is to be managed as an inviolate area and a 'Buffer' or Peripheral area is immediately abutting a Core area, which may be accorded a lesser degree of habitat protection. • There are currently 50 tiger reserves in the country.
Critical Tiger Habitat	• Also known as core areas of tiger reserves, they are identified under the **Wild Life Protection Act, 1972.** • It is notified by State govt. • They are demarcated areas of National Parks/Sanctuaries, **to be kept as inviolate for the purposes of tiger conservation**, without affecting the rights of forest dwellers. • **Largest area under CTH in India**: Nagarjunsagar-Srisailam Tiger Reserve.
Marine Protected Areas	• A marine protected area (MPA) is essentially a space in the ocean where human activities are more strictly regulated than the surrounding waters - similar to parks on land. • These places are given special protections for natural or historic marine resources by local, state, territorial, native, regional, or national authorities.
Biosphere Reserve	• Biosphere Reserve is an international designation by UNESCO comprising terrestrial, marine and coastal ecosystems. • A biosphere reserve is divided into core, buffer and transition zone in decreasing order of protection. • There are **18 biosphere reserves in India, of which 13 are part of the World Network of Biosphere Reserves**, based on the UNESCO Man and the Biosphere (MAB) Programme
Bird Sanctuary	• Bird sanctuaries are nature facilities that ensure conservation of various species of birds and their natural habitats. • There are more than 70 Bird Sanctuaries in India.

Natural Conservation Zones (NCZ)	• NGT constituted a fresh committee to assess whether sub regional plans for the protection of NCZs were consistent with the regional plan prepared by the National Capital Region Planning Board (NCRPB). • The importance of the Natural Conservation Zone (NCZ) is that it is earmarked for conservation, rather than real estate. o Accordingly, construction is allowed only for 0.5 percent and that too for regional recreational activities like regional parks and sanctuaries. o This strictly precludes construction for commercial, residential, tourism, and other real estate purposes.
Protected Special Agriculture Zone (PSAZ)	• Tamil Nadu announced that the **Cauvery delta region would be declared a Protected Special Agriculture Zone** to prevent implementation of oil exploration projects in the state's rice bowl. • Cauvery delta zone comprises of Thanjavur, Tiruvarur, Nagapattinam, Pudukkottai, Cuddalore, Ariyalur, Karur and Tiruchirappalli districts. • Declaring PSAZ ensures that particular region will not be granted permission for any new projects like those related to hydrocarbons.

3.5.13. PROTECTED AREAS IN NEWS



Andhra Pradesh	
Koundinya Wildlife Sanctuary	**Geographical location and other Important features:** • Situated in **Palamner - Kuppam forest ranges of Chittoor district** of Andhra Pradesh.
	Rivers: Kaindinya and Kaigal tributaries of Palar River.
	Forests: Southern tropical dry deciduous forest, with patches of thorn, scrub and grassy plains.
	Fauna: The **only home for Asiatic elephants** in Andhra Pradesh. • The Sanctuary **comes under Project elephant.**
Coringa Wildlife Sanctuary	**Geographical location and other Important features:** • Around 177 sqkm area of **Eco-Sensitive Zone** was declared surrounding this sanctuary.

	Rivers: Situated on the deltaic branches of **Gautami and Godavari at Kakinada Bay.**
	Forests: It is the **second largest Mangrove Forest** stretch.
	Fauna and Flora: One of the **nesting grounds of Olive riddle turtle.**
Atapaka Bird Sanctuary	**Geographical location and other Important features**: • **It is located in Kolleru lake on Krishna-West Godavari** borders in Andhra Pradesh • Kolleru lake is **one of the largest freshwater lakes** in India**.**
	Fauna and Flora: Grey Pelicans and Painted Storks.
Assam	
Raimona National Park	• Located in Kokrajhar district, Raimona has become **Assam's sixth national park** (Kaziranga, Manas, Nameri, Orang and Dibru-Saikhowa are other five)**.**
	Geographical location and other Important features: • The Raimona National Park is within the **Bodoland Territorial Region**. The area of the park includes the northern part of the notified **Ripu Reserve Forest**, which forms the **western-most buffer to the Manas National Park that straddles the India-Bhutan border**. • Raimona is an **integral part of the Manas Biosphere Reserve and the Chirang-Ripu Elephant Reserve.**
	Rivers: Sankosh River marks its boundary.
	Forests: Moist deciduous and Semi-evergreen forest,
	Fauna and Flora: Golden Langur (Mascot of Bodoland), Asian elephant, Bengal tiger, Clouded leopard, Gaur, Chital.
Orang National Park	• Government has issued **notification to expand size of Park**, facilitating **reintroduction of Gharials**. ○ Gharials (IUCN status: Critically Endangered) were **wiped out from the Brahmaputra River system in 1950s.**
	Geographical location and other Important features: • Orang is **one of the seven national parks in Assam.** Others are Kaziranga, Manas, Nameri, Dibru-Saikhowa, Raimona and Dehing Patkai. • It was established as **wildlife sanctuary in 1985** but declared as **National Park in 1999**. • Also known as **mini Kaziranga**, inhabited by **one-horned rhinoceros.**
	Rivers: located on the **north bank of the Brahmaputra River.** • Tributaries Dhansiri and Pachnoi divide the park into two halves.
	Forests: Made up of marshes, streams and grasslands.
	Fauna and Flora: One-Horned Rhinoceros, pigmy hog, Tiger, Elephants, Hog Deer, Wild Pig, Civet Cat etc.
Manas National Park (NP)	• Assam's Manas NP has recorded a massive **spike in tiger population** from 0 to 48 in 20 years.
	Geographical location and other Important features: • Located in the **Himalayan foothills** and contiguous with the Royal Manas National Park in Bhutan. • It is a Wildlife Sanctuary, **UNESCO's Natural World Heritage site,** Project Tiger Reserve, Elephant Reserve and Biosphere Reserve.
	Rivers: Manas River (a tributary of Brahmaputra River)
	Forests: Semi – Evergreen Forests
	Fauna and Flora: Assam roofed turtle, hispid hare, golden langur and **pygmy** hog. • **Largest population of Bengal Florican** found anywhere in the world.
Kaziranga National Park	• Recently, Supreme Court has asked Assam government to **remove all illegal constructions in animal corridors near Kaziranga.**
	Geographical location and other Important features: • Located on **edge of the Eastern Himalayan biodiversity hotspots** – Golaghat and Nagaon district. • **Brahmaputra lies on the North** and **Karbi Anglong hills on the South** of Kaziranga. • It is a UNESCO's World Heritage Site.
	Rivers: Brahmaputra, Diphlu, Mora Diphlu and Mora Dhansiri.
	Forests: Tropical moist broadleaf forests.
	Fauna and Flora: • Great Indian Rhinoceros, Tiger, Leopard, Elephant etc. • Kumbhi, Indian gooseberry, cotton tree, elephant Apple etc.
Bihar	
Valmiki Tiger Reserve (VTR)	• Valmiki Tiger Reserve (VTR) have **started planning for conservation of vultures after 150 of the birds were sighted recently in the protected area.** ○ Vultures from the **Himalayan range visit areas in Bihar bordering Nepal during winters.**

	Geographical location and other Important features: • VTR forms the **eastern most limit of the Himalayan Terai forests** in India and is the **only tiger reserve of Bihar**. • Situated in the **Gangetic Plains bio-geographic zone** of the country, the forest has combination **of bhabar and terai tracts**.
	Rivers: Gandak
	Forests: Himalayan Terai forests
	Fauna and Flora: Champa Trees, Tiger, Sloth bear, Leopard, Wild dog, Bison, Wild boar, barking deer, spotted deer, hog deer, sambar and blue bull.
Chhattisgarh	
Guru Ghasidas National Park (NP) and Tamor Pingla Wildlife Sanctuary	• National Tiger Conservation Authority (NTCA) approved Chhattisgarh government's proposal to declare **combined areas of Guru Ghasidas National Park (NP) and Tamor Pingla Wildlife Sanctuary as a Tiger Reserve.**
	Geographical location and other Important features: • This will be the fourth Tiger Reserve in Chhattisgarh, after **Udanti-Sitanadi, Achanakmar, and Indravati Reserves.** • Turning Guru Ghasidas NP into a Tiger Reserve is important because **provides a corridor for tigers to move between Bandhavgarh (MP) and Palamau (Jharkhand) Tiger Reserves.**
	Fauna and Flora: Bengal tiger, Indian leopard, Spotted deer, Sambar deer, wild boar, Nilgai, Chinkara, Civet, Porcupine, Monitor lizard,
Delhi	
Delhi's Biodiversity Parks	• More birds and animals make Delhi's 7 nature parks their homes • Delhi is home to 7 biodiversity parks that are built around two ecological systems in the capital: the **Yamuna floodplain and the rocky Aravalli landscape-** ○ Yamuna Biodiversity Park, Aravalli Biodiversity Park, Neela Hauz Biodiversity Park, Kamla Nehru Biodiversity Park, Tilpath Valley Biodiversity Park, Tughlaqabad Biodiversity Park, Kalindi biodiversity park in Okhla
Haryana	
Bir Shikargah Wildlife Sanctuary	• 8 **critically endangered Oriental white-backed vultures were released** into wild for the first time in India from the sanctuary.
	Geographical location and other Important features: • Situated in Panchkula, Haryana • It **houses the vulture conservation and breeding centre**, Pinjore. • Also **designated as an Eco-sensitive zone**.
	• **Fauna and Flora:** Indian leopard, Asiatic elephant, Chital (spotted deer), Sambar deer, Wild boar, Rhesus macaque, Gray langur, Striped hyena, Indian jackal, Jungle cat, Indian gray mongoose, Indian fox.
Kerala	
Parambikulam Tiger Reserve	• Parambikulam Tiger Conservation Foundation has won the **Earth Guardian Award** for its efforts in supporting the conservation of tigers and biodiversity.
	Geographical location and other Important features: • It is a well-protected part of the **Nelliampathy - Anamalai sub unit of the Western Ghats** and is buffered by ecologically similar forests of other Forest Divisions and Protected Areas of **Kerala and Tamil Nadu.** • **Unique feature: Kariyanshola,** which is a part of Sungam Range of the Tiger Reserve has been recognized as a **UNESCO World Heritage Site**.
	Rivers: Parambikulam, Sholayar and Thekkedy
	Forests: Evergreen forests, moist and dry deciduous forests and grasslands. Other unique habitats like montane grasslands and marshy grasslands (locally known as 'vayals') are extensively found.
	Fauna and Flora: • Lion-tailed macaques, Nilgiri tahr, elephants, Bengal tigers, Indian leopards, Wild boar, Sambar, Bonnet macaques, Nilgiri langurs, Sloth bears, Nilgiri marten small Travancore flying squirrel and Gaur. • Teak, Neem, Sandalwood and Rosewood. Even the oldest ever teak tree, Kannimara Teak exists here.
Madhya Pradesh	
Panna Tiger Reserve (PTR)	• Recently, over 30 tigers migrated out of Panna Tiger Reserve.
	Geographical location and other Important features: • **Located in the northern Vindhyan range** and only TR in the entire Bundelkhand region.

	• It is the last remaining tiger habitat of **North Madhya Pradesh**- it is spread over Panna and Chhatarpur district. • Its location is crucial, as it is the **only tiger source area which connects the tiger populations of Aravalli and Vindhyan Ranges.** • **3rd Biosphere Reserve in World Network of Biosphere Reserves** from Madhya Pradesh after Pachmarhi and Amarkantak. • PTR's CTH encompasses the entire area of **Panna National Park** and part of **Gangau** Wildlife Sanctuary. • Unique Features-It is characterized by its **extensive plateaus** and **Gorges**
	Rivers: Drained by **River Ken**, a **perennial river** and **tributary of Yamuna**.
	Forests: Dry deciduous forests
	Fauna and Flora: Sambar (largest of Indian deers), chital and chousingha.
Maharashtra	
Sanjay Gandhi National Park (SGNP)	• The Maharashtra government is looking for an alternate site for the permanent rehabilitation of families in the tribal hamlets and eligible encroachers of the SGNP.
	Geographical location and other Important features: • **SGNP located in Mumbai** harbours artificial lakes named **'Vihar and Tulsi'**. • The **Kanheri Caves** (carved from basalt rock between the 1st century BCE to the 10th century CE) at the center of the park were an **important Buddhist learning center and pilgrimage site.**
	Rivers: Dahisar river
	Forests: Mixed Deciduous Forests
	Fauna and Flora: • Spotted Deer, Sambhar, Barking Deer, Black-naped Hare, etc. • Dominated by trees Tectona, Albizzia, Terminalia, Holarrhena, etc. • Kadamba, teak, karanj, shisham, and species of acacia, red silk cotton, and a variety of flowers are found. • **Karvi or karvy**, a flowering plant that blossoms once in eight years, can be found in the park.
Odisha	

Bhitarkanika National Park	• **German government agency** GIZ, will **conserve mangrove and biodiversity of Odisha's Bhitarkanika National Park,** India's second-largest mangrove forest.
	  ○ It is supported by International Climate Initiative (IKI) of German Federal Ministry for Environment, Nature Conservation and Nuclear Safety (BMU).
	  ○ Objective of project is to **support implementation of livelihood-oriented conservation** and **restoration activities** as well as train community members in alternative sustainable livelihoods.

	Geographical location and other Important features:
	• Bhitarkanika National Park in Odisha's Kendrapara district is **India's second-largest mangrove forest**
	  ○ However, **mangroves which protected the region from cyclones were vanishing fast**.
	  ○ The area was **designated a national park in 1998 and a Ramsar site by UNESCO in 2002.**

	Rivers: located in **estuary of Brahmani, Baitarani, Dhamra, and Mahanadi River** systems.
	Flora and Fauna: • The Gahirmatha Beach which forms the boundary of the sanctuary in the east is the largest colony of the Olive Ridley Sea Turtles. • Mangrove species, casuarinas, and grasses like the indigo bush are unique here. • The Park is home to the saltwater crocodile, Indian python, black ibis, wild boar, rhesus monkey, chital, darter, cobra, monitor lizard.
Simlipal Tiger Reserve	**Geographical location and other Important features:** • It is **a national park** situated in the northern part of Orissa's Mayurbhanj district. • It was **formally designated a tiger reserve under Project Tiger** in 1973 and declared a **biosphere reserve** in 1994. • It has been **part of the UNESCO World Network of Biosphere Reserve** since 2009. • It comes under **Mayurbhanj Elephant Reserve** that includes the adjacent Hadgarh and Kuldiha Wildlife Sanctuaries.
	Rivers: At least twelve rivers cut across the plain area, all of which drain into the Bay of Bengal. The prominent among them are **Burhabalanga, Palpala Bandan, Salandi, Kahairi and Deo**.
	Forests: Tropical moist broadleaf forest, tropical moist deciduous forests, dry deciduous forest. The grasslands and the savannas are also common here.
	Fauna and Flora: • Sal is the dominant tree species here.

	• The major mammals include tiger, leopard, Asian elephant, sambar, barking deer, gaur, jungle cat, wild boar, Chausingha (four-horned antelope), giant squirrel and common langur, grey hornbill, Indian pied hornbill, Malabar pied hornbill and Indian trogon, Mugger crocodiles.
Rajasthan	
Ramgarh Vishdhari Sanctuary	• MoEFCC approved the conversion of Ramgarh Vishdhari Sanctuary **in Rajasthan's Bundi district into fourth tiger reserve in the state.**
	Geographical location and other Important features: • Ramgarh Vishdhari Sanctuary **will link Ranthambore Tiger Reserve i**n the Northeast **and Mukundra Hills Tiger Reserve** on the southern side. ○ Sariska Tiger Reserve is third **tiger reserve in the state.**
	Fauna and Flora: • Its flora consists of Dhok, Khair, Salar, Khirni trees with some Mango and Ber trees. • The sanctuary has leopards, sambhars, chital, wild boars, smaller cats, caracals, chinkaras and Nilgai.

Kumbhalgarh, Todgarh sanctuaries	• A National Tiger Conservation Authority (NTCA) report has **ruled out the possibility of declaring** Rajasthan's Kumbhalgarh and Todgarh-Raoli **wildlife sanctuaries as a tiger reserve.**
	• **Reasons cited:**
	  ○ Proposed tiger reserve is **an isolated patch of forest with no connectivity with Ranthambhore,** which has the only tiger source population in the state.
	  ○ Their **landscape** (moderate to steep slopes) **is unsuitable** to hold viable big cat population.
	  ○ The proposed areas would make it difficult to confine tigers which may **escalate the likelihood of human-wildlife conflict** in the adjoining landscape.

	Geographical location and other Important features: • Surrounding the popular, Kumbhalgarh Fort, Khumbhalgarh Wildlife Sanctuary is situated in Rajsamand District of Rajasthan. • It also covers four hill and mountain ranges of the Aravallis – Kumbhalgarh Range; Sadri Range; Desuri Range and the Bokhada Range. • The Marwar plains lie to the northwest of the sanctuary.
	Rivers: • Small rivers such as Sukdi, Mithdi, Sumer and Kot, all of which are the **tributaries of River Luni** lie in close range of the park. • In its eastern part are ranges which is the source of the River Banas.
	Forests: Tropical deciduous forests and grasslands.
	Fauna and Flora: leopard, sambhar, nilgai, chausingha (the four horned antelope), chinkara and Indian hare..
Ranthambore Tiger Reserve (RTR)	• Recently, some tigers went missing from the **Kundera and Talada ranges of RTR.**
	Geographical location and other important features: • Located on **Eastern part of Rajasthan** in Karauli and Sawai Madhopur districts, at the **junction of the Aravali and the Vindhya** hill ranges. • **Comprises**: Ranthambore National Park, Sawai Mansingh and Keladevi Sanctuaries.
	Rivers: Banas River and the Chambal River
	Forest: Mainly **tropical dry deciduous** with **'dhak'** being the commonest.
	Fauna and Flora: • Leopards, striped hyenas, common or Hanuman langurs, rhesus macaques, jackals, jungle cats, blackbuck, Blacknaped hare and chinkara etc. • Tree species found here include **khair, Khajur, Banyan, Kakera, Gum** etc.
Tamil Nadu	
Anamalai Tiger Reserve	• Recently, ICAR-Sugarcane Breeding Institute in collaboration with ATR **launched Scheduled Tribe Component** (STC) project at Attagati in **ATR for tribals.**
	Geographical location and other Important features: • ATR, in Tamil Nadu, **forms part of the Southern Western Ghats** (lies South of the Palakkad gap). • The Reserve falls within the **Western Ghats mountain chain**. • **ATR is home to 6 tribes:** Malasar, Malai malasars, Kadars, Eravallars, Pulayars and Muduvars.
	Forests: Supports diverse habitats- **Wet evergreen forests, semi evergreen forests, moist deciduous, dry deciduous,** dry thorn and shola forests.
	Fauna and Flora: Asiatic Elephant, Lion Tailed Macaque, Nilgiri Langur, Tiger etc. Bamboos, canes, reeds, palms
Srivilliputhur-Megamalai	**Geographical location and other Important features:** • It is the **largest tiger reserve in Tamil Nadu**.

Tiger Reserve (SMTR)	• It acts as **buffer for Periyar Tiger Reserve** and offer excellent genetic exchange grounds for the tigers of Anamalai region. • It covers forests of Megamalai wildlife sanctuary and Srivilliputhur grizzled squirrel wildlife sanctuary in the districts of Theni, Virudhunagar and Madurai.
	Rivers: Vaigai River
	Forests: mix of tropical evergreen forests and semi-evergreen forests, dry deciduous forests and moist mixed deciduous forests, grassland.
	Fauna and Flora: grizzled giant squirrels, Bengal tiger, bonnet macaque, common langur, elephants, flying squirrels, gaur, Indian giant squirrel, leopard, lion-tailed macaques, mouse deer, Nilgiri langur, Nilgiri Tahrs, palm civets, porcupine, sambar, slender loris, sloth bear, spotted deer, tree shrews etc.
Kazhuveli Bird Sanctuary,	• Recently, the Tamil Nadu government declared the 5,151.60 ha of **Kazhuveli wetland** as **Kazhuveli Bird Sanctuary** (**16th** of Tamil Nadu) under **section 18** of the **Wildlife (Protection) Act, 1972**
	Geographical location and other Important features: • Kazhuveli, the **second largest brackish water wetland** in South India, is one of the **largest waterfowl congregation** sites in Tamil Nadu. • Part of the **Central Asian migratory path of birds**
	Forests: Mangrove Forests
	Fauna and Flora: • It is known as a **raptor roosting site** for species like the **Eastern Imperial Eagle**, **Greater Spotted Eagle**, **Red-necked Falcon** etc. • The **Grey-tailed Tattler**, a **rare migratory wader**, has been recorded only here and in **Pulicat** (**largest brackish water lake** in South India).
West Bengal	
Buxa Tiger Reserve-BTR (West Bengal)	• Recently a **Royal Bengal Tiger has been spotted in Buxa tiger reserve after at least 23 years.**
	Geographical location and other Important features: • It is situated at the **easternmost extension of extreme bio-diverse North-East India** & **represents the highly endemic Indo-Malayan** region. • BTR lies in **Alipurduar sub-division of Jalpaiguri district** of West Bengal. • Its **northern boundary runs along the international border with Bhutan.** • The **Phipsu Wildlife Sanctuary of Bhutan** is contiguous to the **North** of BTR. **Manas National Park lies east** of BTR. • It serves as an **international corridor for elephant migratio**n between India and Bhutan.
	Rivers: Sankosh, Raidak, Jayanti, Churnia, Turturi, Phashkhawa, Dima and Nonani.
	Forests: fragile **"Terai Ecosystem"** constitutes a part of this Reserve
	Fauna and Flora: • One of the rarest birds in India the Black – Necked Crane has been sighted during winter, • Apart from Tigers animals like Elephants, Leopard, Himalayan black Bears, Civets, Giant squirrel, Gaur, Bengal Florican, Regal Python, Chinese Pangolin, Hispid Hare, Hog Deer.

3.5.14. KEY FAUNA AND FLORA IN NEWS

Terrestrial species

Asiatic lion

- Eight Asiatic lions have tested positive for Covid-19 at a Hyderabad zoo.

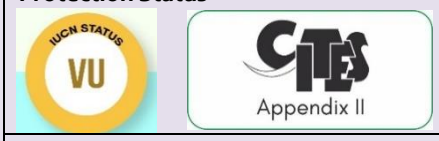
Protection Status

Characteristics:

- Asiatic lions and African lions are subspecies of the same species.

Difference between Asiatic and African Lions		
Criteria	**Asiatic**	**African**
Size	Larger	Smaller
Mane	Relatively dense, Lighter mane	Relatively short, Darker, sparse mane
Skin Fold	Absent	Longitudinal fold of skin that runs along the belly
Pride Size	Larger	Smaller

	• Male Asiatic lions are solitary by nature and form loose prides by associating themselves with up to three females. • On the other hand, females form prides of up to 12 lionesses including their cubs which are much stronger in nature and structure. • **Threat:** Vulnerable to disease, disaster, potential poaching and accidental lion deaths due to human causes.
	Habitat: Population limited to only five protected areas in Gujarat – **Gir National Park, Gir Sanctuary, Pania Sanctuary, Mitiyala Sanctuary and Girnar Sanctuary**
	Conservation Measures: **Asiatic Lion Conservation Project,** funded from the Centrally Sponsored Scheme- Development of Wildlife Habitat (CSS-DWH).
Hoolock gibbon 	• A study led by Centre for Cellular and Molecular Biology (CCMB), Hyderabad scientists states **that India has only western hoolock gibbon** (another species known as eastern hoolock gibbon is not found in India).
	Protection Status 
	Characteristics: • **Hoolock gibbons** are small apes, and the **only apes present in India.**
	Habitat: found in Arunachal Pradesh and Assam.
BlackBuck 	• Odisha's blackbuck population has doubled in the last six years.
	Protection Status 
	Characteristics: • Blackbuck **is considered to be the fastest animal in the world next to Cheetah.** • **Display Sexual dimorphism:** Male blackbucks have long, spiral horns while Females have no horns. • They are social and live in groups. • It is the State animal of Andhra Pradesh, Haryana and Punjab.
	• **Habitat:** semi-desert regions, thorn forest, dry forest, scrublands, open woodlands, • In India the species is widespread in Rajasthan, Gujarat, Madhya Pradesh, Tamilnadu and other areas throughout peninsular India.
	Conservation Measures: • Conservation Plan for Blackbuck. • The Uttar Pradesh State Cabinet has approved first of its kind **Blackbuck Conservation Reserve** in India in trans-Yamuna belt (MEJA FOREST RESERVE) near Allahabad.
One-horned rhinoceros 	• On the occasion of World Rhino day (September 22), **Assam government set 2400 rhino horns to fire**. o Ceremony was aimed at **busting myths about rhino horns.**
	Protection Status 
	Characteristics: • Greater one-horned rhinos are usually solitary, except for females with small calves. • Male rhinos fight violently for preferred habitual areas. • Cover their skin in mud aids thermo-regulation by preventing overheating. • They are **very good swimmers** and can dive and feed under water. • **Can run fast** (up to 40 km/h) and are very agile.

	• **Threats:** Poaching for medical purpose (biggest threat), habitat loss, low genetic diversity.
	Habitat: Alluvial Terai-Duar savanna and grasslands and riverine forest. • Found commonly in **Nepal, Bhutan, Pakistan and India**, with India being home to or over 85% of the population. • **In India found in**- Uttar Pradesh, West Bengal and Assam. • **Assam has 71% of the world's population** (2652 as per 2018 census) with Kaziranga National Park harbouring the highest number.
	Conservation Measures: • **Indian Rhino Vision 2020** (to expand rhino's range) • **Special Rhino Protection Force**. • **National Rhino Conservation Strategy**: It was launched in 2019 to conserve the greater one-horned rhinoceros. • **MoEFCC has a project to create DNA profiles** of all rhinos in the country.
Clouded Leopard 	• In a first, elusive clouded leopard **sighted in Nagaland mountains** at an elevation of 3,700 metres.
	Protection Status 
	Characteristics: • It is the **smallest of the large wild cats.** • They are amongst the best climbers in the family of cats. • Clouded leopards are thought to be solitary, except during breeding or when with their cubs.
	Habitat: • They are largely **known to inhabit low elevation evergreen rainforests.** • Across Southeast Asia and the Himalayas- southern China, Bhutan, Nepal, northeast India, Burma, Thailand, Vietnam, Malaysia, Cambodia, Laos, and Bangladesh.
	Conservation Measures: It is the **State animal of Meghalaya.**
Fishing Cat 	• The Wildlife Institute of India will begin collaring ten Fishing Cats in a bid to estimate its number and survival of in the **Coringa Wildlife Sanctuary (CWS) in Andhra Pradesh.**
	Protection Status 
	Characteristics: • It is **nocturnal animal.** • It preys on fish, frogs, crustaceans, snakes, birds and scavenges on carcasses of larger animals. • **Threats:** Habitat loss due to development activities in wetlands; Intensive aquaculture; hunting for meat and skin etc.
	Habitat: • habitant of wetlands and mainly found in mangroves forest the Sundarbans, around **Chilika Lake, foothills of the Himalayas along Ganga and Brahmaputra River valleys** and in the **Western Ghats.**
	Conservation Measures: • It is the **State Animal of West Bengal.**
Polar bears	• A recent study finds they might disappear by 2100.
	Protection Status 
	Characteristics: • Polar bears are **largest bear** in the world and the **Arctic's top predator.**

- Polar Bears spend over **50% of their time hunting for food.**
- Classified as **marine mammals** because they spend most of their lives on the sea ice of the Arctic Ocean.
- They are good swimmers and have thick layer of body fat and water-repellant coat that insulates them from the cold air and water.
- **Melting sea ice from climate change** has increased human-polar bear conflicts.

Habitat:

- Annual Sea ice covering the waters over the continental shelf and the **Arctic** inter-island archipelagos
- Not found in Antarctica.

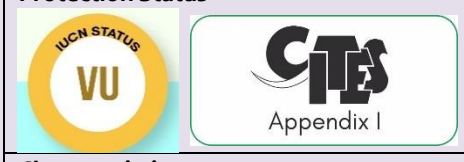
Conservation Measures:

- The International Agreement on Conservation of Polar Bears and their Habitat, 1973.
- Polar Bears International: a non-profit polar bear conservation organization.

Giant panda

- China announces that **Giant panda are no longer endangered** in the wild.
  - After five years, the International Union for Conservation of Nature (IUCN) removed giant pandas from its endangered species list and **classified them as vulnerable in 2016.**

Protection Status



Characteristics:

- Giant panda is also known as **panda bear.**
- **Bamboo is the favourite food** of giant pandas, which accounts for **99%** of their diet.
- They have two unique physical features that help them to hold, crush and eat bamboo:
  - Broad, flat molar teeth
  - Enlarged wrist bone that functions as an opposable thumb
- Symbol of WWF since its formation in 1961.

Habitat: Inhabit bamboo forests in the mountains of central China

Conservation Measures: WWF has been working with the Chinese government's National *Conservation* Program for the *giant panda* and its habitat.

Aquatic species

Dugong

- Recently, the Tamil Nadu government announced **India's first conservation reserve** for Dugongs in Palk Bay.

Protection Status

Characteristics:

- Also known as **Sea Cows,** they are the only **herbivorous marine mammals** and the only member of the family **Dugongidae,** making it one of the four surviving species in the **Order Sirenia** (other is **Trichechidae**, or the manatee family).
- They **live in groups** and come to the **surface to breathe** with a distinct dolphin-like tail and have mammary glands.
- **Lifespan** of dugongs is **70 years or more** and **female dugongs** breed **every 2.5 to 7 years** (starting from **6 to 17** years) with a gestation period of **13 to 15 months** and a nursing period of around **18 months**.
- Its closest relative, **Steller's Sea cow**, was hunted to extinction in the eighteenth century.
- Mainly found in **shallow areas** as they survive mainly on seagrass.
- **Threats:** habitat loss, entanglement in fishing nets, hunting for meat and oil etc.

Habitat: Shallow coastal waters of the Indian and western Pacific Oceans

Conservation Measures:

- MoU on Conservation and Management of Dugongs and their habitats **by UNEP and Conservation of Migratory Species.**
  - India signed it in 2008 and formed a task force for the same.
- **Dugong and Sea Grass conservation project by Global Environment Facility and UNEP** for 8 countries in the Indo-Pacific Region **excluding India**.
- State animal of the Andaman and Nicobar Islands.

Olive Ridley

- Olive Ridley turtles stayed away from Rushikulya rookery in Odisha's Ganjam this year.

Protection Status

IUCN STATUS VU | WPA, 1972 Schedule I | CITES Appendix I

Characteristics:

- It is smallest and most abundant of all sea turtles.
- The olive ridley gets its name from the **olive-green colour of its heart-shaped shell.**
- They are **carnivorous**.
- These turtles, along with their cousin, Kemps Ridley turtle, are best known for their unique **mass nesting called Arribada**, where thousands of females lay eggs on the same beach.

Habitat:

- Warm waters of the Pacific, Atlantic and Indian oceans.
- **Rushikulya river** mouth is considered the second-biggest rookery in India after Gahirmatha.

Conservation Measures:

- 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.
- Coast Guard has launched the **'Operation Oliva' exercise** to ensure the safe mid-sea sojourn of breeding Olive Ridley Sea turtles.
- Zoological Survey of India is carrying out **tagging of Olive Ridley turtles** at three mass nesting sites: **Gahirmatha, Devi River mouth and Rushikulya**.

Gharials (Gavialis gangeticus)

- Recently, Odisha Forest department announced cash reward for rescuing gharials.

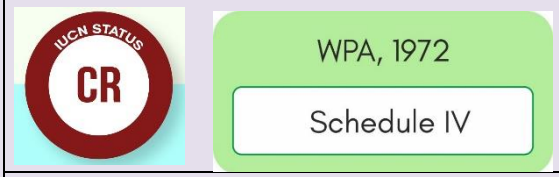
Protection status

IUCN STATUS CR | WPA, 1972 Schedule I | CITES Appendix I

Characteristics:

- Gharial derives its name from ghara, an Indian word for pot because of a bulbous knob (narial excrescence) present at the end of their snout.
- They live in clear freshwater river systems.
- They regulate their body temperature by basking in the sun to warm up or resting in shade or water to cool down
- They do not stalk and lunge at prey like other crocodilians—their snouts contain sensory cells that can detect vibrations in the water.
- **Major threats:** alteration of habitat, depletion of prey base, poaching for use of body parts etc.

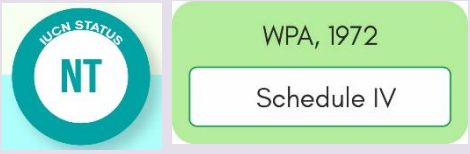
	Habitat:
	• **Found majorly in Chambal River**. Also, there are **satellite populations in Girwa river** (Katarniaghat Wildlife Sanctuary in UP), **Ramganga river** in Jim Corbett National Park and Son river in Son Gharial Wildlife Sanctuary, Madhya Pradesh.
	  ○ **Satkosia gorge in Mahanadi** is the southernmost limit of their home range.
	  ○ Odisha houses all three species of crocodiles-**gharial, mugger (vulnerable) and saltwater (Least Concern) crocodiles.**

	Conservation Measures: • **Indian Crocodile Conservation Project** was launched in 1975 in different States. • **Kukrail Gharial Rehabilitation Centre** was established in 1978.
Avian Species	
Greater Adjutant Storks 	• In a first, **Bihar has decided to tag greater adjutant storks with GPS trackers to monitor their movement** as a part of efforts to conserve them.
	Protection status: 
	Characteristics: • They are **long-necked large birds.** • They are considered **mount of Vishnu thus known as Garuda.** • They help **farmers by killing rats and other farm pests**.
	Habitat: • There are only three known breeding grounds – **one in Cambodia and two in India (Assam and Bihar).** • **Bhagalpur's KadwaDiara floodplains** are the third-most-popular breeding centre for them in the world after Assam and Cambodia.
Great Indian Bustard (GIB) 	• An array of solar and wind energy projects in Rajasthan has led to increasing collision of GIB with high tension wires leading to mortality.
	Protection Status  IUCN STATUS CR WPA, 1972 Schedule I CITES Appendix I In list of 22 species covered under **Species Recovery Programme?**
	Characteristics: • The bird, called **'Son Chiriya'** in Madhya Pradesh and 'Great Indian Bustard' in English, is known as 'Godawan' in Rajasthan and 'Maldhok' in Maharashtra. • The bird **looks like an ostrich**. • Despite weighing heavy, the Great Indian Bustard **can easily fly**. It is, however, not as agile as the other birds are. • The bird is ground-nesting and **omnivorous.** Besides wheat, millet, Indian jujube (Ber), it consumes various insects, snakes, scorpions and lizards. • **Bustard Species Found in India**: Great Indian Bustard, the Lesser Florican and the Bengal Florican. • **Threats:** Shrinking of grassland, rising number of electricity wires and its wanton killing.

	Habitat:
	• Most often found is **arid and semi-arid grasslands, open country with thorn scrub, tall grass interspersed with cultivation. It avoids irrigated areas.**
	• It is **endemic to Indian Sub-continent**, found in central India, western India and eastern Pakistan.
	  ○ **Largest population-Thar Desert, Rajasthan** (state bird).
	  ○ **Other populations** occur in Kachchh (Gujarat), Solapur and Chandrapur (Maharashtra), Kurnool (Andhra Pradesh) and Bellary (Karnataka).
	  ○ Houbara also belong to Bustard family but it's a migratory species.

	• **Important Sites for the species are:** Desert National Park Sanctuary (Rajasthan), Naliya (Gujarat), Warora (Maharashtra) and Bellary (Karnataka)

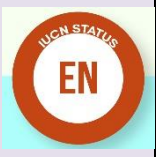
	Conservation Measures:
	• **"Project Godawan"** of **Rajasthan state government** for its conservation at Desert National Park (DNP) in Jaisalmer.
	• **National Guidelines for Recovery of Bustards, 2013.Supreme Court in M. K. Ranjitsinh vs Union of India, April 2021 case** made specific binding directions like-
	  ○ For the undergrounding of powerlines, the Supreme Court has **given a time limit of one year from the date of the order.**
	  ○ **Mandatory for all powerlines** in both the 'potential' and 'priority habitat of the GIB **to be laid underground in the future**.
	  ○ Until the lines are made underground, bird-diverters are to be installed on all lines immediately.
	• It is the **state bird of Rajasthan.**

Spot-billed pelicans (Pelecanus Philippensis) 	• A nematode infestation has led to mass mortality of spot-billed pelicans at Telineelapuram Important Bird Area (IBA) in Andhra Pradesh. ○ Nematode infections are commonly found in the gastrointestinal system of all orders of reptiles.
	Protection Status 
	Characteristics: • Hunt for food in both freshwater and marine environments, can dive slightly below the surface but never to great depth.
	Habitat: • Lives in lowland freshwater, brackish, and marine wetland areas.
	Conservation Measures: • The 'Pelican Bird Festival-2018' was held for first in Atapaka Bird Sanctuary on at Kolleru lake in Andhra Pradesh. ○ It was jointly organised by Andhra Pradesh Tourism Authority (APTA) and Krishna district administration
Insects, rodents etc.	
Kaiser-e-Hind (Teinopalpus imperialis) 	• It has been declared as the **State Butterfly of Arunachal Pradesh.** • It is one of the very rare and elusive swallowtail butterflies which are found at medium and higher elevations. • It flies high in the canopy of broad leaved temperate evergreen forests. • Its presence indicates the existence of a good forest ecosystem and protection.

Brood X Cicadas
 
	• **The cicadas, known as Brood X or Brood 10,** have begun emerging from the earth in portions of the eastern United States.
	• Also, a new cicada species ***Platyomiakohimaensis*** was discovered in the Naga Hills, Nagaland almost after a century.
	• Cicadas are **hemipteran insects known for their** loud, complex and species-specific **acoustic signals or songs** which act as **indicators of a healthy forest ecosystem.**
	  ○ Most **cicadas are canopy dwellers and are found in natural forests with large trees.**
	  ○ Cicadas are **herbivores** and **live in the soil and feed on tree roots** for a period of 3 to 17 years depending on the species.
	• The generic diversity of cicadas in India and Bangladesh ranks the highest in the world, followed by China.

Locusts 	• Belonging to family of **grasshoppers, they are omnivorous** and have life span of 90 days. • **Four species of locusts are found in India: Desert locust** (Schistocerca gregaria), **Migratory locust** (Locusta migratoria**), Bombay Locust** (Nomadacrissuccincta) and **Tree locust** (Anacridium sp.). • **Three breeding seasons for locusts** -Winter breeding [November to December], Spring breeding [January to June] and Summer breeding [July to October]. • **India has only Summer breeding season.** • **Locust Warning Organisation (LWO)**, Ministry of Agriculture & Farmers Welfare is responsible for **monitoring, survey and control of Desert Locust.** • **Toxic pesticides like Malathion and Chlorpyrifos** are used to control desert locust invasion.
Dragonflies 	• According to the **first global assessment of these species in the updated IUCN Red List of Threatened Species,** results show that **16% out of 6,016 species are at risk of extinction.** • **About Dragonfly** o They are **highly sensitive indicators of the state of freshwater** ecosystems. o **Major threats to them include** clearing of forests for residential and commercial construction, Disruption to river flow as a result of hydropower plant, dam and reservoir construction and water extraction for agriculture.
Malayan Giant Squirrel 	• A first-of-its-kind study by the Zoological Survey of India (ZSI), has projected that numbers of the Malayan Giant Squirrel (Ratufa bicolor) could decline by 90 percent in India by 2050. • **Habitat:** Currently found in parts of West Bengal, Sikkim, Assam, Arunachal Pradesh, Meghalaya, and Nagaland. o The Malayan Giant Squirrel is also distributed through Southern China, Thailand, Laos, Vietnam, Burma, the Malayan Peninsula, Sumatra, and Java. • The Malayan Giant Squirrel is **one of the world's largest squirrel species** that has a dark upper body, pale underparts, and a long, bushy tail. • It is **not a flying squirrel**.
Plant Species	
Neelakurinji flowers 	• **Karnataka's Mandalapatti hills** are blossoming with the blue Neelakurinji flowers, which blooms once every 12 years. o Complete blossoming of these flowers after 12 long years comes after **isolated flowering was reported last year from AnakaraMettu Hills of the Western Ghat** • **About the flowers** o It is a **shrub that is found in the shola forests of the Western Ghats** in Karnataka, Kerala and Tamil Nadu. o The **Nilgiris, which means blue mountains, got its name from the purplish-blue flowers** of Neelakurinji.
Boesenbergia albolutea & Boesenbergia rubrolutea	• These two species of plants **are now Extinct in the Wild (EW)** under IUCN which were discovered around 125 years ago. • Boesenbergiarubrolutea was **endemic to Khasi Hill**- Meghalaya while Boesenbergiaalbolutea was endemic to **Andaman Island**. o Classified under the **genus Boesenbergia**, the species belong to the **family Zingiberaceae**, the **ginger family of flowering plants**. • Possible reasons for their disappearance include **climate change, human interference and over-exploitation, or natural calamities**.
AgarWood (Aquilaria Malaccensis)	• Tripura Government released **Tripura Agarwood Policy, 2021** to make its Agarwood industry a **Rs. 20 billion industry** in the **next 5 years**. • Agarwood is an **evergreen tree** found in **Northeastern India** (with Assam and Tripura as main regions) and other parts of the world. 

	• AgarWood is an **aromatic plant** producing highly **valued resinous wood**, commonly used for **medicinal, aromatic** and **religious** purposes such as **perfume making, Agarbatti** etc. • **IUCN status:** Critically endangered
Newly discovered species	
Allium Negianum	• A plant discovered in Uttarakhand in 2019 has been confirmed as a **new species of Allium**, the genus that includes **many staple foods** such as onion and garlic. o Although new to science, the species has **long been known under domestic cultivation** to local communities. o With a narrow distribution, this newly described species is **restricted to the region of western Himalayas** and hasn't yet been reported from anywhere else in the world.
Tibetan woolly flying squirrel and the **Yunnan woolly flying squirrel**	• Recently, **2 new species of woolly flying squirrels,** named Tibetan woolly flying squirrel (Eupetaurustibetensis) and the Yunnan woolly flying squirrel (Eupetaurusnivamons), has been found in Himalayas. • The **Woolly Flying Squirrel (Eupetaurus cinereus)** is listed as an **endangered species** by the International Union for Conservation of Nature (IUCN). • It is the **largest gliding mammal** and **rarest and least studied** mammals in the world, for a long time. For much of the 20th century, it was thought to be extinct, until it was rediscovered in 1994 in northern Pakistan.
Bryumbharatiensis	• It is a new moss species discovered in eastern Antarctica by Indian scientists. o This is the **first time India discovered a plant species** since the research station was set up in Antarctica in 1984.
Gravelyiaboro	• It is the newly discovered **burrow spider**. o It was found **Jharbari range** of western Assam's Chirang Reserve Forest. o Its name has been derived from the Bodo community, one of the largest ethno-linguistic groups in Assam.
Deep-sea mollusc (Xylophaganandani)	• A new species of **deep sea molluscs** belonging to the family Xylophaga been identified from the Arabian Sea for the first time. • The word 'xylophaga' itself denotes 'wood eating'. • They are deep-sea dwellers, their presence recorded even at depths of 7,000 metres. o About mollusc -It is an animal such as a snail, clam, or octopus which has a soft body. They have important commercial benefits such as fisheries and mariculture.
Schistura Hiranyakeshi	• A new **freshwater fish species** was discovered near Amboli **in Western ghats** in Sindhudurg district. o **Maharashtra** declared the as a biodiversity heritage site. • Schistura Hiranyakeshi is **a rare sub-species of Schistura, a freshwater loach**. • The fish was named after the Hiranyakeshi river near Amboli village.
Subdoluseps Nilgiriensis (Asian Gracile skink)	• A new species of an **Asian gracile skink** has been discovered recently **at Anaikatti hills, Coimbatore in Tamil Nadu.** • New species are closely related to **Subdoluseps Pruthi** that is found in **parts of the Eastern Ghats.** • It is currently considered a vulnerable species as there are potential threats from seasonal forest fires, housing constructions, and brick kiln industries in the area.
Pyrostria Laljii	• A 15-meter **tall tree that belongs to the genus of the coffee** family has recently been **discovered in the Andaman and Nicobar Islands.** • The new species Pyrostria Laljii, is also the first record of the genus Pyrostria in India. • Trees belonging to these species **are usually found in Madagascar.** • The tree is distinguished by a long stem with a whitish coating on the trunk and oblong-obovate leaves with a cuneate base and was first reported from **Wandoor forest in South Andaman.** • Other places where trees could be located are: **Jarawa reserve forest, Chidia tapu forest.** • IUCN status: **Critically endangered.**



3.6. FORESTS

3.6.1. INDIA STATE OF FOREST REPORT (ISFR) 2021

Why in News?

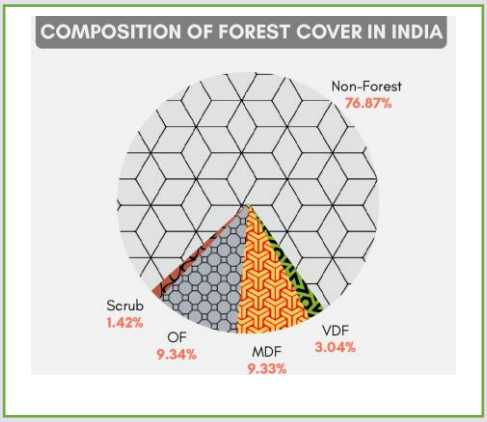
The **Ministry of Environment, Forests and Climate Change (MoEFCC)** recently released **the India State of Forest Report (ISFR) 2021.**

About India State of Forest Report (ISFR)

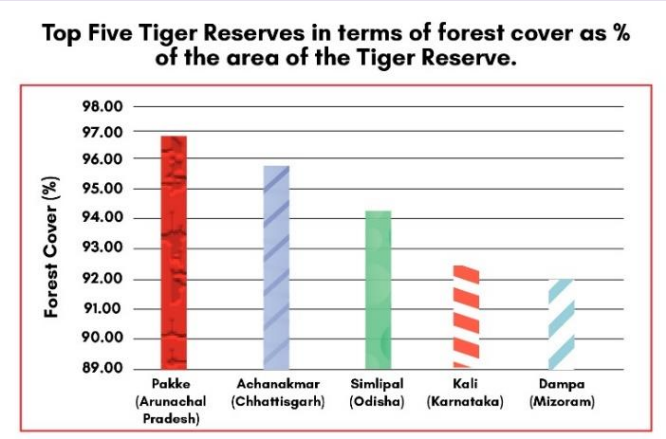
- It is an **assessment of India's forest and tree cover,** published **every two years by the Forest Survey of India** under the Ministry of Environment, Forests and Climate Change.
- The first survey was published in 1987, and ISFR 2021 is the **17th report.**
- With data computed through wall-to-wall mapping of India's forest cover through remote sensing techniques, the **ISFR is used in planning and formulation of policies in forest management as well as forestry and agroforestry sectors.**
- **New Chapters introduced in ISFR, 2021:**
  - **Forest Cover assessment in Tiger reserves and Tiger corridor** areas of the country.
  - **Above Ground Biomass Estimation using Synthetic Aperture Radar data,** based on a study carried out by FSI in collaboration with Space Application Centre (SAC), ISRO, Ahmedabad.
  - **Mapping of Climate Change Hotspots in Indian Forests** based on a study carried out by FSI in collaboration with BITS Pilani, Goa campus.

Key Findings

***Trends below are in comparison to the previous assessment i.e. ISFR 2019, unless otherwise mentioned.**

<table>
<tr>
<td>Forest cover (All tree patches that have canopy density of more than 10% and area of one hectare or more in size)</td>
<td>
• Total forest cover: 7,13,789 sq km (21.71% of the geographical area of India)
• Trends:
<table>
<tr><td>Total forest cover</td><td>↑ Increase of 1,540 sq km (0.22%)</td></tr>
<tr><td>Very Dense Forest (VDF)</td><td>↑ Increase of 501 sq km</td></tr>
<tr><td>Moderately Dense Forest (MDF)</td><td>↓ Decrease of 1,582 sq km</td></tr>
<tr><td>Open Forest (OF)</td><td>↑ Increase of 2,621 sq km</td></tr>
<tr><td>Scrub (not included in forest cover)</td><td>↑ Increase of 242 sq km</td></tr>
</table>


• Top 5 states in Total Forest cover: Madhya Pradesh, Arunachal Pradesh, Chhattisgarh, Odisha, Maharashtra.
• Top 5 states by percent of State's Geographic Area under Forest Cover: Mizoram (84.53%), Arunachal Pradesh (79.33%), Meghalaya, Manipur, Nagaland.
</td>
</tr>
<tr>
<td>Tree cover (Patches of trees as well as isolated trees outside the Recorded Forest Area on areas less than one hectare)</td>
<td>
• Total tree cover: 95,748 sq km (2.91% of the geographical area)
• State with Maximum Tree cover: Maharashtra.
• Trend: ↑ Increase of 721 sq km (0.76%)
</td>
</tr>
<tr>
<td>Trees Outside Forests (TOF)</td>
<td>
• TOF: 29.29 million hectares (36.18% of the total forest and tree cover of India).
• States having largest extent of TOF: Maharashtra followed by Odisha and Karnataka.
• States/UTs having maximum percentage of TOF: Lakshadweep, followed by Kerala and Goa.
</td>
</tr>
<tr>
<td>Forest Cover w.r.t. Recorded</td>
<td>
• Trends:
  ○ Forest cover inside the RFA/GW: ↑ increase of 31 sq km
</td>
</tr>
</table>

Forest Area (RFA) or Green Wash (GW)	○ **Forest cover outside the RFA/GW:** ↑ increase of 1,509 sq km
Area Specific Forest Cover	**Forest cover in the hill districts** • **Total Forest Cover:** 40.17% of the total geographical area of these districts. • **Trend in forest cover:** ↓ decrease of 902 sq km (0.32%) in 140 hill districts.
	Tribal districts • **Total forest cover:** 37.53% of the geographical area of these districts. • **Trend in forest cover:** ○ ↓ decrease of 655 sq km inside the RFA/GW in the tribal districts ○ ↑ increase of 600 sq km outside the RFA/GW in the tribal districts.
	Northeastern region • **Total forest cover:** 64.66% of its geographical area. • **Trend in forest cover:** ↓ decrease of 1,020 sq km (0.60%).
Forest Cover in Tiger reserves (TR) and Tiger corridor (TC)	• **Forest cover in the TR:** 55,666.27 sq km (7.80% of the country's total forest cover and 74.51% of the total area of TRs) ○ **TR with Largest Forest Cover:** Nagarjunasagar-Srisailam Tiger Reserve, Andhra Pradesh • **Forest cover in the Tiger corridors:** 11,575.12 sq km (1.62 % of the country's total forest cover)  **Decadal Changes between 2011 and 2021 assessments:** • **Forest cover in TR:** ↓ Decreased by 22.6 sq km (0.04%). • **Forest cover in TC:** ↑ Increased by 37.15 sq km (0.32%). • **TR with Highest Gain in Forest cover:** Buxa, West Bengal. • **TR with Highest Losses in Forest cover:** Kawal, Telangana.
Growing stock of wood	• **Total growing stock of wood:** 6,167.50 million cum comprising 4388.15 million cum inside forest areas and 1779.35 million cum outside recorded forest areas (TOF). • **Average growing stock per hectare in forest:** 56.60 cum.
Mangrove cover	• **Total Area:** 4992 sq km (0.15% of country's geographical area) • **Top states & UTs with Mangrove Cover:** West Bengal, Gujarat, A&N Islands, Andhra Pradesh, Maharashtra, Odisha. • **Trends:** ○ **Total Area:** ↑ Increased by 17 sq km (0.34%) ○ **States showing increase in mangrove cover:** Odisha and Maharashtra
Bamboo resources	• **Total bamboo bearing area:** 15 sq km. • **Trends:** ○ **Total area:** ↓ Decrease of 10,594 sq km. ○ **State with highest ↑ increase in bamboo bearing area:** Mizoram ○ **State with highest ↓ decrease in bamboo bearing area:** Madhya Pradesh. • **Top state in terms of Bamboo Bearing Area (%):** Madhya Pradesh.
Forest carbon stock	• **Total carbon stock in forest:** 7,204.0 million tonnes. ○ **Soil Organic Carbon (SOC)** represents the largest pool of carbon stock in forests. • **Trend:** ↑ Increase of 79.4 million tonnes in the carbon stock of the country.
Fire prone forest areas	• **22.27% of the forest cover of the country is highly to extremely fire prone.** • **Top 3 States according to number of forest fire detected by FSI:** Odisha, Madhya Pradesh and Chhattisgarh.
Climate Hotspots	• As per the **Climate Hotspot projections for the studied periods i.e. 2030, 2050 and 2085- States/UTs projected to witness highest temperature increase:** Ladakh, Jammu & Kashmir, Himachal Pradesh and Uttarakhand . • **States/UTs projected to witness the least temperature rise:** Andaman & Nicobar Islands, West Bengal, Goa, Tamil Nadu and Andhra Pradesh.

	• **Regions projected to experience the highest increase in rainfall:** The North-Eastern States and Upper Malabar Coast of India. • **Regions projected to experience least increase and sometimes even decline in rainfall:** part of North-Eastern States like Arunachal Pradesh, Sikkim; North-Western parts of the country namely Ladakh, Jammu & Kashmir and Himachal Pradesh.

3.6.2. AMENDMENTS IN FOREST CONSERVATION ACT

Why in News?

Recently, the Ministry of Environment, Forests and Climate Change (MoEFCC) issued a letter and consultation paper that documented proposed changes to the Forest Conservation Act, 1980 (FCA).

Definition of Forest: T N Godavarman case

- Till 1996 concerned authorities used to apply the provisions of the Act only to the forests notified under the Indian Forest Act, 1927.
- However, following a Supreme Court judgment in **T N Godavarman case**, the definition of "forest" was expanded to include:
  - All areas recorded as "forest" in any government (Union and State) record, irrespective of ownership, recognition and classification.
  - All areas that conformed to the "dictionary" meaning of "forest.
  - Areas which are identified as "forest" by an expert committee constituted by the Supreme Court following the 1996 order.
- Thus, forest lands in India include unclassified forests, undemarcated forests, existing or deemed forests, protected forests, reserved forests, sanctuaries and national parks etc.

About Forest Conservation Act, 1980

- The Forest (Conservation) Act, 1980, came into force to provide for the conservation of forests in India.
- The Act **prohibits state and other authorities, except with the prior approval of the Central Government,** to give any order directing:
  - de-reservation of forest;
  - use of forest land for non-forest purpose;
  - assigning any forest land or its portion by way of lease to any private person or organization;
  - Clearing of trees which have grown naturally in forested land.
- Any diversion of land for non-forest purpose requires approval under the Act as well as payment of stipulated **compensatory levies such as Net Present Value (NPV), Compensatory Afforestation (CA),** etc.
- **Power to make rules**: The Act **empowers Central Government to make rules** for carrying out the provisions of this Act.
- **Definition of Non- Forest purpose**: It means the breaking up or clearing of any forest land for the cultivation of tea, coffee, spices, medicinal plants, etc. and for any purpose other than reforestation.
  - Non-forest purposes don't include work relating or ancillary to conservation, development and management of forests and wildlife like establishment of check-posts, fire lines, wireless communications and construction of fencing, etc.
- **Constitution of Advisory Committee**: The Central Government may constitute a Committee consisting to advise that Government for the grant of approval and any other matter connected with the conservation of forests.
- **Penalties:** Contravention of any of the provisions of the Act is punishable imprisonment of upto fifteen days.
- **Offences by the Authorities and Government Departments** are punishable as well.
- **Appeal**: Any person aggrieved may file an appeal to the National Green Tribunal.

Proposed Amendments	
Scope of the Act	• To define 'forests' in an objective manner.
Land Acquired before 1980	• Exempt unused land with vegetation acquired by various ministries, including Ministry of Road, Railway, Defense etc., before 1980 for construction/expansion purposes from the purview of the Act.
Differences in land records of forests	• Revenue records to be statutorily required to reflect the occupier and the nature of land including forest. • Lands identified as plantation, afforestation etc. after 12.12.1996 to remain outside the purview of the Act to encourage forestry activities.
Construction alongside road and railways	• Exemption of land up to 0.05 ha alongside roads and railway lines from the purview of the Act.
Conservation of Pristine Land	• Introducing an enabling provision in the Act to keep certain pristine forests showcasing rich ecological values intact for a specific period.

Development of infrastructure along the international border areas	• Projects of national importance to be exempted from obtaining prior approval of Central Government • To allow the states to permit non-forest use of such lands.
Misuse of provisions by mining companies	• Delete 2(iii) of the Act which allows for assignment of lease which requires detailed examination of the proposal and payment of other compensatory levies such as CA in addition to NPV. • 2 (ii) which allows for use of forest land for non-forestry purpose by paying only NPV, can be invoked for any kind of lease assignment having an intention of using for non-forestry purpose.
New drilling technologies	• New environmentally friendly technologies which enables exploration or extraction of oil & natural gas deep beneath without impacting the forest soil or aquifer to be kept outside the purview of Act.
Private land covered under definition of forests	• Allow owners of private lands coming under definition of forest, for construction of structures and residential unit up to an area of 250 sq mtr as one time relaxation.
Activities related to conservation of forests and wildlife	• Activities like establishment of zoos, safaris, Forest Training infrastructures etc. to be excluded from "non-forestry activity" as activities which are ancillary to conservation of forests and wildlife.
Imposition of compensatory levies	• Double imposition of any levy should be removed.
Penal Provisions	• Offences to be made cognizable, non-bailable and punishable with imprisonment of upto one year. • In case any authority in the State Government or Union territory Administration is involved the compensation shall be deposited in the National CAMPA rather than in State CAMPA.

Related News: Participatory Forest Management

- **Gudalur's Gene Pool Garden (Tamil Nadu)** is an example of **participatory forest management (PFM).**
  - It was established in 1989 under **Hill Area Development Programme** in the Gudalur forest division, Nilgiris district of Tamil Nadu.
  - PFM works on 'co-management' and a 'give and take' relationship between village communities and the Forest Department.
- It was created with **following objectives**
  - **In situ conservation** of available endemic plant species.
  - **Ex situ conservation** of rare, endangered and threatened plant species.

3.6.3. WORLD HERITAGE FORESTS

Why in News?

Recently, UNESCO, World Resources Institute (WRI) and International Union for Conservation of Nature (IUCN) released this report.

More in News

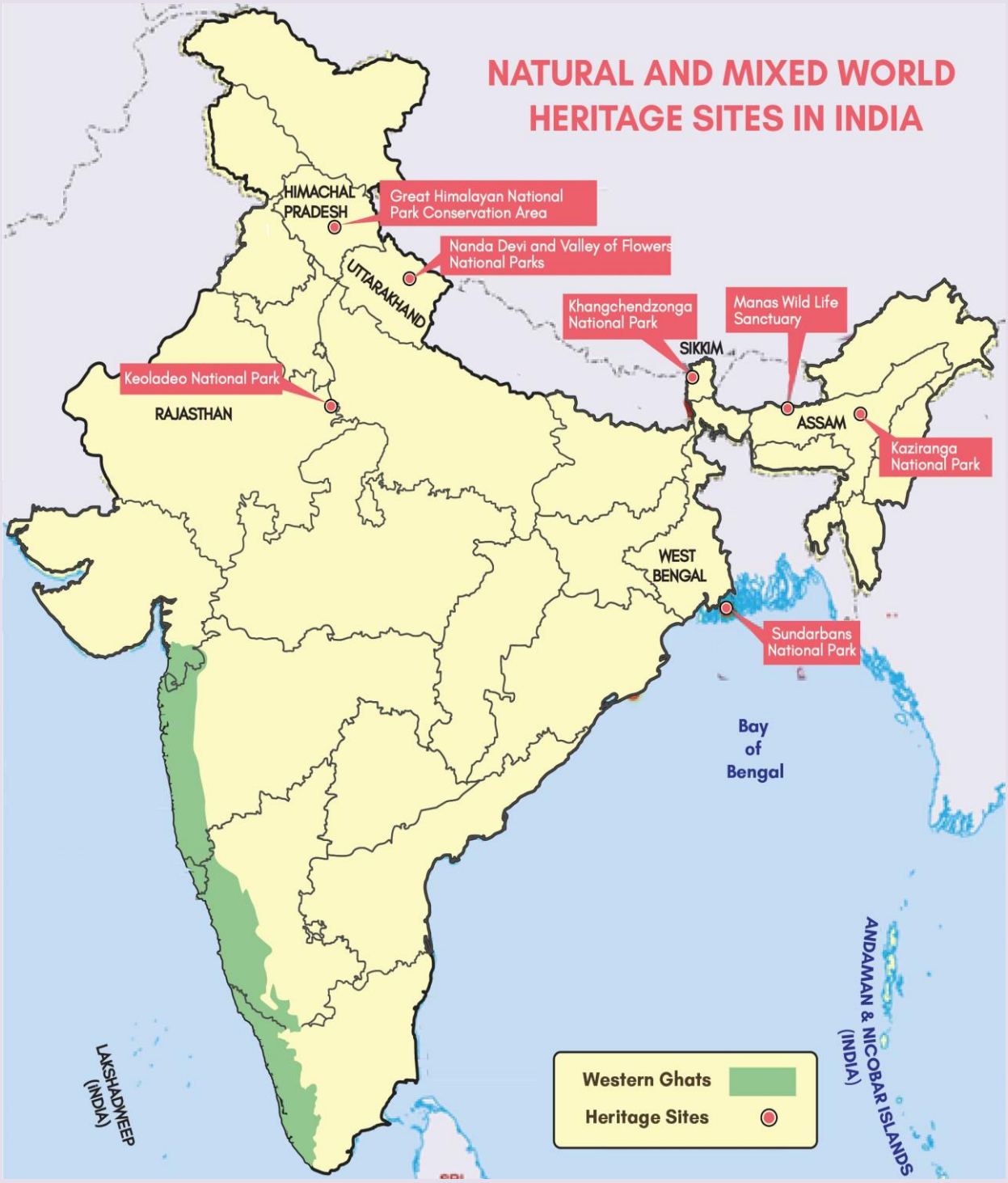
- Report provides the **first global scientific assessment of greenhouse gas emissions and sequestration by forests** in UNESCO World Heritage sites (WHS).
  - Most of the World Heritage Forest carbon is stored in tropical sites.
- Report estimates that forests across WHS **removed approximately 190 million tonnes of CO_2 per year between 2001 and 2020** from the atmosphere.

Key Findings of the report

- Over the past 20 years, WHS lost 3.5 million hectares of forest and forests in 10 World Heritage sites emitted more carbon than they absorbed.
- **Two most widespread threats** to UNESCO WHF-
  - **Climate change with associated severe weather** (e.g., fires, storms, floods, droughts, temperature extremes, and habitat shifting/alteration).
  - **Land-use pressures associated with various human activities** such as illegal logging, wood harvesting, and agricultural encroachment due to livestock farming/grazing and crops.
- India's **Sundarbans National Park is among five sites that have the highest blue carbon stocks** globally.
  - Blue carbon is the organic carbon (**mainly obtained from decaying plant leaves, wood, roots and animals)** stored in coastal and marine ecosystems.
  - Blue carbon ecosystems include seagrass meadows, tidal marshes and mangroves.

About World Heritage sites

- World Heritage Sites are **cultural and/or natural sites of 'Outstanding Universal Value',** which are important across countries and generations.
  - **UNESCO seeks to encourage** the identification, protection, and preservation of cultural and natural heritage around the world considered to be of outstanding value to humanity.
  - This is embodied in **Convention concerning the Protection of the World Cultural and Natural Heritage**, adopted by UNESCO in 1972.
- They are **distributed across more than 110 countries** and cover approximately 350 million hectares (Mha). Collectively, they **include almost 1% of the Earth's land surface and 0.6% of the world's oceans.**
- UNESCO has designated 40 WHS in India- 32 Cultural, 7 Natural and 1 Mixed.



3.7. LAKES, WETLANDS AND COASTLANDS

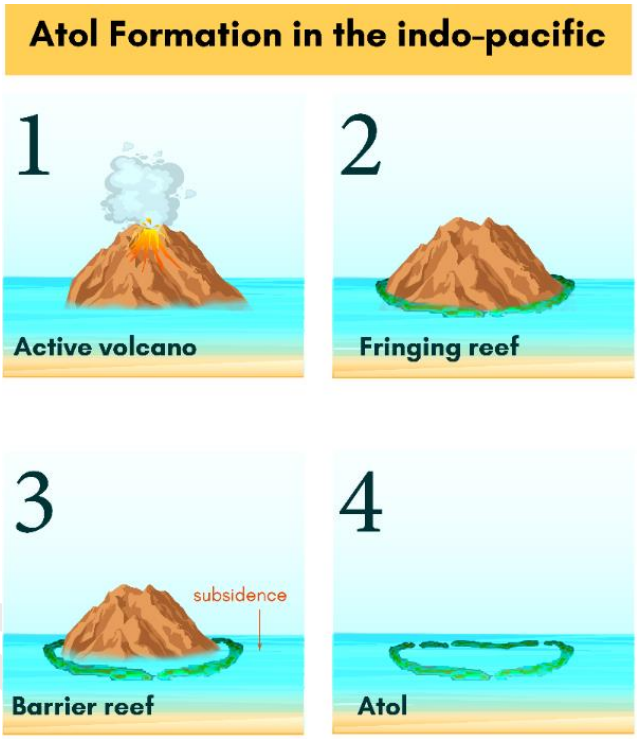
3.7.1. CORAL REEF

Why in news?

Recently, the report 'Sixth status of the Corals of the World' by Global Coral Reef Monitoring Network (GCRMN) stated that 14% of Coral reefs are lost since 2010.

About Global Coral Reef Monitoring Network (GCRMN)

- It is an operational network of the International Coral Reef Initiative that **aims to provide the best available scientific information on the status and trends of coral reef ecosystems for their conservation and management.**
  - The GCRMN is **a global network of scientists, managers and organisations** that monitor the condition of coral reefs throughout the world.
- The flagship product of the GCRMN is the **'Status of Coral Reefs of the World report', that describes the status and trends of coral reefs worldwide.**
- The **global dataset spanned more than 40 years from 1978 to 2019 and** consisted of observations from 73 reef-bearing countries around the world.



Threats

- **Ocean Acidification:** inhibits coral's ability to produce the calcium carbonate exoskeletons, **making them more vulnerable to disease and destruction by storms.**
- **Coral Bleaching:** When corals are stressed due to warmer ocean waters, they eject the symbiotic algae, losing **their built-in food source.**
- **Water pollution:** Agricultural pesticides and fertilizers (reason for algal blooms), oil and gasoline, sewage discharge and sediment from eroded landscapes make it difficult for coral to thrive.
- **Sea level rise:** corals are predicted to end up deeper underwater, receive less sunlight and grow more slowly.
- **Stronger Storms:** can break coral branches and overturn coral colonies.

Where are Coral Reefs found?

- These are **found in more than 100 countries around the world.**
- Most reefs are located between the **Tropics of Cancer and Capricorn, in the Pacific Ocean, the Indian Ocean, the Caribbean Sea, the Red Sea, and the Persian Gulf.**
  - Corals are also found farther from the equator in places where warm currents flow out of the tropics, such as in **Florida and southern Japan.**

- **Destructive and Unsustainable fishing practices** such as cyanide fishing (spraying cyanide in the water stuns the fish to make them easier to catch), 'blast fishing'.
- **Habitat Destruction: Coral mining, construction, Coral collecting, unsustainable tourism, Mangrove destruction** affect the habitat and impact coral reefs adversely.
- **Measures taken in India for protection of coral reefs**
  - Coastal Ocean Monitoring and Prediction system (**COMAPS**), Land Ocean Interactions in Coastal zones (**LOICZ**) and Integrated Coastal and Marine Area Management (**ICMAM**).
  - **Coral Bleaching Alert System** to assess thermal stress accumulated in corals.
  - **Coral Reef Recovery Project** by Wildlife Trust of India and Gujarat Forest Department.

Related News:

Global Fund for Coral Reefs (GFCR)

- The Global Fund for Coral Reefs (GFCR) has launched a fundraising campaign that will **culminate at the UN Climate Change Conference of the Parties (COP26) in Glasgow in November 2021.**
- Officially announced in 2020, GFCR is a **10-year, $625 million** blended finance vehicle established through a coalition between **United Nations agencies, financial institutions, and private philanthropy sources.**
  - Administered by the UN Multi-Partner Trust Fund Office, it is the f**irst United Nations trust fund specifically focused on SDG 14** ("Life Below Water").
  - The fund responds to the **"coral reef funding gap"** and fragmentation of funding for coral reef conservation and restoration projects.

Demand to reclassify 'Toxic 3 Os' used in sunscreen

- US activists, politicians have submitted a Citizen Petition to the Food and Drug Administration (FDA) to **reclassify Toxic 3 Os (oxybenzone, octinoxate and octocrylene).**
- They urged that these chemicals **be shifted to "Not Generally Recognized as Safe & Effective" (GRASE Category II).**
- **These 'Toxic 3 Os'** are **active ingredients** present in more than two-thirds of all **sunscreen**s.
- They pose a **threat to public health, marine life and coral reefs.**

Rose-shaped corals

- Scientists have discovered a pristine, **3-km long reef of giant rose-shaped corals off the coast of Tahiti.**
  - Discovery suggests that there may be many more unknown large reefs in our oceans, given that only about 20% of the entire seabed is mapped.
- The **island of Tahiti is the largest island in French Polynesia.** Papeete, on Tahiti's northwestern coast, is the capital and administrative centre of French Polynesia.
- French Polynesia is **overseas collectivity of France consisting of five archipelagos in the south-central Pacific Ocean.**

3.7.2. NEW RAMSAR SITES

Why in News?

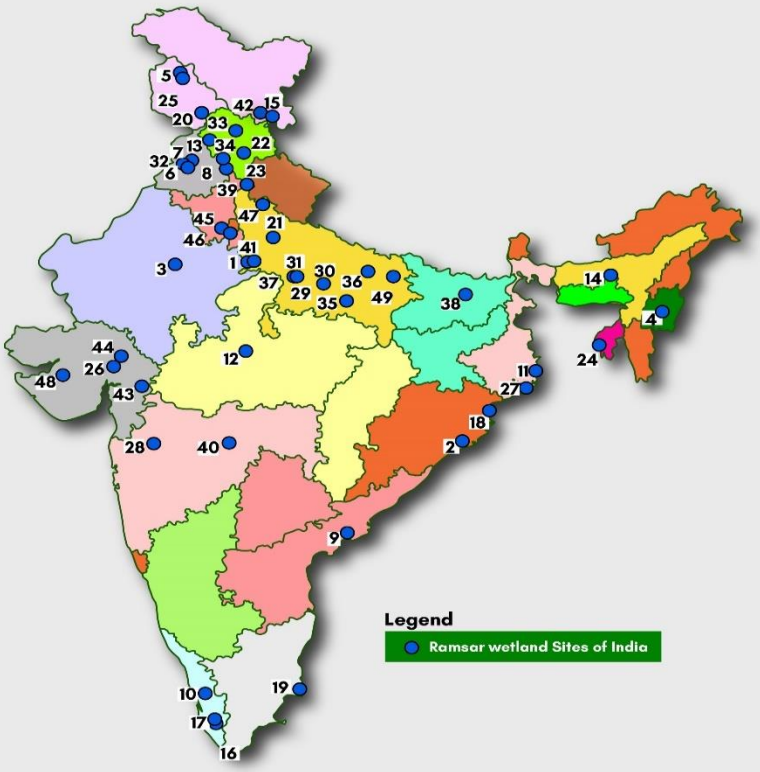
Is India a Party?

Seven new Wetlands were designated as Ramsar Sites in India in the year 2021.

About Ramsar convention, 1971

- It is an **intergovernmental international treaty**, signed in Ramsar (Iran) to preserve ecological character of selected wetlands across the globe.
- **India is a party to the Convention**.
- It aims to develop a global network of wetlands for conservation of biological diversity and for sustaining human life.
- The wetlands declared as Ramsar sites are **protected under strict guidelines of the convention.**
- Ramsar Sites are included in **List of Wetlands of International Importance.**
- The inclusion of a wetland in the List embodies the government's commitment to take steps necessary to ensure that its ecological character is maintained.
- **Largest Ramsar Site by area in India**- Sundarban Wetland in West Bengal
- **Smallest Ramsar Site by area in India**-Renuka Wetland in Himachal Pradesh

Ramsar wetland Sites of India



S.No	Sites Name	Designation Date
1	Keoladeo National Park	1981
2	Chilika Lake	1981
3	Sambhar Lake	1990
4	Loktak Lake	1990
5	Wular Lake	1990
6	Harike Lake	1990
7	Kanjli	2002
8	Ropar	2002
9	Kolleru Lake	2002
10	Vembanad Kol Wetland	2002
11	East Calcutta Wetlands	2002
12	Bhoj Wetland	2002
13	Pong Dam Lake	2002
14	Deepor Beel	2002
15	Tsomoriri	2002
16	Sasthamkotta Lake	2002
17	Ashtamudi Wetland	-2002
18	Bhitarkanika Mangroves	2002
19	Point Calimere Wildlife and Bird Sanctuary	2002
20	Surinsar-Mansar Lakes	2005
21	Upper Ganga River	2005
22	Chandertal Wetland	2005
23	Renuka Wetland	2005
24	Rudrasagar Lake	2005
25	Hokera Wetland	2005
26	Nalsarovar	2012
27	Sundarban Wetland	2019
28	Nandur Madhameshwar	2019
29	Sarsai Nawar Jheel	2019
30	Nawabganj Bird Sanctuary	2019
31	Sandi Bird Sanctuary	2019
32	Beas Conservation Reserve	2019
33	Keshopur-Miani Community Reserve	2019
34	Nangal Wildlife Sanctuary	2019
35	Samaspur Bird Sanctuary	2019
36	Parvati Arga Bird Sanctuary	2019
37	Saman Bird Sanctuary	2019
38	Kabartal Wetland	2020
39	Asan Conservation Reserve	2020
40	Lonar Lake	2020
41	Sur Sarovar	2020
42	Tso Kar Wetland Complex	2020
43	Wadhvana Wetland	2021
44	Thol Lake Wildlife Sanctuary	2021
45	Bhindawas Wildlife Sanctuary	2021
46	Sultanpur National Park	2021
47	Haiderpur Wetland	2021
48	Khijadia Wildlife Sanctuary	2021
49	Bakhira Wildlife Sanctuary	2021

Nine criteria for identifying Wetlands of International Importance

1. Contains a representative, rare, or unique example of a natural or near-natural wetland type found within the appropriate biogeographic region.
2. Supports vulnerable, endangered, or critically endangered species or threatened ecological communities.
3. Supports populations of plant and/or animal species important for maintaining the biological diversity of a particular biogeographic region.
4. Supports plant and/or animal species at a critical stage in their life cycles, or provides refuge during adverse conditions.
5. Regularly supports 20,000 or more waterbirds.
6. Supports 1% of the individuals in a population of one species or subspecies of waterbird.
7. Supports a significant proportion of indigenous fish subspecies, species or families, life-history stages, species interactions and/or populations that are representative of wetland benefits and/or values and thereby contributes to global biological diversity.
8. Important source of food for fishes, spawning ground, nursery and/or migration path on which fish stocks, either within the wetland or elsewhere, depend. Specific criteria based on other taxa
9. Supports 1% of the individuals in a population of one species or subspecies of wetland-dependent nonavian animal species.

Wetlands that were recently declared as Ramsar sites

Wetland	Details
Haiderpur wetland	• Located in- **Uttar Pradesh.** • This **human-made wetland** was formed in 1984 by the construction of the Madhya Ganga Barrage on a floodplain of the River Ganga and is a part of Hastinapur Wildlife Sanctuary. • **Fauna and Flora**: 15 globally threatened species, such as the critically endangered gharial and the endangered hog deer, black-bellied tern, steppe eagle, Indian skimmer and gold mahseer, vulnerable swamp deer, near-threatened Indian grassbird.
Wadhvana Wetland	• Located in- **Gujarat.** • This **reservoir** was created in 1910 by the former **Baroda State**. • It provides wintering ground to migratory waterbirds, including over 80 species that migrate on the **Central Asian Flyway**.

	• **Fauna and Flora**: **Migratory birds** include endangered Pallas's fish-eagle, the vulnerable common pochard, and the near-threatened Dalmatian pelican, grey-headed fish-eagle and ferruginous duck, red-crested pochard. **Resident birds** include the vulnerable river tern and sarus crane and the near-threatened black-necked stork.
Khijadia Wildlife Sanctuary	• Located in- **Gujarat** • This freshwater wetland near the coast of the Gulf of Kutch in Gujarat State was formed following the creation of a bund (dike) in 1920 to protect farmland from saltwater ingress. • **Fauna and Flora**: critically endangered Indian bdellium-tree, Dalmatian pelican , greylag goose.
Bhindawas Wildlife Sanctuary	• Located in- **Rohtak, Haryana** • Human-made freshwater wetland and is the largest wetland in Haryana State. • The wetland was declared as a protected area in 1986 and was designated as an Eco-sensitive zone by the MoEFCC in 2011. • **Fauna and Flora**: Threatened species like Egyptian vulture, steppe eagle, Pallas's fish eagle, black-bellied tern; Mammals like nilgai, common mongoose and black-naped hare.
Sultanpur National Park	• Located in- **Gurugram, Haryana** • This shallow lake at the core of the Sultanpur National Park is fed by the overflow from neighbouring canals and fields, and replenished by saline groundwater. • MoEFCC declared the area within five kilometres of the Park as an eco-sensitive zone. • **Fauna and Flora**: critically endangered sociable lapwing, endangered Egyptian vulture, saker falcon, Pallas's fish eagle and black-bellied tern.
Thol Lake Wildlife Sanctuary	• Located in- **Mehsana district, Gujarat.** • It is on the Central Asian Flyway. • **Fauna and Flora**: critically endangered white-rumped vulture and sociable lapwing and the vulnerable sarus crane common pochard and lesser white-fronted goose.
Bakhira Wildlife Sanctuary	• Located in- **Uttar Pradesh** • It provides a safe wintering and staging ground for a large number of species of the Central Asian flyway.

Related News: Wetlands of India Portal Launched

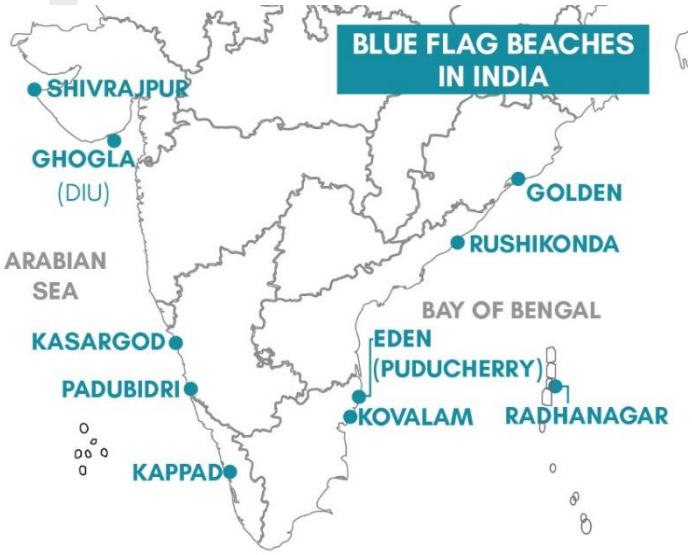
- Launched by MoEFCC, the portal is an i**nitiative to provide a single point access system that synthesizes information dissemination regarding wetland sites of the country**, projects, initiatives and trainings.
- It is 46 Indian sites have been recognised as wetlands of international importance under Ramsar Convention

3.7.3. BLUE FLAG CERTIFICATION

Why in news?

Two more Indian beaches get coveted International Blue Flag Certification.

More on the news

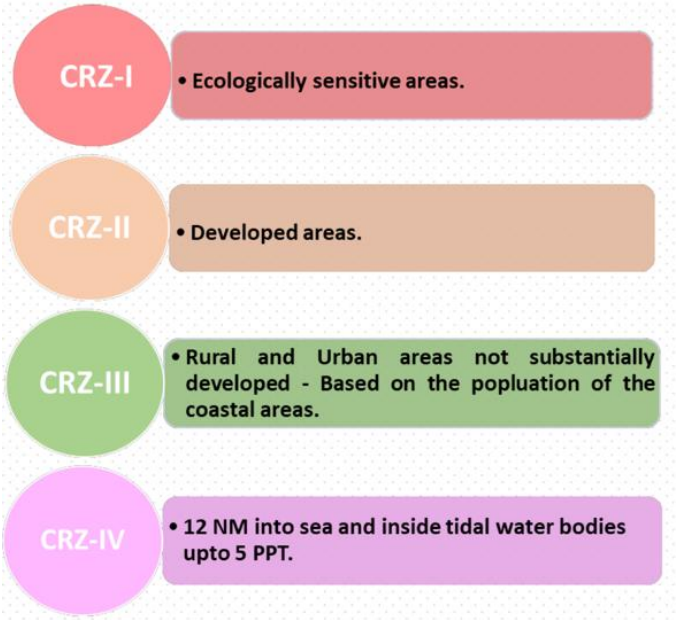


- With the inclusion of **Kovalam (Tamil Nadu) and Eden (Puducherry) beaches,** India now has **10 Blue Flag beaches** (refer infographic).
- **Blue Flag beach is an Eco-tourism model** to provide tourists/beach goers clean and hygienic bathing water, facilities/amenities, safe and healthy environment and sustainable development of the area.
- Certification is **accorded by Denmark based Foundation for Environment Education.**
  - **It is based on 33 criteria in four major heads:** Environmental Education and Information, Bathing Water Quality, Environment Management and Conservation and Safety and Services in the beaches.
- Earlier Ministry of Environment, Forest and Climate Change launched **eco-label BEAMS (Beach Environment & Aesthetics Management Services) under ICZM** (Integrated Coastal Zone Management) project to protect and conserve coastal and marine ecosystems through holistic management of resources.
  - ICZM is to promote sustainable development & management of coastal zones.

3.7.4. AMENDMENTS TO THE COASTAL REGULATION ZONE (CRZ) NOTIFICATION, 2019

Why in News?

Draft notification was recently issued proposing amendments to the Coastal Regulation Zone (CRZ) Notification, 2019.



About the Draft Amendments

- The notification has been issued in exercise of the powers conferred by **Environment (Protection) Act, 1986.**
- **Key changes proposed:**
  - **Development and Production of oil and natural gas** and Exploratory drilling operations **shall be exempted from prior CRZ clearance.**
  - **Purely temporary and seasonal structures** (shacks) customarily put up **may be retained** during the monsoon season with adequate precautions.
  - Till **Integrated Island Management Plans (IIMPs),** as applicable to smaller islands in Lakshadweep and Andaman & Nicobar are formulated by respective States/UTs, **CRZ Notification 2011 shall continue to apply.**
  - The **sand bars in the intertidal areas shall be removed by traditional coastal communities only** by manual method.
- **About CRZ**
  - **Coastal Stretches of seas, bays, estuaries, creeks, rivers and backwaters** which are influenced by tidal action up to 500 metres from High Tide Line (HTL) and land between Low Tide Line (LTL) and the HTL**,** are classified under CRZ.
  - CRZs are **declared by Ministry of Environment, Forest and Climate change** under the **Environment Protection Act 1986.**
  - **CRZ regulation 2019** that aim to promote sustainable development based on scientific principles.

3.8. OTHER BIODIVERSITY INITIATIVES IN NEWS

Finance for Biodiversity Initiative	• Recently, the report by Finance for Biodiversity (F4B) reported that public banks worldwide are responsible for $800 billion in damages to nature annually, due to their investments in nature-based services.
	• Among the G20 countries, China and India have the highest dependency risk (countries dependence on nature), whereas India has the highest nature at risk.
	• **About Finance for Biodiversity Initiative**
	  ○ It was started in October 2019 by the MAVA Foundation based in Switzerland and receives support from the **Children's Investment Fund Foundation (CIFF)** and **the Gordon and Betty Moore Foundation.**
	  ✓ MAVA foundation has a mission to conserve biodiversity for the benefit of people and nature.
	  ○ Its goal is to increase the materiality of biodiversity in financial decision-making and so better align global finance with nature conservation and restoration.
	  ○ Their work is organized across five workstreams: Market efficiency and innovation, Enhanced liability, Citizen engagement, public finance, Nature markets.

Leaf Coalition	• The LEAF Coalition was **launched by an initial group of governments** (Norway, UK, US) and leading **companies** (like Amazon, Nestle etc.) **to mobilise finance for protection of tropical forest.** • The LEAF (**Lowering Emissions by Accelerating Forest finance**) coalition **aims to mobilize at least $1 billion** in finance to support tropical and subtropical forest countries **to move rapidly towards reducing emissions from deforestation.**

	• It is expected to become one of the largest public-private efforts that **support countries in achieving their Nationally Determined Contributions (NDCs) under the Paris Agreement and the Reducing Emissions from Deforestation and Forest Degradation (REDD+) mechanism.** • Reductions in emissions are to be made through **programs that involve all key stakeholders, including Indigenous peoples and local communities.**
BiodiverCities by 2030 initiative	• It is a joint initiative of **the World Economic Forum and the Government of Colombia.** • It aims to **support city governments, businesses and citizens,** to enable cities to live in harmony with nature by 2030. • The initiative **brings together multidisciplinary expertize, combines existing initiatives and surfaces innovative solutions** to promote sustainable, inclusive and nature-positive urban development at a global scale.
Vulture census	• Vulture census will be conducted in March after 6-year gap. • The census would be conducted by **scientists at the Bombay Natural History Society** (a conservation NGO), along with **teams from the 13 states and the MoEFCC**. • 3 Indian vulture species are **Critically Endangered:** Slender-billed Vulture, White-rumped vulture and Indian Vulture. • **Population** of vultures started **declining in 1990s due to kidney failure caused by diclofenac** (an anti-inflammatory drug administered to livestock). • The **'Action Plan for Vulture Conservation 2020-2025'** proposes to establish **Vulture Conservation Breeding Centres.**
PARIVESH Portal	• Pro Active and Responsive facilitation by Interactive and Virtuous Environmental Single window Hub (PARIVESH) Portal is a **single window integrated system developed for online submission and monitoring of the proposals** for seeking Environment, Forest, Wildlife and CRZ Clearances from Central, State and district level authorities. • As per the Ministry of Environment, Forest and Climate Change, the **average time to grant environmental clearances in all sectors has reduced** significantly from over 150 days in 2019 to less than 90 days in 2021. • Further, the ministry has decided to **upgrade the portal to provide a "single window" solution** for administration of environmental regulations.
WHO BioHub initiative	• The WHO and Switzerland signed a MoU to launch a BioHub facility **to allow rapid sharing of pathogens between laboratories and partners to facilitate safe storage, better analysis, sequencing** and preparedness against them. • Presently, **pathogens are shared bilaterally between countries.** • The initiative will **enable member states to share biological materials** with and via the BioHub under pre-agreed conditions, including biosafety, biosecurity, and other applicable regulations. • The move would further contribute to the establishment of an international exchange system for novel coronavirus SARS-CoV-2 and other emerging pathogens.

Biotech-PRIDE Guidelines	• The **first of its kind, Biotech-PRIDE** (Promotion of Research and Innovation through Data Exchange) **Guidelines** is **aimed at providing a framework and guiding principle to facilitate and enable sharing and exchange of biological knowledge, information and data.**
	• It will be **implemented through the** Indian Biological Data Centre (IBDC), which is the **first national repository for life science data in India**.
	  ○ It is **mandated to archive all publicly funded life science data generated at national level.**
	  ○ Other existing datasets and data centres will be bridged to this IBDC which will be called bio-grid

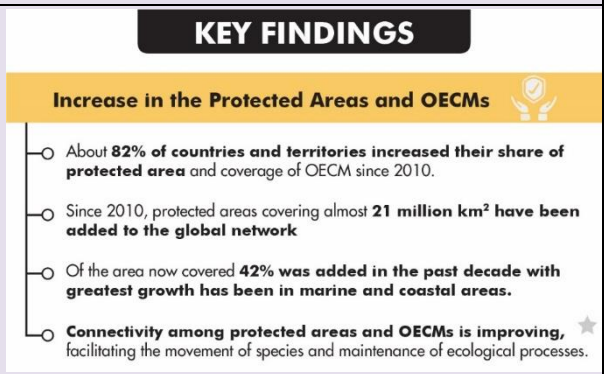
Herbal Park	• **India's Highest Herbal Park was recently inaugurated**. • The Herbal park is **situated at Mana** in Uttarakhand's **Chamoli district**, which is the **last Indian village bordering China.** • Situated at a **height of 11,000 feet**, around **40 species of herbal plants** found in high alpine areas in the Himalayan region are conserved in this park. • The **land for the project** (spread over three acres) was **provided** by the Mana Van panchayat under the Union government's **Compensatory Afforestation Fund Act** (CAMPA).
Panchmuli lake	• Recently, **crocodiles were shifted from Panchmuli lake** for safety of tourists visiting Statue of Unity (in Kevadia, Gujarat). • Panchmuli lake, **also known as 'Dyke-3' of the Sardar Sarovar Dam**, was developed for tourists visiting the **Statue of Unity.**

3.9. CONCEPTS IN BRIEF

Sea snot	• Turkey's **Sea of Marmara**, that connects the Black Sea to the Aegean Sea, **has witnessed the largest outbreak of 'sea snot'.** • Sea snot, or marine mucilage, is a **naturally-occurring green sludge that forms when algae is overloaded with nutrients** because of hot weather and water pollution. • The nutrient overload occurs **when algae feast on warm weather caused by global warming.** Water pollution adds to the problem. • **Impact of sea snot:** several species are under threat (including) oysters, mussels, sea stars; affected the livelihoods of fishermen etc. 
Third pole	• According to a recent study by NASA, **two lakes (Chibzhang Co and Dorsoidong Co) in the third pole region grew larger** between 1987 and 2021. ○ **This happened as the mountain glaciers shrunk** due to rising temperatures, accelerating ice loss and meltwater runoff. • Third Pole **encompasses Tibetan Plateau, Himalayas, Hindu Kush, Pamirs and Tien Shan Mountains**. • Meltwater from Third Pole **feeds many of Asia's large lakes and rivers, including Indus, Brahmaputra, Ganges,** Yellow and Yangtze.

Aerial seeding	• Recently, Marut Drones (a Hyderabad based startup) came up with an **aerial seeding campaign** to overcome the reforestation challenge through its **Hara Bhara** initiative.
	  ○ Earlier, **Haryana Forest Department** has **employed aerial seeding technique** in 2020 to improve green cover in **Aravalli area of Faridabad**.
	  ○ In 2015, **Andhra Pradesh** had launched aerial seeding programme using Indian Navy helicopters.
	• **Aerial seeding is a technique of plantation** wherein **seed balls – seeds covered with a mixture of clay, compost, char and other components** – are sprayed on the ground using aerial devices, including planes, helicopters or drones.
	  ○ Seed balls after being dispersed in a barren area are expected to dissolve when it rains, and result in germination of the seeds.
	• **Advantage of Aerial Seeding:**
	  ○ **Easy plantation** in difficult terrains or inaccessible areas, helping to increase forest cover.
	  ○ Process of the seed's germination and growth is such that **it requires no attention** after it is dispersed.
	  ○ **Eliminate the need for ploughing and digging holes** in the soil.
	• The species selected have to be **native to the area, higher survival percentage**.

3.10. REPORTS AND INDICES

Report	Details
Protected Planet Report 2020	• **Released by:** UN Environment World Conservation Monitoring Centre (UNEP-WCMC), the International Union for Conservation of Nature (IUCN) and the National Geographic Society. • Protected Planet Reports are biennial landmark publications that **assess the state of protected and conserved areas around the world.** • The 2020 edition **provides the final report on the status of Aichi Biodiversity Target 11 and** looks to the future as the world prepares to adopt a new post-2020 global biodiversity framework. 

	• It is the first in the series to **include data on other effective area-based conservation measures (OECMs)** in addition to protected areas.
	  ○ **Other effective area-based conservation measures (OECMs)** are conservation designation for areas that are achieving the effective in-situ conservation of biodiversity outside of protected areas.
	  ○ While protected areas must have conservation as a primary objective, **there is no restriction on the management objectives of OECMs,** provided those objectives result in effective long-term conservation outcomes for biodiversity.

Conflict and Conservation	• **Released by:** International Union for Conservation of Nature (IUCN).
	• It focuses on the **complex relationships between nature and armed conflict**.
	• **Key highlights of the report**
	  ○ **Major threats posed by the conflict**
	  ✓ **Direct killing** of wildlife (e.g., for food)
	  ✓ **Degradation** of ecosystems
	  ✓ **Disruption** of conservation efforts
	  ○ Armed conflicts were particularly **prevalent in some of the world's more biodiverse regions.**
	  ○ **Conflicts were less frequent** within the boundaries of **natural reserves** and other protected areas.
	  ○ **Degradation of nature** was associated with increased risk of conflict.

Nature in a Globalised World	• **Released by:** International Union for Conservation of Nature (IUCN). • This is the first report in the IUCN flagship report series Nature in a Globalised World. The purpose of this series is to help bring the importance of nature conservation into mainstream political and economic decision-making.

A future for all - the need for human-wildlife coexistence report	• **Released by**- World Wide Fund for Nature (WWF) and UN Environment Programme (UNEP).
	• Key findings:
	  ○ **India will be most-affected by human-wildlife conflict**, according to report.
	  ✓ This was because it had **world's second-largest human population as well as large populations of tigers, Asian elephants, one-horned rhinos, Asiatic lions and other species.**
	  ✓ **India's elephants are restricted to just 3-4% of their original habitat.**

Nature-based solutions (NBS)	• A report titled **'State of Finance for Nature Report'** was released by: **United Nations Environment Programme,** the **World Economic Forum** and the Economics of Land Degradation (ELD).
	  ○ ELD, a global strategy for sustainable land management, is a global initiative established in 2011 by United Nations Convention to Combat Desertification supported by a broad network of partners across diverse fields of knowledge.
	  ○ Report highlights importance of investing in nature-based solutions (NBS) to meet global biodiversity and land degradation targets.
	• NBS are actions to protect, sustainably manage, and restore natural and modified ecosystems that address societal challenges effectively and adaptively, simultaneously providing human well-being and biodiversity benefits.
	• **Key findings of the report**
	  ○ More than half of the world's total GDP is moderately/highly dependent on nature. Agriculture, food and beverages and construction are the largest sectors dependent on nature.
	  ○ Global biodiversity and land degradation targets can be met only if annual investments in NBS are tripled by 2030 and increased four-fold by 2050 from the current level of investments.
	• Currently, Public sector spending for NBS is dominated by the United States and China, followed by Japan, Germany and Australia.

Ecosystem Restoration	• A report titled 'Ecosystem Restoration for People, Nature and Climate' was recently released by **UNEP in association with Food and Agriculture Organization (FAO).** ○ The report has been published for **UN Decade on Ecosystem Restoration:2021-2030.** • Ecosystem Restoration **means assisting in the recovery of ecosystems** that have been degraded or destroyed, as well as conserving the ecosystems that are still intact.

Food and Agriculture Organization of the United Nations	• **Key findings**
	  ○ **We are using the equivalent of 1.6 Earths** to maintain our current way of life, and ecosystems cannot keep up with our demands.
	  ○ Every year **ecosystem services worth more than 10% of our global economic output is lost.**
	  ○ **Around 1/3rd of the world's farmland is degraded**, about 87% of inland wetlands worldwide have disappeared since 1700, and **1/3rd of commercial fish species are overexploited.**
	  ○ Degradation is already **affecting the well-being of 40% of the world's population**.
	• **Restoration is essential for keeping global temperature rise below 2°C** among other benefits.

State of the World's Trees 2021	• Released by- London-based **Botanic Gardens Conservation International (BGCI).**
	  ○ BGCI is an **independent UK charity** established in 1987 to **link the botanic gardens of the world in a global network for plant conservation.**
	  ○ It is a membership organisation, representing **botanic gardens in more than 100 countries around the world.**
	• According to the report, **India's 18% tree species are threatened with extinction. India is also home to 650 endemic tree species** that are not found anywhere else.

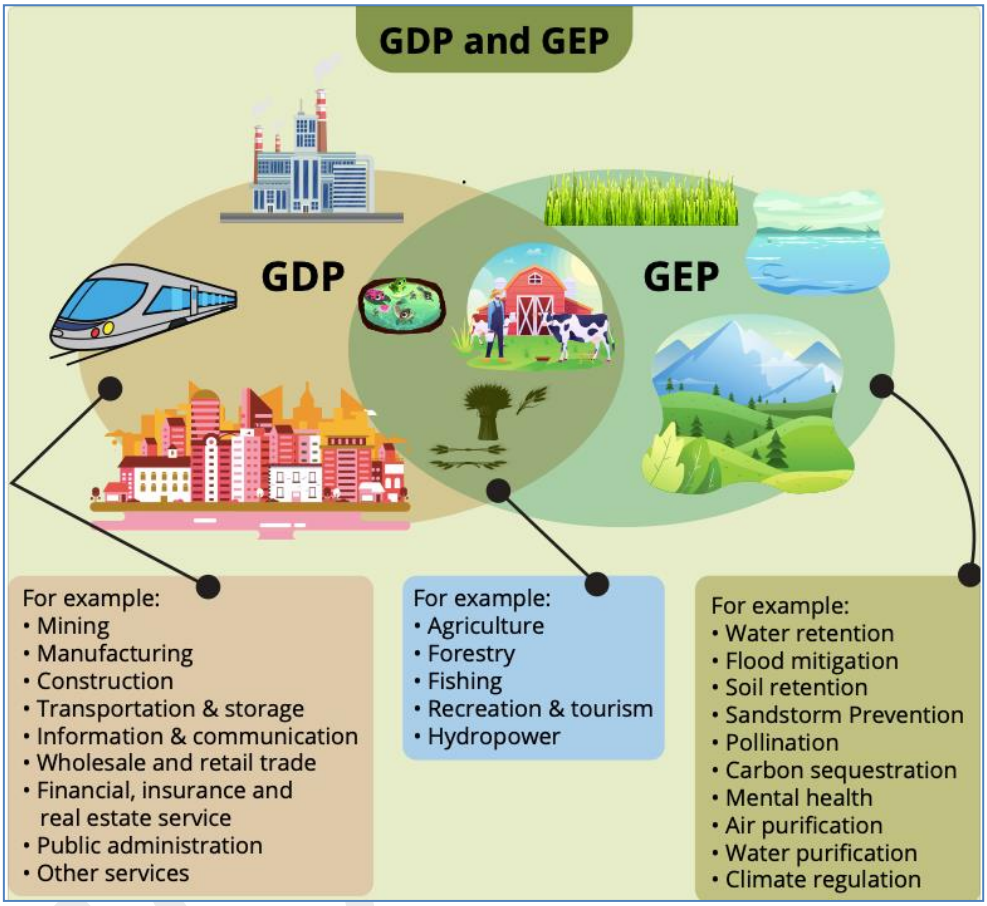
State of India's Environment Report 2021	• **Released by:** Centre for Science and Environment (CSE)
	  ○ CSE is a **public interest research and advocacy organization** based in New Delhi.
	• India's rank has slipped by two places from last year to 117 on the 17 Sustainable Development Goals (SDGs).
	• The **reasons for drop are challenges** like
	  ○ Ending hunger and achieving food security (SDG 2),
	  ○ Achieving gender equality (SDG 5) and
	  ○ Building resilient infrastructure, sustainable industrialisation and innovation (SDG 9).
	• India **ranked below four South Asian countries** — Bhutan, Nepal, Sri Lanka and Bangladesh.
	  ○ Overall SDG score of **India is 61.9 out of 100.**

4. SUSTAINABLE DEVELOPMENT

4.1. GROSS ENVIRONMENT PRODUCT

Why in news?

On World Environment Day, **Uttarakhand became the first state** in India **to take into account Gross Environment Product (GEP)** while calculating its Gross Domestic Product (GDP).



More in news

- **Four critical natural resources- Air, Water, Forest and Soil- will be assigned monetary values.** The **quality and quantity** of these natural resources would **determine the GEP of Uttarakhand.**

What is GEP?

- It is the **total value of final ecosystem services supplied to human well-being in a region annually** and can be **measured in terms of biophysical value and monetary value.**
- It indicates the **overall health of the environment** as GEP measures prime indicators such as forest cover, soil erosion, air quality and dissolved oxygen in river water.
- **Unlike Green GDP** which is obtained after deducting the damage to the environment from the total production of the state, **GEP will assess the improvement in the environment components in a year.** Further it will tell **how much work the state has done in reducing the loss of the ecosystem** in environmental protection and resource use.

Other global standards /initiatives	
System of Environmental and Economic Accounts (SEEA)	Guidebook developed by the United Nations to provide standards for incorporating natural capital and environmental quality into national accounting systems.
Happy Planet Index (HPI)	It was created by the **British New Economics Foundation (NEF) to** measure national welfare in the context of environmental sustainability.
Bhutan's Gross National Happiness (GNH)	It has environmental preservation as one of the four policy objectives.
Other	• **China** (since 2004) **has been undertaking studies to estimate the cost of various types of environmental damage which offsets its economic growth.** • **Sweden** (since 2003) **has brought in various environmental indicators** (like air emissions, waste etc.) as part of the government policy of achieving sustainable development

4.2. RENEWABLE ENERGY CERTIFICATE (REC)

Why in news?

Ministry of Power redesigned Renewable Energy Certificate (REC) Mechanism to boost green economy.

About Renewable Energy Certificates (REC)

- REC mechanism in India was introduced in 2010.
- Renewable Energy Certificate (REC) also called as **Renewable Energy Credit**, is a **market based instrument** where the owner of the REC can legally claim to have purchased renewable energy.
- **One Renewable Energy Certificate (REC) is treated as equivalent to 1 MWh.**
  - In other words, it represents the environmental benefits associated with one Megawatt-hour of electricity generated from a renewable energy resource.
- There are **two categories of RECs**, viz.,
  - **Solar RECs:** issued to eligible entities for generation of electricity based on solar as renewable energy source
  - **Non-solar RECs:** issued to eligible entities for generation of electricity based on renewable energy sources other than solar.
- RECs are traded in power exchange within the **forbearance price and floor price determined by Central Electricity Regulatory Commission (CERC)** from time to time.
- **National Load Despatch Centre (NLDC)** is responsible for registration of Renewable Energy Generation Facilities, issuance of Renewable Energy Certificates etc.
- **The distribution companies, Open Access consumer, Captive Power Plants (CPPs)** are eligible of purchasing the REC.
- **Current status of REC Scheme**
  - Only **4% of the installed RE capacity stands registered** as on December, 2021.
  - **Wind and solar power account for 58% and 21% share**, respectively, of the total registered capacity.
  - States with attractive renewable resources such as **Tamil Nadu, Maharashtra, Rajasthan and Gujarat account for 73% share of total registered capacity**.

CHANGES INTRODUCED IN THE REVAMPED REC MECHANISM ARE:

- **Validity of the REC is now perpetual** till it is sold. (Presently the validity of an REC is 3 years).
- **Removal of the floor and forbearance (maximum) prices** of REC.
- **Monitoring and surveillance mechanism** to ensure that there is no hoarding of RECs.
- **REC will be issued to the eligible RE generators for the period of the power purchase agreement (PPA).** (Existing RE projects eligible for REC would continue to get RECs for 25 years).
- **Technology multiplier** for promotion of new and high priced RE technologies.
- **RECs can be issued to obligated entities beyond their RPO targets.**
- **No REC to be issued to the beneficiary of subsidies**/concessions or waiver of any other charges.
- **Allowing traders and bilateral transactions in REC mechanism.**

4.3. GREEN DAY AHEAD MARKET (GDAM) PORTAL

Why in News?

Ministry of Power Launched Green Day Ahead Market (GDAM) Portal.

About the Portal

- GDAM portal will operate in **integration with the conventional day-ahead market** in the power sector, enabling **electricity generation and distribution companies** to buy or sell Renewable Energy (RE) through open access.
  - DAM is an **electricity trading market for delivery on the following day.**
- Power Exchanges **will allow participants to submit bids together for both conventional and renewable energy** through separate bidding windows.

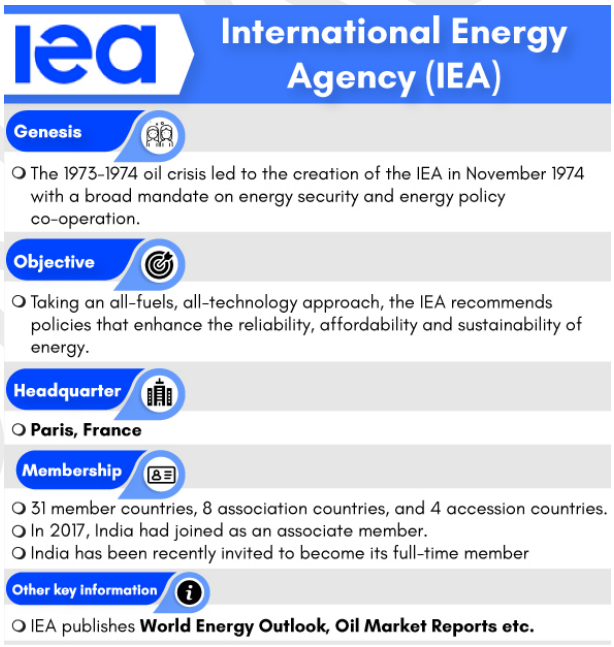
- **Significance of GDAM**
  - It will lead to a **gradual shift from Power Purchase Agreement (PPA) based contract to market-based models.**
  - **Providing competitive price sign**als to reduce the cost of power.
  - Promoting transparency, flexibility and **efficiency in green energy trade.**
  - Create Pan India Green market by unlocking the untapped potential of RE and instant payment to RE generators.
- **Other initiatives taken for promotion of Renewable energy**
  - **Power Exchange India (PXIL)** and **Indian Energy Exchange (IEX)** launched **Real-Time Electricity Market (RTM) platform.**
    - ✓ RTM **enable buyers and sellers pan-India** to meet their energy requirement closer to real time of operation.
    - ✓ Central Electricity Regulatory Commission (CERC) **regulates both IEX and PXIL.**
  - IEX started cross-border electricity trade to **build an integrated South Asian regional power market.**

4.4. ENERGY EFFICIENCY

4.4.1. GLOBAL FUEL ECONOMY INITIATIVE (GFEI)

Why in news?

According to International Energy Agency's (IEA) **Global Fuel Economy Initiative (GFEI) update** progress towards achieving a global goal to half the fuel **consumption of new light-duty vehicles by 2030 from 2005 levels has been lagging.**



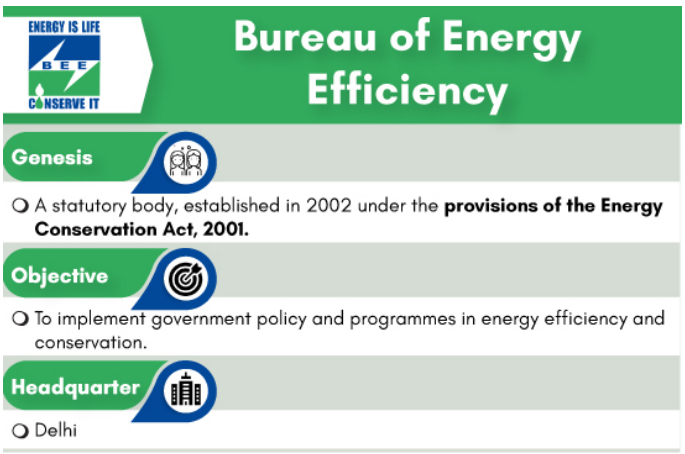
About Global Fuel Economy Initiative (GFEI)

- GFEI was founded in 2009 with the **purpose of promoting and supporting government action to improve energy efficiency** of the global light-duty vehicle fleet.
- It is a partnership between the **IEA, UNEP, the International Transport Forum of the OECD (ITF),** the International Council on Clean Transportation (ICCT), the University of California-Davis and the FIA Foundation.
- It has a target of improving average fuel economy of light duty vehicles by 2030 for new vehicles (compared with a 2005 baseline) and **includes electric and hybrid technology**.

4.4.2. ENERGY ACCOUNTING (EA)

Why in news?

Ministry of Power Mandates Electricity Distribution Companies (DISCOMS) to Undertake Energy Accounting (EA).



More on the News

- The **regulation** was issued by **Bureau of Energy Efficiency (BEE)** under the provisions of **Energy Conservation (EC) Act, 2001.**
- **Key regulations**
  - **Quarterly energy accounting** by DISCOMs, through a **certified Energy Manager**, within 60 days.
  - **Annual energy audit** by an independent Accredited Energy Auditor.

- Both annual and quarterly reports will be **published in the public domain.**

About Energy Accounting (EA)

- EA prescribes **accounting of all energy inflows at various voltage levels in the distribution periphery of the network**, including renewable energy generation and open access consumers, as well as energy consumption by the end consumers.
  - EA will provide **detailed information about electricity consumption** by different categories of consumers & the **transmission and distribution losses** in various areas. Enable **fixation of responsibility on officers** for losses and theft.
  - Enable the DISCOMS to plan for **suitable infrastructure up-gradation** as well as **demand side management** efforts.

Related News: Ministry of Power (MoP) Notifies Rules for the Sustainability of the Electricity Sector and Promotion of Clean Energy

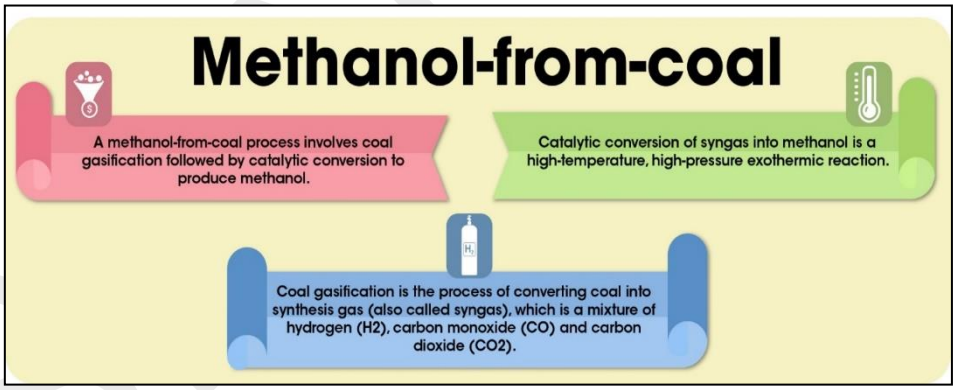
- New rules are notified (under Electricity Act, 2003) **to sustain economic viability of the sector, ease financial stress of various stakeholders and ensure timely recovery of costs** involved in electricity generation.
- **Key highlights of the rules**
  - **Compensation shall be payable by the procurer** in the event of a curtailment of supply from a must-run power plant.
  - Must run status means that the concerned power plant has to supply electricity to the grid under all conditions.
  - **RE generator is also allowed to sell power in the power exchange** and recover the cost suitably.

4.5. ALTERNATIVE FUELS AND ENERGY RESOURCES

4.5.1. METHANOL ECONOMY

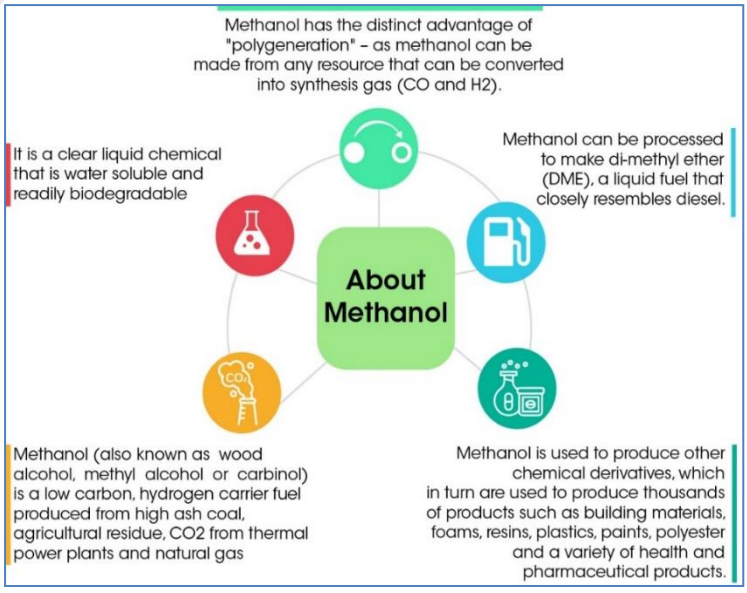
Why in News?

Recently, India's first Indigenously Designed High Ash Coal Gasification Based Methanol Production Plant was inaugurated at BHEL R&D Centre, Hyderabad.



About Methanol Energy

- Methanol burns efficiently in all internal combustion engines, produces no particulate matter, no soot, almost nil SOx and NOx emissions.
  - Blending of 15% methanol in petrol will reduce pollution by 33% & diesel replacement by methanol will reduce pollution by more than 80%.
- Although **slightly lower in energy content** than petrol and diesel, methanol can replace both these fuels in Transport sector, Energy sector, Retail cooking etc.
- Methanol & DME are substantially cheaper than Petrol and Diesel.
- Methanol has many desirable attributes which make it an excellent spark-ignition engine fuel, including **high octane number and improved efficiency**.



Initiatives taken in India

- **NITI Aayog's road map for Methanol Economy**
- Substitute 10% of Crude imports by 2030, by Methanol alone.
- 20MT of methanol annually can be produced @ Rs. 19 a litre by 2025 by using Indian High Ash coal, Stranded gas, and Biomass
- **Methanol Economy Research Programme**, by Department of Science and Technology, for production of Methanol from various sources including Indian coal and CO_2 from thermal plants, steel plants etc.
- **Bureau of Indian Standards has notified 20% DME blending with LPG**, and a notification for M-15, M-85, M-100 blends has been issued by the Ministry of Road, Transport and Highways.
- **Test standards and plans for the M-15 blend are being evolved** in consultation with the Indian Oil Corporation Limited, Automotive Research Association of India and Society of Indian Automobile Manufacturers.
- **Railway is working towards blending methanol** in the range of 5-20% through direct fuel injection in locomotives.
- In 2018, Assam Petrochemicals launched **Asia's first canister-based methanol cooking fuel programme.**
- Recently, BHEL developed India's **first pilot plant** at **Hyderabad** using indigenous technology to **convert high ash coal to methanol**.
    - It uses **fluidised bed gasification technology** to first produce **synthesis (syngas) gas** from coal and then convert it into **methanol** with 99% purity.
    - As part of the **Clean Energy Research Initiative** from **NITI Aayog** and funded by the **Department of Science and Technology**, it will help India in adoption of **clean technology**, optimum utilization of Indian **energy reserves** and reduce crude oil imports for **self-reliance**.

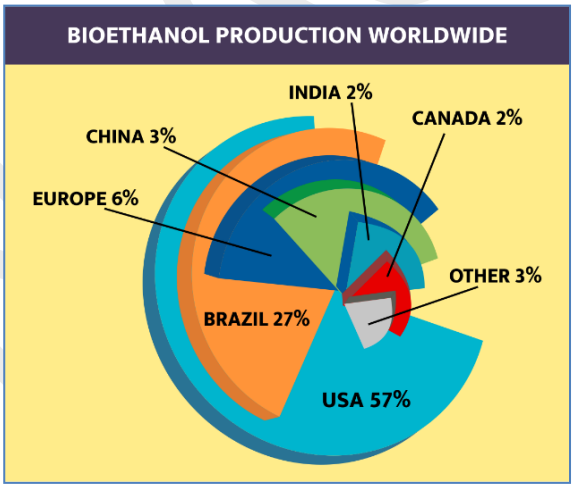
4.5.2. ETHANOL BLENDING IN INDIA

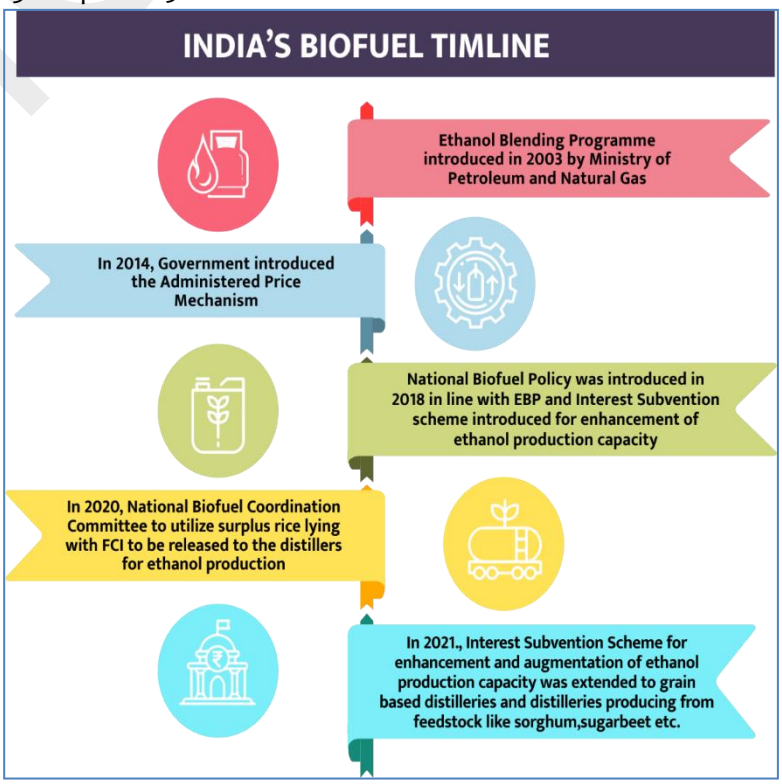
Why in News?

Recently, the central government has **advanced the target of 20% ethanol blending** in petrol (also called as E20)**, by five years to 2025, from 2030**.

More in News

- The Government has also released an **expert committee report** on the **'Roadmap for Ethanol Blending in India by 2025'**.
    - It proposes a gradual rollout of ethanol-blended fuel to achieve E10 fuel supply by April 2022 and phased rollout of E20 from April 2023 to April 2025.
    - Earlier, National Biofuel Policy 2018 had envisaged an indicative target of 20% blending of ethanol in petrol and 5% blending of biodiesel in diesel by 2030.
    - In 2020, India had set a target of 10% ethanol-blending in petrol by 2022, 20% ethanol-blending in petrol by 2030 and 10% ethanol-blending in diesel by 2030.
- It also recommends **introducing vehicles** that are compatible by **rolling out of E20 material-compliant and E10 engine-tuned vehicles from April 2023 and production of E20-tuned engine vehicles from April 2025.**
    - These efforts will **facilitate setting up of additional ethanol distillation capacities** and will provide timelines for **making blended fuel available across the country**.





- It will also **help increase consumption of ethanol** in the ethanol producing states and the adjoining regions before the year 2025.

What is ethanol blending?

- An ethanol blend is defined as a **blended motor fuel containing ethyl alcohol** that is at least 99% pure, derived from agricultural products, and blended **exclusively with gasoline.**
  - Since it is plant-based, it is **considered to be a renewable fuel.**
- Government has allowed ethanol production/ procurement from **sugarcane-based raw materials** viz. C & B heavy molasses, sugarcane juice / sugar / sugar syrup**, surplus rice with Food Corporation of India (FCI) and Maize**.
- The Oil Marketing Companies are to procure ethanol from domestic sources and blends ethanol at its terminals.
  - Government has been notifying administered price of ethanol since 2014.
- **Department of Food and Public Distribution (DFPD)** is the nodal department for promotion of fuel grade ethanol producing distilleries in the country.

Recent Initiatives to promote bioethanol

- Under **PM-JIVAN (Jaiv Indhan- Vatavaran Anukool fasal awashesh Nivaran) Yojana,** 12 commercial plants and 10 demonstration plants of Second Generation (2G) Bio-Refineries are envisaged to be set up in areas having sufficient availability of biomass so that ethanol is available for blending throughout the country.
- **2G plants utilise surplus biomass and agricultural waste** to produce bioethanol.
- Cabinet Committee on Economic Affairs (CCEA) approved ₹8,460 crore **Modified scheme for extending interest subvention for those setting up standalone ethanol distilleries** using grain, molasses, dual feed, sugar beet, sweet sorghum and cereals as a feedstock.
  - The focus is on **increasing India's ethanol production capacity**.
- Prime Minister has launched a **Pilot Project of E 100 dispensing stations at three locations in Pune**.

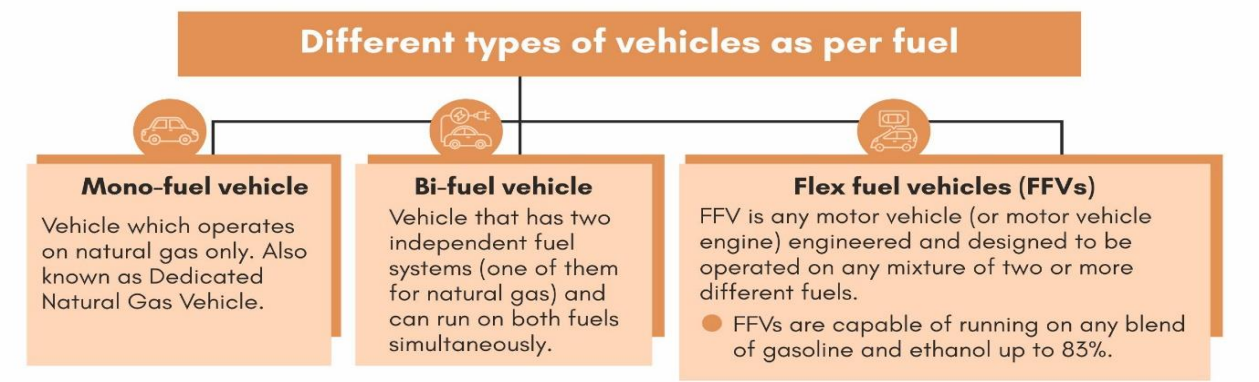
Related News:

Notification of Mass Emission Standards for E12 AND E15 Fuels by Ministry of Road Transport and Highways

- The **mass emission standards for E 12 (12% Ethanol with Gasoline) and E15 (15% Ethanol with gasoline) fuels** are notified under the **Central Motor Vehicles (Twenty Fifth Amendment) Rules, 2021.**
  - This will enable the Automotive Industry to manufacture **E 12 and E 15 compliant motor vehicles.**
  - The **compatibility of vehicle** to the level of ethanol blend shall be **displayed on vehicle** by putting a clearly visible sticker.
  - This is in line with **India's Ethanol Blending Program** which sets a target of 20% Ethanol blending with gasoline by 2023-24.

Government issues advisory to carmakers to introduce flex-fuel engines in vehicles

- Car makers have been **given six months to introduce flex fuels** so that cars can also run on ethanolin the future.
- **Flex Fuel Vehicle** is a **modified version of vehicles that could run both on gasoline and blended petrol** with different levels of ethanol blends.
  - These are currently being used successfully in Brazil, **giving people the option to switch fuel** (gasoline and ethanol).



Cassava (Tapioca)

- ICAR-Central Tuber Crops Research Institute (CTCRI) has identified **Cassava (tapioca) as a promising raw material for bioethanol production** to meet Ethanol Blending Petrol (EBP) programme target of 2025.
- **About Cassava:**
- Its starch with its unique **physico-chemical and functional properties** finds extensive applications in the **food and industrial sectors.**
- The agricultural residues of cassava such as peels, stems and leaves are **potential feedstock for 2G bioethanol production.**
- **Major production is from Tamil Nadu,** followed by Kerala.

4.5.3. USED COOKING OIL BASED BIODIESEL

Why in News?

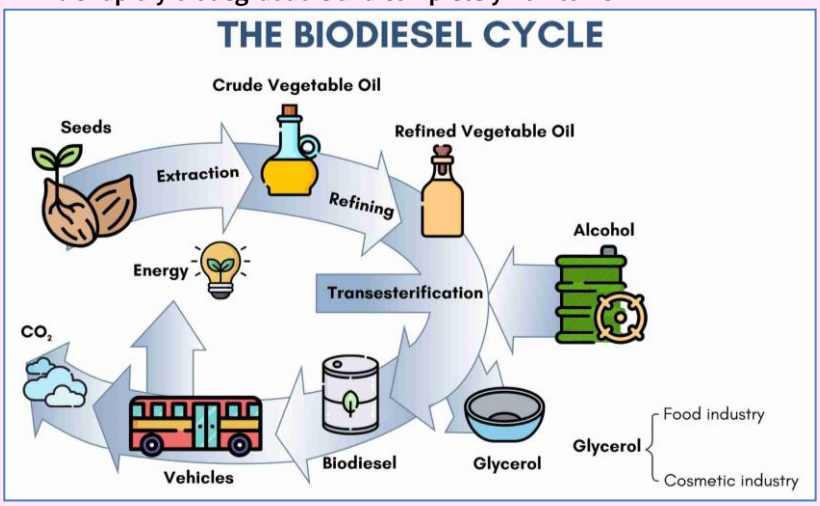
Recently, Indian Oil Corporation has kicked-off the supply of diesel that is blended with biodiesel made from used cooking oil.

About Used Cooking Oil (UCO)

- UCOs are oils and fats that have been used for cooking or frying in the food processing industry, restaurants, fast foods and at consumer level, in households.
  - UCO must contain only fats, oils, or greases **that were previously used for cooking or frying operations**.
- UCO is an **important source of raw material to produce biodiesel.**
- It is also used for making soap, cosmetics, cooking oil, and animal feed, etc**.**
- **Benefits of biodiesel made from UCO**
  - **Prevent people from serious ailments such as hypertension, obesity, atherosclerosis, Cancer, Alzheimer's disease, liver diseases** by removing reused or burnt cooking medium from the food chain.
  - UCO when discarded without any treatment **clogs drainage systems**.
  - **Contributing to the needs of a Circular Economy**.

About Biodiesel

- It is an **alternative fuel, similar to conventional or 'fossil' diesel**.
- It can be produced from **vegetable oil, animal oil/fats, tallow and waste cooking oil.**
- The process used to convert these oils to Biodiesel is called **Trans-esterification.**
- It is **'carbon neutral'**.ie the oilseed absorbs the same amount of CO_2 as is released when the fuel is combusted in a vehicle.
- It is **rapidly biodegradable and completely non-toxic**.



Initiative taken to make biodiesel from UCO

- In 2019, Ministries of Petroleum and Natural Gas & Steel, along with Health & Family Welfare, Science & Technology and Earth Sciences, **had initiated Expressions of Interest for "Procurement of Bio-diesel produced from UCO"**
  - It aims to create an eco-system for collection and conversion of UCO into Biodiesel and developing entrepreneurship opportunities.
  - Under this initiative, OMCs offer periodically **incremental price guarantees for five years and extend off-take guarantees for ten years to prospective entrepreneurs.**
- **National Policy on Biofuels, 2018**, encourages setting up of supply chain mechanisms for **biodiesel production from non-edible oilseeds, Used Cooking Oil, short gestation crops**.
- **Food Safety and Standards Authority of India (FSSAI)** in association with the Biodiesel Association of India (BDAI) **launched 'Repurpose Used Cooking Oil (RUCO) project'** in 2019.
  - Project is aimed at purchasing used oils from hoteliers, caterers, snack makers and traders at a reasonable price and converting it into biodiesel at a plant.
- **RUCO sticker and a mobile phone application was launched** for collection of used cooking oil (UCO) to ensure that it does not come back to ecosystem.

Issues with RUCO

- At present, there is **no established chain of collection for UCO.**
- **Presence of impurities** like free fatty acid and water in UCO.
- RUCO require **large food business operators to store UCO separately**, which they can then sell to authorised UCO aggregators or collection agencies.

4.5.4. NATIONAL COAL GASIFICATION MISSION

Why in News?

Recently, a blueprint for the 'National Coal Gasification Mission' prepared by the Union Coal Ministry.

More in News

- The government **aims to achieve gasification of 100 Million Tonnes (MT) of coal by 2030** and this is the first time that a mission document has been released.
- In order to take ahead the Vision of 100 MT coal Gasification by 2030, Ministry of Coal has chalked out implementation strategy which include:
  - **Mapping of gasification potential of coalfields** especially in North east.
  - **Development of indigenous technology** suitable for various feed stock (low ash coal, coal mixed with pet coke and high ash coal).
  - **Development of suitable business model** for setting up of various projects.
  - **Marketing strategy for end products.**
  - **Policy support** with a view to encourage Atmanirbhar Bharat Scheme.
  - **Coordination with various stake holding Ministries.**
  - **Providing quantifiable targets** to various companies and monitoring the implementation of activities.

India's initiative for coal gasification

- Ministry of Coal has **created a Resource Group of academic and research institutions for research activities related to Coal Gasification.**
- **Bharat Heavy Electricals Limited (BHEL) has developed the fluidized bed gasification technology** suitable for high ash Indian coals to produce syngas and then convert syngas to methanol with 99% purity.
- **Jindal Steel & Power Limited has installed world's first DRI plant based on Coal gasification technology by using domestic coal** which is already operating in Angul District of Orissa for steel making.

About Coal Gasification

- Coal gasification is the **process of converting coal into synthesis gas** (also called syngas), which is **a mixture of hydrogen (H_2), carbon monoxide (CO) and carbon dioxide (CO_2).**
- The syngas technology allows **conversion of non-mineable coal/lignite into combustible gases through in situ gasification of the material.**
- Coal gasification is considered as **cleaner option** compared to burning of coal.

Coal Gasification Products

Source	Compounds		Products
	Precursor	Derivatives	
Bituminous coals (High grade)	Hydrogen		Refinery processes; Ammonia; Ammonium nitrate
	Carbon monoxide		Acetic acid; Chemical feedstock
		Acetic acid	Household cleaners; Waterproof sealants
	Methanol		Dyes, Formaldehyde; Fuels; plasticizers; Source for methyl acetate
		Formaldehyde	Caulks; Cements and glues; Construction adhesives; Detergents; Fingernail polish; Liquid soaps and shampoos
		Olefins:	Ethylene glycol; Polyester fibers; Engine coolant; Source for ethylene and propylene
		Ethylene	Styrene to make synthetic rubber
		Propylene	Fuel (similar to propane); Refrigerants
		Methyl acetate	Solvent for paints and glues: Source for acetic anhydride
		Acetic anhydride	Cellulosic plastics: Filter products; Photographic film

4.5.5. ENERGY STORAGE SYSTEM (ESS)

Why in news?

Minister of Power and New and Renewable Energy discusses draft Policy on Energy Storage system (ESS).

More on the news

- Objective of the policy is to **promote the creation of storage systems on a large scaleacross the value chain of the electricity sector** viz. at generation, transmission, and distribution levels throughout the country.
- **Key highlights of the draft policy include**
  - ESS shall be an **integral part of the power system under Electricity Act.**
  - People may be free to set up standalone ESS.
  - Developer shall be **granted inter-state transmission connectivity** allowing them to sell or purchase power from any part of country.

- Quantum of ESS included with Round-The-Clock Renewable Energy shall be **counted as Renewable Purchase Obligation (RPO) for storage.**
- **Transmission cost for renewable energy shall be waived** both at time of charging as well as at time of selling the stored RE.

- Earlier, Government launched **National Mission on Transformative Mobility and Battery Storage** to promote ESS.
- **About Energy storage systems**
  - **Energy storage systems** are devices that **enable energy from renewables like solar and wind to be stored and then released when customers need power most.**
  - **Key grid energy storage technologies** - Batteries, pumped hydroelectric storage, compressed air energy storage, Thermal storage, hydrogen, flywheels.

Related news: National Programme on Advanced Chemistry Cell (ACC) Battery Storage
- It is a **Production Linked Incentive scheme** approved by the Cabinet.
- ACCs are the new generation storage technologies that can **store electric energy either as electrochemical or as chemical energy and convert it back to electric energy** as and when required.

4.6. MISCELLANEOUS

4.6.1. DAM SAFETY ACT, 2019

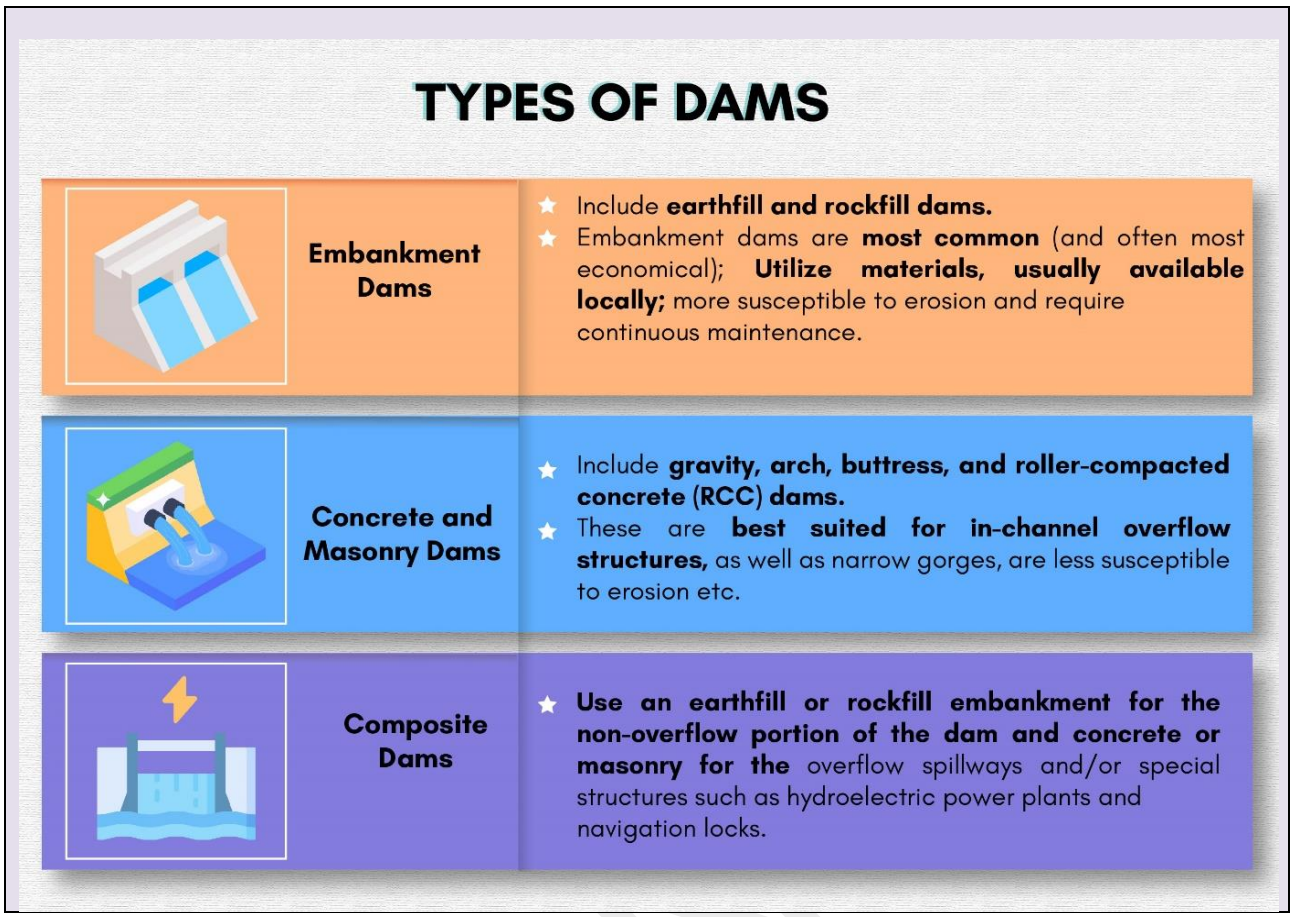
Why in News?

Recently, Rajya Sabha passed the Dam Safety Bill, 2019.

More on News

- Act proposes to help all states and UTs **adopt uniform dam safety procedures** and seeks to set up an **institutional mechanism to ensure the safe functioning of specific dams** in the country.
- It provides for **adequate surveillance, inspection, operation, and maintenance of all the large dams** in the country so as to prevent dam failure related disasters.

Dams in India
- **India ranks third globally** after China and U.S with 5334 large dams in operation and 411 under- construction. They are vital for **ensuring the water security of the country** and constitute a major responsibility in terms of asset management and safety.
  - As per the data of the National Register of Large Dam (NRLD) of 2018, **Maharashtra has maximum number of Dams** followed by Madhya Pradesh and Gujarat.
- **Major dams in India (refer map):**
  - **Highest Dam: Tehri Dam** in Uttarakhand is built on **Bhagirathi River.**
  - **Longest Dam: Hirakud Dam** in Odisha is built on **Mahanadi River.**
  - **Oldest Dam: Kallanai Dam** in Tamil Nadu is built on the **Cauvery River** is about **2000 years old.**



Key features of the Act

Applicability	• **Act applies to all specified dams in the country.** These are dams with: o Height more than 15 metres, or o Height between 10 metres to 15 metres and satisfying certain additional design conditions such as reservoir capacity.
Dam safety authorities	• There will be **four layers of monitoring, two at the central level and two at the state level.** o A **National Committee on Dam Safety (NCDS)** will be constituted to help evolve uniform dam safety policies, protocols, and procedures. o A **National Dam Safety Authority (NDSA)** as a regulatory body for ensuring the nationwide implementation of dam safety policies and standards. ✓ Any decision taken by NDSA shall be binding upon all the parties. o At the State level, the Act prescribes for the constitution of **State Committees on Dam Safety (SCDS)** and the establishment of the **State Dam Safety Organizations (SDSO).** ✓ **SDSO will undertake surveillance, inspections and monitoring** of operation and maintenance of all specified dams. ✓ Every SDSO is required to report the event of any dam failure under their jurisdiction to the NDSA.
Obligation of Dam Owners	• **Dam owners will be responsible for the safe construction, operation, maintenance** and supervision of a dam. They must provide a dam safety unit in each dam. • **Functions of Dam owners** include preparing an emergency action plan, carrying out risk assessment studies and preparing a comprehensive dam safety evaluation.
Offences and penalties	• Anyone obstructing a person in the discharge of his functions under the Act or refusing to comply with directions may be imprisoned for a year. • In case of loss of life, the person may be imprisoned for two years.
Others	• It also addresses in a comprehensive manner, **critical concerns related to dam safety on account of emerging climate change related challenges.** • This Act provides for regular inspection and hazard classification of dams.

Other Government initiatives for Dam Safety

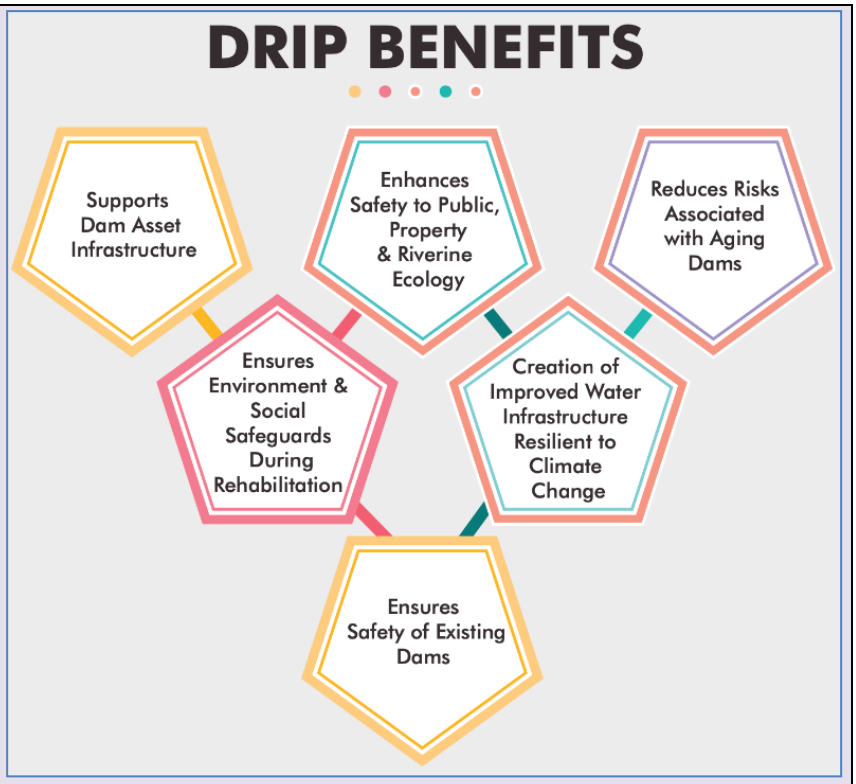
- **DHARMA (Dam Health and Rehabilitation Monitoring):** It is a **web tool to digitize all dam related data** effectively that will help to document authentic asset and health information pertaining to the large dams

in the country, enabling appropriate actions to **ensure need-based rehabilitation**. It is a new stride in asset management aspect by India.

- **Seismic Hazard Assessment Information System (SHAISYS):** It is a **web based interactive application tool,** being developed in CWC (Central Water Commission) under Dam Safety Organisation (DSO) to estimate Seismic Hazard at a point in South Indian region.

Related News: Dam Rehabilitation and Improvement Project (DRIP)

- Recently, **India and World Bank signed a $250 million project** for **Dam Rehabilitation and Improvement Project (DRIP Phase II)** to make existing dams safe and resilient.



About Dam Rehabilitation and Improvement Project (DRIP)

- It is a **State Sector scheme** with a central component, **initiated in 2012** by Government of India with financial assistance from the World Bank to **bridge the funding gap** and **provide urgent finance to States for repair** and maintenance of dams.
- 80% of the total project is provided by the World Bank as loan/credit and remaining 20% is borne by the States/ Central Government.
- It is touted as the **World's largest dam management program.**
- **DRIP Phase-I:**
  - It has comprehensively addressed hydrological, structural, and operational safety of **223 dams located in seven States** (Jharkhand, Karnataka, Kerala, Madhya Pradesh, Odisha, Tamil Nadu, and Uttarakhand).
  - The **Central Water Commissi s. on (CWC)** had been entrusted with **overall coordination and supervision.**
  - It was successfully **closed in March 2021.**
- **DRIP Phase II and Phase III:**
  - Based on the success of DRIP Phase-I, **Ministry of Jal Shakti initiated** another **externally funded Scheme DRIP Phase II and Phase III.** This new Scheme has **19 States,** and **three Central Agencies** on board. It was approved in 2020 for rehabilitation provision of **736 dams.**
  - The Scheme is of **10 years duration,** proposed to be implemented in **two Phases,** each of six-year duration with two years overlapping.
  - DRIP Phase-II is being co-financed by two multi-lateral funding Agencies - **World Bank** and **Asian Infrastructure Investment Bank (AIIB),** with **funding of US$ 250 million each.**
  - The funding pattern of Scheme is **80:20**(Special Category States), **70:30**(General Category States) and **50:50**(Central Agencies). The Scheme also has provision of **Central Grant of 90% of loan amount for special category States** (Manipur, Meghalaya and Uttarakhand).

4.6.1.1. DAMS/HYDROELECTRIC PROJECTS IN NEWS

India	
Mekedatu Dam, Karnataka	• NGT formed a committee to investigate into the alleged violation of norms in the construction of Mekedatu Dam. • It is projected to generate 400MW of electricity and also solve the water crisis in the city of Bengaluru and nearby regions. • Its construction is **disputed by Tamil Nadu**. • Located on- confluence of River **Cauvery** with its **tributary Arkavathi** river in Karnataka.
NagarjunaSagar Dam	• Recently, the dam became a point in water war between Andhra Pradesh and Telangana with Andhra Pradesh accusing Telangana of unilateral hydel power generation without **Krishna River Management Board** approval which was **notified recently** along with **Godavari River Management Board**. • Located on- River **Krishna**, between Nalgonda (Telangana) and Guntur (Andhra Pradesh) border.
Ratle HEP, Jammu and Kashmir	• Currently, there is a **disagreement between India and Pakistan on Ratle and Kishenganga (Jhelum River) projects.** • Located on- **River Chenab,** Kishtwar district, Jammu and Kashmir.
Jangi Thopan Powari HEP, Himachal Pradesh	• Protests were held against the proposed Run of River **Jangi Thopan Powari** hydroelectricity project in Himachal Pradesh. • Located on- **River Satluj,** Kinnaur district, Himachal Pradesh.
Mullaperiyar Dam, Kerala	• **Kerala government has raised concerns over Tamil Nadu releasing water** from the Mullaperiyar Dam without sufficient warning. • Located on- the **confluence of Mullayar and Periyar rivers in Kerala.**
Gandhi Sagar Dam, Madhya Pradesh	• According to the CAG report, Gandhi Sagar in Madhya Pradesh needs immediate repair. • Located on- **Chambal river**
Pakal Dul Hydro Electric Project, Jammu and Kashmir	• Recently, a diversion of **Marusudar River** of **Pakal Dul Hydro Electric Project** was inaugurated in Kishtwar District of Jammu and Kashmir. • Once completed, the **1,000 MW Pakal Dul Hydro Electric Project** will be the **largest hydroelectric project** of J&K producing around 3,330 million units (MU) of energy a year. • Located on- **Marusudar River, Jammu and Kashmir** ○ It is a major tributary of Chenab River, it originates from Nunkun glacier and joins Chenab River.
Pulichintala Dam, Andhra Pradesh	• Flood alert was raised after gate got broken. • Located on- **Krishna river** in Andhra's Krishna district**.** • Also called as **K L Rao Sagar multipurpose irrigation** project, it is a multi purpose project serving **irrigation needs, hydro power generation and flood control** of Andhra Pradesh.
International	
Baihetan Hydropower Station, China	• China recently began operating it. • Located on- **Jinsha River**
Grand Ethiopian Renaissance Dam, Ethiopia	• It is the source of an almost **decade-long diplomatic standoff between Ethiopia and downstream nations Egypt and Sudan.** • When completed it will be **largest dam in Africa.** • Located on- **Nile River's main tributary - Blue Nile.** ○ **White Nile and Blue Nile** are two major **tributaries of the Nile**. Blue Nile supplies about 80% of the water in the Nile during the rainy season.

Grand Ethiopian Renaissance Dam

4.6.2. NATIONAL INTERLINKING OF RIVERS AUTHORITY (NIRA)

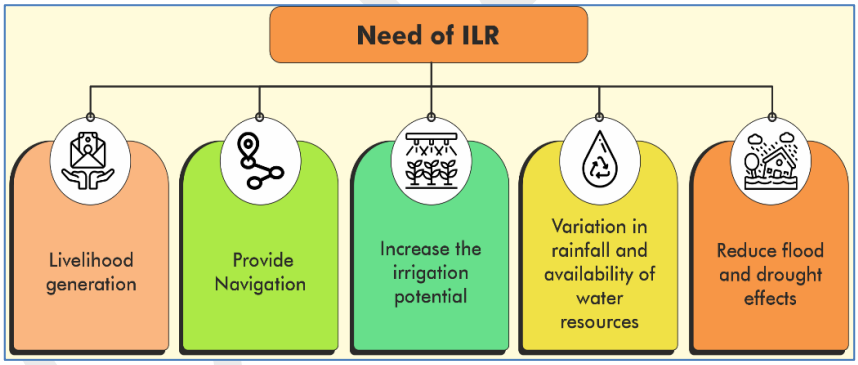
Why in news?

Recently, the Centre has set in motion the process of creating the exclusive body- **National Interlinking of Rivers Authority (NIRA)-** to implement river-linking projects in India.

What is National Interlinking of Rivers Authority (NIRA)?

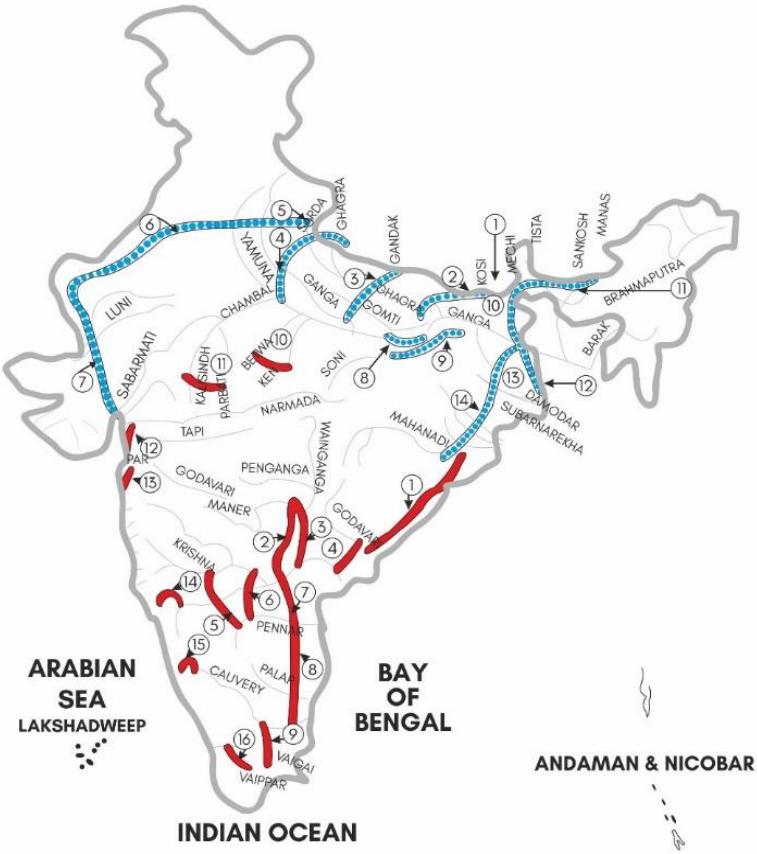
- NIRA is an **independent autonomous body** for planning, investigation, financing and the **implementation of the river interlinking projects in the country.**
- NIRA will be headed by a **Government of India Secretary-rank officer**.
- It will replace the existing **National Water Development Agency (NWDA)** and will function as an **umbrella body for all river linking projects**.
- **Function of NIRA:**
  - **Coordinate with neighbouring countries** and concerned states and departments as directed by the Ministry of Jal Shakti or the Ministry of External Affairs.
  - Have **powers on issues related to environment, wildlife and forest clearances** under river linking projects and their legal aspects.
  - Have the **power to raise funds** and act as a repository of borrowed funds or money received on deposit or loan given on interest.
  - Have the power to set up a **Special Purpose Vehicle (SPV)** for individual link projects.

About Interlinking of Rivers (ILR) Programme in India



- **Background of ILR:**
  - The initial plan to interlink India's rivers came in 1858 from a **British irrigation engineer, Sir Arthur Thomas Cotton,** who suggested **interlinking the Ganga and the Cauvery rivers** for navigational purposes.
    - ✓ But the idea of interlinking Indian rivers was revived a few decades ago independently by M. Visveswarayya, K. L. Rao and D. J. Dastur.
  - In 1980, **National Perspective Plan (NPP)** was prepared by the then Ministry of Irrigation (now Ministry of Jal Shakti).
    - ✓ Under NPP, the **National Water Development Agency (NWDA)** has identified 30 links (16 under Peninsular Component and 14 under Himalayan Component). (Refer map)
  - A **"Special Committee on Interlinking of Rivers"** has been constituted in September, 2014 for the implementation of ILR programme.
  - The **Ministry of Jal Shakti is monitoring the progress** of ILR from time to time.
- **Aim of ILR: Linking different surplus rivers of country with the deficient rivers** so that the excess water from surplus region could be diverted to deficient region.

- As of now, there are **six ILR projects:** Ken- Betwa, Damanganga- Pinjal, Par- Tapi -Narmada, Manas- Sankosh -Teesta- Ganga, Mahanadi-Godavari, and Godavari-Cauvery (Grand Anicut).



Peninsular Component

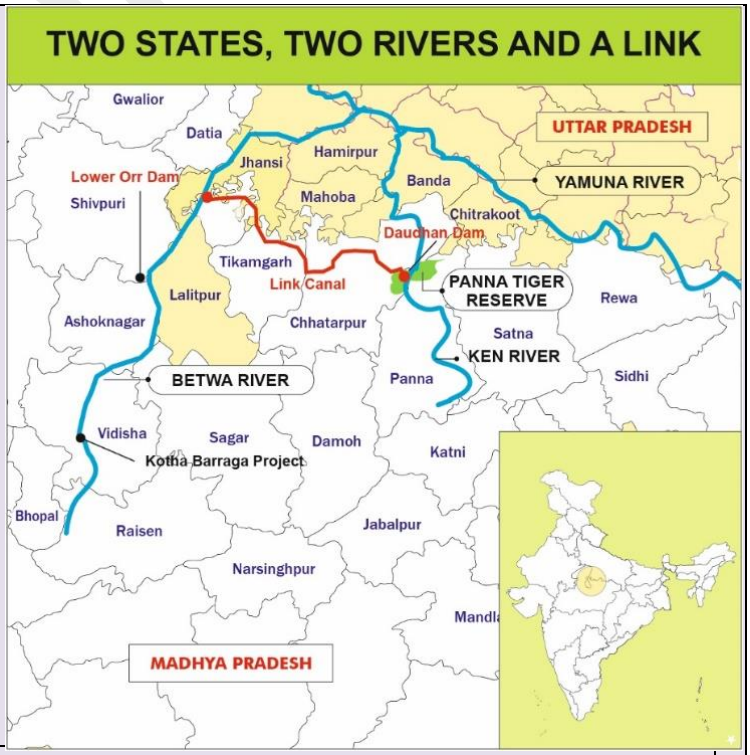
1. - Mahandi - Godavari
2. Inchampalli - Nagarjunasagar
3. Inchampalli - Pulichintala
4. Polavaram - Vijayvada
5. Almatti - Pennar
6. Srisailam - Pennar
7. Nagarjunsagar - Somasila
8. Somasila-Grand Anicut
9. Kattalai - Vaigai - Gundar
10. Ken Betwa
11. Parbati - Kalisindh - Chambal
12. Par - Tapi - Narmada
13. Damanganga - Pinjal
14. Bedti - Varda
15. Netravati - Hemavati
16. Pamba - Achankovil - Vaippar

Himalyan Component

1. Kosi - Mechi
2. Kosi - Ghagra
3. Gandak - Ganga
4. Ghagra - Yamuna
5. Sarda - Yamuna
6. Yamuna- Rajasthan
7. Rajasthan - Sabarmati
8. Chunar - Sone Barrage
9. Sone Dam - Souther Tributaries of Ganga
10. Manas - Sankosh - Tista - Ganga
11. Jogighopa - Tista - Farakka (Alternate)
12. Farakka - Sunderbans
13. Ganga (Farakka) - Damodar - Subernarekha
14. Subernarekha - Mahanadi

Ken-Betwa River interlinking Project (RLP)

- Recently, Cabinet **approved the funding and implementation of Ken-Betwa** RLP.
- It is **the first project under the National Perspective Plan** for interlinking of rivers.
- Ken-Betwa RLP transfers water f**rom Ken to Betwa River through the construction of Daudhan Dam** and a canal linking the two rivers. Both these rivers are tributaries of river Yamuna.
- It will carry **water from water surplus areas to drought prone and water deficit areas in Bundhelkhand Region.**
- **Implementing Agency**: Ken-Betwa Link Project Authority (KBLPA), a Special Purpose Vehicle.
- However, there are concerns like the project will **partly submerge the Panna Tiger Reserve in MP** and affect the habitat of vultures and jackals.



About Ken and Betwa River			
River	**Origin**	**River Basin**	**Other features**
Ken River	Kaimur Hills (Jabalpur)	Madhya Pradesh and Uttar Pradesh	• Flows through Panna and Joins Yamuna as its last tributary
Betwa River	Raisen district (MP)	Madhya Pradesh and Uttar Pradesh	• Joins Yamuna as its Tributary

4.7. OTHER SUSTAINABLE INITIATIVES IN NEWS

Earth Overshoot Day	• Earth Overshoot Day marks the date when **humanity's demand** for **ecological resources** and **services** in a **given year** exceeds what **Earth can regenerate in that year**. o It is hosted and calculated by **Global Footprint Network** since **1970**. o **29th July** was the Earth overshoot day for 2021. • **Last year the Earth Overshoot day was on 22nd August,** which was an exception to the advancing trend of overshoot till 2019 (29th July). This year the pre-2020 trend has returned due to o **Increased deforestation** of Amazon's rainforests. o **Increase in CO_2 emissions** by energy sector.
Green Voyage 2050 Project	• Launched in May 2019, it is a **partnership project between Norway and International Maritime Organisation (IMO).** • Aim is to **transform the shipping industry towards a lower carbon future.** o It is **supporting developing countries** in meeting their commitment **towards relevant climate change and energy efficiency goals**, for international shipping, • **India has been selected as the first country** under this project for **conduct of a pilot project related to Green Shipping.**
Geospatial Energy Map of India	• NITI Aayog in collaboration with **Indian Space Research Organisation (ISRO)** has developed a comprehensive **Geographic Information System (GIS) Energy Map of India** with the support of Energy Ministries of Government of India. o GIS is a computer system for **capturing, storing, checking, and displaying data** related to positions on Earth's surface. o GIS technology is a crucial part of **spatial data infrastructure**. • This GIS map provides a **holistic picture of all energy resources** of the country. o This is in line with the **Draft National Geospatial Policy, 2021.** o It enables **visualisation of energy installations** such as conventional power plants, oil and gas wells, petroleum refineries, coal fields and coal blocks, district-wise data on renewable energy power plants and renewable energy resource potential, etc. through **27 thematic layers.**
Shunya Labelling for Net Zero Energy Buildings (NZEB)	• Recently, **Shunya programme for NZEB and Net Positive Energy Buildings (NPEB)** were launched • NZEB are **highly efficient buildings with extremely low energy demand.** • Based on **Energy Performance Index (EPI)**, i.e. total energy consumed in a building over a year divided by total built up area, the buildings having o 10 ≤ EPI ≤ 0 kWh/m2/year, **will be awarded by Shunya Label.** o EPI < 0 kWh/m2/year **will be awarded by Shunya+ label.** • It will **encourage to make energy efficient buildings and further making improvements** to make it NZEB/NPEB.
Network for Greening the Financial System	• **Reserve Bank of India (RBI) has joined** the Central Banks and Supervisors Network for Greening the Financial System (NGFS) as a member. • **About NGFS:** o The NGFS is a **group of Central banks and supervisors** willing to share the best practices and contribute to the development of the **environment and climate risk management in the financial sector**. o The System was launched **at the Paris One Planet Summit in December 2017.**
Strategic Clean Energy Partnership (SCEP)	• The SCEP is launched in accordance with **US-India Climate and Clean Energy Agenda 2030Partnership** at the **Leaders' Summit on Climate** held in April 2021. o Energy security is at the core of India-US strategic energy partnership. o India elevated India-US energy dialogue to a strategic energy partnership in February 2018. • SCEP organizes inter-governmental engagement across **five pillars of cooperation,** o **Power and Energy Efficiency,** o **Responsible Oil and Gas,** o **Renewable Energy,** o **Sustainable Growth and** o **Emerging Fuels**.
IREDA bags 'Green Urja Award'	• **Indian Renewable Energy Development Agency Ltd. (IREDA)** has been conferred with **'Green Urja Award'** for being the **Leading Public Institution** in Financing Institution for Renewable Energy in 2021 by **Indian Chamber of Commerce (ICC).** • IREDA is a **Mini Ratna (Category – I)** Government of India Enterprise under the administrative control of **Ministry of New and Renewable Energy (MNRE).**

	○ It is a **Public Limited Government Company** established as a **Non-Banking Financial Institution in 1987.**
SATAT	• SATAT is an initiative aimed at **setting up of Compressed Bio-Gas production plants and makes it available in the market for use** in automotive fuels by inviting Expression of Interest from potential entrepreneurs.
Sustainable Development Cell (SDC)	• Ministry of Coal Constituted Sustainable Development Cell (SDC). • SDC has been established **to advice, mentor and plan action to minimise the adverse impact of mining.** SDC is also formulating future **policy framework for environmental mitigation** in Coal and Lignite sector.
Bio-Jet Fuel Technology	• CSIR-IIP Dehradun's **home-grown technology to produce bio-jet fuel**, formally approved for use on military aircraft of the Indian Air Force. ○ **Bio-jet fuel can be produced from used cooking oil, tree-borne oils, short gestation oilseed crops,** and waste extracts from edible oil processing units. • Earlier, AN 32 (transportation plan) **and commercial plan (Spice jet) was flown in 2018** using the bio-jet fuel.
Urban Shift Initiative	• It is the brand name for **Sustainable Cities Impact Program**, funded by **Global Environment Facility (GEF).** • Urban Shift **supports cities** (in Asia, Africa and Latin America) **to adopt integrated approaches to urban development,** shaping a resilient, inclusive, zero-carbon future **where both people and planet can thrive.** ○ In India **Pune, Surat etc are included.** ○ **It is led by UN Environment Programme** (UNEP), in partnership with institutes/ organizations like World Resources Institute, UNDP, World Bank etc.
Sustainable Cooling Handbook for Cities	• Released by: **UN Environment Programme (UNEP)** • The handbook offers a **comprehensive overview of sustainable urban cooling approaches** within an integrated **whole-system" approach.**
Electric Vehicles Initiative (EVI)	• The 'Global Electric Vehicles (EV) Outlook' was recently **released by** International Energy Agency (**IEA**) and Electric Vehicles Initiative (**EVI**) released the annual **Global EV Outlook 2021.** • It is a **multi-governmental policy forum** established in 2010 under the Clean Energy Ministerial (CEM). ○ **Fifteen countries** are currently participating in EVI, including **India**, with IEA acting as the coordinator. Is India a member • It works towards **accelerating the introduction** and **adoption** of electric vehicles worldwide. This includes campaigns and programmes like- ○ **EV30@30**- to have at least 30% new electric vehicle sales by 2030. ○ **EVI Global EV Pilot City Programme (EVI-PCP)**- a platform for global cities to communicate and cooperate for increasing the uptake of electric mobility.
Mission Innovation-CleanTech Exchange	• Recently, India launched **Mission Innovation (MI) - CleanTech Exchange** under the Innovation Platform of **Mission Innovation.** ○ It was launched virtually at the **Innovating to Net Zero Summit** hosted by **Chile** this year. • **About CleanTech Exchange** ○ **CleanTech Exchange** is a **global initiative to create a network of incubators** across member countries to accelerate clean energy innovation. ○ The network will **provide access to the expertise and market insights** needed to support new technologies to access new markets globally. • **About Mission Innovation (MI)** ○ MI is an action-oriented global initiative to pioneer clean energy solutions through domestic innovation and international cooperation. ○ It consists of **24 countries and EU. India is a founding member.** Is India a member ○ The **first phase** of **Mission Innovation** was **launched along the Paris Climate Change Agreement** at the **2015** UN Climate Conference. ○ MI has an **Innovation Platform** for member countries to track innovation progress, exchange knowledge and work with investors, innovators and end-users to accelerate technologies to market. ○ **Mission Innovation 2.0**, the second phase of MI, was also launched in the above summit. ○ It aims to catalyze increased investment in clean energy research, development and demonstrations to deliver affordable clean energy solutions by 2030.

4.8. CONCEPTS IN BRIEF

Ecological Civilization	• Over the years, **Chinese President Xi Jinping has stressed advancing ecological civilization.** • Ecological Civilization describes **a world in which human communities** (systems of economics, agriculture, production, and consumption, etc.) are designed to promote overall well-being of people and the planet. ○ It considers nature to be part of life, rather than something that can be exploited without restraint.

Sustainable Recovery Plan	• International Energy Agency (IEA), in its latest report, has observed that **carbon emissions are set to rebound** as countries focus on economic recovery following the COVID-19 pandemic.
	• **About Sustainable Recovery Plan**
	  ○ Launched in 2020, plan estimates that if governments **mobilised $1 trillion in clean energy investments each year** from 2021-2023, it would boost global **economic growth on an average by 1.1 percentage** point a year.
	  ○ IEA believes a **full and timely implementation** of the plan would **save or create roughly 9 million jobs** and would also help in **meeting Paris Agreement goals.**

Localization of Sustainable Development Goals (SDGs)	• "Localization of Sustainable Development Goals (SDGs) through Panchayati Raj Institutions (PRIs)" report was released by the Ministry of Panchayati Raj to serve as **an action plan to assist the 32 lakh elected representatives of PRIs to consider for working towards localising of SDGs.** • 'Localising' is the process of **recognising subnational contexts in the achievement of the 2030 SDG agenda.** • It relates both to how local and sub-national governments can support achievement of the SDGs **through bottom up action** as well as how SDGs can provide a framework **for local development policy.**
Bioeconomy	• According to recent FAO report, **Renewable wood-based products, engineered wood products and wood-based textile fibres** are two emerging forest product categories that can provide renewable and sustainable solutions to the global crisis. • These both products can help in realizing Bioeconomy. • Bioeconomy generally refers to an **economy using renewable natural resources to produce food, energy, products, and services**. • Bioeconomy covers all sectors and systems that rely on biological resources (animals, plants, micro-organisms and derived biomass, including organic waste), their functions and principles.

4.9. REPORTS AND INDICES

Report	Details

Renewables Integration in India 2021	• **Released by:** NITI Aayog and International Energy Agency (IEA)
	• **Key findings**
	  ○ India is the **third largest energy-consuming country in the world.**
	  ○ **Per-capita electricity consumption is still around a third of the world average,** and is expected to continue increasing despite the government's intention to pursue strong energy efficiency standards, including LED lighting, efficient cooling and building standards.
	  ○ Majority of **India's renewable capacity additions take the form of solar and wind.**
	  ○ **Renewable energy penetration is highly variable** by state in India.

World Energy Investment Report 2021	• Released by- International Energy Agency (IEA)
	• **Key findings**
	  ○ In 2021, **annual global energy investment** is set to rise to **USD 1.9 trillion,** rebounding nearly 10% from 2020.
	  ○ **Renewables to dominate investment** in new power generation and **expected to account for 70% of 2021's total of USD 530 billion** spent on all new generation capacity.
	  ○ Upstream investment in **oil and gas is expected to grow 10 percent.**
	  ○ **Global emission is set to grow** by 1.5 billion tones.

A Multi-Billion-Dollar Opportunity: Repurposing Agricultural Support to Transform Food System	• **Published by:** Food and Agriculture Organization (FAO), UN Development Programme (UNDP) and UN Environment Programme (UNEP) on the eve of Food Systems Summit (FSS). ○ UN FSS took place during the UN General Assembly in New York to set the stage for global food systems transformation to achieve the Sustainable Development Goals by 2030.

Food and Agriculture Organization of the United Nations UNEP	
Agricultural Outlook Report 2021-2030 Food and Agriculture Organization of the United Nations	• **Released by**- OECD and FAO • The report provides a **consensus assessment** of the **ten-year prospects for agricultural commodity, fish and biofuel markets** at national, regional and global levels, and **serves as a reference for forward-looking policy analysis and planning.**

Transforming Food Systems for Rural Prosperity
IFAD INTERNATIONAL FUND FOR AGRICULTURAL DEVELPMENT
	• Released by- International Fund for Agricultural Development (IFAD)
	• Report analyses the **issues arising in different segments of the food system** (consumption, production and midstream) in relation to the lives of poor rural people.
	• **About IFAD**
	  ○ It is an international financial institution and specialized United Nations agency.
	  ○ Headquarters- **Rome, Italy**
	  ○ It has 177 Member States comprised of developing, middle and high-income countries from all regions of the world who are dedicated to eradicating poverty in rural areas.
	  ○ **India is a member state.**
	  ○ Membership in IFAD is open to any State that is a member of the United Nations, any of its specialized agencies or the International Atomic Energy Agency.

State Energy Efficiency Index (SEEI) -2020 ENERGY IS LIFE BEE CONSERVE IT	• **Developed jointly by the Bureau of Energy Efficiency (BEE) and Alliance for an Energy Efficient Economy (AEEE).** • It was first launched in 2018. • It **assesses the performance of the 36 states and UTs in energy efficiency using 68 qualitative, quantitative, and outcome-based indicators, across six sectors,** namely, Buildings, Industry, Municipalities, Transport, Agriculture & DISCOMs and Cross Sector. • Indicators assess states' performance in **Policy and Regulation, Financing Mechanisms, Institutional Capacity, Adoption of Energy Efficiency Measures, and Energy Savings.** • Based on their efforts and achievements, states have been **classified as 'Front runner', 'Achiever', 'Contender' and 'Aspirant'.**

5. DISASTER MANAGEMENT

5.1. STATE DISASTER RESPONSE FUND (SDRF)

Why in News?

Centre released ₹8873 crore for State Disaster Response Fund (SDRF).

More on the news

- This is the **first instalment of the central share of SDRF** for the year 2021-22, released ahead of the normal schedule.
  - Centre said that states can use up to **50% of amount for COVID-19 containment measures.**
  - It can be **utilized to meet the cost of oxygen generation**, ventilators, etc.

About SDRF

- Under **Disaster Management Act 2005**, National Disaster Response Fund at national level and SDRF at state level were created **to meet the rescue and relief expenditure during any notified disaster**.
  - In 2018**, Central Government enhanced its contribution to 90% and all States will contribute 10 % to SDRF**.
    - ✓ It is **released in two equal instalments as per Finance Commission recommendation.**
    - ✓ SDRF shall be used only for **providing immediate relief to the victims.**
- **Disasters covered under SDRF:** Cyclone, drought, earthquake, fire, flood, etc.
  - Last year, Ministry of Home Affairs had decided to treat **COVID-19 as a notified disaster** for purpose of providing assistance under SDRF.
  - Also, **state government may use up to 10% of funds** for local **disasters** which is not included in notified list.

Related News:

India COVID-19 Emergency Response and Health System Preparedness Package (ECRP)

- The Health Ministry clarified that Centre by Aug 24 released 50% funds earmarked for states under ECRP phase II and **states have utilized 60% of the approved funds.**
- The ECRP is a **centrally sponsored scheme to prevent, detect and respond to the threat posed by the ongoing pandemic** and strengthen the national health systems for emergency response and preparedness across the country.
  - The Cabinet approved ECRP-**Phase-II to be implemented from July 1, 2021, to March 31, 2022**

Prime Minister's National Relief Fund (PMNRF)

- Recently, Prime Minister approved ex gratia from PMNRF for the victims of stampede at Mata Vaishno Devi Bhawan.
- PMNRF was established in 1948 with public contributions **to assist displaced persons from Pakistan.**
- The resources of the PMNRF are utilized to **render immediate relief to families of those killed in natural calamities like floods, cyclones, and earthquakes,** etc.
- It does not get any budgetary support and it **accepts voluntary contributions from Individuals, Organizations, Trusts, Companies, and Institutions etc.**
- Donation to PMNRF is **completely tax exempt** and is also classified as **Corporate social responsibility under Company act 2013.**

5.2. 1ST CLIMATE HAZARDS AND VULNERABILITY ATLAS OF INDIA

Why in News?

India Meteorological Department (IMD) launched 1st Climate Hazards and Vulnerability Atlas of India.

More on the news

- Atlas is **based on several extreme weather events** (extreme rainfall, drought, cold wave, heatwave, thunderstorm, cyclones, lightning etc) and the **risks they pose to the local population, livelihoods and economy** of each district.
  - The atlas **provides a range of vulnerability with risks** ranging from nil, low, moderate, high and very high categories **for every Indian district.**
- **Significance**
  - **Impact-based warnings** can be issued for various regions. Atlas will help in understanding region specific impact of certain extreme weather events.

- **Help disaster management sectors to identify the vulnerable districts** for taking preventive and adaptive measures.
- **Aid in disaster preparedness as extreme weather events rise** in the wake of the climate crisis.
- Planning **climate-resilient infrastructure**.
- **Changes in the hazard-prone areas** in recent times have also been incorporated.
- **Supporting monitoring** and forecasting, Improving public health facilities i.e. emergency response capabilities, better early warning systems etc.

Key terms

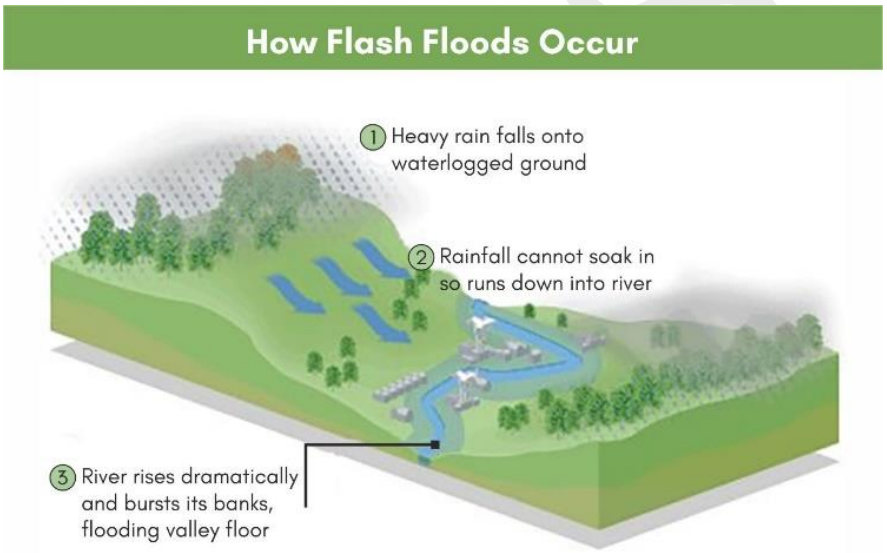
Hazard	Physical phenomena that pose a threat to the people, structures or economic assets and which may cause a disaster.
Vulnerability	It is the extent to which a community, structure, service or geographic area is likely to be damaged or disrupted by the impact of a particular hazard.

5.3. FLASH FLOODS

Why in news?

Heavy rains trigger flash floods, landslides in Himachal Pradesh.

About Flash floods



- Flash Floods are defined as **those flood events where the rise in water is either during or within a few hours of the rainfall that produces the rise.**
  - They are highly localized events of short duration with a very high peak. **Topography, soil conditions, and ground cover** play an important role**.**
- **Causes of flash floods**
  - **Heavy rains from thunderstorms, hurricanes** and tropical storms.
  - Due to **Dam or Levee Breaks**, and/or Mudslides (Debris Flow).
  - **Glacial melt** due to global warming and climate change.
  - Deforestation and urbanisation.
- **Measures taken:**
  - India Meteorological Department launched **Flash Flood Guidance Services for South Asia** to provide warnings for **flash floods threatsand risks6 and 24 hours in advance respectively.**
  - Strict implementation of building laws and demarcation of flood prone areas.
  - Use of Intelligent flood warning systems like **IFLOWS (integrated flood warning system).**

Related concept: Urban Flooding
It can be defined as 'the submergence of usually dry area by a large amount of water that comes from sudden excessive rainfall, an overflowing river or lake, melting snow or an exceptionally high tide' .

5.4. LANDSLIDE EARLY WARNING SYSTEM (LEWS) UNDER TRIAL

Why in news?

LEWS, being developed by Geological Survey of India (GSI) **under the aegis of UK's LANDSLIP project,** is based on rainfall thresholds since 2017.

About LANDSLIP
LANDSLIP is working **to develop understanding of the factors which trigger landslides,** including weather regimes, rainfall and geological conditions.

About landslide

- Landslide is the **movement of rock, earth, or debris down a sloped section of land.**

- **Major causes of landslides:** geological (weak or fractured earth or rock), Morphological (slopes that lose their vegetation to fire or drought are more vulnerable), Human Activity (deforestation, excavation etc).
- **About 12.6% of Indian land mass is prone to landslides,** with **Himalaya and Western Ghats regions particularly prone**

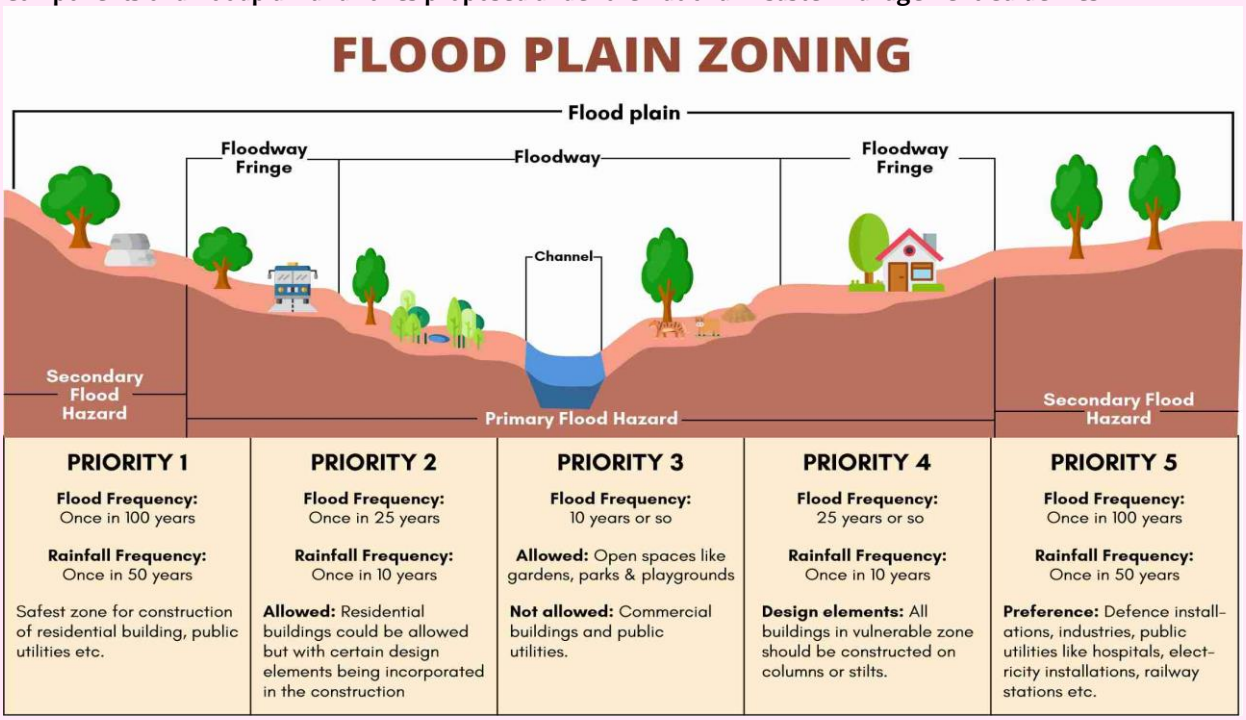
- Since the 2020 southwest monsoon, **GSI has started issuing daily landslide forecasts to district administrations in Darjeeling and Nilgiris.**
  - Also, **GSI plans to add five more** – Himachal Pradesh, Karnataka, Assam, Meghalaya and Mizoram – **by 2022 under LEWS.**
- **Other initiatives taken in India**
  - **GSI's landslide susceptibility mapping** in different parts of the country.
  - **NDMA guidelines** for Landslide Hazard Zonation.

5.5. FLOOD PLAIN ZONING

Why in news?

CAG report (prepared against the backdrop of 2018 Kerala floods) highlighted that state is yet to enact FPZ legislation, **45 years after the Union Government circulated a Model Bill for Flood Plain Zoning (MBFPZ).**

Components of a floodplain and zones proposed under the National Disaster Management Guidelines.



About Flood Plain Zoning

- FPZ is aimed at **demarcating zones or areas likely to be affected by floods,** and specify types of permissible developments in these zones, **to minimize damage caused by floods.**
- Floodplains are **crucial for regulating flow of water in a river**.
- **FPZ policies in India**
  - FPZ is within **state government's ambit** as it is deals with land along the riverbanks and land is a state subject.
  - **MBFPZ** provides for surveys of floodplain area, notification of limits of floodplains, prohibition or restriction of the use of the floodplains etc
  - **National Disaster Management Guidelines for floods** includes regulation of floodplains and enforcement of FPZ.

5.6. REPORTS AND INDICES

Report	Details

Global Assessment Report on Disaster Risk Reduction (GAR)
UNDRR
UN Office for Disaster Risk Reduction
	• **Released by:** UN Office for Disaster Risk Reduction (UNDRR)
	• **GAR Special Report on Drought 2021** explores the **systemic nature of drought and its impacts on achievement of Sendai Framework for Disaster Risk Reduction**, SDGs and human and ecosystems health and wellbeing.
	  ○ **UNDRR oversees the implementation of the Sendai Framework for Disaster Risk Reduction 2015-2030.**
	• **Key highlights of the report:**
	  ○ **20 million people** across Africa and middle east **came to brink of starvation owing to droughts.**
	  ○ **700 million people are at a risk of being displaced** as a result of drought by 2030.
	  ○ **Two third of the world will be under water stressed conditions** by 2025.
	• **India specific findings**
	  ○ Effect of severe droughts on India's gross domestic product (GDP) is estimated at 2–5%
	  ○ **Deccan region sees the highest frequency** (>6%) of severe droughts in all of India. Significant drought conditions are found once in every three years in Deccan plateau **leading to large scale migration and desertification.**
	  ○ **Overdependence on groundwater resources and lack of water-retaining structures** have significantly increased vulnerability in Indian cities during severe drought events.

Global Risks Report 2022	• **Published by -** World Economic Forum (WEF).
	• It is an **annual report** based on Global Risks Perception Survey (GRPS) and **highlights key risks emanating across five categories:** Economic, Environmental, Geopolitical, Societal, and Technological.
	• **Key findings**
	  ○ **Vaccine inequality and resultant uneven economic recovery risk** has compounded social fractures and geopolitical tensions.
	  ✓ E.g. Poorest 52 countries with 20% world population have only 6% vaccination.
	  ○ **Economic Stagnation:** By 2024, developing economies (excluding China) will have fallen by 5.5% below their pre-pandemic expected GDP growth.
	  ○ **Growing dependence on digital systems** with increasing cybersecurity threats.
	  ✓ E.g. 435% increase in ransomware in 2020.
	  ○ **Worsening of Climate change impact** with 200 million projected climate refugees by 2050.
	  ○ **Space as a new frontier of divergence** with 5 new government-developed space stations by 2030.
	  ○ **Increasing pressure to transition to net-zero economies** could have severe short-term impacts, such as putting millions of carbon-intense industry workers out of jobs or triggering societal and geopolitical tensions.
	Top 5 Global Risks
	• Climate Action Failure,
	• Extreme Weather,
	• Biodiversity loss,
	• Social Cohesion Erosion, and
	• Livelihood crisis
	Top 5 India Risks
	• Fracture of interstate relations,
	• Debt crises in large economies,
	• Widespread youth disillusionment,
	• Failure of technology governance, and
	• Digital inequality

Building Resilience Index (BRI)	• BRI is an **innovation of International Finance Corporation** and is **supported by World Bank.**
	• It is a **web-based hazard mapping and resilience assessment framework** for the building sector.
	• **It is designed to**
	  ○ Facilitate **access to location-specific hazard information,**
	  ○ Provide resilience **measures to mitigate applicable risks,** and
	  ○ **Improve transparency f**or disclosing a building's resilience information between sector stakeholders.
	• **BRI makes it easy for building sector stakeholders,** including construction developers, financial institutions, insurers, and governments **to assess, improve, and disclose the resilience of buildings.**

6. GEOGRAPHY

6.1. ATLANTIC MERIDIONAL OVERTURNING CIRCULATION (AMOC)

Why in News?

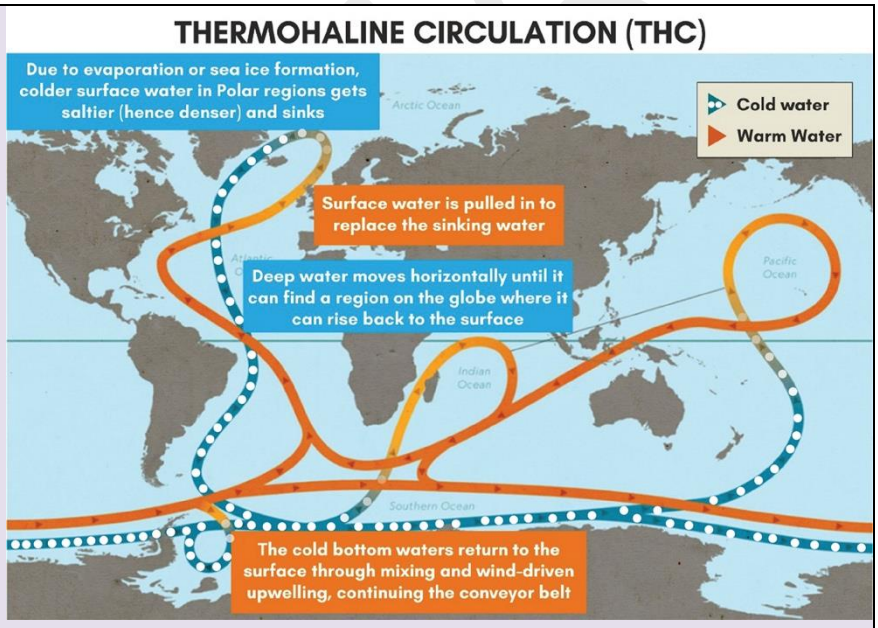
According to the **Sixth Assessment Report of the Intergovernmental Panel on Climate Change,** it is very likely that AMOC will decline over the 21st century.

About AMOC

- The AMOC is a **large system of ocean currents**. It is the Atlantic branch of the ocean conveyor belt or Thermohaline circulation (THC) and distributes heat and nutrients throughout the world's ocean basins.
- **Two main features of the AMOC:**
  - **Flow of warm, salty water in the upper layers of the ocean northwards from the Gulf of Mexico** (red line). This is made up of the "Gulf Stream" to the south and the "North Atlantic Current" further north.
  - **Cooling of water in the high latitudes of the Atlantic,** which makes the water denser. This denser water then sinks and returns southwards towards tropics and then to the South Atlantic as a bottom current (blue line). From there it is distributed to all ocean basins via the **Antarctic circumpolar current.**

Thermohaline circulation (THC)

- The theory for the thermohaline circulation pattern was first proposed by **Henry Stommel and Arnold Arons in 1960.**
- While winds drive ocean currents in the upper 100 meters of the ocean's surface, ocean currents also flow thousands of meters below the surface. These **deep-ocean currents** are driven by differences in the water's density, which is controlled by **temperature (*thermo*) and salinity (*haline*).** This process is known as thermohaline circulation.



- It is also known as the **Global Ocean Conveyor** or **Great Ocean Conveyor Belt.**
- The ocean's global circulation system plays a key role in distributing heat energy, regulating weather and climate, and cycling vital nutrients and gases.

Difference between Surface Ocean Currents and THC

	Surface Ocean Currents	THC
Driven primarily by	Global wind systems that are fuelled by energy from the sun.	Horizontal differences in temperature and salinity
Speed	Relatively fast with speed of **about 5 to 50 cm per second**	Relatively Slow with typical speed of **1 centimetre per second**
Volume of water moved	Relatively less	Tremendous volumes of water are moved

Reasons for recent decline in the AMOC

The AMOC and THC strength has always been fluctuating. In the late Pleistocene time period (last 1 million years) during the extreme glacial stages, weaker circulation and slowdown in AMOC have been observed. But the **changes destabilising the AMOC** in the last 100-200 years are mostly anthropogenic and linked to Global warming, such as-

- **Freshwater from melting Greenland ice sheets and the Arctic region**: It can make circulation weaker as it reduces the salinity and density of the water, making it unable to sink to the bottom.

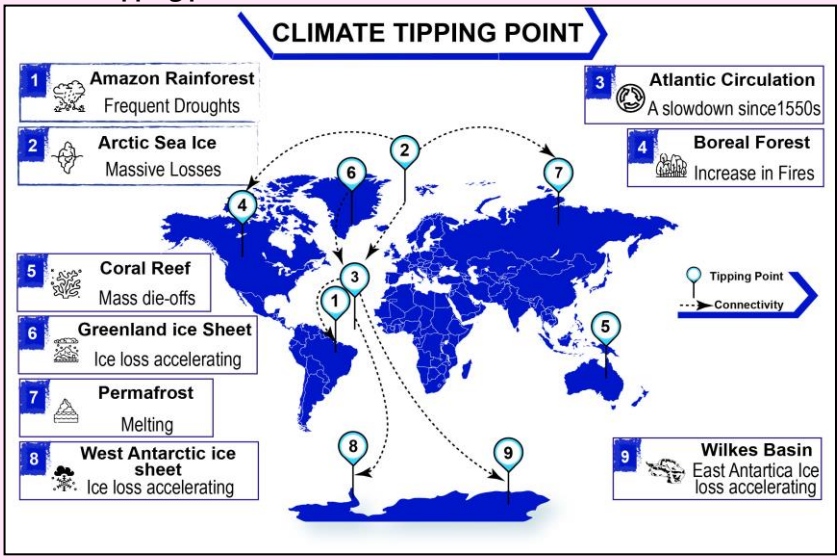
- **Weakening of Gulf Stream:** According to some estimates global warming can lead to weakening of the Gulf Stream System by 34 to 45 percent by 2100.
- **Dilution dues to increased rainfall and river runoff.**

Impact of decline of AMOC

- **Changes in regional Climate:** Weakening of AMOC and Warm Gulf Stream, will trigger a cooling effect on climate and decrease rainfall over around the North Atlantic region.
  - It may also lead to increase in winter storms over Europe and stronger hurricanes in the US.
- **Sea level rise:** due to piling up of water at the US east coast.
- **Changes in the seasonal cycle, the temperature, the nutrient conditions in Atlantic marine ecosystems** disrupting fish populations and other marine life.
- **Collapse of AMOC:** AMOC is one of the **nine "tipping points"** where a changing climate could push parts of the Earth system into abrupt or irreversible change.
  - This means that **increase in the freshwater input could cause the AMOC to collapse into a state of reduced flow.** From this collapsed state, even if freshwater input into the oceans decreases to current levels, the AMOC may remain in a collapsed state. The ability of the system to not return to the initial state once the forcing is reversed is referred to as **hysteresis.**
  - This is mainly because the **AMOC is a self-reinforcing system.** The circulation itself brings salty water into the high-latitude Atlantic and the salty water increases the density. Thus, the water is able to sink because it is salty and it is salty because of the circulation.

Tipping points

- These are thresholds **where a tiny change could push a system into a completely new state.**
  - Globally, **there are nine "tipping points" where a changing climate could push parts of the Earth system into abrupt or irreversible change.**
- **Nine tipping points-**



- **Other impacts:** A collapse of the AMOC may induce causal interactions like changes in ENSO [El Niño–Southern Oscillation] characteristics, dieback of the Amazon rainforest and shrinking of the West Antarctic Ice Sheet due to seesaw effect, southern migration of the ITCZ [Intertropical Convergence Zone] and large warming of the Southern Ocean etc.

6.2. GLACIAL LAKE ATLAS OF GANGA RIVER BASIN

Why in News?

Recently, Ministry of Jal Shakti (MoJS) released an atlas of glacial lakes that are part of the Ganga River basin.

More on News

- Atlas is brought out **under National Hydrology Project (NHP).**
- In the present study, glacial lakes with water spread area ≥ 0.25 ha have been mapped using Resourcesat-2 satellite data.

About Ganga River Basin

- The Ganga River basin **extends over Central Himalayas in India, Nepal, Tibet (China), and Bangladesh.**
- It contains **9 of the 14 highest peaks in the world over 8,000 m** in height, including Mt. Everest.

- Other peaks over 8,000 m in the basin are **Kanchenjunga, Lhotse, Makalu, Cho Oyu, Dhaulagiri, Manaslu, Annapurna, and Shishapangma.**

- In this atlas, **Ganga River basin has been divided into 11 subbasins** (refer infographic) on the basis of confluence of major rivers contributing into the system viz., Yamuna joining on the right, whereas rivers like Sarda, Ghaghara, Gandak, and Kosi joining on the left.
- Climate over the Ganga River basin is mainly **tropical and subtropical to temperate subhumid on the plains.**

Key Findings of the Atlas

- Based on its process of lake formation, location, and type of damming material, glacial lakes are identified in nine different types, majorly grouped into four categories viz.,
  - **Moraine-dammed** (form during periods of glacier retreat from a moraine),
  - **Ice-dammed** (when drainage is blocked by a glacier that advances or becomes thicker),
  - **Glacier Erosion, and**
  - **Other Glacial lakes.**
- A total of **4,707 glacial lakes have been mapped.**
  - Out of 11 subbasins, **only 6 subbasins contain glacial lakes,** which are predominantly distributed in Kosi subbasin (51.77%) followed by Ghaghara subbasin (26.77%).
  - **Minimum number of glacial lakes are present in Yamuna subbasin** and then in Sarda subbasin.
  - Glacier Ice-dammed Lake is only one in the entire Ganga River basin and is located in Gandak subbasin.
- **Uttarakhand shares 93.50% of lake count,** followed by 6.50% in Himachal Pradesh.
- **Each glacial lake has been given a 12 alpha-numeric unique glacial lake ID,** along with several attributes that include hydrological, geometrical, geographical, and topographical characteristics.

About National Hydrology Project (NHP)

- NHP, under MoJS, aims **to improve the extent, quality and accessibility of water resources information** and to strengthen the capacity of targeted water resources management institutions in India.
- Under NHP, National Remote Sensing Centre (NRSC), **ISRO, is carrying out hydrological studies using satellite data and geo-spatial techniques.**
  - As part of this, detailed glacial lake inventory, prioritization for GLOF risk, and simulation of GLOF for selected lakes are taken up **for entire catchment of Indian Himalayan Rivers** covering Indus, Ganga, and Brahmaputra River basin.

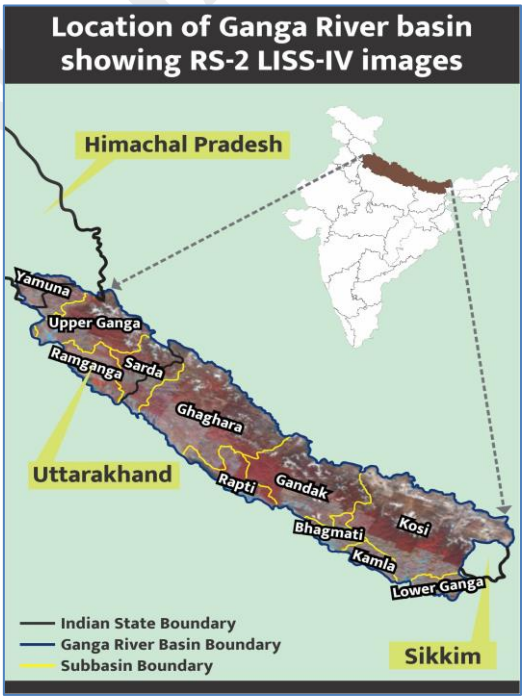
About Glacial Lake

- It is defined as **water mass existing in a sufficient amount and extending with a free surface in, under, beside, and/or in front of a glacier** and originating from glacier activities and/or retreating processes of a glacier.
- As glaciers retreat, the **formation of glacial lakes takes place behind moraine or ice 'dam'.**
- These damming materials **are generally weak and can breach suddenly** due to various triggering factors, leading to catastrophic floods. Such outburst floods are known as GLOF.

Details of subbasins of Ganga River basin

S. No.	Subbasin	Area (Km)^2	Area (%)
1	Bhagmati	7,635	3.09
2	Gandak	36,465	14.76
3	Ghaghara	53,072	21.48
4	Kamla	6,106	2.47
5	Kosi	59,709	24.16
6	Lower Ganga	6,543	2.65
7	Ramganga	11,455	4.65
8	Rapti	11,423	4.62
9	Sarda	17,326	7.01
10	Upper Ganga	25,675	10.39
11	Yamuna	11,701	4.73
	Total	2,47,110	100.00

Location of Ganga River basin showing RS-2 LISS-IV images



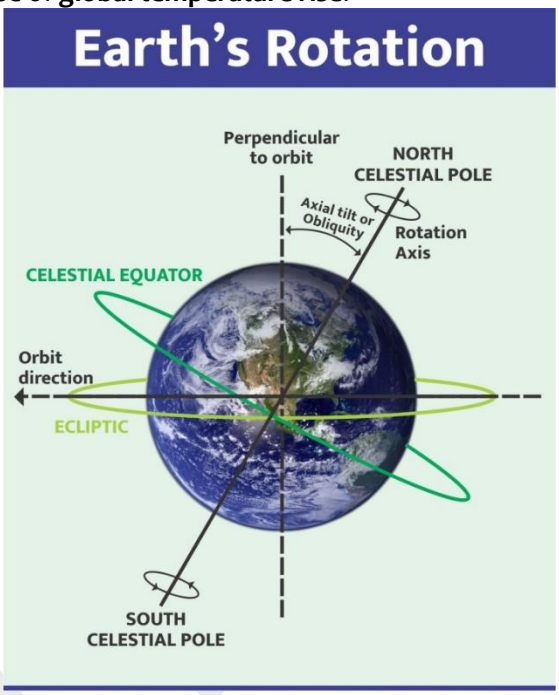
6.3. SHIFT IN EARTH'S AXIS

Why in the News?

According to the new study, climate change has caused billions of tonnes of glacial ice to melt into oceans causing **the Earth's poles to move in new directions** since the 1990s.

More on the News

- From 1995 to 2020, the average speed of movement in earth's axis of rotation was 17 times faster as compared to the speed from 1981 to 1995.
- **Potential Cause:** The **increased melting of glaciers** because of **global temperature rise.**
    - The other possible reasons include the change in non-glacial regions due to climate change, **unsustainable consumption of groundwater** for irrigation and other **anthropogenic activities.**
- While this **change is not expected to affect daily life,** it can change the length of the day by a few milliseconds.



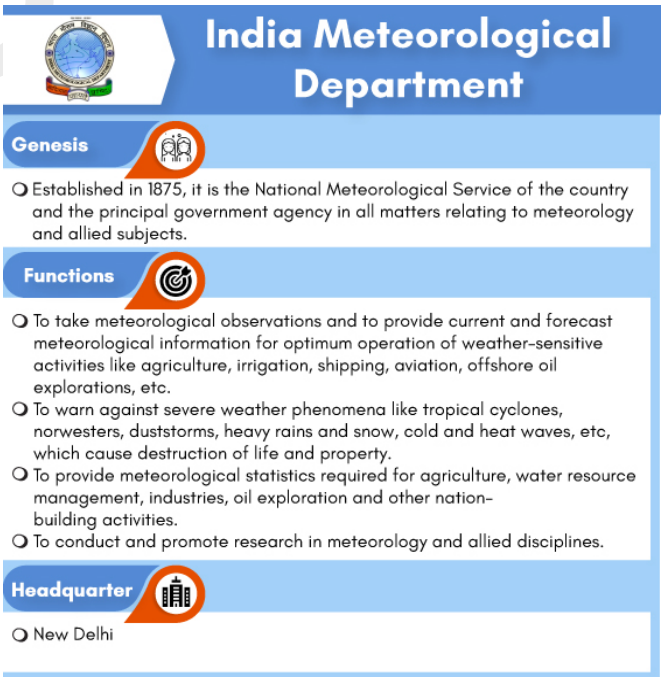
About Earth's Axis

- **Earth's axis is the line along which it spins around itself** as it revolves around the Sun.
    - The points on which the axis intersects the planet's surface are the **geographical north and south poles.**
    - The location of the poles is not fixed. Thus, the **poles move when the axis moves,** and the movement is called "polar motion".
    - Generally, polar motion is caused by changes in the hydrosphere, atmosphere, oceans, or solid Earth. But now, **climate change is adding to the degree with which the geographical poles wander.**
- Polar Motion is **different from Polar wandering** where **magnetic poles** over Earth's surface wander through geologic time.

6.4. LONG RANGE FORECAST (LRF)

Why in News?

India Meteorological Department (IMD) **will disseminate month-wise Long Range Forecast (LRF)** of June-to-September period in the 2021 monsoon season.



More on the news

- Month-wise LRF will be helpful given the **increasing unpredictability of rainfall due to climate change.**
- IMD has **so far been issuing a two-stage forecast** for monsoon season: one in April and other in May/June.
- Also, IMD **will release a separate forecast for the rainfed regions.** So far, LRF was only available for the country as a whole.
- It will enable better planning for these regions.
- Forecasting models used by IMD
    - **Statistical Ensemble Forecasting system (SEFS)** based on following parameters:
        - ✓ Sea Surface Temperature (SST) Gradient between North Atlantic and North Pacific
        - ✓ Equatorial South Indian Ocean SST
        - ✓ East Asia Mean Sea Level Pressure
        - ✓ Northwest Europe Land Surface Air Temperature
        - ✓ Equatorial Pacific Warm Water Volume

- **Dynamical global climate forecasting system** that simulates land, atmosphere and ocean state on supercomputers and extrapolate it into the monsoon months.
- **Multi-Model Ensemble forecasting system** based on coupled global climate models from different global climate prediction and research centers.
- **LRF** is defined as the forecast from 30 days' up to one season's description of averaged weather parameters. Monthly and seasonal forecast comes under LRF.

Relate news: Doppler Weather Radar

- Recently, a state-of-the-art **Doppler Weather Radar** was inaugurated at Indian Meteorological Department in Jammu along with an indigenous GPS based **Pilot Sonde.**
- **Doppler Weather Radar (DWR)** is based on **doppler effect**, i.e. change in frequency of a wave based on the relative motion between wave source and observer.
  - To monitor weather, DWR sends **pulses of electromagnetic energy** into the atmosphere, which are reflected back to radar by raindrops or snow.
  - It helps in providing advance information for early warning in the event of severe weather; **protecting life and property.**

6.5. DEEP OCEAN MISSION

Why in News?

The Cabinet approved the Deep Ocean Mission.

About the mission

- Mission aims **to explore Deep Ocean for resources and develop deep sea technologies** for sustainable use of ocean resources.
- It will be **a mission mode project to support Blue Economy Initiatives**.
- Mission will be implemented in a **phase-wise manner over a period of 5 years.** Ministry of Earth Sciences will be the nodal Ministry.
- India's first manned ocean mission 'Samudrayan' was recently launched under the scheme.
  - **Matsya 6000** (the deep water manned submersible) under **Samudrayan initiative** is capable of carrying **three human beings** with an endurance **of 12 hours** and an additional **96 hours in case of emergency situation.**
- **Major components** of the Mission:

Component	Objective
Development of Technologies for Deep Sea Mining, and Manned Submersible	• A **manned submersible will be developed** to carry three people to a depth of 6000 metres. • An **Integrated Mining System for mining Polymetallic Nodules** in the central Indian Ocean.
Development of Ocean Climate Change Advisory Services	• To understand and provide future **projections of important climate variables** on seasonal to decadal time scales.
Technological innovations for exploration and conservation of deep-sea biodiversity	• **Bioprospecting of deep sea flora and fauna** including microbes and studies on sustainable utilization of deep sea bio-resources.
Deep Ocean Survey and Exploration	• To explore and identify **potential sites of multi-metal Hydrothermal Sulphides mineralization** along the Indian Ocean mid-oceanic ridges.
Energy and freshwater from the Ocean	• Studies and detailed engineering design for **offshore Ocean Thermal Energy Conversion powered desalination plant.**
Advanced Marine Station for Ocean Biology.	• Development of **human capacity and enterprise** in ocean biology and engineering. • Will **translate research into industrial application** and product development.

Related news:

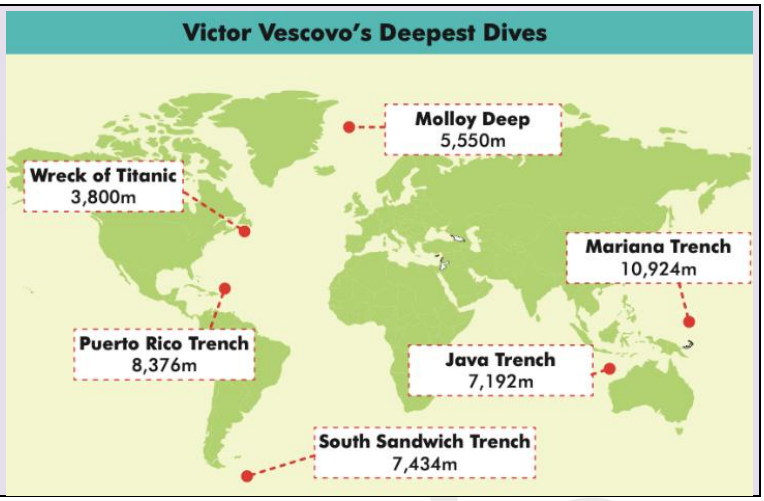
Five Deeps Expedition

- The Five Deeps Expedition is the **first manned expedition to reach the deepest points** in each of the world's five oceans.
- The Expedition is led by explorer and private equity investor **Victor Vescovo**.

Ocean Services, Modelling, Application, Resources and Technology (O-SMART)

- Cabinet **approved continuation of O-SMART scheme** from 2021-2026.
- **Objective of O-SMART scheme** of Ministry of Earth Sciences (MoES) is to:

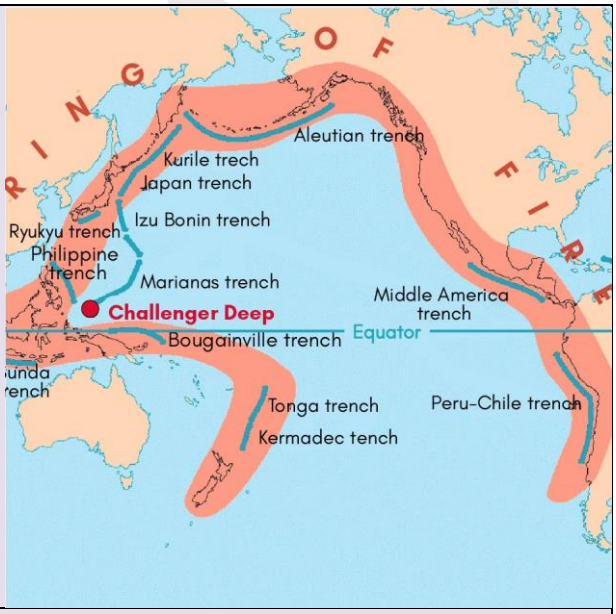
- Generate and regularly update **information on Marine Living Resources.**
- Develop **technologies to tap the marine bio resources.**
- Develop **technologies generating freshwater and energy** from ocean.
- Carryout **exploration of Polymetallic Nodules.**
- Develop **underwater vehicles and technologies.**



6.6. OTHER NEWS

Pacific Ring of Fire

- Also referred to as the Circum-Pacific Belt, it is an **area along the Pacific Ocean that is characterised by active volcanoes and frequent earthquakes.**
- It is home to about **75 per cent of the world's volcanoes. Also, about 90 per cent of the world's earthquakes occur here.**
- Along the area, **tectonic plates move towards each other creating subduction zones.**
- One plate gets pushed down or is subducted by the other plate.
- As this subduction happens, **rocks melt, become magma and move to Earth's surface and cause volcanic activity.**



Darvaza gas crater

- Turkmenistan President has ordered experts to **find a way to extinguish a fire in a huge natural gas crater, the Darvaza gas crater** or **'Gateway to Hell'.**
- The decision has been taken as it **negatively affects both the environment and the health** of the people living nearby.
- **About Darvaza gas crater:**
  - Located in Turkmenistan in **Karakum desert**, the crater has been **burning for the last 50 years.**
  - It was **created in 1971** when a Soviet drilling rig a**ccidentally punched into a massive underground natural gas cavern**, causing the ground to collapse.

Heat Dome in Northern America

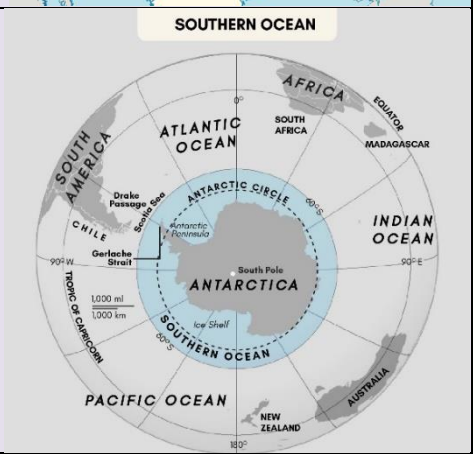
- Heat dome is an **area of high pressure** that parks over a region like a lid on a pot, trapping heat.
  - They are more likely to **form during La Niña years like 2021**, when **waters are cool in the eastern Pacific and warm in the western Pacific.**
  - That temperature difference creates winds that blow dense, tropical, western air eastward.
  - Warm air gets trapped in the **jet stream—a current of air spinning counter-clockwise around the globe**—and ends up on the U.S. West Coast.

Turbidity Current

- A vast underwater avalanche (called turbidity current) occurred (in 2020) **off West Africa, in a deep canyon leading away from Congo River.**
- Turbidity current is a **rapid, downhill flow of water** caused by increased density due to high amounts of sediment.
- Turbidity is a **measure of level of particles such as sediment, plankton, or organic by-products,** in a body of water.

	• Turbidity currents can be **caused by earthquakes, collapsing slopes, and other geological disturbances.** • Once set in motion, turbid water rushes downward and **can change physical shape of seafloor.**

Earth's First Continents Formation	• **Based on the age of rocks from continental fragments** (called cratons), researchers have found that Earth's first **continents emerged from the ocean 700 million years earlier than thought.**
	  ○ It was widely accepted that **continents rose about 2.5 billion years ago.**
	• Study also pointed that **earliest continental land to have risen** may have been **Jharkhand's Singhbhum region.**
	• Research tends to **break another notion that continents rose due to plate tectonics.**
	  ○ Continents probably **rose as they were inflated by progressive injection of magma** derived from deep in the Earth.

Zero Shadow Day	• Recently, Odisha's Bhubaneswar witnessed Zero Shadow Day. It is a **rare celestial phenomenon** during which n**o shadow** of an object or a being is observed. • The phenomenon **occurs twice a year** when the **sun is at its highest point in the sky at all the regions between the Tropic of Cancer and the Tropic of Capricorn.** • Due to the sun being exactly overhead, the **shadow of all beings or objects disappears,** resulting in Zero Shadow Day.
World's northernmost island	• Scientists have discovered **new world's northernmost island** located **off the coast of Greenland.** • New island is **made up of seabed mud and moraine,** i.e. soil, rock and other material left behind by moving glaciers, and has **no vegetation.** • Before this, **Oodaaq** was marked as Earth's northernmost terrain. • Global warming has had severe effect on ice sheet of Greenland but new island is not direct consequence of climate change. • Greenland is **vast autonomous Arctic territory** that belongs to Denmark. 
Southern Ocean	• **National Geographic Society has recognised the Southern Ocean (SO) as the world's fifth ocean** in addition to the Pacific, Atlantic, Indian and Arctic Oceans. • It will **constitute most of the waters that surround Antarctica out to 60° south latitude excluding the Drake Passage and Scotia Sea.** • Unlike other oceans that are defined by the continents that fence them, the **SO is defined by a current called Antarctic Circumpolar Current** (ACC). • Significance includes climate **regulation through heat distribution, supporting of cold fragile marine ecosystems** etc. 

6.7. RIVERS IN NEWS

Bhogdoi River	• Due is Coal mining in Nagaland, encroachments and waste discharge from tea estates, the inter-state River Bhogdoi is dying a slow death.
	• **Origin: Mokokchung in North Hills of Nagaland**
	• **Flows through:** Jorhat before joining **Dhansiri River.**
	• **Other features:**
	  ○ It is a **south bank tributary to Brahmaputra.**
	  ○ It is the **most polluted river of Assam.**
	  ○ **Other tributaries of Brahmaputra**- Lohit, Dibang, Dihang, Manas, etc.

Kameng River, Arunachal Pradesh	• Thousands of fish were found floating dead in Kameng river in Arunachal Pradesh's East Kameng district. • **Origin:** Glacial lake below the **Gori Chen mountain,** south of the McMahon Line. • **Tributary:** It is one of the major tributaries of the Brahmaputra River.

	• **Other features:**
	  ○ It is called **Jia Bhorelli in Assam**.
	  ○ **Geographical features**: It forms the boundary between East Kameng District and West Kameng Districts. **Dafla Hills are at east** and the Aka Hills are west of the Kameng River
	  ○ It is also the **boundary between the Sessa and Eaglenest sanctuaries** to its west and the Pakke tiger reserve to the east.

Mahananda river	• Rapid urbanisation, inefficient waste management and encroachment have turned the Mahananda into a drain.
	• **Origin:** North of West Bengal **from the hills of Darjeeling.**
	• **Other features:**
	  ○ It is **tributary of the Ganga River**.
	  ○ **Flows into Bangladesh.**

Sabarmati river	• Ministry of Civil Aviation is **taking steps for making seaplane operations viable** between Sabarmati River Front & Statue of Unity. • **Origin:** Aravalli hills of Rajasthan. • **Flows through:** Rajasthan and Gujarat • **Tributaries**: Hamav, Guhai, Hathmati, Khari, Meshwo, Mazam, Watrak, Mohar and shedhi. • **Other features:** ○ Gandhinagar, the capital of Gujarat and **Ahmedabad are located on its banks**.

Mahakali River	• Cabinet has approved the Memorandum of Understanding (MoU) between India and Nepal for **construction of a bridge over Mahakali River** at Dharchula.
	• **Origin:** At Kalapani in Pithoragarh district (Uttarakhand).
	• **Other features:**
	  ○ **Also known as Sharda/ Kali River**.
	  ○ It **joins Ghaghra River**, a tributary of the Ganga.
	  ○ It **serves as the boundary between Uttarakhand's Kumaon Division and Nepal**.

Lukha river	• **Recently, the Meghalaya Government** claimed that the pilot project to rejuvenate the Lukha by using algae to remove toxic contents from the water has become a success. The detoxification process is called **phycoremediation.** • **Origin:** It receives water from the Lunar river (Wah Lunar) and small streams draining from the Narpuh Reserve Forest and the undulating hills of the area while flowing down. • **Flows through:** southern part of **east Jaintia Hills of Meghalaya.** • **Other features:** ○ The river passes via the Sonapur village and then into the Surma valley and ultimately ends up in the flood plains of Bangladesh.

Chalakudy River	• Recently, the Kerala government has called off the proposed 163-megwatt Athirappilly hydroelectric power project on the Chalakudy river basin.
	• **Origin:** Anamalai hills
	• **Flows through:** Kerala.
	  ○ It is the fifth longest river in Kerala.
	• **Other features:**
	  ○ The famous waterfalls, Athirappilly Falls and Vazhachal Falls, are situated on this river.
	  ○ It merges with the Periyar River.

Giri River	• Recently, Prime Minister inaugurated and laid the foundation stone of **hydropower Renukaji Dam project in Himachal Pradesh.** • **Origin:** Hills of Jubbal, Himachal Pradesh • **Flows through**: South-Eastern **Himachal including Shimla Hills** before joining Yamuna upstream of Paonta below Mokkampur. • **Other features:** An important tributary of the Yamuna.
Pabbar River	• Recently, foundation of **Sawra-Kuddu Hydro Power Project** was laid here in Himachal Pradesh. • **Origin**: **Chandra Nahan Glacier** • **Other features:** It is a **tributary of Tons River** which further drains into Yamuna.
Mahanadi and Brahmani River	• Recently, National Green Tribunal **ordered measures to mitigate adverse environmental impact** on River Mahanadi and Brahmani banks due to illegal quarrying. **Mahanadi River:** • **Origin:** Pharsiya village, Raipur, Chhattisgarh. • **Tributaries:** Seonath, Hasdeo, Mand and Ib from left while Ong, Tel and Jonk join it from right. • **Other features:** Hirakud Dam, longest man-made earthen dam of the world, is on it at Sambalpur, biggest river of Odisha. **Brahmani River** • **Origin:** near Nagri village in Ranchi, Jharkhand (known as South Koel at its origin).

	• **Tributary:** Joined by Sankh River from Chattisgarh, becoming Brahmani River and drains in Bay of Bengal as River Maipura.

Umngot River	• The Meghalaya government has defended its plan to dam Umngot, despite protests from more than a dozen villages downstream.
	  ○ The villages in the West Khasi Hills district are near the border with Bangladesh but the site of the proposed 210 MW Umngot Hydroelectric Project is upstream in the adjoining West Jaintia Hills district.
	• **Origin:** Eastern part of the Shillong peak.
	• **Flows through: Dawki,** a town in the East Jaintia Hills district near the Indo-Bangladesh border.
	• **Other features:**
	  ○ It forms the **natural boundary between Ri Pnar (of Jaintia Hills) with Hima Khyrim (of Khasi Hills).**
	  ○ It is a tributary of the Surma River in Bangladesh.
	  ○ At the final lap of its journey, it enters the plains of Bangladesh.
	  ○ It is the **gateway to Bangladesh.**
	  ○ Umngot River is also called by the name Dawki River, which has greenish-bluish color transparent water.

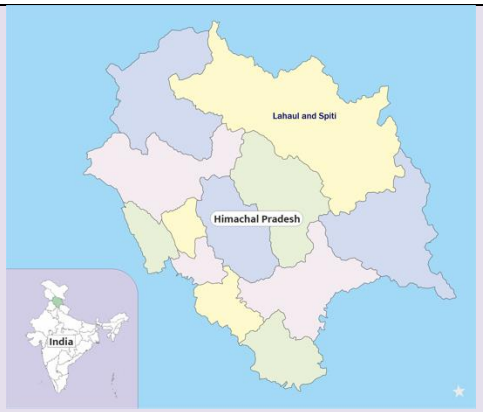
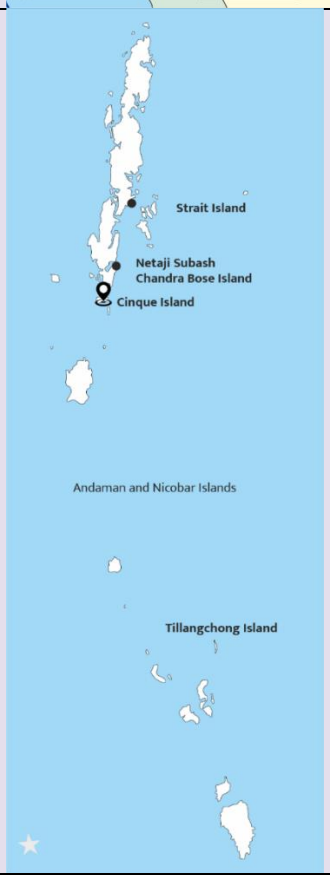
International	

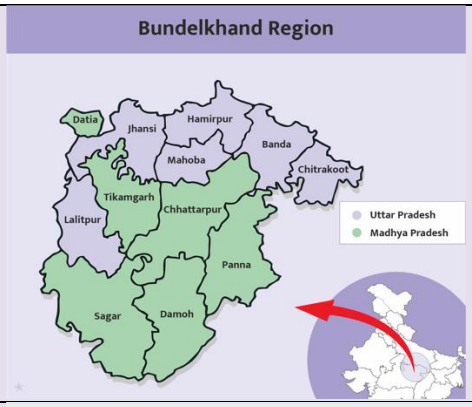
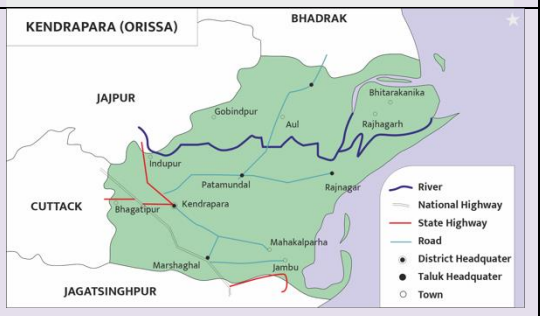
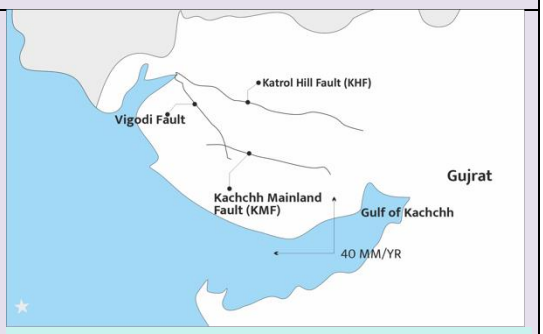
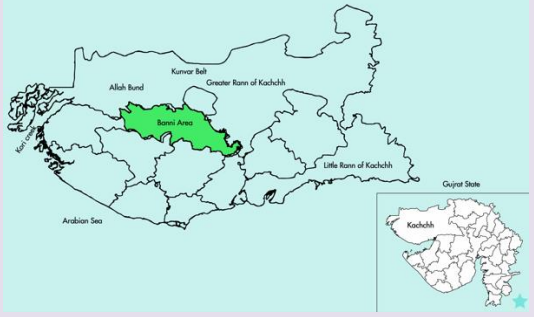
Nile river	• Longest river in the world, it **rises south of the Equator** and flows from **south to north through eastern Africa.**
	• It **covers a distance of 6600 km** and **empties into the Mediterranean Sea**
	• **Its basin includes** parts of Tanzania, Burundi, Rwanda, the Democratic Republic of the Congo, Kenya, Uganda, South Sudan, Ethiopia, Sudan, and the cultivated part of Egypt.
	• Its **three main tributaries are the White Nile, the Blue Nile, and the Atbara.**
	  ○ **White Nile begins at Lake Victoria, Africa's largest lake**, which touches the countries of **Uganda, Kenya and Tanzania.**
	  ○ **Blue Nile's** source is at **Lake Tana in Ethiopia**.

6.8. PLACES IN NEWS

6.8.1. PLACES IN NEWS INDIA

Mountain Passes in news	• **Zoji La Pass:** For the first time Border Roads Organisation (BRO) has kept the Zoji mountain pass open, connecting Ladakh to Srinagar, beyond 31st December.
	  ○ Zoji La Pass is a **high mountain pass** located in the **Kargil district of Ladakh**.
	  ○ It is the **strategic link connecting Ladakh to Srinagar** and the rest of India.
	  ○ To provide **all-weather connectivity to Ladakh**, the Zojila Tunnel is being constructed.
	  ○ Once completed, at 14.15 km, it will be **India's longest road tunnel,** and Asia's longest bi-directional tunnel.
	• **Lamkhaga pass:** A team of trekkers went missing in Lamkhaga Pass amid inclement weather.
	  ○ Lamkhaga Pass is one of the **toughest passes which connects Kinnaur district (Himachal Pradesh) with Harshil (Uttarakhand).**
	• **Umlingla Pass:** BRO was recognised by Guinness World Records for **constructing and black topping the world's highest motorable road at Umlingla Pass in Ladakh.**
	  ○ It is much **above the altitude of Siachen Glacier** which is at 17,700 ft.
	  ○ The **Khardung La Pass in Leh** is at an altitude of 17,582 ft.
		

North India	• **Lahaul and Spiti, Himachal Pradesh:** Recently, world's highest EV charging station was installed at Kaza in the Spiti Valley. ○ **Located South of Ladakh**, Lahaul and Spiti are connected to each other through **Kunzum la** or **Kunzum Pass** (altitude of 4,551 m) ○ **It lies in a rain shadow area, North of Pir Panjal Ranges,** with Lahuli (Bhoti) is the main local dialect and Keylong as the administrative HQ **(near the confluence of River Chandra and Bhaga)**	
	• **Chumbi Valley:** It is being reported that China is strengthening connectivity in Chumbi valley. ○ **Location:** It is situated at the corner of **India-Bhutan-China tri-junction.** ○ **Significance**: It is **close to Siliguri corridor** that connects the northeast to the rest of the country.	
	• **Pensilungpa Glacier (Zanskar, Ladakh):** A recent study has been conducted about the retreat of the glacier**.**	
Andaman and Nicobar	• **Cinque Island** Recently, the Indian Coast Guard rescued nine crew from a sinking vessel off Cinque Island. • **Tillanchong Island**: The island has the largest surviving populations of the endemic Nicobar megapode bird (Megapodius nicobariensis), and is a protected sanctuary. • **Netaji Subhash Chandra Bose Island:** Ross Island was renamed as Netaji Subhash Chandra island. • **Strait Island:** Few Great Andamanese (GA) tribes were shifted to their tribal settlements at Strait Island to ensure their safety against the COVID-19 pandemic.	

Bundelkhand Region	• **Buxwaha diamond mining** project will make Bundelkhand's water scarcity worse. • **About Bundelkhand** - o Part of central India, comprising 13 district in Uttar Pradesh and six in Madhya Pradesh. o Comprises of **Vindhyan range** and the region is mostly a dryland. o The **Betwa River** has been dammed and provides irrigation waters. o Diamonds of good quality but small size are found in Panna.	
Sohra (formerly called **Cherrapunji)**	• Home Minister launched **"Green Sohra Afforestation Campaign'** under Assam Rifles. • Sohra, formerly called Cherrapunji, is located in East Khasi Hills of Meghalaya. • Once credited as the wettest place of earth, the region has lost its tag due to deforestation and indiscriminate tree-feeling for development.	
Odisha's Kendrapara district	• It is now **India's only district to have all 3 species of crocodilians - salt-water, gharial and mugger.** • **Kendrapara** district is **crisscrossed by rivers, creeks, water inlets** and claimed fame for its successful conservation programme for salt-water or estuarine crocodiles at the Bhitarkanika National Park. • **All 3 species are protected under** Schedule 1 of Wildlife Protection Act, 1972 and Appendix 1 of CITES. • **IUCN status of crocodiles** o **Saltwater**- Least Concern o **Gharial**- Critical Endangered o **Mugger**- Vulnerable	
Gujarat	• **Katrol Hill Fault, Kachchh region**: Recent studies on sediment samples in Kachchh basin highlighted changes in the landscape of KHF in last 30,000 years. o The Katrol Hill Fault (KHF) is one of the **E–W trending major intrabasinal faults** located in the central part of Mainland Kachchh. o Among other seismically active faults of the region, viz. Kachchh Mainland Fault (KMF), South Wagad Fault (SWF), Gedi Fault (GF), and Island Belt Fault (IBF), seismic activity along KHF is not apparent. • **Banni Grasslands**: It has been encroached by invasive tree species. o **They are the Asia's largest grasslands** in northwest Gujarat's Kachchh district. o They home to a pastoral community called **Maldhari**. o In **1960s to protect this region from salinity ingress from Rann of Kutch** government dropped millions of seeds of exotic species **called Prosopis Juliflora from helicopters.**	 

6.8.2. GEOGRAPHICAL FEATURES- INTERNATIONAL

Volcanoes in news

Kilauea Volcano (Hawaii, USA): Scientists **noticed a surge of earthquakes** and the ground swelling.

- Kilauea Volcano is a **shield volcano** and one of the most active volcanos on earth, lying on Hawaii's **Big Island in Hawaii National Park, Hawaii** (a volcanic island group in the **Central Pacific Ocean**)
- Home to **Mauna Loa** (largest volcanic mountain of world by volume, Hawaii includes a number of islands including Oahu Island with Pearl Harbor, a land-locked harbor attacked by Japan in WW-II).

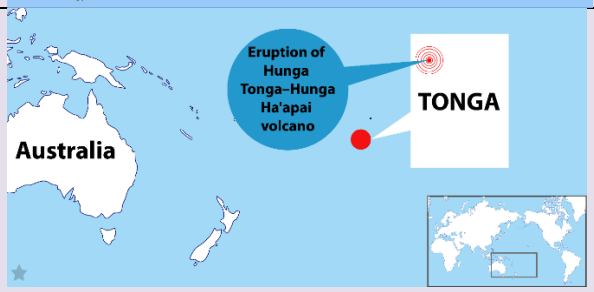
- **Cumbre Vieja Volcano, Canary Islands:** It erupted recently.
  - Located in Atlantic Ocean near mainland Africa, the Canary Islands is a group of **seven islands**, as autonomous community of Spain.

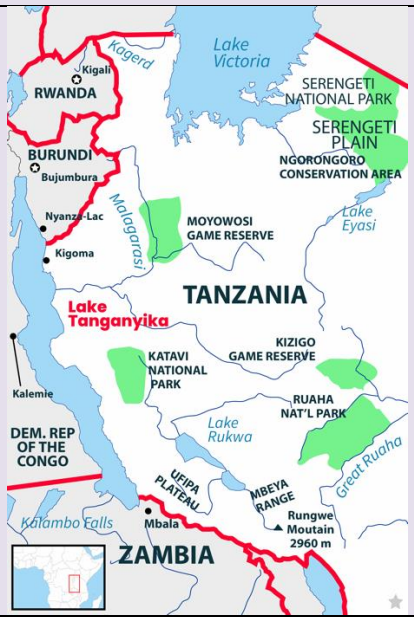
- **Mount Nyiragongo's volcano, Democratic Republic of Congo:** It recently erupted.
  - Nyiragongo is a **large strato volcano** near Lake Kivu at the eastern border of DR Congo with Rwanda in the Virunga National Park.
  - It is infamous for its **extremely fluid lava** that runs as water when the lava lake drains.

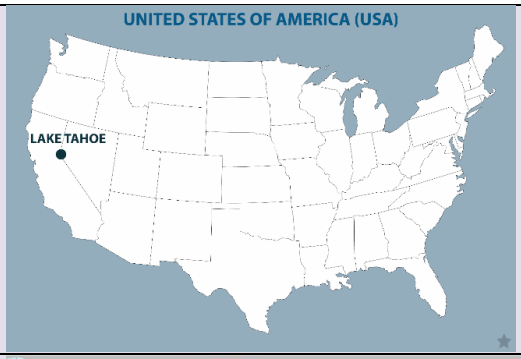
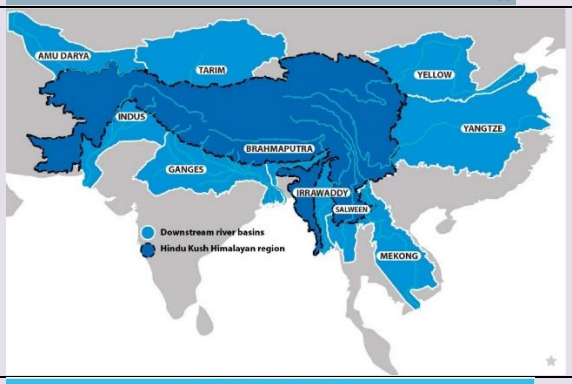
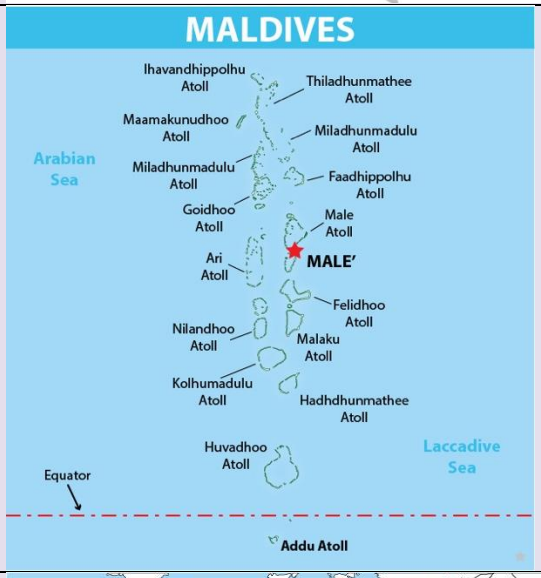
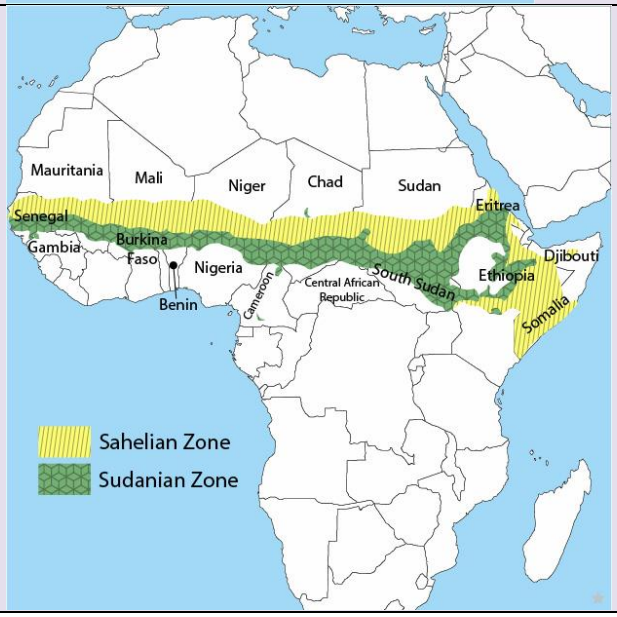
- **Merapi Volcano, Indonesia:** It recently erupted.
  - Merapi, a steep stratovolcano north of Central Java's capital Yogyakarta, is Indonesia's most active volcano out of its 127 volcanoes.
- **Mount Semeru:** The highest volcano of Java Island, Indonesia, erupted once again recently.
  - Mount Semeru, the highest volcano of Java Island (Indonesia), erupted once again recently.
  - Semeru, also known as **Mahameru (Great Mountain)** is located within the **Bromo**

	Tengger Semeru-Arjuno, a UNESCO Biosphere Reserve.	

	• **Volcano Mount Aso, Japan:** It recently erupted.
	  ○ **Location:** in the **Kyushu Group of islands of Japan.**
	  ○ **Other features:** Aso's caldera rank among the world's largest. Volcano is the central feature of Aso-Kuju National Park.
		

	• **Hunga Tonga Hunga Ha'apai volcano, Tonga:** A violent eruption in this underwater volcano triggered tsunami waves around the Pacific.
	  ○ **Tonga is a group of islands in the South Pacific Ocean, located near Fiji and Samoa.**
	  ○ There are an **estimated one million undersea volcanoes,** and most of them are located near the tectonic plates.
		

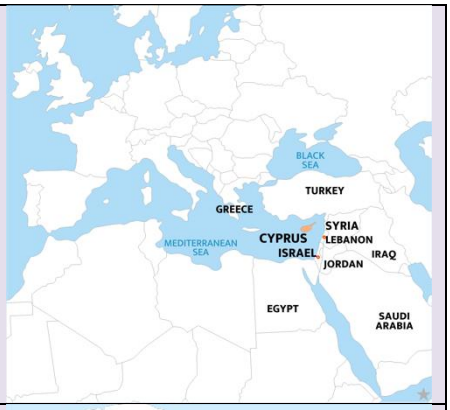
Lake Tanganyika (Eastern Africa)	Recently, floods and landslides were caused by the rising level of **Lake Tanganyika**. • Lake Tanganyika is the **second largest freshwater** lake in volume after **Lake Baikal of Russia.** • **River Lukuga** is its major outflow river, flowing into the **Congo River System** and **River Ruzizi** is the **main inflow River** along with River **Kalambo** and River **Malagarasi** (2nd largest river of Tanzania).	

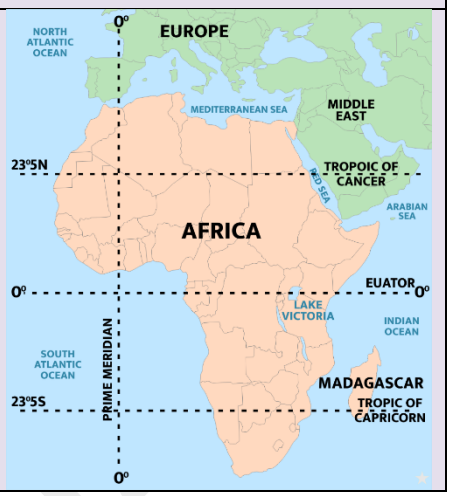
Lake Tahoe, U.S.A.	• Drought fueled by climate change has **dropped Lake Tahoe below its natural rim** and halted flows into the Truckee River. • Lake Tahoe is a freshwater lake occupying a fault basin on the California-Nevada border in the northern Sierra Nevada, U.S.	
Hindu-Kush Himalayas (HKH)	According to a UNDP **report,** Glacier melting in Hindu-Kush Himalayans (HKH) will cause food and water crisis by 2100. • HKH region **extends over eight countries**—Afghanistan, Bhutan, Bangladesh, China, India, Myanmar, Nepal, and Pakistan. • It contains the **world's third-largest storage of frozen water after Antarctica and Arctic**.	
Addu Atoll	Maldives stated that it has made no decision on opening an Indian consulate at Addu Atoll. • Addu Atoll is the **southernmost island group in the Maldives.** It is divided by four channels: Gan Kandu, Viligilikandu, Maakanda and Kodakanda.	
Sudano-Sahelian Zone (SSZ)	Food production in this zone of Africa is under threat due to **climate change**. • The **semi-arid SSZ** is located between the **Saharan desert and the humid Guinean zone** and stretches from the Atlantic coast to the Red Sea coast.	

Java Island, Indonesia	Recently, a 6.6 magnitude earthquake struck off Java Island, Indonesia. • It is home to over 100 volcanoes including **Mount Semeru** the **highest volcano mountain** of Indonesia • It is part of Sunda Island Arc, which includes Sumatra to the northwest and Bali to the east.	

6.8.3. COUNTRIES IN NEWS

1.	**Faroe Islands**	Recently, over 1,400 dolphins were killed as part of the traditional hunting practice in the Faroe Islands. • Faroe Islands, a **semi-autonomous region** under **Denmark**, is the **largest fjord** in the **North Atlantic territory**. • **Moss, grass** and **mountain bog** are the **natural vegetation** of the region with Fishing industry and other marine occupations as the main source of income.	
2.	**Apo Island, Philippines**	Recently, the **Apo Island** of Philippines became its first **'zero waste'** island. • The island nation shares maritime boundaries with **Malaysia, Indonesia, Vietnam, Taiwan, China, Japan** and **Palau.** • **Mount Apo** is its **highest peak** and **Cagayan River** as the **longest river.**	

3.	**Cyprus**	Recently, Cyprus opened its **Museum of Underwater Ayia Napa** (MUSAN), world's **first underwater forest** with over 130 sculptures in **Pernera**(a marine protected area) • It is the **3rd largest island of Mediterranean Sea and member of EU since 2004** with Mount Olympus as its highest peak. • The **Pedieos is the longest river in Cyprus** which **originates in the Troodos Mountains**.	
4.	**Iceland**	Iceland's glaciers have **lost seven percent of their surface** since the turn of the millennium due to global warming and could **disappear entirely by 2200.** • Predominantly a volcanic island formed of basaltic rocks, it is famous for its hot springs, geysers, icefields and active volcanoes • **Largest river:**Thjorsa River is its largest River and **Highest Peak:** Hvannadals Peak.	
5.	**Peru**	A **90 day environmental emergency** has been declared in the coastal area of Lima due to the recent oil spill. An earthquake hit northern Peru. • **Geographical features** - The **andes mountains, lake titicana and cold Peru Current** (or Humboldt Current) which is fundamental to the concept of el-nino. • It's **northern tip nearly touches the Equator**. • The world's largest rainforest, the **Amazon, covers nearly half of Peru**.	
6.	**Greece**	After intense heat waves in Southern Europe and wildfires across region including Greece, it has decided to form a Climate Crisis Ministry. • **Major Water Bodies:** Aegean Sea, Ionian Sea, Sea of Crete, Libyan Sea and Mediterranean Sea are main water bodies, sharing maritime borders with Cyprus, Egypt, Italy and Libya.	
7.	**Siberia**	Siberia is reeling under worst wildfire for 3rd year in a row. • It is **vast region of Russia and northern Kazakhstan,** constituting all of northern Asia and **known for its harsh winters.** • Siberia **extends from the Ural Mountains** in the west t**o the Pacific Ocean** in the east and southward from the Arctic Ocean to the hills of north-central Kazakhstan and the borders of Mongolia and China.	

9.	**Nepal**	Nepal's Langtang Microhydro Electricity Project is Nepal's first hydropower from a glacial lake. • **Climate**: Nepal falls in the **temperate zone** north of the Tropic of Cancer. • **Geographical features** - The **highest point** in the country is **Mt. Everest (8,848 m)** while the **lowest point** is in the **Tarai plains of Kechana Kalan** in Jhapa. • **Rivers:** Nepal can be divided into **three major river systems** from east to west: the **Kosi** River, the **Narayani** River (India's Gandak River), and the **Karnali** River.	
10	**Madagascar**	The Island nation is facing **one the most acute water shortages** where water became more expensive than food. • **Physical location and geographical features:** o It **lies off the southeastern coast of Africa** in the Indian Ocean and is **separated from the African coast by the 400-km wide Mozambique Channel.** o It is the **fourth largest island in the world** o Highest point: **Maromokotro** o Longest river: **Mangoky** • The island was ruled by the French from 1895 to 1957.	

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NAVI MUMBAI | NOIDA | ORAI | PANAJI (GOA) | PANIPAT | PATIALA | PATNA | PRAYAGRAJ (ALLAHABAD) | PUNE | RAIPUR | RAJKOT | RANCHI | ROHTAK | ROORKEE
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