ENVIRONMENT & SPECIES
PRELIMS SPECIAL

KSG
An Institute For IAS Exam...

2024

COP28 UAE
UNITE. ACT. DELIVER.

BOOKLET 6/8

YEARLY COMPILATION
(MAY 2023 - DECEMBER 2023)

Jan to April 2024 will be released in mid May

Table of Contents

CLIMATE CHANGE & ENERGY

COP 28

News Excerpt:

On January 13, 2023, the UNFCCC Secretariat announced that the UAE had been appointed COP 28 President-Designate.

- COP28, hosted by the oil-rich United Arab Emirates (UAE), mobilized a flurry of voluntary pledges in the lead-up to its landmark final deal calling for a "transition away" from fossil fuels.

Key Outcome of the COP28:

Global Initiatives:

COP28 Health & Green Pledge

- **Health Pledge:** On the **first Health Day at COP28**, global leaders united in endorsing the **Health and Climate Change Declaration**, sounding the alarm on the severe health implications of climate change. **India is not a signatory of the Health Pledge.**
- **Green Pledge:** CoP 28 also has cleared a **Global Renewables and Energy Efficiency Pledge,** which aims to **triple renewable-energy generation capacity by 2030** and calls for an end to new investments in Coal-significantly. **India didn't sign on to this.**

Global Stocktake (GST)

- The Global Stocktake (GST) is a comprehensive assessment of the world's progress on climate action.
- The **first Global Stocktake (GST**) of implementing the Paris Agreement was concluded at COP 28.
- Each stocktake is a **two-year process every five years** to assess the world's collective progress towards achieving its climate goals.
- **Significance of GST:**
  - Monitors global climate change mitigation and adaptation progress, translating into implications for countries signatories to the Paris Agreement.
  - Countries are expected to update and increase the ambition of their **NDCs until 2025** and submit their **first 'biennial transparency report' (BTR1)** to track progress.
  - The GST is crucial to the **'ratcheting up' mechanism** that is key to meeting the **Paris Agreement goals**.

Climate Club

- Germany first proposed it during a G7 summit meeting (2022).
- **Climate Club** is an open, inclusive, high-level forum for cooperation on climate action between countries on **decarbonizing the industrial sector**. It was formally launched on the second day of COP28.
- **Led by Germany and Chile,** the Club has garnered support from 36 member countries, including Kenya, the European Union, Switzerland, etc.

What is the **Climate Club Work Programme 2024?**

- **Aim**- Make the decarbonization of industries successful for climate and businesses through ambitious policies, alignment of methodologies and standards, and improvement of finance and assistance for emerging and developed economies.
- The Club's **core idea** is based on the fact that the **hard-to-abate sectors, including steel, cement, and chemicals, are responsible for about 70 percent of global CO2 emissions from industry**, and developed countries account for a significant share of these emissions.

Loss and Damage Fund

It is a global financial package to **ensure the rescue and rehabilitation of countries** facing the cascading effects of climate change.

- It was first announced after **COP-27 in Sharm El-Sheikh, Egypt.**
- The **term refers to the compensation that rich nations, whose industrial growth has resulted in global warming** and driven the planet into a climate crisis, **must pay to poor nations, whose carbon footprint is low** but are facing the brunt of rising sea levels, floods, crippling droughts, and intense cyclones, among others.

- The **World Bank will be the "interim host"** of the fund for four years. It is expected to operate by the principles of the UNFCCC and the Paris Agreement.
- **All developing countries are eligible to apply,** and every country has been "invited" to contribute to the fund.

New Collective Goal on Climate Finance

This CoP hopes to sort out the definition and mechanics of delivering **$100bn in Climate finance by OECD countries,** a pledge made in **2009 and due to start in 2020 but has not been kept so far.**

Tripling Nuclear Capacity by 2050

- **Tripling renewables: 132 countries** committed to tripling **renewable energy capacity worldwide by 2030** and doubling the annual rate of energy efficiency improvements.

Tripling nuclear: More than 20 countries led by the US called for tripling the **world's nuclear energy capacity by 2050.**

Food and Farming

- Nearly 160 countries agreed to **prioritize food and agriculture systems in their national climate plans**.
- The non-binding declaration was welcomed by observers, with food systems estimated to be responsible for roughly a third of human-made greenhouse gasses

Global Methane Pledge

The expansion of the Global Methane Pledge, with 150 signatories committed to reducing methane emissions by **30% by 2030,** continues the momentum from **COP 26.**

Indian Stance in COP 28

- India is one of the few economies globally that is on track to meet the NDC targets.
- India's target is to reduce emissions intensity by **45 per cent by 2030.**
- India **will increase its share of non-fossil fuel to 50 percent**.
- India is sticking **to a net zero target of 2070,** not bringing that earlier.
- **India and UAE launched a Green Credit Initiative.**
- India wants to host **the CoP33 to be held in 2028, which India last hosted in 2002.**
- **India is not** a signatory to the Green Pledge and Health Pledge.
- India also resisted the phase-down of Coal.
- **India did not sign** the **Global Methane Pledge** proposed by the European Union and the United States of America to target a 30% reduction in global methane emissions from 2020 levels by 2030.
- In India, smallholder and marginal farmers with less than two hectares of land account for **86.2% of all farmers but own just 47.3%** of the arable lands.
- **India stands to gain immensely from protein diversification that will** bolster our food security and contribute to a reduction in methane emissions.

India's Initiatives at COP 28

Green Credits Initiative

- The Green Credits Initiative surpasses the commercial nature of carbon credits, Generating **Green Credits** through plantations **on degraded wasteland.**
- It was launched by the **Ministry of Environment, Forest and Climate Change (MoEFCC)** in the **2023-24 budget** under **Mission LiFE**.
  - MoEFCC issued the draft '**Green Credit Programme Implementation Rules 2023**' under the **Environment Protection Act 1986**.
- **Flashback on India's COP 26 commitments:**
  - Previously, India made its commitments at **Glasgow, in COP-26,** of **cutting the emissions** intensity of India's **GDP by 45%,** increasing the share of **non-fossil fuels to 50% by 2030**, and achieving **net zero by 2070**.
  - In **COP 28**, India **offered the concept to the international community to create a market for green credits** at a global level, just like the one on carbon credits exists.
- The **New Collective Quantified Goal (NCQG)** refers to **ongoing negotiations on a new climate finance commitment** developed countries must make to developing countries to accelerate the world's transition away from fossil fuels.

Lead IT 2.0

Lead IT 2.0 will focus on **co-development and transfer of low-carbon technology and financial assistance to emerging economies.**

- The main agenda is **to complete a stocktaking exercise** to review the progress in the global fight against climate change and decide on measures to strengthen climate actions being taken by countries.

Fossil Fuels

In COP 28, India fought hard to change the word 'phase-out' to 'phase-down', with the tacit support of many powerful countries, **including the United States and China, both big coal consumers like India.**

- At COP27 last year, **India argued against the singling out of Coal and called for the phase-down of all fossil fuels.**

GST on Fossil fuels:

- All three successive GST drafts find that the **1.5°C target** would require a **"deep, rapid and sustained"** reduction in global **emissions of 43% by 2030 and 60% by 2035** relative to 2019 levels, reaching **net-zero CO2 by 2050,** with global emissions expected to peak **around 2020 or latest by 2025.**

Fossil Fuels: Is It Replaceable?

In **COP26, in Glasgow in 2021,** countries agreed to tackle Coal — the fossil fuel with the biggest global warming footprint — by agreeing to **"phase down" its use.**

- **India's National Electricity Plan, 2022-27,** plans to **add nearly 87,000 MW i**n this period in the form of fresh coal-fired capacity: **27,000 MW** via under-construction power plants and **60,000 MW from new plants.**
- Creating a path to net zero greenhouse gas emissions by 2050 keeps global temperatures from **rising beyond 1.5 degrees ˚C** by the end of the century.

Global Biodiversity Framework Fund

News Excerpt:

The Global Biodiversity Framework Fund (GBFF) was ratified and launched at the 7th Assembly of the Global Environment Facility (GEF) in Vancouver (Canada), and its first Council meeting will be held in January 2024.

About GBFF:

- **GBFF** is a fund to directly support global efforts to **halt and reverse biodiversity loss by 2030**, a goal agreed to by 196 countries as part of the Global Biodiversity Framework established at COP15.
- **Origin**: It was 1st approved in July 2023 under the Global Environment Facility (GEF).
- **Composition of GBFF Council**: 16 Members from developing countries, 14 Members from developed countries, 2 Members from the countries of central and eastern Europe and the former Soviet Union.
- **Decision-making**: Consensus-based decisions, following the GEF Instrument model.
- **Funding Partners**: Contributions by the Governments, non-profits, and the private sector.
    - **Initial contributions** included 200 million Canadian dollars from Canada and 10 million pounds from the United Kingdom.

Global Environment Facility (GEF)

- **About**: It is a multilateral environmental fund and the largest source of multilateral funding for biodiversity globally. It distributes more than $1 billion a year on average to address inter-related environmental challenges.
- The GEF also supports the implementation of the Montreal Protocol on Substances that Deplete the Ozone Layer (MP).
- **Origin**: It was established ahead of the 1992 Rio Earth Summit and includes 184 countries in partnership with other stakeholders.
- The World Bank serves as a trustee.
- **Financial Mechanism:** The GEF also serves as a financial mechanism for the following conventions:
    - Convention on Biological Diversity (CBD)
    - United Nations Framework Convention on Climate Change (UNFCCC)
    - United Nations Convention to Combat Desertification (UNCCD)
    - Stockholm Convention on Persistent Organic Pollutants
    - Minamata Convention on Mercury
- **India is both a donor and a recipient of GEF**.
- **Funding Allocations**:
    - 20%- Indigenous Peoples and Local Communities (IPLCs)

- 36%- Most vulnerable people, Small Island Developing States (SIDS).
- 3%- LDCs (Least Developed Countries)
- 25%- to increase resources through private sector involvement and ensure streamlined policies.
- Funds would be channelled to non-state actors like the indigenous communities.

- **Targets**: Raise international financial flows to developing countries (at least $20 billion by 2025 and $30 billion by 2030).
- **Trustee of the GBFF**: World Bank.

Carbon Capture and Storage (CCS) & Carbon-Dioxide Removal (CDR)

News Excerpt:

In a recent research, scientists stated that Carbon capture and storage (CCS) has a big role in factories that make cement and fertilizer, as well as in plants that burn rubbish.

Carbon capture and utilization (CCU) technology is needed to clean up industries like cement and chemicals.

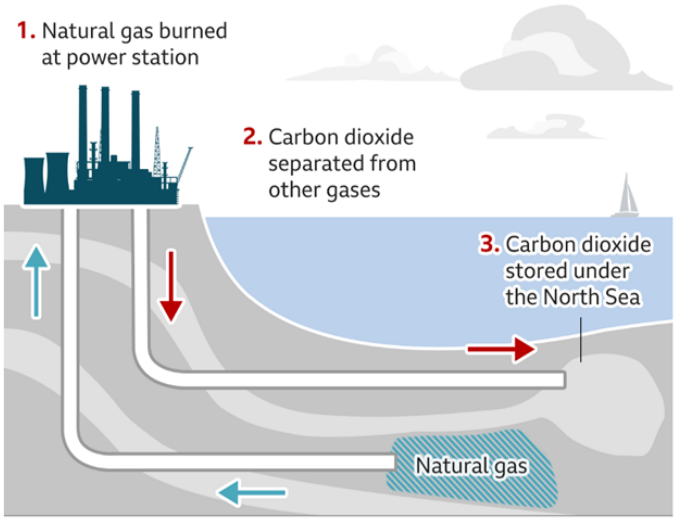
About Carbon capture and storage (CCS):

- CCS refers to technologies that can capture carbon dioxide (CO2) at a source of emissions before it is released into the atmosphere.
- These sources include the fossil fuel industry (where Coal, oil, and gas are combusted to generate power) and industrial processes like steel and cement production.
- Effective CCS applications should achieve a capture rate of **90-95%** or more, store emissions permanently, and keep methane emissions leakage under 0.5%.

About Carbon dioxide removal (CDR):

- CDR takes the forms of both natural means like **afforestation or reforestation** and **technologies like direct air capture,** where machines mimic trees by absorbing CO_2 from their surroundings and storing it underground.
- There are also more complex CDR technologies like enhanced rock weathering, where rocks are broken down chemically; the resulting rock particles can remove CO_2 from the atmosphere.
- **IPCC 6th Assessment Report (AR6) indicates** that achieving the **1.5 degrees Celsius** target is nearly impossible without **significant CDR efforts.**
- **CO2 removal options** include direct air capture, bioenergy with CCS, Afforestation reforestation, Biochar soil carbon, enhanced weathering, and ocean fertilization.

Carbon capture and storage



Source: BBC research

- CCS is different to CDR — where carbon is sucked out of the atmosphere — although some of the technologies overlap.
- The key difference is that CDR brings down the level of carbon dioxide in the atmosphere, cooling the planet, while CCS in fossil fuel plants and factories prevents the gas from getting out in the first place.

About CCU:

- Carbon capture and utilization (CCU) technologies **suck carbon dioxide (CO2) from the atmosphere and convert it into fuel or other valuable products.**
- CCU encompasses methods and technologies to remove CO2 from the flue gas and from the atmosphere, followed by recycling the CO2 for utilization and determining safe and permanent storage options.
- CO2 captured using CCU technologies is converted into fuel (methane and methanol), refrigerants and building materials**.**
- If not being used on-site, the captured CO2 is compressed and transported by pipeline, ship, rail or truck to be used in a range of applications or injected into deep geological formations, which trap the CO2 for permanent storage.

- Using CO2 to improve crop yields in agricultural greenhouses and enhanced oil recovery are two examples of mature CCU technologies.
- CCU is considered an important tool to help countries halve their emissions by 2030 and reach net zero by 2050.

Kampala ministerial Declaration on Migration, environment, and climate change (KDMECC)

News Excerpt:

A total of 48 African countries have now agreed to adopt the **Kampala Ministerial Declaration on Migration, Environment and Climate Change (KDMECC)** to address the nexus of human mobility and climate change in the continent.

About the issue:

- The continental expansion of the KDMECC was discussed at a three-day Conference of States that began on August 23, 2023.
- It was co-hosted by the Governments of Kenya and Uganda with support from the International Organization for Migration **(IOM)** and the United Nations Framework Convention on Climate Change **(UNFCCC)**.
- It also enabled the African States to develop a common position ahead of the **Africa Climate Summit** and the Conference of Parties **(COP 28)**.

About KDMECC:

- KDMECC is a significant outcome of the **Inter-Ministerial Conference on Migration, Environment, and Climate Change** held in Kampala, Uganda, which was originally signed and agreed upon by 15 African states. This declaration represents a collective commitment and agreement among governments from various African countries.
- The conference was **organized by RCC Kampala, the International Organization for Migration (IOM), and the Ministry of Water and Environment of Uganda**.
- It addresses the growing concerns related to the impact of climate change on human mobility. It highlights the environmental and climate-induced challenges that affect people and communities, particularly in Africa, and emphasizes the need for enhanced cooperation and action in response to these challenges.

Methane eating Bacteria: Reducing Global Warming

News Excerpt:

According to a new study, a strain of bacteria has been found that could potentially remove methane from major emission sites such as landfills, paddy fields, and oil and gas wells. Harnessing these bacteria on a large scale can keep 240 million tonnes of methane from reaching the atmosphere by 2050.

About bacterial strain Methylotuvimicrobium buryatense 5GB1C:

- **"Methylotuvimicrobium buryatense" 5GB1C**, formerly Methylomicrobium buryatense 5GB1C (1), is a **type I methanotroph** employing the ribulose monophosphate (RuMP) cycle for carbon assimilation and growing only on one-carbon substrates.
- It has emerged as a promising candidate for industrial applications due to its fast growth, tolerance to high salinity and pH, and robust genetic tools.
- **Methanotrophs** are a diverse group of **gram-negative bacteria** that are related to other members of the Proteobacteria.
- These bacteria are classified into **three groups** based on the pathways used for the assimilation of formaldehyde (the major source of cell carbon) and other physiological and morphological features.
- The bacteria consume methane, which is over 85 times more potent than carbon dioxide (CO2) on a 20-year timescale. **(Methane is responsible for nearly 30 percent of the total global warming).**

Features that make the bacterial strain Methylotuvimicrobium buryatense 5GB1C a promising candidate for methane removal technology:

- **Low Methane Consumption Threshold:** This strain can consume methane at low concentrations, as low as **500 parts per million (ppm)**, which is significantly lower than the typical concentration required by other methanotrophs (5,000-10,000 ppm). It can even grow at concentrations as low as 200 ppm.
- **Efficient Growth:** The bacterial strain demonstrates robust growth and methane consumption even at low methane concentrations, making it highly effective at removing methane from the atmosphere.

- **Biomass Production:** After consuming methane, the bacteria produce biomass, which can be utilized as feed in aquaculture. This biomass generation adds economic value to the methane removal process.
- **Potential for Economic Benefit:** The study indicates that for every tonne of methane consumed, the bacteria can generate approximately 0.78 tonne of biomass with a value of roughly $1,600 per tonne, suggesting economic viability.
- **Scalability:** The strain's ability to consume methane efficiently at low concentrations makes it suitable for large-scale deployment.

Food Waste and Climate Change

News Excerpt:

Every year, the world throws away around 931 million tons of food, most of which end up in landfills. This is creating a big climate problem.

Food Waste Index

It is produced jointly by the **United Nations Environment Programme (UNEP) and WRAP**. It seeks to support efforts to halve food waste by 2030. It aims at supporting the goals of SDG 12.3.

Key Highlights of the 2021 Report are:

- The report estimates that around 931 million tonnes of food waste was generated in 2019, 61 percent of which came from households, 26 percent from food service and 13 percent from retail.
- **Household per capita food waste generation is found to be broadly similar across country income groups**, suggesting that action on food waste is equally relevant in high, upper-middle, middle and lower-middle-income countries.
- Previous estimates of consumer food waste significantly underestimated its scale. While data doesn't permit a robust comparison across time, food waste at the consumer level (household and food service) appears to be more than twice the previous FAO estimate.

Pre-Connect:

- **Food waste** means the environmental impacts of food production without any of the benefits of people being fed.
- **Throwaway food** when it decomposes produces around a tenth of the world's climate-warming gases, according to the United Nations.
- Estimates suggest that 8-10% of global greenhouse gas emissions are associated with food that is not consumed.
- **Among the top five biggest food wasters per capita, at least three of the United States, Australia, and New Zealand have increased their food waste since 2015**.
- 7% of all food available at consumer levels was wasted in 2019 according to the report by the Food Waste Index.
- **In India, an average person wastes 137 grams of food every single day**. According to estimates, food wastage costs around Rs 92,000 crores a year.

How Food Waste Impacts Climate Change

- The greenhouse gases (GHG) from the food industry account for 25% to 30% of the total emissions.
- According to a report by the Intergovernmental Panel on Climate Change (IPCC), the loss and waste of food caused between 8% and 10% of the emissions of the gases responsible for global warming in the period 2010-2016.
- According to a study on Climate Change and Land, the reasons for food waste differ according to the country and its level of development.

Climate-Proof Sanitation

News Excerpt:

At the recent **G20 summit in New Delhi**, world leaders reiterated their previous commitment to addressing climate change challenges by building sustainable and appropriate solutions.

What is Climate-proof or Climate-resilient Sanitation?

- Climate-resilient sanitation **refers to sanitation systems (both non-sewered and sewered),** services and behaviours that can survive, function or quickly recover in the face of climate-related shocks, chronic stresses and seasonal variabilities. Ideally, climate-resilient sanitation both adapts to climate change and mitigates contributions to climate change simultaneously.
- Climate-resilient sanitation ultimately strengthens the overall resilience of communities and households, allowing the continuation of essential public health services in the face of climate-related crises.

Government Initiatives:

- **WASH programming:** India has made rapid progress in ending open defecation across the country, which significantly impacts improving water, sanitation, and hygiene (WASH).
    - **UNICEF** extended the objective of eradicating open defecation to effective solid and liquid waste management in all cities and villages.
    - **By 2019**, according to the latest estimates, the number of people without access to toilets has reduced significantly by an **estimated 450 million.**
- **Swachh Bharat Sanitation Programme**: The concept of Swachh Bharat Abhiyan is to provide basic sanitation facilities like toilets, solid and liquid waste disposal systems, village cleanliness, and safe and adequate drinking water supply to every Indian citizen.
    - **Core 6 components of this mission**: Individual household toilets, Community toilets, Public toilets, Municipal Solid Waste Management, Information and Education Communication (IEC), Public Awareness, and Capacity Building.
- **Jal Jeevan missions:** This program aims to supply 55 litres of water to each citizen residing in rural households by providing extensive and Functional Household Tap Connections (FHTC) by 2024.
    - Rainwater harvesting and water conservation are also the most essential aspects of the mission, focusing on planting trees.

Diel Vertical Migration and Its Role

News Excerpt:

Diel Vertical Migration (DVM) has been recently in the news due to its role in carbon sequestration.

What is DVM?

Every day, billions and billions of animals, mostly zooplankton (e.g., smallish animals, including fish, various shrimp, and jellies), migrate up and down in the ocean all over the planet. This movement is referred to as Diel Vertical Migration (DVM).

- Diel means that it occurs on a daily, **24-hour cycle.**
- **Vertical refers to the direction of the movement up and down in the water column,** generally between the surface layer (called the epipelagic layer) and the deeper middle layer (called the mesopelagic layer). This journey of almost 1000m is quite impressive, especially for creatures of the size of zooplanktons.
- **Layers of Oceans:** The surface layer of the open ocean is between 0 and 200 m deep. In this layer, there is enough light for phytoplankton to grow. The middle layer of the open ocean is between 200 and 1,000 m deep. The light rapidly declines in this layer, often called the "twilight zone." All this movement consumes a great deal of energy.
- **History:** The great French naturalist Georges Cuvier first noted the daily migration of aquatic animals in the early 1800s. DVM is like a circadian rhythm (in humans) associated with genetics.

Global Greenhouse Gas (GHG) Watch

News Excerpt:

World Meteorological Congress approves global GHG Watch to fill critical information gaps on heat-trapping gases fueling temperature increases.

About GHG Watch:

The GHG watch will consist of **four main components**:

- A comprehensive sustained, global set of surface-based and satellite-based observations of concentrations, total column amounts, partial column amounts, vertical profiles and fluxes of the main GHGs – carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O), which together account for 90% of the radiative forcing on the climate system ; such data will be internationally exchanged as rapidly as possible, pending capabilities and agreements with the system operators.
- Prior estimates of the GHG emissions based on activity data and process-based models.
- A set of global high-resolution Earth System models representing GHG cycles.
- Associated with the models, data assimilation systems optimally combine the observations with model calculations to generate products of higher accuracy.

Key Outcomes of GHG Watch:

- The Global GHG Watch initiative recognizes the pressing need for improved monitoring of GHGs. **Filling critical information gaps** will provide accurate and up-to-date data on heat-trapping gases, allowing for a better understanding of their impact on the environment.

- One of the primary objectives of the Global GHG Watch is to **monitor and track temperature increases resulting from the accumulation of GHGs**. This data will provide valuable insights into the changing climate and help shape effective mitigation and adaptation strategies.

Bonn Climate Meet

News Excerpt:

Delegates representing more than 100 Parties to the Paris Agreement met in Bonn, Germany, paving the way for some key decisions for the UN Climate Conference (COP 28) in Dubai.

Pre-Connect

UNFCCC Conference of Parties:

- The COP is the supreme decision-making body of the UNFCCC.
- The COP meets every year unless the Parties decide otherwise. The first COP meeting was held in Berlin, Germany in March 1995.
- The COP meets in Bonn, the seat of the secretariat, unless a Party offers to host the session.
- The COP Presidency rotates among the five recognized UN regions which include Africa, Asia, Latin America and the Caribbean, Central and Eastern Europe and Western Europe and Others.
- The venue of the COP also shifts among these groups.

Significant Outcomes of Bonn Climate Meet:

- **The Global Stocktake (GST)** is designed to drive the Paris Agreement's ambition cycle and will provide the basis for the next round of Parties' emissions reduction targets for 2035 and 2040, as well as new efforts to adapt to the impacts of climate change and to raise financial and technical resources to support developing countries.
- Negotiations also followed up on the breakthrough commitment Parties made at COP27 in Egypt, notably to put in place balanced **new funding arrangements** with an expanded donor base to help vulnerable communities face loss and damage caused by climate change.
- Progress was made on operationalizing the **Santiago Network** on loss and damage. Still, unfortunately, no decision was reached on the host of the network, despite the constructive engagement of all Parties.
- The parties remain hopeful that they can craft a solution in Dubai that will ensure that **technical assistance** can start flowing soon to those who need it the most.

Global Stocktake:

- Mandated by the 2015 Paris Agreement, GST is an exercise aimed at **assessing the progress** in the fight against climate change, and deciding ways and means to enhance global action to bridge the adequacy gap.
- The Paris Agreement says GST must be conducted every five years, starting in 2023.
- The exercise saw repeated squabbling between the developed and developing countries, mainly over provisions related to finance and the '**historical responsibility'** of the rich countries.

Petersberg Dialogue on Climate Change

News Excerpt:

The Petersberg Dialogue on Climate Change was held in Berlin. It was co-hosted by Germany and the United Arab Emirates- the **incoming COP28-Presidency**.

- The first **Petersberg Climate Dialogue (PCD),** aimed at improving communication between leaders and environmental ministers following the nearly unsuccessful negotiations at the 2009 United Nations Climate Change Conference in Copenhagen (COP15), was initiated by Germany.

Key Takeaways:

- To limit global warming to 1.5°C, significant reductions in greenhouse gas emissions are necessary.
- Emphasis should be placed on increasing renewable energy capacity rather than solely phasing out fossil fuel emissions.
- Renewable energy capacity needs to triple by 2030 followed by a doubling in 2040.
- The Global Stocktake in 2023 will evaluate global climate action and its alignment with the Paris Agreement's goals.
- The Global Stocktake outcome should consider how climate change affects developing countries' developmental priorities, including poverty eradication.

$100 billion climate finance:

- Important key highlights of the dialogue are that developed countries are "on a good track" to deliver the $100 billion per year they had promised

to mobilize by 2020 during the COP15 in 2009.

- Delivering the $100 billion goal in 2023 might be too little too late.
- The $100 billion is likely to be a gross underestimation of the true need for climate finance in developing countries.
- A recent estimate pegs climate finance needs at $1 trillion per year by 2030 for emerging markets alone.
- This means that climate finance needs are almost more than 10 times the amount that developed countries have been able to mobilize 14 years after committing to the $100 billion figure.

International Climate Action in Civil Aviation

News Excerpt:

India will start participating in the **International Civil Aviation Organisation's (ICAO)** Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) and the **Long-Term Aspirational Goals (LTAG)** in 2027.

Pre-Connect

- **The ICAO** is responsible for **reducing carbon emissions in international civil aviation.**
- **The Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA)** is intended to address carbon emissions from international aviation.
- CORSIA's main objective is to achieve **carbon-neutral growth** in the aviation sector by requiring airlines to offset their emissions through the purchase of carbon credits from approved projects.
- CORSIA is a significant step towards mitigating the environmental impact of international aviation on climate change. It provides a framework for monitoring, reporting, and verifying emissions.
- LTAG provides a vision and strategic direction for sustainable aviation growth. It serves as a roadmap to guide the development of policies and initiatives to ensure the long-term sustainability and resilience of the aviation sector.

About

- **International Climate Action in Civil Aviation** refers to collaborative efforts and initiatives undertaken at the global level to address the environmental impact of aviation on climate change.
- It includes measures to reduce greenhouse gas emissions, improve fuel efficiency, promote sustainable aviation fuels, and implement carbon offsetting and reduction schemes within the aviation industry.

Aviation Sector and Climate Change:

- The aviation sector is a notable source of greenhouse gas emissions, primarily carbon dioxide (CO2), nitrogen oxides (NOx) and water vapour. When aircraft burn jet fuel, CO2 is released into the atmosphere, contributing to the accumulation of greenhouse gases that trap heat and cause global warming.
- The demand for air travel has been steadily increasing, leading to a growth in aviation emissions.
- NOx emissions from aircraft can lead to the formation of ozone in the lower atmosphere, contributing to the greenhouse effect. Additionally, aircraft contrails and cirrus clouds can have a warming effect by trapping heat radiating from the Earth's surface.

The carbon intensity of aviation refers to the amount of CO2 emitted per unit of distance travelled. The aviation sector typically has a high carbon intensity compared to other modes of transportation due to the energy-intensive nature of flying and reliance on fossil fuels.

Carbon offsetting and related Issues

News Excerpt

In recent years, the carbon offset industry has boomed. It is worth $2 billion (€1.87 billion) annually and is expected to grow five times that size by the end of the present decade.

- The idea of carbon offsetting was conceptualized by the **Kyoto Protocol.**
- The Kyoto Protocol is an international agreement that aims to reduce carbon dioxide (CO2) emissions and the presence of greenhouse gases (GHG) in the atmosphere.
- **Article 6** of the Paris Agreement establishes that Parties should voluntarily cooperate in achieving their carbon emission reduction targets.
- Carbon offsets are considered part of the net-zero journey to balance out residual emissions that are unfeasible to eliminate.

Understanding Carbon Offsetting:

- **About**: A carbon offset broadly refers to a reduction in GHG emissions by increase in carbon storage (either through planting of trees or reducing GHG emission) that is used to compensate for emissions that occur elsewhere.

- **Objective**: Carbon offsets are tradable "rights" or certificates linked to activities that lower the amount of CO2.
  - By buying these certificates, a person or Organization can fund projects that fight climate change mandated by climate change conventions and protocols.
- Offset projects can be broadly split into-
  - **1. Removal offsets**: These describe actions that actively take carbon out of the air and store it permanently, such as by planting trees or direct air capture.
  - **2. Avoidance offsets** are from projects that stop the release of greenhouse gases, such as protecting trees from being logged.

Carbon accounting: The process of measuring and quantifying the amount of greenhouse gas emissions produced by an individual, Organization, or activity.

- It assesses and manages emissions to mitigate climate change and support sustainable practices.

Carbon Offsetting and Climate Change

- Carbon offsetting reduces greenhouse gas emissions to combat climate change.
- It supports the **transition to a low-carbon economy and reduces carbon footprint** while having growth in renewable energy.
- It helps achieve **net-zero emissions and carbon neutrality goals**. It promotes international cooperation in addressing climate change.
- It operates within **market-based mechanisms**. It is not a substitute for reducing emissions at their source.

White Hydrogen

News Excerpt:

Scientists discovered a large reservoir of naturally occurring "white hydrogen" in the Lorraine region of France while assessing methane concentrations in the subsoils of the region.

What is White Hydrogen?

Hydrogen, the lightest element on Earth with the **symbol "H" and atomic number 1, is a gas** in standard conditions.

- White hydrogen, also known as natural hydrogen, is a **gaseous form of hydrogen that exists naturally within geological formations and is a primary energy source** found **deep within the Earth's crust.**
- The Geological Society of America (GSA) forecasts that the demand for hydrogen will quintuple by 2050, with about 100 megatons of hydrogen currently used annually for industrial processes. GSA calculates that white hydrogen could meet at least half of the global demand for sustainable and clean hydrogen by 2100.

Why does White Hydrogen Matter?

- Potential to revolutionize the energy landscape by providing a **renewable and eco-friendly alternative to traditional fossil fuel-based energy sources**.
- **Promising from a climate perspective** because it produces only water when burned, making it an attractive **clean energy source.**

Where does White Hydrogen reside?

- Geologically, it is concealed within the Earth's crust and is often discovered accidentally during geological surveys or explorations for fossil fuels.

How White Hydrogen Is Extracted and Utilized?

- It is extracted by **drilling into geological formations and using hydraulic fracturing (fracking).**
- The process involves injecting a mixture of water, sand, and chemicals at high pressure to release the hydrogen gas from rocks.
- In fuel cell vehicles, hydrogen can be converted into electricity, presenting a promising **alternative to traditional fuel sources** and contributing to the reduction of harmful emissions.

Energy Conservation Building Code

News Excerpt:

The Paris-based **International Energy Agency (IEA)**, in its **World Energy Outlook 2023** report has highlighted India's **Energy Conservation Building Code (ECBC), 2017.**

Key Points:

- **IEA** highlighted that **India's Energy Conservation Building Code (ECBC), 2017** for commercial buildings, sets it apart from other developing economies where **"energy efficiency in buildings stands out as a laggard".**
- Being one of the few rising markets and developing economies with energy efficiency construction rules, India was cited as a **"notable exception."**

Bureau of Energy Efficiency (BEE):

- The Government of India set up BEE on March 1 2002 under the provisions of the Energy Conservation Act, 2001.
- **Vision:** To improve the energy intensity of the Indian economy, thereby contributing towards the country's sustainable development.
- **Objective:** To reduce energy intensity in the Indian economy.

State Energy Efficiency Index (SEEI):

- In 2022, **BEE** released the SEEI, which ranked states according to a number of energy-efficiency criteria.
- **Karnataka scored 22.5 out of a possible 25 points,** making it the highest-rated state in the SEEI for energy efficiency in buildings.
- It was followed by **Telangana, Haryana, Andhra Pradesh, and Punjab**.
- **Bihar** was given the lowest score of 0.5 points. With Bihar, states like Odisha, West Bengal, Tamil Nadu, and Jharkhand were the five worst-rated states.

Energy Conservation (Amendment) Act in 2022:

- India passed the **Energy Conservation (Amendment) Act (ECA) in 2022**, expanding the ambit of building codes in the country.
- It provides for the **transitioning of ECBC into the Energy Conservation and Sustainability Building Code** by incorporating measures relating to embedded carbon, net zero emissions, materials and resource efficiency, deployment of clean energy, and circularity.
    - It also makes **ECO Niwas Samhita,** the Residential Building Energy Code, mandatory.

What is the Energy Conservation Building Code (ECBC)?

- ECBC establishes minimal energy requirements for commercial buildings to allow compliant structures to **achieve energy savings of 25–50%.**
- The code applies to **commercial buildings** with a **connected load of 100 kW** or more or a **contract demand of 120 kVA** or more.
- **Building envelopes (walls, roofing, windows), lighting systems, HVAC systems, and electrical power systems are the six main components** of building design that are examined. The standards under each of these components are divided into two categories: **mandatory and prescriptive.**
- This code is for both new buildings and retrofitting existing buildings.
- Three tags in ascending order of efficiency, namely **ECBC**, **ECBC Plus, and Super ECBC**, are assigned to Compliant buildings.

Implementation status of ECBC in India:

- The ECBC was first released by the Ministry of Power's Bureau of Energy Efficiency (BEE) in **2007,** followed by an update in **2017.**
- The updated 2017 code has additional priorities of renewable energy integration, ease of compliance, inclusion of passive building design strategies, and flexibility for the designers.
- Although **ECBC serves as a national standard,** individual states in India are free to alter it to suit their own particular requirements.
- **Only 15 states have notified rules based on the most recent ECBC, 2017**, even though 23 out of 28 states have notified rules to enforce ECBC compliance**.**
- States like Uttar Pradesh, Punjab, Telangana, Karnataka, Andhra Pradesh, and Kerala are among them.

India Joins BESS Consortium for Renewable Energy Integration

News Excerpt:

India became a member of the **Battery Energy Storage Systems (BESS) Consortium**, an initiative led by the **Global Leadership Council (GLC)** of the **Global Energy Alliance for People and Planet (GEAPP).**

About BESS Consortium for Renewable Energy Integration:

- This move, announced at the **COP28 Summit in Dubai**, aligns with India's goal of achieving energy security and reliable round-the-clock energy access.

Battery Energy Storage Systems (BESS):

- BESS is a critical element in increasing the **reliability of grids** and accommodating the variable renewable energy sources that are needed to power economic development.
- The BESS Consortium is a global initiative aiming to secure commitments for **5 gigawatts (GW)** of BESS by the end of **2024.**
- In many cases, a combination of BESS and renewables is already **cheaper than fossil fuel** alternatives.

- The expansion of BESS is crucial in **bringing down the high cost** to resolve the issue of intermittency and lead to accelerated RE (renewable energy) integration.

India's stance:

- **India has already approved a scheme to develop 4,000 megawatt-hours (MWh) of BESS projects by 2030-31**, with financial support for developers.
- The goal is to integrate **400 gigawatts** of renewable energy by 2030 and alleviate energy poverty.
    - **IndiGrid**, an infrastructure trust, has been awarded a major BESS project in Delhi as part of this effort. The goal is to enhance grid stability, support renewable energy growth, and contribute to a net-zero future.

Global Energy Alliance for People and Planet (GEAPP):

- The GEAPP was formed in **2021** to catalyze **clean energy technologies** and **new pools of finance** to bring reliable, livelihood-enhancing energy to people who lack it.
- Working with **developing countries**, the Alliance seeks to foster collaboration and speed in harnessing the considerable human and financial resources needed to reduce energy poverty while combating climate change.

Global Leadership Council (GLC):

- The GLC is a **high-level coalition** within the GEAPP, established in **2022.**
- The GLC is committed to reducing the cost of renewable energy technologies, focusing on battery storage and off-grid tech aggregation, with a mission to address climate issues and improve global access to sustainable energy.

Electricity (Promoting Renewable Energy through Green Energy Open Access) (2nd Amendment) Rules, 2023

News Excerpt:

The Central Government amended the green energy open access rules for the second time, in which it changed the name of the regulation to Electricity (Promoting Renewable Energy Through Green Energy Open Access) (Second Amendment) Rules, 2023.

Why does India need such changes?

- **Nationally Determined Contributions (NDC):** India is aiming at cutting emissions by 45 percent, which is in line with India's updated NDC target for 2030 and **net zero targets by 2070**.
- **Green Energy Open Access Rules** are a major step towards India going green and cutting emissions by 45 percent in line with India's **updated NDC target for 2030**. It will also help bring down power costs significantly.
- **Empowering Small Consumers**: Open access will also help to empower small consumers to access clean electricity by allowing them to aggregate their total capacity.

What are the changes in the new rules?

- The New Electricity (Promoting Renewable Energy Through Green Energy Open Access) (Second Amendment) Rules, 2023, updates the definition of entity, and eligibility criteria for open access, and adds offshore wind projects to the energy sources for which additional surcharge shall not be applicable.
- Under the latest rules, the Government has allowed green energy to be open to smaller consumers, empowering **Micro, Small, and Medium Enterprises (MSMEs), commercial consumers, and large households** to shift towards green energy.
    - The limit of the **Open Access Transaction** has been reduced **from 1 MW to 100 kW** for green energy to enable small consumers also to purchase renewable power through open access.
- The Government also extended the scheme to offer a waiver of **surcharge for electricity generated** through offshore wind by 7 years - from **2025 to 2032.**
    - In the previous amendment, a waiver of surcharge was to be offered only to offshore wind projects that were commissioned up to 2025**.**

What are the opportunities through these changes?

- **Updating the Energy sector**: Despite the hurdles, commercial and industrial consumers are increasingly seeking to buy electricity directly from renewable energy generators through open access for financial gains due to competitive or cheaper tariffs and decarbonization goals articulated in their **Environmental, Social, and Governance (ESG)** frameworks.
- **Sustainable energy:** With this amendment, virtual net metering provides a similar opportunity with

huge potential to make affordable, clean electricity accessible to smaller end consumers.

- **Distribution companies:** Distribution companies have an opportunity to generate additional revenue, which they can do by providing grid and balancing services such as power banking, energy storage, etc.
- **Boost for offshore energy:** The amendment of the rules extends the waiver of surcharge to electricity generated from offshore wind farms commissioned from 2025 to 2032. This intends to incentivize tapping the potential of the offshore wind energy sector.
    - Currently, India **does not have any installed offshore wind capacity** but plans to bid out **37 GW by 2029-30**.

Clean Tech for an Inclusive Green Future in India

News Excerpt:

The Indian Prime Minister, in his Independence Day address, talked about India showing the world how to combat climate change. The green economy paradigm provides an optimistic pathway to align development and environmental outcomes by enabling access to cleantech solutions for livelihoods.

Pre-Connect

- **Green growth is one of the seven priorities (Saptarishi) of the Union Budget** 2023-24 for ushering green industrial and economic transition, environmentally friendly agriculture, sustainable energy and generating various green jobs in the country.
- The Union Budget has envisaged several projects and initiatives spread across various sectors and ministries, viz. Green Hydrogen Mission, Energy Transition, Energy Storage Projects, Renewable Energy Evacuation, Green Credit Program, PM-PRANAM, GOBARdhan Scheme, Bhartiya Prakritik Kheti Bio-Input Resource Centres, MISHTI, Amrit Dharohar, Coastal Shipping and Vehicle Replacement.

About Clean Technology (Clean Tech):

- It refers to **avoiding environmental damage at the source** using materials, processes, or practices to eliminate or reduce the creation of pollutants or wastes.
- This sector is projected to be the fastest-growing segment in India.
- This sector comprises six segments: **renewable energy, energy efficiency, green transportation, water and wastewater treatment, air quality control, and solid waste management.**
- **Examples:** Electric cars, solar panels, wind, wave energy, etc.

India and its Clean Tech Initiatives:

- India has achieved remarkable success in sustainable development by implementing clean technology and has become a global clean energy powerhouse.
- India, which was the **third-largest emitter of greenhouse gases**, advanced a scheme to convert to renewable energy using the sun and wind from fossil fuels. This continuous effort has created an increase in the country's renewable energy capacity (around 80 gigawatts of installed renewable energy capacity, 2019), with a compound annual growth rate of over 20%.
- By steadily increasing India's renewable capacity, India is achieving the Paris Agreement with a significant reduction in producing carbon emissions.
- Adopting renewable energy not only brought technological advances to India but also impacted employment by creating around 330,000 new jobs by 2022 and more than 24 million new jobs by 2030, according to the International Labour Organization in the renewable energy sector.

SDG Goals related to Clean Tech:

SDG 6: Ensure availability and sustainable management of water and sanitation for all.

SDG 7: Ensure access to affordable, reliable, sustainable and modern energy for all.

SDG 11: Make cities and human settlements inclusive, safe, resilient and sustainable.

SDG 13: Take urgent action to combat climate change and its impacts.

Clean Tech initiatives taken in rural India:

- **Solar Dryers**
- **Biomass-Powered Cold Storages**
- **Solar-Powered Silk Reeling Machines**
- **Solar Pumps**
- **Energy-Efficient Food Processing:** Initiatives like the Pradhan Mantri Formalization of Micro food Processing Enterprises (PM-FME) scheme.
- **Solar Grain Mills**

- **Solar Refrigerators:** Under schemes like the Pradhan Mantri Matsya Sampada Yojana to reduce food spoilage and improve storage.
- **Collateral-Free Loans:** Government programs like the Pradhan Mantri MUDRA Yojana.
- **Financing Support** will enable large-scale financing of cleantech solutions.
- **Multi-actor partnerships** between technology innovators, manufacturers, distributors, financiers, and market-linkage players.

Green Hydrogen

News Excerpt:

Recently, India announced the **definition of Green Hydrogen.**

About Green Hydrogen:

- Green hydrogen is an environment-friendly fuel produced from renewable sources of energy that can be easily replenished.

Definition as per the recent Government circular:

- Hydrogen produced **using renewable energy**, including, but not limited to, production through **electrolysis or conversion of biomass**.
- The standard defines **Green Hydrogen** as having a well-to-gate emission (i.e., including water treatment, electrolysis, gas purification, drying and compression of hydrogen) of not more than 2 kg CO2 equivalent/kg H2.

GREEN HYDROGEN MISSION

- On January 4 2023, the Union Cabinet approved the **National Green Hydrogen Mission** with an outlay of ₹ 19,744 crore from FY 2023-24 to FY 2029-30.
- According to the Union Power & NRE Minister, it is expected to reduce ₹ 1 lakh crore worth of fossil fuel imports and nearly 50 MMT per annum of CO2 emissions by 2030.

Green hydrogen benefits:

- **Sustainability**- does not emit polluting gases in either its production or combustion.
- **Reduces carbon footprints**- does not release greenhouse gases.
- **Versatile**- can be transformed into either a synthetic gas or electricity.
- It can be utilized for **commercial, domestic, mobility, or industrial purposes.**
- It is also easily **storable** as hydrogen is very **lightweight**.

E27 Fuel and Ethanol Blended Diesel Fuel

News Excerpt:

Hindustan Petroleum Corporation Limited (HPCL) has successfully launched a **pilot study on vehicles using E27 fuel and Ethanol Blended Diesel Fuel.**

Significance

- HPCL has become the first Oil Marketing Company in India to initiate such a comprehensive research program that aims to promote the adoption of Ethanol Blending in gasoline.
- The roadmap for ethanol blending outlines a phased rollout plan ensuring widespread availability of E20 by April 2025.
- It further emphasizes the introduction of E20 material-compliant and E10 engine-tuned vehicles, followed by the production of E20-tuned engine vehicles in April 2025.
- It is projected that by 2025, the use of E20 fuel will contribute to the reduction of more than 200 lakh MT of GHG emissions.

Indian Standards on Biofuel to Aid GBA's Clean Energy Goals

News Excerpt:

The Bureau of Indian Standards (BIS) released 9 standards on biofuels.

About the standards:

- These standards will aid stakeholders, including manufacturers, traders, and other entities dealing with biofuel or related matters.
- They will significantly complement the objectives of the India-led **Global Biofuel Alliance (GBA)**- a forum of 30 countries and international institutions to facilitate the adoption of biofuels.
- It will help meet the target of net zero by 2070 and 50% of energy through renewable sources.

About BIS:

It is a national standards body of India working under the aegis of the Food and Consumer Affairs Ministry.

- BIS is also in the process of developing a standard on paraffinic (green) diesel, which is derived from second (2G) generation feedstock.
- According to BIS- the USA, Brazil, and India- collectively contribute to 85 % of the production and 81 % of ethanol consumption globally.

Sustainable Aviation Fuel

News Excerpt:

Recently, India cited that the worldwide requirement for **Sustainable Aviation Fuel (SAF)** to be adopted by 2050 was deemed "too early." India emphasized that each country should have the freedom to devise its own strategy based on national plans.

About SAF:

- It is derived from **renewable sources** such as non-food crops, agricultural residues, waste oils, and algae.
- Unlike traditional jet fuel, which is derived from fossil fuels, SAF utilizes **sustainable feedstocks, reducing reliance on finite resources.**
- SAF can be used in existing aircraft and infrastructure without requiring major modifications. It can be blended with conventional jet fuel or used as a drop-in replacement, making it a viable option for transitioning to greener aviation.

Environmental Benefits of SAF:

- Reduce carbon dioxide emissions by up to 80% compared to conventional jet fuel.
- Decreases greenhouse gas emissions compared to conventional jet fuel. It can reduce carbon dioxide (CO_2) emissions by up to 80%, contributing to global efforts to combat climate change and achieve carbon neutrality.
- Lower emissions of pollutants such as sulfur oxides (SO_x), nitrogen oxides (NO_x), and particulate matter.
- Responsible sourcing practices, minimizing the impact on biodiversity and ecosystems.
- Encourages the use of non-food crops and waste materials, avoiding competition with food production and land use conflicts.
- Contribute to carbon offset programs, enabling airlines to reduce their carbon footprint.
- Encourages sustainable land use practices and minimizes the potential impact on biodiversity.

Challenges:

- **Scaling up production**
- **Regulatory framework**
- **Infrastructure development**

Global Biofuels Alliance

News Excerpt:

India announced the launch of the Global Biofuel Alliance, aimed at promoting international collaboration and accelerating the development and adoption of biofuels.

Pre-Connect

- The India-led coalition comprises public and private stakeholders with the common goal of boosting biofuel usage, fostering development, and raising awareness.
- Members encompass India, the USA, Brazil, the European Union, the International Energy Agency (IEA), the Biofuels Alliance (comprising 20 nations advocating sustainable low-carbon bio-economies), the Indian Sugar Mills Association, and the Society of Indian Automobile Manufacturers.
- The USA and Brazil are biofuel pioneers in production and consumption, with Brazil even utilizing 100% ethanol for its vehicles.

About Biofuel:

- Any hydrocarbon fuel that is produced from an organic matter (living or once living material) in a short period of time (days, weeks, or even months) is considered a biofuel.
- Biofuels may be solid, liquid or gaseous in nature.
    - Solid: Wood, dried plant material, and manure
    - Liquid: Bioethanol and Biodiesel
    - Gaseous: Biogas
- These can be used to replace or can be used in addition to diesel, petrol or other Fossil fuels for transport, stationary, portable and other applications. Also, they can be used to generate heat and electricity.
- Some of the main reasons for shifting to biofuels are the rising prices of oil, the emission of greenhouse gases from fossil fuels and the interest in obtaining fuel from agricultural crops to increase the income of farmers.

Compressed Bio-Gas (CBG)

News Excerpt:

Recently, the Government announced the mandatory blending of Compressed Bio-Gas in the CNG (Transport) & PNG (Domestic) segments of the CGD Sector.

- **Promotion of biofuels:**
    - Sustainable Aviation Fuel (SAF/Bio-ATF) initial indicative blending percentage targets were set by the **SAF (Sustainable Aviation Fuel) Committee** constituted by the Petroleum

Ministry. The following initial indicative blending percentages of SAF in ATF are approved based on the comments received from the stakeholders, like MoCA, Niti Aayog, OMCs, etc.
    - **1% SAF indicative blending target in 2027 (Initially for International flights)**
    - **2% SAF blending target in 2028 (Initially for International flights)**
- **Production of Ethanol:** Promoting ethanol production from maize with all stakeholders to make it a prominent feedstock in the coming years.
    - To develop high starch-yielding varieties.
    - To develop and improve the quality of maize DDGS (Dried Distillers Grain Solids) by removing aflatoxins,
    - Faster registration of new seed varieties.
    - Promoting the maize training programs for distillers with seed companies.

About Compressed Bio-Gas:

- Compressed Bio-Gas (CBG) is a **mixture of hydrocarbon gases and vapours produced by decomposing plant and animal waste.**
- It is purified and compressed for use as an automotive fuel and industrial application.
- CBG has high calorific value and other properties similar to CNG and can be utilized as green renewable automotive fuel.
- It will reduce the higher costs due to natural gas and crude oil imports.
- It will reduce GHG emissions and pollution levels.
- It will provide a buffer for energy security and thus reduce crude/gas price fluctuations.
- It will promote the Swachh Bharat Mission and help double the farmers' income through responsible waste management.

Clean Energy Share in India and its States' Electricity mix

News Excerpt:

According to the data published at the time of COP 28 Summit, India's **share of clean energy in power production rose from 17% in 2000 to 23% in 2022.**

What is clean energy?

The energy comes from **renewable, zero-emission sources that do not pollute the atmosphere** when used, and **energy is saved** by energy-efficient measures.

For example: Solar energy, Wind energy, and Hydroelectric energy etc.

Status of Indian States:

- India's progress has been relatively slow, with its share of clean energy in power production rising from **17% to 23% in this period.**
- India proposed widening the deal to include oil and gas in the phasing down of Coal. It won backing from more than 80 countries, but Saudi Arabia and other oil and gas producers blocked it.
- **Only the top 15 States** in terms of power generation are selected.
- **Gujarat** has recorded a drastic decrease in its usage of fossil fuels for power generation from **80% in 2019 to 60% in 2022.**
- **Rajasthan, along with Gujarat,** has recorded a decline in clean energy production.
- **Karnataka and Himachal Pradesh** are the only States among the top 15 producers where the share of clean energy is already higher.
- **Tamil Nadu** was inching closer to the 50:50 mark, but progress has stagnated in recent years.
- On the other hand, the share of fossil fuel in power generation was more than 90% consistently in **Uttar Pradesh, Madhya Pradesh, Chhattisgarh, West Bengal, and Bihar.**
    - In the four years considered, the share has not been budged in these states.
- Odisha's fossil fuel usage has shown an increase in recent years along with Punjab.

ENACT Partnership

News Excerpt:

Recently, six new countries and a United Nations agency joined the **ENACT Partnership**.

About ENACT (Enhancing Nature-based Solutions for an Accelerated Climate Transformation) Partnership:

- It is an **ambitious global initiative** that seeks to coordinate global efforts to address climate change, land and ecosystem degradation, and biodiversity loss through **Nature-based Solutions.**
    - Nature-based Solutions involve **working with nature**, including the protection, restoration or management of natural and semi-natural ecosystems; the sustainable management of aquatic systems and working lands; and the integration of nature in and around our cities.
- New members include France, the **United States of America, Belgium, the Netherlands, Switzerland,**

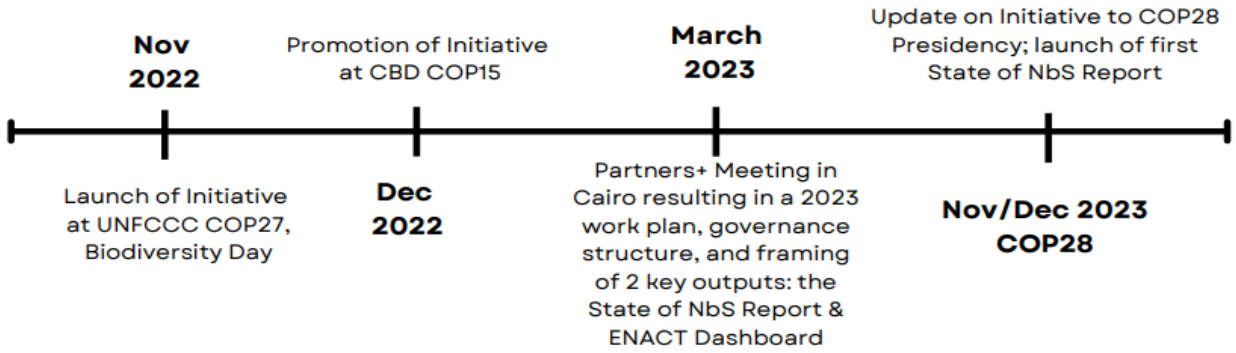


Figure: Key milestone of Enact Partnership

Pakistan, and the UN Environment Programme, including its World Conservation Monitoring Centre.

- They joined Germany and Egypt, along with the International Union for Conservation of Nature, and **launched ENACT at COP27.**
- Canada, the European Union, Spain, and Malawi. Norway, South Korea, Japan, and Slovenia are also founding members of the partnership.
- It aims to enhance the protection from and resilience to climate impacts of **at least 1 billion vulnerable people** and secure up to **2.4 billion hectares** of healthy natural and sustainable ecosystems. And significantly increase global mitigation efforts by protecting and restoring carbon-rich ecosystems.

Report on loss of vegetation in Cauvery basins

News Excerpt:

As per a recent paper published by researchers at the **Indian Institute of Science (IISc), Bengaluru**, there has been a significant loss of natural vegetation in the Cauvery basin for 50 years (1965 to 2016).

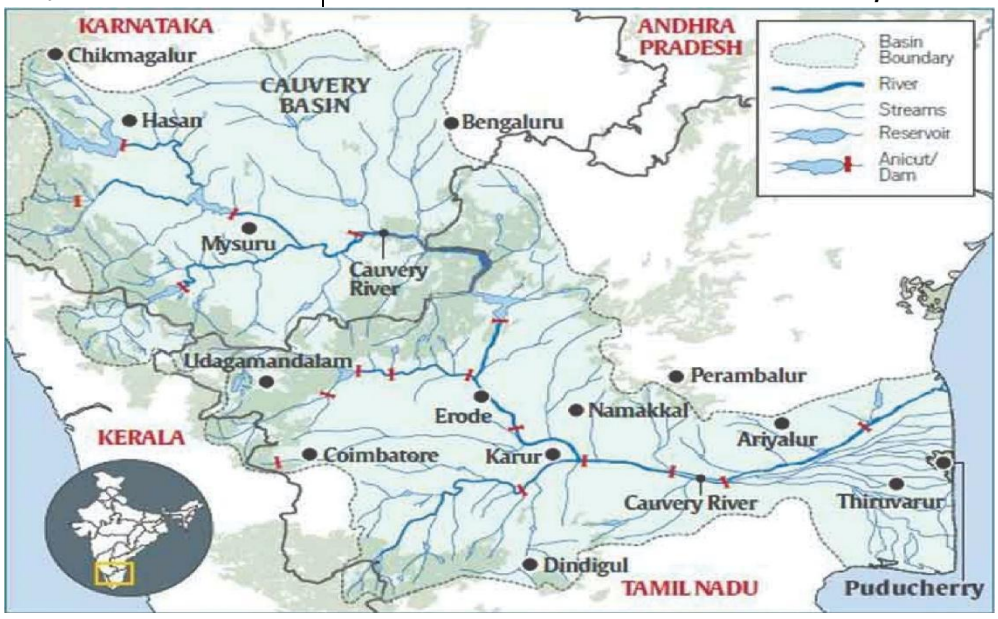
Summary of the report:

The extent of Vegetation Loss:

- The report quantifies the loss of natural vegetation, revealing that approximately **12,850 sq. km** of land in the Cauvery basin experienced a decline in natural vegetation cover.
- The reduction in dense vegetation was 35% (6,123 sq. km.), while degraded vegetation witnessed a more significant decrease of 63% (6,727 sq. km.).

Geographical Distribution of Loss:

- **Karnataka** bears the brunt of the lost green cover, accounting for **3/4th of the total**, while Tamil Nadu's share is around 1/5th.
    - The **two states' water demand increased**, and land use analysis showed that in **73.5% of the catchment, agriculture and horticulture constituted** the dominant activities.
- The report identifies specific areas, such as the **Brahmagiri Wildlife Sanctuary**, **Bandipur National Park, Nagarhole National Park**, and the **Cauvery Wildlife Sanctuary**, which have suffered adverse changes in forest cover.
    - In respect of the **Bannerghatta National Park,** the moist deciduous forest area, which was about **50% in 1973, stood at**



28.5% in 2015 due to "anthropogenic pressure".

Land Use Dynamics and Water Demand:

- The report traces the historical growth of the cropping area in the basin, emphasizing the rise in **irrigated land** in both **Tamil Nadu and Karnataka.**
- This increase in **agricultural activity** contributes to a heightened demand for water in the region.

ADB launches initiative for the Hindu Kush Himalayan region

News Excerpt:

The Asian Development Bank (ADB) announced the launch of an initiative to address the adversities of climate change in the Hindu Kush Himalayan (HKH) region, a vital source of water for billions of lives.

Hindu Kush Himalaya (HKH):

- The HKH stretches **3,500km** from Afghanistan to Myanmar and has the highest mountain ranges in the world.

Adversities of climate change in the Hindu Kush Himalayan region

- According to ADB, the Hindu Kush Himalayan region can lose up to **75%** of the glaciers by the end of the century.
- **Loss of glaciers** can cause frequent hazards, day zeros, loss of biodiversity and climatic catastrophe. **Nepal and Bhutan** face increased threats like **landslides, earthquakes, and floods**.

29th World Ozone Day

News Excerpt:

The Ministry of Environment, Forest and Climate Change (MoEF&CC) celebrated the 29th World Ozone Day on September 16, 2023.

About the World Ozone Day

- It is celebrated on September 16 each year to c**ommemorate the signing of the Montreal Protocol,** which came into force on this day in 1987.
- It is celebrated every year to **spread awareness among people about the depletion of the Ozone Layer** and the measures taken/ to be taken to preserve it.
- The **Ozone Cell**, MoEF&CC, has been celebrating World Ozone Day since 1995 at the National and State levels.

Related terms:

- **Ozone Layer**: It exists in the Stratosphere, between 10 KM and 40 KM above the Earth's surface and protects us from UV radiation from the Sun. Ozone formed in the Stratosphere is called **stratospheric or good Ozone**.
- **Significance of the Ozone Layer:** Without the Ozone layer, radiation from the Sun would reach Earth directly, having ill effects on human health, such as eye cataracts, skin cancer, etc., and adverse impacts on agriculture, forestry, and marine life.
- **Ozone Depleting Substances:** These are the manmade chemicals containing chlorine and bromine that reach the Stratosphere and undergo a complex series of catalytic reactions, destroying Ozone.
- **The Vienna Convention** is an international treaty on the protection of the Ozone Layer, which **came into force in 1985.**
- Under this Convention, **the Montreal Protocol came into force in 1987.** It is an international environmental treaty to protect the Earth's Ozone Layer by phasing out the production and consumption of Ozone Depleting Substances for end applications.
- The **theme** for World Ozone Day 2023 is "**Montreal Protocol: fixing the ozone layer and reducing climate change".**

Ground-level Ozone

News Excerpt

The Centre for Science and Environment (CSE) study indicates that certain areas within the Delhi-NCR region have observed ground-level ozone levels surpassing the established national standards.

About:

- Ground-level Ozone, found closer to the Earth's surface, is called **tropospheric or "bad" Ozone.**
- It is formed in the atmosphere through a **photochemical reaction involving sunlight, nitrogen oxides** (NOx), and various **volatile organic compounds** (VOCs).
- VOCs are hydrocarbons that exhibit photochemical reactivity and contribute to the formation of ground-level Ozone.
- Photochemical smog, which has a hazy and brownish-grey appearance, is an air pollution

phenomenon that significantly contributes to the generation of ground-level Ozone.

- **Stagnant atmospheric conditions** in certain regions promote the occurrence of photochemical smog by trapping air pollutants near the Earth's surface.
- The lack of air movement prevents the dispersion of pollutants, allowing them to accumulate and undergo chemical reactions.
- As a result, ground-level Ozone is formed as a **secondary pollutant within the lower atmosphere.**

Key Takeaways:

- The CSE analysis, based on data from the Central Pollution Control Board (CPCB) collected from 58 stations across Delhi-NCR, also indicates that although the extent of ground-level Ozone exceeding the standard has been relatively lower this year, its duration has increased.
- Ground-level ozone formation is **more prevalent during the summer months.**
- Delhi-NCR recorded ozone exceedance on almost all days of this summer. Mumbai, with 75 days of exceedance, was the second-most impacted metro.
- For Mumbai, ground-level Ozone is becoming a yearlong problem: So far, 75 days this summer have registered exceedance among the air quality monitoring stations of Greater Mumbai.
- Chennai and Bengaluru have longer exceedance durations despite lower frequency compared to other metros.

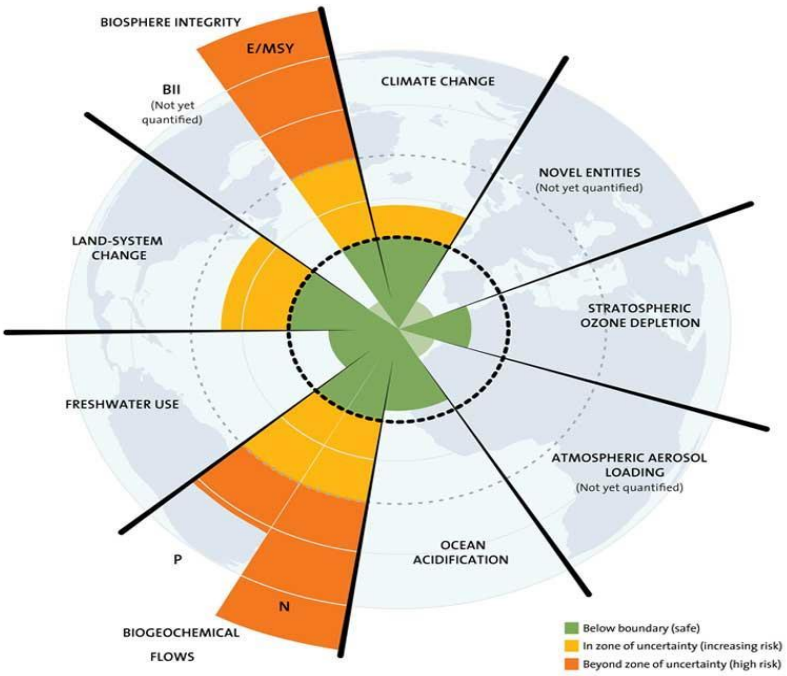
Humans Breach Most of The Planetary Boundaries

News Excerpt:

Recently, a study published in Science Advances stated that **Earth has breached 6 out of 9 planetary boundaries**.

About Planetary Boundaries:

- This Framework was developed in 2009 to measure and quantify the anthropogenic impact on the Earth System.
- It identifies nine processes that are critical for maintaining the stability and resilience of the Earth system as a whole.



Nine Planetary Boundaries and Control Variables:

1. **Biosphere Integrity:** The health of ecosystems and rate of species extinction.
2. **Climate Change:** Atmospheric CO2 concentration and change in radiative forcing.
3. **Novel Entities**: Levels of plastic, concrete, synthetic chemicals, and gene-modified organisms.
4. **Stratospheric Ozone Depletion:** Release of ozone-depleting chemicals.
5. **Freshwater Change**: Human-induced impact on both surface and soil water.
6. **Atmospheric Aerosol Loading**: Particles from human emissions affecting cloud formation and atmospheric circulation.
7. **Ocean Acidification:** Reduction in ocean pH over time.
8. **Land System Change**: Changes in land use and fires, mainly deforestation and conversion of tropical forests to farmland.
9. **Biogeochemical Flow:** Alteration in natural flows of nitrogen and phosphorus cycles, which are vital for plant growth.

Findings of the Study:

6 Planetary boundaries have been breached by humans out of 9, which are climate change, biosphere integrity, freshwater change, land system change, biogeochemical flows, and novel entities.

Climate Change: The planetary boundary for atmospheric CO2 concentration and radiative forcing

was set at 350 parts per million (ppm) and 1 Watts per square meter (W/mˆ2).
    - However, the current levels are 417 ppm and 2.91 W/mˆ2, respectively, indicating a significant overshoot.

Radiative forcing:
- It measures the change in energy balance due to a change in a climate-forcing agent (e.g., greenhouse gaseous, aerosol, cloud, and surface albedo) to affect the global energy balance and contribute to climate change.

- **Biosphere Integrity:** The safe limit for human-induced species extinctions was set at less than 10 extinctions per million species-years, but the actual rate exceeds at over 100 extinctions per million species-years.

NPP equals the difference between the amount of carbon produced through photosynthesis and the energy used for respiration.

    - Approximately 1 million out of the 8 million plant and animal species are threatened with extinction.
    - Over the last 150 years, more than 10% of the genetic diversity of plants and animals may have been lost.
    - Humans appropriated roughly 30 % of the net primary production (NPP) or the energy available to support biodiversity before the Industrial Revolution.
- **Land System Change:** The global forested land area has fallen below the safe limit of 75% and currently holds only 60%.
- **Freshwater Change:** In 1905 and 1929, both blue water (surface and groundwater) and green water (available water for plants) surpassed their safe thresholds of 10.2% and 11.1%, respectively.
    - They are now standing at 18.2% and 15.8%, respectively.
- **Biogeochemical Flows:** Phosphorus and Nitrogen in the environment have exceeded the safe limits, triggering algal blooms and ocean dead zones.
    - The limit for phosphorus was set at 11 teragrams (Tg) and has now reached 22.6 Tg.
    - The limit for Nitrogen was 62 Tg and is currently at 190 Tg.
- **Novel Entities:** The planetary boundary for novel entities was set at zero, implying no adverse impact. However, human novel entities like microplastics, endocrine disruptors, and organic pollutants have transgressed this limit.
- **Elements under safe planetary boundaries**: Stratospheric ozone depletion, aerosol loading, and ocean acidification were found to be within the safe planetary boundaries.

India's Bamboo Biodiversity

News Excerpt:

The Department of Forests and Wildlife (Delhi) is collaborating with over 6,000 types of Indian plants to create the **Bamboo Biodiversity Project on Yamuna floodplains as part of the "Meri Maati, Mera Desh" programme.**

Meri Maati Mera Desh Campaign
- This campaign Honors the brave freedom fighters and brave hearts who sacrificed their lives for the country by encouraging people to send soil from their native places to the Ministry of Culture to create Amrit Vatika.
    - **Tagline**: `Mitti ko naman, veeron ka vandan.'

About the project:

The Bamboo Biodiversity Project is a pioneering conservation effort to protect India's rich bamboo biodiversity. This project lies at the '**Bharat Kunj' Bambusetum** (established in the shape of India's map) on the Yamuna floodplains in Delhi.

Status of Bamboo in India:

- Bamboos belong to the grass family Poaceae (Gramineae).
- **Species in India**: 136 indigenous and exotic species of Bamboo belong to 23 genera.
- **Coverage**: According to the **Forest Survey Report 2021**
    - Bamboo forests occupy roughly 12.8% (10.03 million hectares) of the country's total forest area; they have grown from 13,882 (2019) to 53,336 (2021) million culms/stems.
- **Geographical Area**: Bamboos, native to the tropics, also exist in subtropical and temperate zones.
- **Producing States: Assam** is the largest producer of Bamboo in India.
    - More than 50% of the bamboo species occur in Eastern India - Arunachal Pradesh, Assam,

Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, Tripura, and West Bengal.
    - Other bamboo-rich areas are the Andamans, the Bastar region of Madhya Pradesh and the Western Ghats.
- **India's global status**: India is the world's second-largest cultivator of Bamboo after China, but its share in the global bamboo trade and commerce is only 4%.

Initiatives taken to promote Bamboo:

- **Bamboo Clusters**: The MoA&FW has inaugurated 22 bamboo clusters in 9 states: Gujarat, Madhya Pradesh, Maharashtra, Odisha, Assam, Nagaland, Tripura, Uttarakhand, and Karnataka.
- **Minimum Support Price (MSP) support**: The Central Government has revised the MSP for Minor Forest Produce (MFP).
    - MFP includes all non-timber forest produce of plant origin, including Bamboo, canes, fodder, leaves, waxes, resins, and wild fruits.
- **Not included in the 'Tree' Category**: Bamboo outside forest areas was excluded from the category of trees by amending the Indian Forest Act, 1927, in 2017.
    - This will enable Bamboo cultivation and business without felling and transit permission.
- **Formation of 10,000 new Farmer Producer Organizations (FPOs) in 5 years:** FPOs offer various assistance to farmers, including improved farm practices, input purchase collectivization, transportation, market linkage, and enhanced price realization by eliminating intermediaries.
- **Trade support**: Import policy has also been altered to support the growth of the country's bamboo sector.
- **National Bamboo Mission (NBM)**: It helps local artists by using locally grown bamboo species, indirectly boosting farmers' revenue and reducing their reliance on raw material imports.
    - For example, NBM launched an MIS-based reporting platform for agarbatti stick production.
- **Common Facility Centres**: These are being established near the plantations to cut transportation costs and encourage local entrepreneurship.

About National Bamboo Mission (NBM):

- NBM was launched in 2006-07, and **Restructured NBM** was developed in 2018-19.
- In 2022-23, the NBM was merged with the Mission for Integrated Development of Horticulture (MIDH) scheme.
- **Nodal Ministry and Implementing Authority**: The Department of Agriculture & Cooperation (DAC), Ministry of Agriculture and Family Welfare (MoA&FW).
- It is a **Centrally Sponsored Scheme**
- **Funding Pattern:**
    - NE & Hilly States: 90:10 between Centre and State Govt.
    - All other States: 60:40 between Centre and State Govt.
    - Union Territories/R&D Institutes/Bamboo Technology Support Groups (BTSGs) and National-Level Agencies: 100% by the Central Government.
- **Restructured NBM uses** a cluster-based approach, focusing on industry and spoke models to connect farmers to markets and harness opportunities.
- Presently, the scheme is being implemented in 24 States/UTs.

First IEA Critical Minerals and Clean Energy Summit

News Excerpt:

The International Energy Agency (IEA) hosted the 1st international summit on critical minerals and their role in clean energy transitions in Paris.

About critical minerals:

- They are essential for rapidly growing clean energy technologies, economic development and national security.
- The **Government has released a list of 30 critical minerals** for India, such as Cobalt, Copper, Graphite, Nickel, Phosphorous, Potash, Silicon, Titanium, etc.
- India has set up **KABIL** (Khanij Bidesh India Limited), a joint venture of three PSUs, to ensure a consistent supply of critical minerals to the Indian domestic market.

Highlights of the Summit:

The challenges and opportunities behind meeting the rising demand for minerals required for clean energy technologies were at the forefront of discussions.

IEA's 2024 Ministerial Meeting will be held in France and co-chaired by Ireland and France.

About the International Energy Agency (IEA):

- It was established in 1974 **under the Framework of the Organisation for Economic Cooperation and Development (OECD)** to ensure the security of oil supplies.
- **India is not a member but an associate country.**
- The IEA was created in response to the 1973-1974 oil crisis when a major oil producer's oil embargo pushed prices to historical levels and exposed industrialized countries' vulnerability to dependency on oil imports.
- Made up of **31 member countries, 13 association countries, and 4 accession countries.**
- Headquarters: Paris, France.

Dakar Declaration on Climate Change 2023

News Excerpt:

Ministers from the world's 46 least developed countries (LDC) issued a joint Dakar Declaration on Climate Change 2023 outlining their expectations and priorities for the 28th Conference of Parties (COP28) to the United Nations Framework Convention on Climate Change.

United Nations Office for Disaster Risk Reduction (UNDRR)

- Created in December 1999 to ensure the implementation of the International Strategy for Disaster Reduction.
- It is part of the United Nations Secretariat.
- It supports the implementation & review of the Sendai Framework for Disaster Risk Reduction adopted by the Third UN World Conference on Disaster Risk Reduction on March 18, 2015 in Sendai, Japan.
- The Sendai Framework is a 15-year voluntary people-centred approach to disaster risk reduction, succeeding the 2005-2015 Hyogo Framework.

About:

- The Dakar Declaration called for urgent global emissions reductions, increased climate finance, a strong outcome operationalizing the new Loss and Damage Fund and an ambitious Global Stocktake to close the gaps in global climate action.
- The COP28 will be convened from November 30, 2023, to December 12, 2023, in Dubai, United Arab Emirates.
- According to the ministers, while LDCs account for more than 14 % of the global population, they only account for about 1 % of emissions from fossil fuels and industrial processes.
- According to the declaration, developed countries must present a clear road map for at least doubling adaptation finance delivered by 2025 through public, grant-based financing. They demanded that a New Collective Quantified Goal on Climate Finance should provide new and additional resources and should be many times greater than the current $100 billion per year floor.

UN Launches 10 Principles to Close Asia-Pacific Sustainable Finance Gap

News Excerpt:

The **UN ESCAP 2023 Report** proposes 10 principles to boost financing for critical Sustainable Development Goals, focusing on bridging the gap in sustainable finance for climate action in the Asia Pacific region.

About UN ESCAP:

- The Economic and Social Commission for Asia and the Pacific (ESCAP) is an intergovernmental platform in Asia-Pacific.
- ESCAP is one of the 5 regional commissions of the United Nations.

It has 53 member States and 9 associate members, including India.

Key Takeaways:

- The UN ESCAP Report, which focuses especially on climate action, presents 10 principles for mobilizing and deploying financing for UN-mandated Sustainable Development Goals.

- Key Principles for Action:
  - New climate finance partnerships, effective NDC financing strategies and policy coherence across key government ministries.
  - Regulatory action to shift capital in Asia Pacific towards the Net Zero transition.
  - Increasing investment of time and effort with partners in project preparation and driving investments in the capacities of financial personnel and for sectoral and project-based financial data
  - **Net Zero pledges for 2050 with credible transition pathways, including the 2030 goals.**
  - Local currency financing of energy transition projects, green technologies, and other net-zero investments should be increased.
  - Multilateral development banks, bilateral development financial institutions, and public development banks should accelerate concessional financing and risk-sharing.
- Only 17 of the 51 Asia-Pacific countries party to the UN Framework Convention on Climate Change have assessed and reported their financial needs for meeting their Nationally Determined Contributions.
- The average economic losses in the region from disaster-related hazards are expected to rise to $1.1 trillion in a moderate climate-change scenario and $1.4 trillion in a worst-case scenario.

EU Carbon Removal Certification Framework (CRCF)

News Excerpt:

The European Union (EU) finalized a new draft rule banning advertisements that mislead customers with false sustainability promises to contain greenwashing.

About CRCF:

- The CRCF framework aims to scale up carbon removal activities and is critical to combat misleading green claims and ensure transparency.
- **The EU certification of carbon removals will be developed in two steps:**
  - The Commission will set up high-level quality criteria under the proposed Regulation.
  - The Commission will approve detailed certification rules for measuring, monitoring, reporting and verification of carbon removals from both industrial and nature-based activities.

Related:

EU Green Deal—This is a set of legislative proposals that attempts to put the EU on a green transitional path to achieve carbon neutrality by 2050. The new Framework contributes to the EU's larger goals of attaining net zero emissions by 2050.

Green Washing

News Excerpt:

Recently, while major banks publicly announced more funding for green projects and India strengthened its transition policies, several US states are moving in the opposite direction.

Green washing:

- The term "**green washing"** was first used in 1986 by environmentalist Jay Westerveld to describe a false, deceptive, or untrue action or series of claims made by an organization using terminology such as "eco-friendly" or "sustainable, about the positive impact that a company, product, or service has on the environment.
- Green washing is an attempt to capitalize on the growing demand for environmentally sound products, whether that means they are more natural, healthier, free of chemicals, recyclable, or less wasteful of natural resources.
- One common form of Greenwashing is to include misleading labelling or bury environmentally unsound practices in the fine print. This can include" which are vague and not verifiable.

Related terms:

- Greenwashing- making false claims about the company's products or services so that they appear more sustainable than they actually are.
- Greenwishing- wanting to be more environmentally responsible without taking any concrete actions for that.
- Greenhushing- an organization intentionally downplaying its achievements.

Artificial Reef

News Excerpt:

The Department of Fisheries (DoF) has sanctioned 732 Artificial Reef (AR) units for 10 coastal states, with a

total investment of Rs 126 crore under PMMSY, to rejuvenate coastal fisheries.

About AR:

They are engineering technology interventions used to rehabilitate/ improve natural habitats, increase productivity and manage aquatic resources, including habitat enhancement (FAO, 2015).

Natural Coral Reefs are formed of colonies of coral polyps held together by calcium carbonate.

Advantages:

- Provide a home for fish to live and grow, reduce wave damage on coasts, help regenerate marine ecosystems and act as a carbon sink.
- Provide a firm substrate for marine life such as corals, algae and plankton.
- Provide favourable conditions for sea ranching and serve as spawning and nursery grounds for fish.
- Enhance recreational fisheries, snorkelling, eco-tourism, creating suitable areas for diving and reducing conflicts.
- Restrict bottom trawling in the near shore areas.

Pradhan Mantri Matsya Sampada Yojana (PMMSY) was launched in May 2020 with an investment of Rs. 20,050 crore to bring about the Blue Revolution through sustainable and responsible development of the fisheries sector.

Forever Chemicals

News Excerpt:

According to a new study, the supposedly sustainable paper and bamboo straws contain potentially toxic "Forever chemicals."

About:

- **Polyfluoroalkyl and perfluoroalkyl substances (PFAS)** are commonly known as "forever chemicals".
- Due to their water—and fat-repellent properties, they are found in various products, such as non-stick cooking pans and fast-food packaging.
- Their presence in plant-based straws could be due to factors like unintentional contamination from plants grown in soil polluted by PFAS and the use of recycled paper containing PFAS in the production of straws.
- **Detection**: liquid chromatography with tandem mass spectrometry and Screening Approach.

Indian Coast Guard (ICG) Pollution-Control Vessel 'Samudra Prahari'

News Excerpt:

Indian Coast Guard Ship Samudra Prahari, a specialized Pollution-Control Vessel, arrived at the port of Tanjung Priok, Jakarta, Indonesia.

About Samudra Prahari:

- It is first in the class of three vessels, including SAMUDRA PRAHARI, SAMUDRA PAHEREDAR and SAMUDRA PAVAK.
- The ship has 13 NCC cadets who will participate in "Puneet Sagar Abhiyan, an international outreach programme in coordination with partner nations.
- This vessel is equipped with a Chetak Helicopter configured for Pollution Response.
- This deployment is vital to India's ASEAN initiatives for Marine Pollution Response, showcasing ICG's Pollution Response capabilities.

About ICG:

- Motto: "VAYAM RAKSHAMAH" - WE PROTECT.
- Duties: Safety and Protection of Artificial Islands and Offshore Terminals.
- Undertake regular patrols to keep the Offshore Development Areas (ODAs) under surveillance on both the Eastern and Western seaboard.

Phonotaxis

News Excerpt:

Crickets use phonotaxis to attract mates.

About:

- Phonotaxis refers to the movement of an animal in response to a sound.
- It has mostly been observed among crickets, moths, frogs, toads, and other creatures.
- There are two types of phonotaxis:
  - **Positive phonotaxis**- Its main purpose is attraction. It usually happens when the females of a particular species – including those of crickets and frogs – are attracted to the sounds made by the males.

- **Negative phonotaxis**- It serves to repel or warn, such as when the sound of a predator nearby signals to an animal that it needs to move away.

Stratospheric Aerosol Intervention (SAI)

News Excerpt:

Studies show that geoengineering technology called SAI may affect global food production.

About SAI:

SAI mimics volcanic eruptions by injecting sulphur dioxide into the Stratosphere (a layer of atmosphere extending from about 10 kilometres to 50 km in altitude). There, it oxidizes to form sulphuric acid, which then forms reflective aerosol particles.

It is often referred to as Plan B if mitigation strategies to reduce emissions fail.

UNCCD DATA DASHBOARD

News Excerpt:

The **UN Convention to Combat Desertification (UNCCD) Data Dashboard** compiles national reporting data from **126 nations** and demonstrates how rapidly land degradation is progressing in all areas.

According to the UNCCD Data Dashboard:

- By the end of 2019, **9.5%** of **India's total land area remained** in degraded form, up **from 4.4%** in 2015.
- 36.8% of India's land area is **drought-prone**, and 83.85% of the Indian population is exposed to **drought** situations.
- 18.39% of India's population was vulnerable to **land degradation**.
- **50.49%** of the **global land area** is drought-prone, while the Eastern and Central Asia, Latin America and Caribbean regions experience the most severe degradation.

UNCCD – 21st session:

- Samarkand (**Uzbekistan)** will host the 21st session of the UNCCD Committee for the Review of the Implementation of the Convention **(CRIC 21).**
- The **forum** will address urgent issues, including **enhancing drought resilience, promoting women's land rights, and combating sand and dust storms**, and it will **evaluate global progress toward LDN.**

About Land degradation and desertification:

- Land degradation is the **deterioration or loss of the productive capacity** of the soils for the present and future.
  - **Land desertification is** the process by which drylands, including arid, semi-arid, and dry sub-humid zones, lose biological productivity due to natural or artificial influences.
- **Land Degradation Neutrality (LDN)** refers to a condition in which the **quantity and quality of land resources required to sustain ecosystem functions and services** and improve food security either stay constant or grow.
  - For 2030, 109 nations have voluntarily established LDN objectives.

Measures undertaken by India:

- Under the **National Action Plan on Climate Change (NAPCC)**, the **National Mission for a Green India (GIM)** aims **to** enhance **ten million hectares of forest and non-forest land**, the amount of forest cover and the quality of the current forest, thus reducing land degradation.
- Several central government programmes address the need for medium and long-term drought mitigation requirements: Mahatma Gandhi National Rural Employment Guarantee Scheme **(MGNREGS),** Integrated Watershed Management Programme **(IWMP),** Drought Prone Area Programme **(DPAP),** National Rural Drinking Water Programme **(NRDWP),** Swarna-Jayanthi Grameen Swarozgar Yojana **(SGSY),** Rashtriya Krishi Vikas Yojana **(RKVY),** Fodder & Feed Development Scheme, etc.
- India is committed to **restoring 26 million hectares** of degraded and deforested land **by 2030** as part of the **Bonn Challenge**.
- ISRO publishes the **Desertification and Land Degradation Atlas** of India.

Land Restoration and Biodiversity

News Excerpt

The Global Land Outlook report prepared by the United Nations Convention to Combat Desertification (**UNCCD**) and its partners, sheds light on the critical issue of diminishing land resources and emphasizes the urgent need to restore lands across the globe.

Pre-Connect

UNCCD:

- The UNCCD, adopted in 1994, is the only legally binding international agreement that effectively connects the realms of environment and development with sustainable land management practices.
- It focuses on the arid, semi-arid, and dry sub-humid regions collectively known as drylands and pays particular attention to these vulnerable ecosystems and communities.
- Regular Conferences (COPs) are held every two years, where the Convention's member countries gather to drive the Convention's goals forward and make significant strides in its implementation.

30 by 30:

- The 30x30 target aims to **conserve 30% of the world's land and sea** by establishing protected areas (PAs) and other conservation measures.
- It surpasses the previous goal, Aichi Target 11, which sought to protect 17% of land and 10% of coastal and marine areas.

State of Global Land Degradation:

- According to the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) Global Assessment Report on Biodiversity and Ecosystem Services, released in 2019, **approximately 25% of the Earth's land is degraded to some extent.**
- The United Nations Convention to Combat Desertification (UNCCD) estimates that **around 3.2 billion people, or 40% of the global population, are affected by land degradation**. This includes soil erosion, desertification, and loss of productive land.
- The Food and Agriculture Organization (FAO) reports that **land degradation reduces global agricultural productivity by about 12% annually,** leading to food insecurity and economic losses.
- The **World Wildlife Fund (WWF)** states that unsustainable land management practices, such as deforestation, overgrazing, and inappropriate irrigation methods, contribute significantly to land degradation.
- **Climate change exacerbates land degradation,** as rising temperatures, changing rainfall patterns, and extreme weather events increase the vulnerability of ecosystems and agricultural lands.

Land Degradation Neutrality (LDN)

- It refers to a state whereby the amount and quality of land resources necessary to support ecosystem functions and services and enhance food security remain stable or increase within specified temporal and spatial scales and ecosystems.
- LDN seeks to maintain natural capital and the ecosystem services that flow from it.
- LDN is about keeping land in balance.
- Keeping land in balance provides the basis for keeping food, water, carbon and biodiversity in balance as well.

Lead Above Permissible Limit in Paints

News Excerpt:

Recently, a study done by **Toxics Link** and the **International Pollutant Elimination Network (IPEN)** found that **90% of paint samples tested** contained **lead above permissible limits in India.**

Key Findings of the Study:

- **Over 90% of the 51 paints** available in the Indian market contain **lead concentrations above the Central Government's permissible limit of 90 parts per million (ppm).**
- Also, 76.4% of these paints contained **lead more than 111 times the permissible limit.**

Regulation of Lead Contents in Household and Decorative Paints Rules, 2016:

- These regulations **came into force in 2017.**
- Under these, **the manufacture, trade, import and export of household and decorative paints** containing lead or lead compounds over 90 ppm **is prohibited in India.**

Why Lead is used in the Paint Industry?

- **Incentive for the Manufacturer:** The pigments used in making paints containing lead are cheaper than pigments without lead.

Why is it a Challenge?

- **Toxic metal:** It is banned for use in paints in Europe, the U.S., and Australia.
- **Harmful to children:** It interferes with the developing brain and **causes lower IQ, attention deficiency, poor impulse control and aggressive behaviour even at very low exposures.**
- **The World Health Organization (WHO)** has stated that **childhood lead exposure is not safe**.
- However, in developing countries, lead is still used in paints as pigments and drying agents.
- The damage caused during development is irreversible but entirely preventable.

Impacts Of Lead Paints that are above Permissible Limits:

- The paint coated on walls would **decay over time and fall on the ground as dust,** and it could **easily be ingested by children, making them more vulnerable to lead poisoning.**
- **Lead poisoning** can also be **transferred from a pregnant woman to a foetus.**
- Also, during **repainting and sanding of walls,** dust containing lead in the paint will spread in the house.
- Depending on the level and duration of exposure, lead can affect different organ systems, including **haematological cells, brain, kidney, gastrointestinal tract and liver. It gets stored in bone and can be released gradually from there.**

Measures/Mitigation Efforts:

- **Global Alliance to Eliminate Lead Paint (Lead Paint Alliance):** This voluntary partnership, formed by the United Nations Environment Programme (UNEP) and the World Health Organization (WHO), aims to prevent exposure to lead by promoting the phase-out of paints containing lead.
- **Lead Paint Reformulation Technical Guidelines:** The Global Alliance to Eliminate Lead Paint developed them, guided by the United Nations Environment Programme (UNEP).
- **Regulation of Lead Contents in Household and Decorative Paints Rules, 2016.**
- **The US Environmental Protection Agency (EPA)** mandates that any contractor or worker who performs renovation in a pre-1978 apartment, school or facility (including private homes) must be trained and certified in EPA Renovation, Repair, and Painting (RRP).
- **Switch Asia Project:** The project funded by the **European Union** aimed to reduce childhood lead poisoning by working to eliminate lead decorative paints in seven countries, i.e., Bangladesh, India, Indonesia, Nepal, Philippines, Sri Lanka, and Thailand.

World Organization for Animal Health (WOAH)

News Excerpt:

Recently, India hosted the **33rd** Conference of the World Organization for Animal Health (WOAH) Regional Commission for Asia and the Pacific.

About the WOAH Conference:

- The WOAH has set up **five Regional Commissions** as full-fledged regional institutional bodies to express specific problems faced by its members in the different regions of the world.
- **The Regional Commission for Asia and the Pacific** organizes a Conference once every **two years** in one of the countries of the region.
- These conferences aim to develop technical items and foster regional cooperation for the **control of animal diseases**. Regional programmes are also considered to reinforce major **disease surveillance and control.**
- The Regional Commissions report on their **activities** and submit recommendations to the **World Assembly of Delegates.**
    - The World Assembly of 183 Delegates is the highest authority of WOAH.

About WOAH:

- WOAH was founded in 1924 as the **Office International des Epizooties (OIE).**
- Currently, 182 countries and all EU Member States are members of WOAH.
- In May 2003, it adopted the common name **World Organization for Animal Health.**
- It focuses on transparently disseminating **information on animal diseases, improving animal health globally** and thus building a safer, healthier and more sustainable world.

Solar Energy Mini-Grids

News Excerpt:

Solar energy mini-grids can help end the energy poverty of rural communities in **climate-vulnerable regions**. Investments in these renewable energy initiatives must be scaled up.

About Mini-Grid:

- It is a **set of small-scale electricity generators and possibly energy storage systems** interconnected to a distribution network that supplies electricity to a small, localized group of customers and **operates independently from the national transmission grid**.
- When it is harnessed using solar energy, it is known as Solar Energy Mini-Grid.
    - They range in size from a few kilowatts **up to 10 megawatts.**

Why was it needed?

- The primary reason is **due to energy poverty**, as approximately 675 million people worldwide lack access to electricity.
    - The majority of these individuals reside in **Sub-Saharan Africa.**

Potential of Mini Grids:

- Solar mini-grids are identified as a **cost-effective and sustainable solution** to provide electricity for about **75% of the 675 million people** who live without electricity.
- These decentralized energy systems **contribute to climate resilience**, particularly in farming-dependent rural areas prone to climate shocks like droughts, heat stress, and flooding.
- In instances **where central grid infrastructure cannot reach remote communities, mini-grids can act as important complements**.
    - They've been integrated into national grids in some cases, **serving as local distributors and benefiting a significant number of consumers.**

Mapping the Yamuna floodplains

News Excerpt:

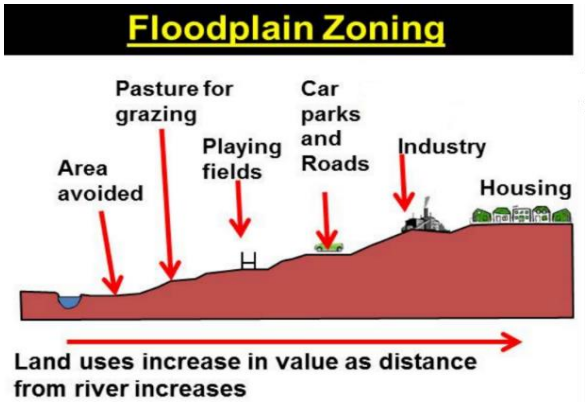
Last month, the Yamuna River water incursion in nearby areas of Delhi put policymakers' focus on Flood Plain Zoning legislation.

Pre-Connect

- **Constitutional mandate:** Floodplain zoning is firmly within the state government's ambit as it deals with the land along the riverbanks, and land is a state subject under entry 18 of List II.
- The **Model Bill on Flood Plain Zoning (MBFPZ):** This bill envisages zoning of flood plain of a river according to flood frequencies and defines the type of use of flood plain.
- The **Central Water Commission (CWC):** CWC has unremittingly impressed upon the states to take follow-up action to implement the flood plain zoning approach.

About Flood Plain Zoning:

- **Objectives**–
    - To **limit and regulate the encroachment of the respective zone** that frequently comes under the effect of flood.
    - To allow selected activities in the zone that come under the influence of the flood less frequently in such a manner that they are susceptible to flood damages.
    - To **demarcate** the zones that are subjected to flood only on rare occasions.



- Moreover, Floodplain zoning **legislation limits the construction activities and development in flood zones** to lessen the risks associated with flooding.
- Additionally, the legislation also looks for specific building standards and construction materials to reduce potential flood damage.
- Floodplain zoning ensures that **land on the floodplain isn't urbanized.**
- The rampant riverbed and floodplain encroachments caused a huge loss of lives, property and infrastructure. Swollen rivers ruptured their banks, and floodwaters gushed through houses built on the floodplains.
- The lack of Regulation and enforcement of land use in the floodplains added to the severity of the damage.

Climate Change: Ocean Colour Change

News Excerpt:

According to a new study published in the journal Nature, Climate change is altering the colour of the oceans.

About the issue:

- The colour of the Earth's oceans has significantly altered over the past two decades, **most likely due to human-induced climate change**.
- Over 56 percent of the oceans, more than the total land area on the planet, have experienced a colour shift.
- Generally, the colour of the Ocean is Blue, but due to several reasons like climate change, the colour of the ocean changes from blue to green or sometimes even brown and other colours as well.

Reasons for ocean changing colour:

- **Due to the existence of phytoplankton (**containing the green-coloured pigment

chlorophyll**) on the upper surface of the water**, the higher concentration of phytoplankton present in the ocean causes colour change.

- **Due to human-induced Climate Change.**

Places where the phenomenon of Ocean colour change is occurring:

- The study says one of the **most affected areas is the Tropical Ocean region, near the equator,** where the water is turning from blue to green.
- The findings suggest that a colour shift is happening in those regions where the oceans are getting more stratified.

Ocean stratification is the natural separation of an ocean's water into horizontal layers by density, with warmer, lighter, less salty, and nutrient-poor water layering on top of heavier, colder, saltier, nutrient-rich water. Usually, ocean ecosystems, currents, wind, and tides mix these layers, creating smoothed temperature and salinity transitions between them.

Siberian Permafrost

News Excerpt:

Recently, Scientists brought microscopic worms back to life after they were frozen in the Siberian permafrost for 46,000 years.

About the Issue:

- Scientists discovered and reanimated two kinds of frozen microscopic nematodes or roundworms in Siberia five years ago.
- The new study reveals that they are 46,000 years old, and **one of them is an entirely new species that has never been discovered.**
- **Cryptobiotic state** can survive the complete absence of water and oxygen and withstand other extreme conditions including heat and cold in a state between life and death.

Techniques used by the Researchers:

- Genome sequencing, assembling and phylogenetic analysis of the worms, Relationship to modern species and discovered that it belongs to a previously unknown species—-Panagrolaimus kolymaensis.
- They also tested the hardiness of the ancient worms by mildly drying them in the laboratory.
- When they did that, the worms produced a sugar called trehalose, which might help them survive harsh desiccation (drying) and freezing.

Carbon Circular Economy

News Excerpt:

The G20 has recently endorsed initiatives like the Circular Carbon Economy (CCE).

About Carbon Circular Economy (CCE):

- The CCE is a flexible, technology-neutral and inclusive framework for climate change mitigation and was first endorsed by the G20 leaders in 2020.
- The COP27 meeting brought to the fore a circular economy's relevance in mitigating carbon emissions for India.
- The concept of CCE can support the design of net-zero emissions. The idea of CCE is based on 4Rs.
- The **G20 Protection and Climate Stewardship Working Group (CSWG) conference** was held in Saudi Arabia, the most crucial goal of this conference was to leverage the benefits of reducing greenhouse gas emissions by using the CCE.
- The concept enables the support of the design of net-zero emissions pathways adapted to a **country's national circumstances, resource endowments, and competitive advantages.**
- A circular carbon economy is **a sustainable approach to managing carbon dioxide (CO2) in the atmosphere** while involving several methods-

Methods	Example
Carbon Capture and Storage (CCS) ○ CCS involves capturing carbon dioxide (CO2) emissions from industrial sources or power plants and then securely storing them underground or in other long-term storage solutions, preventing their release into the atmosphere.	○ A large coal-fired power plant produces lots of CO2 while generating electricity. ○ With CCS technology, the plant installs special equipment that captures the CO2 before it is released into the air. ○ The captured CO2 is then transported through pipelines and stored deep underground in geological formations. ○ By storing the CO2 in this way, it is kept isolated from the atmosphere, reducing its impact on the environment, climate change and Global Warming.
Carbon Utilization ○ CO2 can be used as a raw material to produce various products. ○ CO2 can be transformed into synthetic fuels, such as methane or even liquid hydrocarbons, which can be used as alternatives to traditional fossil fuels.	○ CO2 emissions from an industrial facility, such as a power plant, are captured and utilized in the production of concrete. ○ Concrete is one of the most widely used construction materials globally, but its production typically involves significant CO2 emissions due to the chemical reactions involved in creating cement, a key component of concrete.
Carbon Recycling and Circular Products ○ It is a concept that involves finding ways to reuse and transform carbon dioxide (CO2) emissions into valuable and sustainable products. ○ The goal is to close the carbon loop by recycling carbon rather than allowing it to be released into the atmosphere as a harmful greenhouse gas.	○ The factory produces plastic products using carbon-recycled materials. These plastics have the same quality and usefulness as traditional plastics but with a significant difference – they're made from captured CO2, making them more environmentally friendly. ○ When these carbon-recycled plastics reach the end of their useful life, they can be recycled again, creating a circular process. ○ Instead of becoming waste, they can be transformed back into raw materials.

Analytica

SDGs and Carbon Circular Economy

The Circular Carbon Economy (CCE) aligns with and contributes significantly to several Sustainable Development Goals (SDGs).

India and Carbon Circular Economy

- **India has adopted LiFE programme** to promote CCE practices, encourage circular business models, and foster sustainable behaviour.
- The 2022-23 Budget recognized the importance of sustainable growth. In sync with a circular economy, the Government formulated the **Battery Waste Management Rules.**

CCE Index

- It is a composite indicator comprised of 38 individual variables or indicators.
- It is a tool for energy and climate policymakers to check performance and potential for reaching CCEs.
- The index measures and benchmarks large economies and hydrocarbon-producing countries on two temporal dimensions
    - The **CCE Performance sub-index** measures countries' current performance on the various CCE activities (e.g., energy efficiency, renewable energy, fuel switching, or carbon capture and storage).
    - The **Enablers sub-index** gauges how countries are positioned to progress toward the CCE based on key enabling factors.

International Conference on Green Hydrogen

News Excerpt:

India recently organized the International Conference on Green Hydrogen (ICGH-2023). The conference's main focus was on advances and emerging technologies in the entire green hydrogen value chain.

Pre-Connect

- Depending on the nature of the method of its extraction, hydrogen is categorized into several categories-

COLOUR	DESCRIPTION: FEEDSTOCK
	Grey: natural gas reforming without CCUS
	Brown: brown coal (lignite) as feedstock
	Blue: natural gas reforming with CCUS
	Green: electrolysis powered through renewable electricity
	Pink: electrolysis powered through nuclear energy
	Turquoise: methane pyrolysis
	Yellow: electrolysis powered through electricity from solar
	Orange: electrolysis powered through electricity from wind

  - **Grey Hydrogen**: It is produced via coal or lignite gasification (black or brown) or via a process called steam methane reformation (SMR) of natural gas or methane (grey). These tend to be mostly carbon-intensive processes.
  - **Blue Hydrogen**: It is produced via natural gas or coal gasification combined with carbon capture storage (CCS) or carbon capture use (CCU) technologies to reduce carbon emissions.
  - **Green Hydrogen**: It is produced using electrolysis of water with electricity generated by **renewable energy**.
- Union Cabinet approved the **National Green Hydrogen Mission** with an outlay of ₹ 19,744 crore from FY 2023-24 to FY 2029-30.
- In 2022, the Ministry of Power (MoP) unveiled the first part of India's much-awaited. Green Hydrogen Policy.

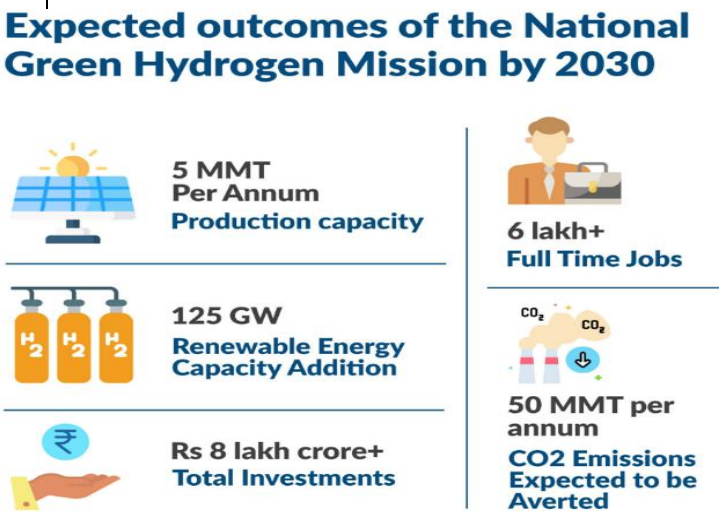
About Green Hydrogen

Green hydrogen is produced by electrolysis from renewable sources and involves breaking down water molecules (H2O) into oxygen (O2) and hydrogen (H 2).

  - The water used in the electrolysis must contain salts and minerals to conduct the electricity.
  - Two electrodes are immersed in the water and connected to a power source, where a direct current is applied.
  - The dissociation of hydrogen and oxygen occurs when the electrodes attract ions with an opposite charge to them.
  - During electrolysis, an oxidation-reduction reaction occurs due to the effect of the electricity.

India's Efforts towards Green Hydrogen

- **To encourage production**, **the Strategic Interventions for Green Hydrogen Transition (SIGHT) programme** has been launched.
  - **SIGHT** proposes two distinct financial incentive mechanisms to support the domestic manufacturing of electrolyzers and the production of Green Hydrogen.
- **To enhance adoption**, the Government has taken significant steps, such as waiving inter-state transmission charges and providing GH2 plants with open access to the grid.
- The Government has announced ₹19,744 crore in the latest budget for several programmes to encourage green hydrogen, including domestic manufacturing of electrolyzers and GH2 production.
- The **Solar Energy Corporation of India (SECI) plans** to issue a mega tender to aggregate demand for fertilizer plants and refineries.
- Kandla Port on the west coast and Tuticorin Port on the east coast have been designated as **India's first green hydrogen and green ammonia refuelling hubs, respectively.**
- By the end of 2023, **hydrogen fuel cell technology** will be used to power 8 trains on narrow-gauge heritage routes.



Analytica

Green Hydrogen and Energy Transition

- The carbon intensity ultimately depends on the **carbon neutrality of the source of electricity** (i.e., the more renewable energy there is in the electricity fuel mix, the "greener" the hydrogen produced).
- Green hydrogen is produced through electrolysis, which utilizes solar, wind, or hydroelectric power to split water into hydrogen and oxygen. Therefore, reducing carbon emissions in the atmosphere will help reduce greenhouse gas emissions and decarbonize the energy sector.
- Green hydrogen can serve as a **large-scale energy storage solution**. Hydrogen can be stored and later used as a clean energy source during times of low renewable energy production or high energy demand.
- The widespread adoption of green hydrogen can help decouple the energy grid from fossil fuels. Hence, dependency on coal-intensive power generation will be minimal.
- By shifting to green hydrogen, industries can significantly reduce their carbon footprint and contribute to a more sustainable economy.
- The transition will stimulate economic growth through investments in renewable energy infrastructure, hydrogen production facilities, and related technologies.

High Seas Treaty

News Excerpt:

The UN adopted the Marine Biodiversity of Areas Beyond National Jurisdiction (BBNJ) or the High Seas Treaty.

Pre-Connect

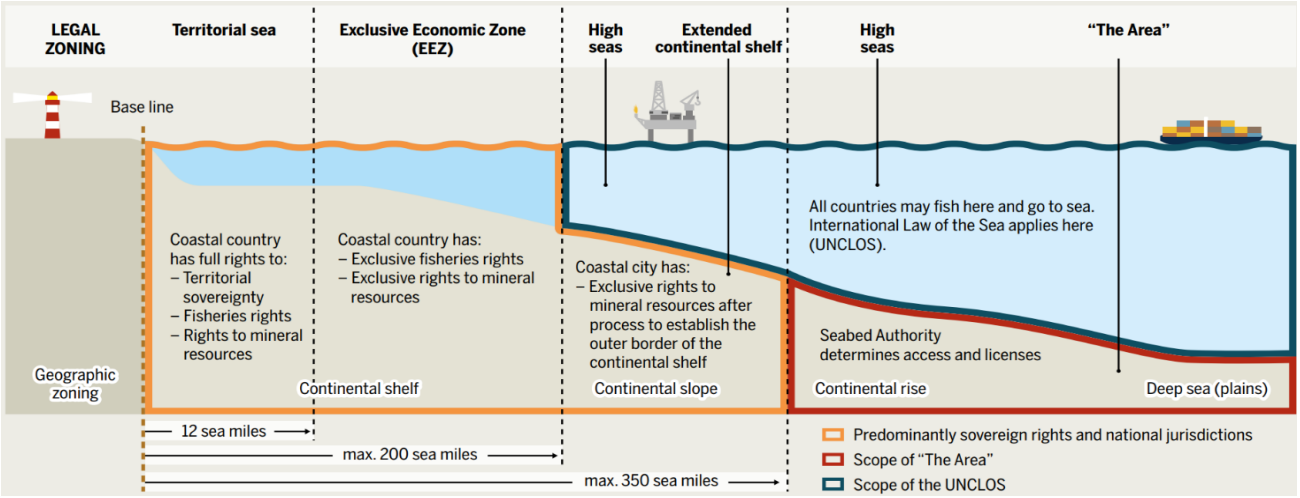
- High Sea became the third agreement to be approved under United Nations Convention on the Law of the Sea (UNCLOS), after the 1994 and 1995 treaties.
- UNCLOS is a comprehensive treaty that sets out the legal Framework for the use of the world's oceans, including the high seas and the seabed, beyond national jurisdiction.
- In 1994, the International Seabed Authority (ISA) was established as an autonomous international organization under the UNCLOS.
- The Fish Stocks Agreement, was adopted in 1995. It was intended to promote conservation and sustainable management of straddling fish stocks and highly migratory fish stocks in the world's oceans.

International Seabed Authority (ISA)

- ISA is the organization through which States Parties to UNCLOS organize and control all mineral-resources-related activities in the Area for the benefit of humankind.
- ISA has the mandate to ensure the effective protection of the marine environment from harmful effects that may arise from deep-seabed-related activities.
- In accordance with UNCLOS, Article 156(2), all States Parties to UNCLOS are ipso facto members of ISA.
- As of May 2023, ISA has 169 Members, including 168 Member States and the European Union.

About the High Sea Treaty

- The treaty aims to address critical issues such as the increasing sea surface temperatures, overexploitation of marine biodiversity, overfishing,



coastal pollution, and unsustainable practices in waters beyond national jurisdiction.

- The High Seas Treaty establishes marine protected areas in these high seas, which will help achieve the global goal of protecting 30% of the world's oceans, which was made at the UN biodiversity conference last year.
- The High Seas Treaty has four main objectives:
  - Demarcation of marine protected areas (MPAs), as they are like protected areas.
  - Sustainable use of marine genetic resources and equitable sharing of benefits arising from them.
  - Initiation of the practice of environmental impact assessments for all major activities in the oceans.
  - Capacity building and technology transfer.

Genetically modified insects

News Excerpt:

Recently, the Department of Biotechnology issued the 'Guidelines for Genetically Engineered Insects'.

Pre-Connect

- The **Cartagena Protocol on Biosafety** to the Convention on Biological Diversity is a global treaty that seeks to guarantee the secure management, movement, and utilization of living-modified organisms (LMOs) to safeguard biodiversity.
- The first Global Conference on GMO Analysis was organized by the European Commission.
- **Genetic Engineering Appraisal Committee (GEAC) functions as a statutory body under the Environment Protection Act 1986 of the Ministry of Environment & Forests (MoEF).**

Bioeconomy in India

- India's Bio-Economy contributes 2.6% to the GDP. The Indian Bio-Economy for 2021 (January-December 2021) is estimated at $ 80.12 billion. The Bio-Economy registered 14% growth over 2020.
- The Bio-Economy in 2020 was valued at $ 70.2 billion.
- Foreign Direct Investment (FDI) in biotech is estimated to have touched $830 million in 2021, up from $780 million in 2020.
- The cumulative number of start-ups in 2021 was estimated at 5365. About 1128 companies have registered in 2021. This is the highest number since the year 2015.

Issues pertaining to the latest guidelines

Latest Guideline
• The guidelines note that Genetically Engineered (GE) insects are becoming globally available and are intended to help Indian researchers navigate regulatory requirements.
• The guidelines apply only to research and are not to confined trials or, deployment, or disease alleviation.
• The guidelines offer standard operating procedures for GE mosquitoes, crop pests, and beneficial insects.
Issue
• The guidelines don't specify the purposes for which GE insects may be approved in India or how the DBT, as a promoter of biotechnology, envisions their use.
• Government authorities will also have to closely follow the deployment of these insects. Once deployed, GE insects can't be recalled, and unlike genetically modified foods, they are not amenable to individual consumer choice.
• What is 'beneficial', in the context of GE insects, is not clear. • The lack of clarity about the insects and the modifications to them that are deemed 'beneficial' will impede funders and scientists from investing in this research. • Funding for biotechnology in India has been stagnating for a while. Despite a slight uptick during COVID-19, when DBT led the vaccine and diagnostics efforts, funding hasn't returned to the pre-pandemic level.

Radio Collars

News Excerpt:

Cheetahs dying due to Radio Collar in Kuno National Park.

Background:

Two cheetahs died of **suspected septicaemia** from festering neck wounds caused by radio collars in Kuno.

About:

A radio collar is an electronic device that contains a small transmitter. This transmitter sends signals through radio waves. These signals reach other devices, where they can be received. The battery inside the radio collar runs the transmitter.

- Downsides of Carrying Something on the Body

- **Additional weight-** Affecting Hunting and animal athleticism.
- Using collar-attached accelerometers, the researchers found that during movement, the forces exerted by collars were generally equivalent to up to **five times** the collar's weight for a lion — and a massive **18 times** for a cheetah.
- Pet dogs get acute moist dermatitis or hot spots. Hot spots are often triggered or aggravated by a tick or flea bite and can worsen rapidly.
- Tight-fitting collars can cause pressure necrosis — thick bedsores — that begin with rapid loss of hair around the neck.
- Collar-induced injuries.

- The pathogens that aggravated the wound under the collar could be novel either to the African cheetahs or to Indian conditions.
- These animals could be vulnerable to certain local pathogens to which Indian tigers and leopards may be immune.
- Or they could have carried some dormant pathogens that flourished in new conditions, given the animals' loss of immunity due to stress.
  - **According to MoEF&CC -** deaths caused due to radio collars were speculation and not based on scientific evidence.

Biodiversity Management Committee

News Excerpt:

Patancheru mandal was adjudged the best functional **Biodiversity Management Committee (BMC)** of Telangana for 'excellent performance' in biodiversity conservation and management.

About BMC:

- BMC is constituted by every local self-governing institution in rural and urban areas, under the provisions of the **Biological Biodiversity Act (BDA) 2002.**
- Under Section 62 of BDA, Biological Diversity Rule, 2004 was released, and Rules 22 states to establish BMC.
- BDA, 2002, is intended to achieve the objectives of the Convention on Biological Diversity (CBD).
- The Convention on Biological Diversity (CBD) entered into force on December 29 1993. It has 3 main objectives:
  - The conservation of biological diversity
  - The sustainable use of the components of biological diversity
  - The fair and equitable sharing of the benefits arising out of the utilization of genetic resources.
- BDA and Rules 2004 provide for regulated access to bio-resources for commercial utilization and **fair and equitable sharing of benefits in India,** at the grassroots level, it is being ensured by the BMC.

People's Biodiversity Registers (PBR):

- PBRs and BMC are two important components of the **Biodiversity Conservation Framework** in India.
- BMC shall be responsible for maintaining and validating the People's Biodiversity Registers (PBR).
  - PBR contains comprehensive information on the availability and knowledge of local biological resources, their medicinal use, and the traditional knowledge associated with them.
- PBRs are prepared at the local level, usually at the level of a village or a group of villages.
- The purpose of a PBR is to document and safeguard the traditional knowledge and biodiversity-related practices of local communities.

Hydrogen from seawater

News Excerpt:

Recently, Researchers from the Department of Physics at IIT-Madras have developed critical components for a highly efficient, cost-effective way **to electrolyze seawater to generate hydrogen.**

Important facts

- State-of-the-art **alkaline water electrolyzer technology** is energy-intensive, requires an expensive oxide-polymer separator, and uses fresh water for electrolysis.
- In place of pure or fresh water, researchers have developed an **electrolyzer using alkaline seawater**.
- They used a carbon-based support material for the electrodes instead of metals to almost eliminate the possibility of corrosion.
- They designed and developed transition metal-based catalysts that can catalyze both oxygen and hydrogen evolution reactions.
- The catalyst enhances the production of both hydrogen and oxygen even when impurities and chemical deposition on one of the electrodes take place.
- The researchers have developed a **cellulose-based separator** that is very economical and serves the purpose of allowing hydroxide ions to pass through but prevents oxygen and hydrogen that are generated from crossing over.

- The researchers have optimized all the parameters such that the water electrolyzer can directly use photovoltaic-derived voltage to split seawater and generate green hydrogen and oxygen, oxygen can be used elsewhere.

Miyawaki plantation method

News Excerpt:

Recently, the prime minister of India stated about the Japanese Miyawaki plantation method in his "Mann ki Baat" programme. He also cited the example of a Kerala-based teacher, Raafi Ramnath, who used the Miyawaki technique to transform a barren land into a mini forest called Vidyavanam by planting 115 varieties of trees.

Miyawaki plantation method

- Named after Japanese botanist **Akira Miyawaki**, this method involves planting two to four different types of indigenous trees within every square metre. In this method, the trees become self-sustaining, and they grow to their full length within three years.
- The methodology was developed in the 1970s with the basic objective of densifying green cover within a small parcel of land.
- The plants used in the Miyawaki method are mostly self-sustaining and don't require regular maintenance like manuring and watering.
- Over the years, this cost-effective method has become the go-to solution for the civic body to restore the green cover in a space-starved city like Mumbai.
    - Meanwhile, to fight climate change, curb pollution levels, and increase the green cover of the financial capital, the Brihanmumbai Municipal Corporation (BMC) has been creating Miyawaki forests in several open land parcels of Mumbai.

National Framework for Climate Service

News Excerpt:

India recently initiated a significant first-ever **national-level framework for providing climate services and information.** India's maiden project will be able to offer **climate-smart solutions** for various climate-related issues.

About the National Framework for Climate Services (NFCS):

- **The NFCS is led by the Indian Meteorological Department (IMD).**
- It is modelled around the **Global Framework for Climate Services,** made during the Third World Climate Conference held in Geneva in 2009.
- **Aim:** It aims to create a comprehensive platform to provide Climate information and services on priority sectors like **agriculture, energy, disaster management, health and water,** making it user-friendly and enabling informed decision-making and mitigating climate change risks.

About Global Framework for Climate Service (GFCS)

- The GFCS is a UN-wide initiative in which WMO Members and inter- and non-governmental, regional, national and local stakeholders work in partnership to develop targeted climate services.
- **National Meteorological and Hydrological Services** lead GFCS in their respective nations.
- It aims to generate high-quality data from national and international databases on temperature, rainfall, and weather conditions for the long term to mitigate climate change and combat climate vulnerabilities.
- **5 components of GFCS:**
    - **Observations and monitoring.**
    - **Climate service information system.**
    - **Research, modelling, prediction.**
    - **User, interface platform.**
    - **Capacity Development.**

Implementation of NFCS:

- **Countries with NFCS launched**: Switzerland, China, Germany, and the United Kingdom.
- **India's status of implementation:**
- India's adoption of NFCS is at the consultation stage.
- India has started planning its national consortium workshops on the implementation of NFCS.

India's First National Water-Body Census

News Excerpt

The Jal Shakti ministry has released the report of India's First Water Bodies Census, which provides a comprehensive database of ponds, tanks, lakes and reservoirs in the country.

Pre-Connect

- India accounts for 18% of the world's population, but has only 4% of its fresh water resources. More than 80% of water in the country is consumed in agriculture while the rest is used for domestic and industrial purposes.

- In the 11th plan, the **Central Water Commission (CWC) of the Ministry of Jal Shakti** initiated a project called **India-WRIS (Water Resource Information System)**, which serves as a unified platform for accessing comprehensive data on water resources.
- As part of the India-WRIS project, an inventory mapping of more than 850,000 surface water bodies, each exceeding 0.1 hectare in size, was created using Cartosat-1.
- The **Repair, Renovation & Restoration (RRR) scheme**, a component of the **Pradhan Mantri Krishi Sinchayee Yojana,** offers Central Assistance to States for the development and restoration of irrigation potential through the repair and renovation of water bodies.
- The **Central Pollution Control Board (CPCB) has released "Indicative Guidelines for Restoration of Water Bodies",** which provide general recommendations for enhancing the capacity of water bodies and improving their water quality.

Key Findings of the report

- The census has enumerated 2.42 million water bodies, out of which 97.1% (2.35 million) are in rural areas and 2.9% (69,485) in urban areas.
- The census classifies **water conservation schemes**, percolation tanks & check dams (9.3%), lakes (0.9%) and others (2.5%).
- Among these water bodies, 83.7% (2.03 million) are 'in use'; the remaining are non-functional on account of drying up, silting, construction, etc.
- According to the census, 55.2% (1.33 million) are owned by private entities, and 44.8% are under public ownership.
- Only 1.6% of water bodies, out of all the enumerated bodies, have suffered encroachment, and within these, 95.4% are in rural areas, and the remaining 4.6% are in urban areas.
- **West Bengal's South 24 Parganas** has been reported to be the district with the highest (0.35 million) number of water bodies across the country.
- **Maharashtra** leads among all the states and UTs in building water bodies' underwater conservation schemes.

AI Water Foot Prints

News Excerpt:

According to a study, ChatGPT consumes fresh water, and significant water usage is associated with maintaining data centres for the effective working of AI tools.

Pre-Connect

Water footprint refers to the total amount of freshwater used directly or indirectly by an individual, organization, or product throughout its lifecycle. It helps assess water consumption.

Understanding AI Footprint:

- AI systems consume water **during the operation and maintenance of AI systems**, particularly large-scale data centres.
- AI systems generate significant heat during operation, requiring cooling infrastructure to prevent overheating. Cooling mechanisms, such as water-based cooling systems, may be used in data centres to maintain optimal temperatures.
- AI systems require substantial energy to function, and the generation of electricity often involves water-intensive processes.
- Data centres employ various cooling technologies, including water-based systems such as cooling towers, chilled water systems, or direct liquid cooling.
- These systems use water to absorb and transfer heat generated by the computing equipment, helping to maintain appropriate temperatures.
- The evaporation-based cooling process requires water for evaporation, and the water consumption can be significant, depending on the scale and design of the cooling infrastructure.
- The water footprint of data centres can have environmental implications, particularly if the water is sourced from local freshwater supplies.
- High water consumption from data centres can strain local water resources, especially in regions facing water scarcity or where the demand for water is already high.

Key Points of the Study

- The study reveals shocking water usage by AI models: training large AI models like GPT-3 can consume 700,000 litres of fresh water, equivalent to producing 370 BMW cars or 320 Tesla electric vehicles.
- Even conversing with an AI chatbot like ChatGPT can use up to 500 ml of water for 20-50 questions, and with over 100 million active users, the cumulative water footprint is substantial.
- AI models may operate online, but their data storage and processing happen in physical data

centres. These data centres produce substantial heat, which calls for water-intensive cooling systems, including evaporative cooling towers. The water used for cooling must be pure freshwater, and data centres also rely on significant amounts of water for power generation.

Environmental Consequences of AI System

- Energy Poverty
- Carbon Emissions
- Infrastructure Footprint
- Electronic Waste

Great Pacific Garbage Patches

News Excerpt:

Recently, in a study, researchers from Canada, the Netherlands, and the U.S. have reported that coastal lifeforms have colonized plastic items in the Great Pacific Garbage Patch, throwing up many dubious firsts.

About the Great Pacific Garbage Patch:

- It is a collection of marine debris in the North Pacific Ocean. Marine debris is litter that ends up in oceans, seas, and other large bodies of water.
- It also known as the **Pacific trash vortex,** spans waters from the West Coast of North America to Japan.
  - The patch is actually comprised of the Western Garbage Patch, located near Japan, and the Eastern Garbage Patch, located between the U.S. states of Hawai'i and California.
- **The entire Great Pacific Garbage Patch is bounded by the North Pacific Subtropical Gyre (NPSG).**
  - There are some water currents in the oceans that, driven by winds and the Coriolis force, form loops. These are called **gyres**.
  - It includes the Kuroshio, North Pacific, California, and North Equatorial currents and moves in a clockwise direction.
- Inside this gyre, just north of Hawaii, lies a long east-west strip where some of the debris in these currents has collected over the years. The eastern part of this is the Great Pacific Garbage Patch.
- The patch contains an estimated 45,000-1,29,000 metric tonnes of plastic, predominantly in the form of microplastics.
  - The numerical density of plastics here is around 4 particles per cubic metre.

Key points of the study:

- 98% of the debris items had invertebrate organisms.
- The number of coastal species, such as arthropods and molluscs, identified rafting on plastic was over three times greater than that of pelagic species that normally live in the open ocean.
- According to the study, of the 46 taxa organisms, 37 were coastal; the rest were pelagic. Among both coastal and pelagic organisms, crustaceans were the most common.
  - The coastal species were most commonly found on fishing nets, whereas the pelagic species were on crates.
- According to the Study, "Nearly all taxa were of Northwest Pacific origin", including Japan.
- 68% of the coastal taxa and 33% of the pelagic taxa reproduced asexually and was evidence of sexual reproduction among the hydroids and the crustaceans, among others. They found a strong positive correlation between reproduction and mobility.

Science Based Targets initiative (SBTi)

News Excerpt:

After two climates advocacy organizations wrote a joint letter to UN Race to Zero, Adani Green Energy Ltd, Adani Transmission, and Adani Ports & SEZ were recently excluded from the Science Based Targets Initiative.

About Science Based Targets initiative (SBTi):

- The UN Global Compact (UNGC), CDP, the World Resources Institute (WRI), and WWF collaborated to create the "Science Based Targets" program.
- A global campaign is being made to improve corporate climate.
- To make sure that the transformative action is in line with the most recent findings in climate science, it sets emissions reduction targets.
- It is "science-based" because it corresponds to the scale needed to maintain the increase in global temperature below 2°C relative to pre-industrial levels.
- Enhancing businesses' competitive edge while they make the transition to a low-carbon economy is possible through "science-based target setting."
- The SBTi also introduced **the first Corporate Net-Zero Standard in the world to make sure that businesses' net-zero goals** are translated into actions that are consistent with attaining a net-zero world by no later than 2050.

Phantom Credit

News Excerpt:

More than 90% of rainforest offset credits do not represent genuine carbon reductions.

About Phantom Credit:

- The "**phantom credits**" are often marketed as "offsets," but in reality, they do not result in actual carbon emissions reductions and may even have the opposite effect by speeding up global warming.
- Numerous major corporations, including Netflix, Disney, Shell, Gucci, Sales Force, and Easy Jet, have acquired rainforest offset credits from the VCS Programme.
- These rainforests offset credits have not been able to produce the supposed carbon credit due to implementation failure and corruption.
- Since doing so enables them to claim the lucrative "carbon neutral" moniker, buying these credits frequently constitutes a significant portion of businesses' net-zero strategies.

Eco-sensitive Zones

News Excerpt:

Recently, the Supreme Court updated its ruling to require mandatory eco-sensitive zones (ESZ) of at least one km around national parks, wildlife refuges, and protected forests across the nation.

About Eco-sensitive Zones:

- Ecologically Sensitive Zones (ESZ) are areas designated to protect biodiversity and conserve the natural habitats of specific species.
- It aims to minimize ecological imbalances as well as the tension between people and the environment.
- By restricting and prohibiting particular activities, especially those that are conducted close to natural parks and wildlife sanctuaries, ESZ declarations strive to create protected zones.
- Under the Environmental Protection Act of 1986, Ecologically Sensitive Zones are declared by the Central Government through the Ministry of Environment, Forests, and Climate Change.
- More than 600 Ecologically Sensitive Zones have been declared in various states of India.
- Uttar Pradesh, Haryana, West Bengal, Andhra Pradesh, Maharashtra, and Karnataka are a few of India's key Eco-Sensitive Zones.
- According to the **National Wildlife Action Plan (2002–2016) of the Ministry of Environment, Forest and Climate Change (MoEFCC),** state governments are required to designate land within 10 kilometres of national parks and wildlife sanctuaries as eco-fragile zones or eco-sensitive zones (ESZs) under the Environmental (Protection) Act of 1986.
- The 10-km guideline is followed as a general rule, although there is some flexibility in how far it is actually put to use. If there are more significant ecologically essential "**sensitive corridors**" in an area beyond 10 km, the Union government may also declare it an ESZ.

River-Cities Alliance (RCA)

News Excerpt:

Recently, The National Mission for Clean Ganga (NMCG) and the National Institute of Urban Affairs (NIUA) together organized the 'River-Cities Alliance (RCA) Global Seminar: Partnership for Building International River-Sensitive Cities'.

About River-Cities Alliance (RCA):

- The RCA is a **cooperative project of the Ministries of Housing and Urban Affairs (MoHUA) and Jal Shakti (MoJS)**, with a goal to link river cities and concentrate on sustainable river-centric development.
- The three major areas of focus for the Alliance are **networking capacity building, and technical support.**
- The Alliance, which had 30 member cities when it first started in November 2021, has grown to **110 river cities** throughout India and **one overseas member city from Denmark.**
- The RCA wants to help Indian cities acquire new techniques and strategies for managing urban rivers by facilitating knowledge exchange (online).
- Additionally, it will provide international cities with the chance to learn from Indian city experiences that may be applicable to their own contexts.

Central Asian Flyway (CAF)

News Excerpt:

The Ministry of Environment, Forest, and Climate Change recently hosted a meeting of Range Countries in New Delhi to strengthen conservation efforts for

migratory birds and their habitats in the Central Asian Flyway (CAF).

About Central Asian Flyway (CAF):

- **Flyway**-It is a geographic area where one or more migratory species complete their whole annual cycle, including breeding, moulting, staging, and non-breeding.
- The C**entral Asian Flyway (CAF) spans a sizable portion of Eurasia between the Arctic and Indian Oceans**. It is one of the top nine flyways for migrating birds worldwide.
- The Flyway is home to at least 279 populations of the 182 migratory waterbird species, of which 29 are vulnerable or approaching threat on a worldwide scale.
- The Central Asian Flyway encompasses 30 nations, including India.
- It stretches from the furthest breeding grounds in the Russian Federation (Siberia) to the furthest non-breeding (wintering) grounds in West and South Asia, the Maldives, and the British Indian Ocean Territory.

Net zero innovation virtual centre

News Excerpt:

Recently, During the India-UK Science & Innovation Council conference, India and the UK announced the establishment of a "NET Zero" Innovation Virtual Centre to address climate change and environmental goals.

About Net Zero Innovation Virtual Centre:

- Specifically with regard to climate change and environmental challenges, India and the UK have jointly launched an endeavor to increase their scientific and technological cooperation.
- It will operate as a platform for bringing together stakeholders from the two nations to work on some of the main areas, including the decarbonization of manufacturing processes, transportation systems, and green hydrogen as a renewable source.
- As long as greenhouse gas emissions and removals from the atmosphere are balanced, it will help the effort to achieve net zero emissions.
- Additionally, it will help the two nations' policy discussions and capacity-building efforts as well as knowledge sharing and innovation in research and development.
- The UK has become India's second-largest international partner for research and innovation.
- The cooperative research project between the UK and India has increased from almost nothing to close to £300-400 million.

Mission LiFE

News Excerpt:

Green Tourism for a sustainable, responsible and resilient tourism sector is one of the five priorities for the Tourism Working Group under **India's G20 Presidency**.

About:

- **Mission LiFE (Lifestyle for Environment)**, is a global mass movement led by India urging individuals and communities to act for the protection of the environment against the effects of climate change.
- **Ministry of Tourism** has accordingly developed the **Travel for LiFE program under Mission LiFE** to bring large-scale behavioural change amongst tourists and tourism businesses, significantly impacting environment protection and climate action.
- The program significantly promotes India's G20 priority of Green Tourism under **Tourism Working Group**. The program has identified an illustrative list of "**Travel for LiFE Actions**", which can be adopted by tourists and tourism businesses.

Objectives of Mission LiFE:

- The spirit of the **Pro Planet People (P3) model**: those individuals and communities who practice a lifestyle that is synchronous with nature and does not harm it
- and functions on the basic principles of **"Lifestyle of the planet, for the planet and by the planet".**
- The mass movement calls for a transition **from a "use-and-dispose" economy to a circular**

economy characterized by mindful and deliberate utilization of resources.

Three Core Shifts envisaged under Mission LiFE:

- **Change in Demand (Phase I)**
- **Change in Supply (Phase II)**
- **Change in Policy (Phase III**): The long-term vision of Mission LiFE is to trigger shifts in large-scale industrial and Government policies.

Actions under Mission LiFE:

- A comprehensive and non-exhaustive list of individual actions has been identified under Mission LiFE.
- These actions are aimed to initiate Phase I, i.e., Change in demand which will be supported by raising awareness and gradually encouraging people, communities, and institutions to engage in simple environmental-friendly behaviours (LiFE behaviours) in their everyday lives.
- **Implementation:** The Travel for LiFE program will use the institutional structure outlined in the **National Strategy for Sustainable Tourism** to implement and monitor the Travel for LiFE program.
  - **National Level:** The National Board for Sustainable Tourism, assisted by the Central Nodal Agency for Sustainable Tourism (CNA-ST), will spearhead the program at the National level. CNA-ST, under the aegis of the Ministry of Tourism.
  - **State Level State**: Governments will have a crucial role in creating momentum for the Travel for LiFE Program, and most of the actions will be coordinated by the States to encourage the tourists and tourism businesses to implement the program.
  - **District Level:** The districts and destination management committees will have the most crucial role in coordinating the program implementation on the ground.

FORESTS

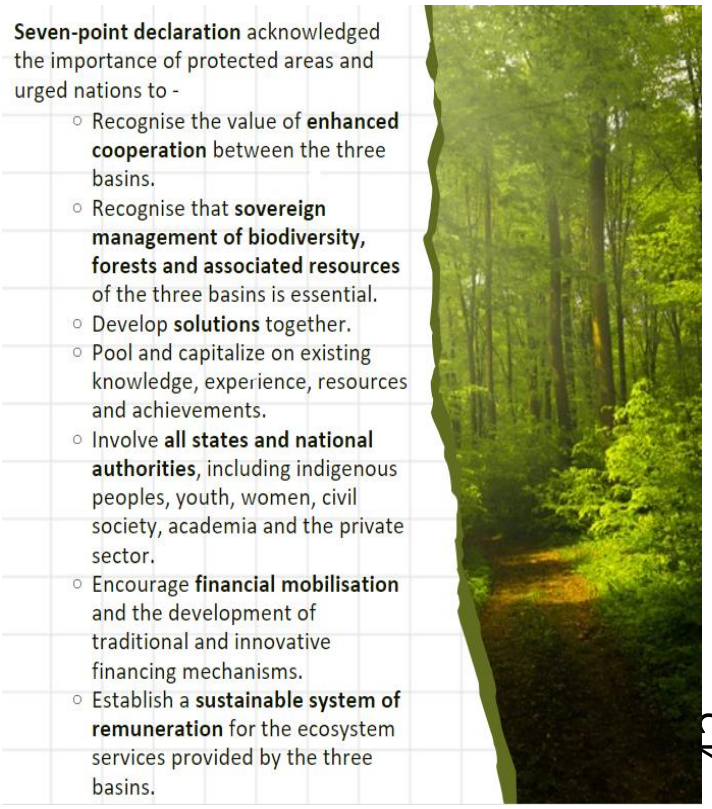
Brazzaville Summit

News Excerpt:

The Summit of the Three Basins was held in **Brazzaville, Congo**, on October 26-28, 2023.

Background:

- The **First Summit** of the three tropical forest basins was held in **Brazzaville** in **2011**. It resulted in the



declaration of the Summit of the Three Tropical Forest Basins.
    - It recognized the need to establish a platform to promote cooperation among the countries of the three basins.
- **The Three Basins Threat Report: Fossil Fuel, Mining, and Industrial Expansion Threats to Forests and Communities.**
    - By the research and advocacy group **Earth Insight** and other non-profits.
    - It documents the **challenges** that the world's remaining **tropical forest** basins face.
        - It showed that large parts of tropical forests in these areas remain **threatened** by **fossil fuel, mining** and **extractive industry** expansion.

About:

- The summit included countries in **three basins** of the **Amazon**, **Congo**, and **Borneo-Mekong-Southeast Asia** countries.
- The leaders urged developed countries -
    - to create a **fund** to address climate change **loss and damage**.
    - To meet their commitments, including **$200 billion annually** by 2030 in the **Kunming-Montreal Global Biodiversity Framework** and **$100 billion annually** in **climate finance** as new resources for developing countries.

United Nations Forum on Forests

News Excerpt:

Recently, **the Ministry of Environment, Forest and Climate Change (MoEFCC)** has been organizing a **Country-Led Initiative (CLI)** event at the Forest Research Institute (FRI) **in Dehradun, Uttarakhand, as part of the United Nations Forum on Forests (UNFF). About the meeting (18th Session)** held on **26th October 2023:**

- The programme includes two days of deliberations and exchanges **on guiding themes- forest fires and forest certification.**
- The deliberations will promote the sharing of good practices to support global actions in advancing the **Global Forest Goals of the UN Strategic Plan for Forests (UNSPF).**

Need For Such a Forum or Initiatives:

- **There has been an alarming increase in the scale and duration of wildfires** worldwide in recent years.
- Profound impact on biodiversity, ecosystem services, human well-being, livelihoods, and national economies.
- **Fires affect approximately 100 million hectares, equivalent to 3% of the world's forest area,** every year.

United Nations Forum on Forests (UNFF):

- It is a high-level intergovernmental policy forum that promotes the **management, conservation and sustainable development** of all types of forests.
- Founded on **October 18 2000** by the UN Economic and Social Council and headquartered in New York, USA.
- In 2007, UNFF adopted the **UN Non-Legally Binding Instrument on All Types of Forests (Forest Instrument).**
- In 2009, UNFF adopted a decision on **financing Sustainable Forest Management** (SFM) that calls for the creation of a **Facilitative Process,** with **an** initial focus on Small Island Developing States (SIDS) and Low Forest Cover Countries (LFCCs)**,** to assist countries in reversing a 20-year decline in forest financing.
- 2011 was declared The International Year of Forests, "Forests for People".

UN Strategic Plan for Forests (UNPFF) for the period of 2017-2030:

- It was the **first-ever UN Strategic Plan for Forests adopted by the United Nations General Assembly (UNGA).**
- It serves as a **global framework for actions at all levels** to achieve the sustainable management of **all types of forests**, including trees outside forests, and to combat deforestation and forest degradation.

Country-Led Initiative (CLI):

- **Its primary goal** is to contribute to the discussions of UNFF regarding the i**mplementation of SFM and the UNSPF and facilitate** the sharing of best practices among UNFF Member States.
- **The CLI** will discuss thematic **areas involving forest fires and forest certification.**

Forest Certification:

- Forest certification is a mechanism for **forest monitoring, tracing and labelling timber, wood**

and pulp products and non-timber forest products, where the quality of forest management is judged against a series of agreed standards.

- Credible forest certification also accounts for workers' and local communities' social and economic well-being, as well as transparency and inclusiveness in decision-making.

Forest Fires:

- **Causes of forest fires:**
  - **Natural causes:** Lightning, which sets trees on fire, High atmospheric temperatures and dryness (low humidity), etc.
  - **Manmade causes:** Naked flame, cigarette or bidi, electric spark or any source of ignition comes into contact with inflammable material.
- Nearly 4 % of the country's forest cover is extremely prone to fire, whereas 6% of forest cover is found to be very highly fire-prone (**ISFR India State of Forest Report 2019).**
- Based on the forest inventory records, **54.40% of forests in India are exposed to occasional fires, 7.49% to moderately frequent fires and 2.40% to high incidence levels while 35.71% of India's forests** have not yet been exposed to fires of any real significance.
- **Satellite-based remote sensing technology and GIS tools have been effective in better prevention and management of fires** by creating early warning for fire-prone areas and monitoring fires in a real-time basis. E.g.- Near Real Time Forest Fire Monitoring (MODIS & SNPP-VIIRS), Forest Fire Danger Rating System (FFDRS), Van Agni Geo-portal, etc. and Burnt scar assessment.

Accredited Compensatory Afforestation (ACA) program

News Excerpt:

The Ministry of Coal showcased environmental stewardship through successful reclamation and Afforestation at the Jamuna Open Cast Project. The Ministry proposes 579 hectares of reclaimed land under the **Accredited Compensatory Afforestation (ACA) program** to achieve broader environmental conservation goals.

Accredited Compensatory Afforestation (ACA) program:

- ACA allows project developers to purchase afforested land from **private or public entities**.
- This is done **to " compensate"** for forest land lost to non-forest activity and was introduced by the **Forest (Conservation) Rules of 2022**.
  - Compensatory Afforestation is mandatory under the Forest (Conservation) Act of 1980.
- The initiative transforms former coal mining land into a **green haven, restoring biodiversity** and promoting responsible **resource management**.
- This system is a **radical shift away from previous norms**, which made it mandatory for project developers to **find non-forest land and bear the cost of raising compensatory Afforestation** on it.
- The Ministry sets a precedent for the industry by proving that **economic activities** like coal mining can **coexist with environmental preservation**.
- Aligned with national goals, ACA addresses funding delays and land availability issues, aligns with India's target of **33% forest cover**, and creates a carbon sink by **2030.**

Tropical trees

News Excerpt:

Tropical trees use social distancing to maintain biodiversity. Tropical forests often harbour hundreds of species of trees in a square mile, but scientists often struggle to understand this. In a study published in Science, researchers at The University of Texas provide insights into this.

About

- They discovered that adult trees in a Panamanian forest are three times as distant from other adults of the same species. The distance between the trees is much greater than the distance that seeds typically travel.
- They found an explanation for why each tree species is much more negatively affected by its own kind than by other species. This is probably because species suffer from species-specific enemies: pathogens such as fungi or herbivores such as insects. These enemies "make room" for other species to establish around every tree, leading to a more diverse forest and keeping any one species from dominating.

International Tropical Timber Council (ITTC)

News Excerpt:

The 59th International Tropical Timber Council (ITTC) recently concluded with significant decisions on sustainable tropical forest management.

59th International Tropical Timber Council (ITTC):

- The countries agreed to endorse **eight projects** related to sustainable forest management and related objectives.
- The session approved and adopted a budget of **$7.1 million** for the coming financial year **2024-25.**
- The work programme for **2024-25 was adopted,** which included a request to the executive director to collaborate closely with members of the **Collaborative Partnership on Forests** and other partners on implementation.

About ITTC:

- The IITC is the governing body of the **International Tropical Timber Organisation (ITTO)**, which aims to promote **sustainable management and conservation of tropical forests**.
- The ITTC meeting occurs at least **once a year**. Its agenda includes a wide range of topics promoting sustainable tropical forest management and the trade of sustainably produced tropical timber.

International Tropical Timber Organization (ITTO):

- It works towards conserving tropical forests and expanding and diversifying international trade in tropical timber from sustainably managed and legally harvested forests.

Global Tropical Primary Forest Cover

News Excerpt:

As per the **World Resources Institute's (WRI) Global Forest Watch (GFW)**, Tropical areas lost 4.1 million hectares of forest cover in 2022.

About Tropical Rainforests:

- They are mainly located between the latitudes of the Tropic of Cancer and the Tropic of Capricorn.
- They are found in Central and South America, western and central Africa, western India, Southeast Asia, the island of New Guinea, and Australia.
- In India, they are situated across the Andaman and Nicobar Islands, the Western Ghats alongside the Arabian Sea, the coastal areas of peninsular India, and the larger Assam region in the north-eastern part of the country.
- **The Tropical Forest Alliance** is a public-private partnership that aims to **reduce tropical deforestation** linked to the production of commodities such as palm oil, soy, beef, and pulp and paper.

About Primary & Secondary Forest:

- **Primary forests** often store more carbon than other forests and are rich sources of biodiversity. Their loss is almost irreversible in nature: even if the green cover regrows, a secondary forest is unlikely to match the extent of biodiversity and carbon sequestering capabilities of a primary forest.
- **Secondary forests**, also known as regrowth or second-growth forests, refer to forests that have regrown or reestablished after significant disturbance or human intervention, such as deforestation, logging, or agricultural activities.

About GFW:

- The World Resources Institute (WRI) established Global Forest Watch in 1997 as part of the Forest Frontiers Initiative.
- Global Forest Watch (GFW) is an online platform providing data and monitoring tools for forests.
- **Key Findings of GFW**
  - WRI measures progress on two goals –
    - Ending deforestation by 2030.
    - Restoring 350 million hectares (Mha) of lost and degraded forests by 2030.
  - The global deforestation rate needs to decrease by at least 10% annually to achieve the 2030 target.
  - Although the global deforestation rate decreased by 3.1% compared to the 2018-2020 baseline, it still exceeded the required level by over one million hectares, putting the world off track to meet the 2030 goal.
  - **An increase in tree cover by 22 million hectares per year between 2021 and 2030 is necessary to restore 350 million hectares of forests worldwide by 2030.**
  - Brazil and the Democratic Republic of Congo have the most tropical forest cover, and both experienced losses in 2022.
    - Ghana and Bolivia also witnessed rapid losses in their primary forest cover. However, Indonesia and Malaysia

successfully kept their primary forest cover losses at record-low levels in 2022.

India and Global Forest Watch:

- According to the Global Forest Watch, India experienced a loss of 43.9 thousand hectares of humid primary forest between 2021 and 2022, accounting for 17% of the country's total tree cover loss during that period.
- The total tree cover loss in India between 2021 and 2022 amounted to 255 thousand hectares.
- From 2002 to 2022, India lost 393 thousand hectares of humid primary forest, contributing 18% of the total tree cover loss during that time.

REPORT	DETAILS
UNEP REPORT: THE GLOBAL COOLING WATCH 2023 **News Excerpt:** The **United Nations Environment Programme (UNEP) led Cool Coalition** has released a **Global Cooling Watch report** named **"Keeping it Chill: How to Meet Cooling Demands while cutting emissions".** **About the report:** ● The report is released to support the **Global Cooling Pledge,** a joint initiative between the **United Arab Emirates as host of COP28 and the Cool Coalition.** ● It emphasizes that **"Cooling is a double burden on climate change**". ○ **Rising demand for power-hungry equipment**, such as air conditioners and refrigeration, will drive greater indirect emissions from the associated electricity consumption. ○ At the same time, these emissions are compounded by **direct emissions from the release of refrigerant gases in cooling equipment**, the majority of which have a much higher global warming potential than CO2. ○ **82%** of global cooling-related GHG emissions came **from G20 countries in 2022.**	**Highlights of the report:** It lays out that **sustainable cooling integrated action is needed in three key areas:** ● **Passive strategies** to address extreme heat and reduce cooling demand in buildings and the cold chain: ○ Passive cooling measures can **dramatically reduce cooling loads** while maintaining indoor thermal comfort and temperatures in cold storage. ○ Such passive cooling measures can **curb the demand for cooling capacity growth in 2050 by 24%** and **reduce 2050 emissions by 1.3 billion tons of CO2.** ● **Higher energy efficiency** standards and norms for cooling equipment. ○ To deliver a good amount of reduction, the **global average efficiency of all cooling equipment operating in 2050 would need to be almost triple** the average efficiency of equipment operating today. ○ Driving efficiency in cold chain and refrigeration through MEPS and passive cooling **can deliver 30% of the required energy savings by 2050** while greatly reducing food loss and waste. ● **A phase-down of climate-warming hydrofluorocarbon** (HFC) refrigerants at a faster rate than is required under the Kigali Amendment to the Montreal Protocol while improving the energy efficiency of cooling equipment. ○ If fully implemented, it will reduce the 2050 emissions from cooling **by more than 60%**. ○ The emission reductions **grow to 96% when these actions are combined with rapid electricity grid decarbonization.**
Dynamic Groundwater Resource Assessment Report 2023 **News Excerpt:** The Union Minister of Jal Shakti released the Dynamic Groundwater Resource Assessment Report for the entire country for the year 2023. The Government reports widespread arsenic and fluoride in groundwater.	**Key Findings of the Report:** ● **Groundwater Recharge:** The total annual groundwater recharge in 2023 stood at 449.08 billion cubic meters (BCM), reflecting an increase of 11.48 BCM compared to 2022. Rainfall accounts for nearly 60.3% of this recharge, with contributions from other sources like return flow from irrigation, canal seepage, etc.

Central Ground Water Board (CGWB):

- It is a **multi-disciplinary scientific organization and National Apex Agency** of the Department of Water Resources, River Development and Ganga Rejuvenation, Ministry of Jal Shakti, Government of India.
- The **CGWB** regularly monitors and assesses groundwater quality.

Pollution Related to Ground Water:

- **Arsenic** was found in **25 states** and **fluoride in 27 states**, impacting **230 and 469 districts**, respectively.
- These studies indicate the occurrence of arsenic and fluoride in groundwater beyond permissible limits- set by the **Bureau of Indian Standards** - for human consumption in isolated pockets in various states and Union Territories.

- **Extractable Groundwater Resource:** The country's total annual extractable groundwater resource was **assessed at 407.21 BCM.**
- **Groundwater Extraction:** The annual groundwater extraction in 2023 was reported at 241.34 BCM. The irrigation sector is the largest consumer, utilizing 87% of the total annual groundwater extraction.
- **Improvements in Assessment Units:** The identification of improvements in 226 assessment units suggests that certain areas have witnessed positive changes in groundwater conditions, reflecting potential successful interventions or natural improvements.
- **Decrease in Over-exploited Units:** The reduction in the number of over-exploited units signifies progress in managing and potentially alleviating stress on groundwater resources in certain regions.
- **Geographical Variation:** Over-exploited units are prevalent in the northwestern states (like Punjab and Haryana) due to over-extraction beyond recharge capacities. Arid regions like Rajasthan and Gujarat also face similar over-exploitation due to low recharge rates.

Adaptation Gap Report 2023

News Excerpt:

The recent UNEP's Adaptation Gap Report 2023, titled **"Underfinanced. Underprepared – Inadequate investment and planning on climate adaptation leaves the world exposed",** finds that the **progress on climate adaptation is decelerating instead of accelerating**.

About:

- **Adaptation** refers to reducing the **vulnerability** of countries and communities to climate change by enhancing their **ability** to absorb its impacts.
- The **adaptation gap**, the **difference** between the adaptation **implemented** and the society's **set goals**, is determined by climate change impact-related preferences reflecting resource limitations and competing priorities.

Key highlights of the report:

- The need for adaptation finance is **10-18 times higher** than the current public flows, and the adaptation finance gap is expanding, now standing at **US$ 194-366 billion annually**.
- The action plan on **loss and damage** has neglected **non-economic losses** such as **cultural heritage** and **indigenous knowledge**.
- Despite pledges made at the **26th Conference of Parties** in Glasgow to double 2019 adaptation finance support by **$40 billion per year by 2025**, public multilateral and bilateral adaptation finance flows declined **by 15% to US $21 billion** in 2021.
- **Five out of six Parties** to the UNFCCC have established at least **one national adaptation plan/strategy/ or policy**, and just under **half of them** have **two or more national instruments** that replace or update the initial ones.
- A **Climate Vulnerable Economies Loss Report** indicates that the **55** most climate-vulnerable economies alone have experienced losses and damages of more than **US $500 billion** in the last two decades.
- The report estimates that adaptation costs will increase significantly **by 2050** for most sectors, especially under high-global warming scenarios.
    - **For example,** the annual costs of adaptation for **coastal protection** will increase with the rise of sea levels by 2050.

	• The world has **already warmed by 1 degree Celsius** since the pre-industrial era, and current climate action is inadequate to meet the Paris Agreement goal, which aims to limit temperature rise to 2°C, preferably to 1.5°C above pre-industrial levels. • Multilateral Development Banks (MDBs) such as the **World Bank and IMF finance adaptation projects in developing countries.** However, their financial **commitments decreased** by 11% in 2021 after seeing an increase from 2017 to 2020. • The report analyzed the integration of **gender equality** and **social inclusion** in nationally determined contributions **(NDCs)** and national adaptation programmes **(NAPs)**. ○ It finds that only 20% of these plans have a dedicated budget for such activities, and the amount allocated is generally low, averaging 2%.
United Nations Office for Disaster Risk Reduction Report **News Excerpt**: According to the report released by the United Nations Office for Disaster Risk Reduction (UNDRR) ahead of the International Day for Disaster Risk Reduction on October 13, 2023, **no progress has been made in the last decade to help people with disabilities cope with disaster.**	**Key findings of the survey:** • It showed that the vulnerable population group had been left out of disaster management planning despite the previous survey, conducted in 2013, stressing the need for its inclusion. • The world is projected to face some 560 disasters every year by 2030, according to UNDRR. • UNDRR has highlighted the importance of removing inequalities to reduce disaster risk, which refers to the probability of death, injuries or damage due to natural disasters. • Around 16 percent of the world's people have some form of disability and are killed by disasters two-four times more often than the rest of the population. • If a sufficient early warning is provided, 39 percent of respondents reported they would have no difficulty evacuating, compared to 26 percent if there was no warning. • The international law under the **Convention on the Rights of Persons with Disabilities** mandates that countries have defined mechanisms to provide safety to people with disabilities. • UNDRR stressed that the Sendai Framework for Disaster Risk Reduction 2015-2030 also called for disability inclusion, the provision of accessible disaster risk information, and the establishment of inclusive and end-to-end early warning systems. • They called for immediate action to address these challenges and meaningful inclusion of people with disabilities in community disaster risk reduction planning.
ANNUAL STATE OF CLIMATE SERVICES REPORT **News Excerpt:** The World Meteorological Organization (WMO), in its **Annual State of Climate Services Report,** has warned that the world is warming faster.	**About the Report:** • WMO has issued annual reports on the **State of Climate Services since 2019** to provide scientifically based information to support climate adaptation and mitigation. • **This 2023 edition of the report** focuses on **health,** one of the priorities of the **Global Framework for Climate Services**

About the World Meteorological Organization (WMO):

- It is an intergovernmental organization with 193 member countries and territories headquartered in Geneva.
- With the approval of the WMO Convention on March 23, 1950, WMO became the United Nations specialized organization for meteorology.

Global Framework for Climate Services (GFCS):

- It was established by the international community at the **World Climate Conference-3 in 2009** to enable better management of the risks of climate variability and change and adaptation to climate change by developing and incorporating science-based climate information.

(GFCS) and a top priority for countries in their **Nationally Determined Contributions.**

Highlights of the Report:

- The world is **warming faster** than at any point in recorded history.
- The changing climate undermines health determinants, like **air quality, water quality, food security, shelter, economics, livelihoods, equity and access to healthcare**, and social support structures that are necessary for maintaining good health.
    - Such increasing pressure on health systems threatens to reverse decades of progress to promote human health and well-being, **particularly in the most vulnerable communities.**
- **50% of future excess mortality** from climate change is projected to occur in **Africa.**

THE EMISSIONS GAP REPORT - 2023

News Excerpt:

The Emissions Gap Report - 2023 was recently published by the UN Environment Programme (UNEP).

About Emissions Gap Report (EGR):

- It is UNEP's spotlight report, which was launched annually before the annual climate negotiations.
- The EGR tracks the gap between where global emissions are heading with current country commitments and where they ought to be to **limit warming to 1.5°C.**

Key highlight of EGR -2023:

- **As many as 86 days this year** have already breached **the 1.5 degree Celsius temperature** threshold, as global greenhouse **gas emissions scaled a record high in 2022.**
- The world, together, **emitted 57.4 billion tonnes of carbon dioxide in 2022, a 1.2 percent increase** over the previous year and higher than the previous record achieved in 2019.
- The **emissions of China and the United States,** the world's two biggest emitters, also rose in 2022, as did that of India, the third largest emitter.
    - **The European Union, Russia and Brazil saw emissions go down a bit.**
- Even if all the climate actions as per the current promises made by the countries were carried out with the **highest ambition, global emissions in 2030** would still be **at least 19 billion tonnes of CO2** equivalent higher than the level required to keep **global warming within 1.5 degree Celsius** from pre-industrial times (the average of annual temperatures in the 1850-1900 period).
- To meet this gap, **global emissions** would need to drop **by at least 8.7 per cent yearly from 2024 (instead of the 1.2 per cent rise in 2022).**

GLOBAL DROUGHT SNAPSHOT 2023

News Excerpt:

The report '**Global Drought Snapshot**' was released by the UN Convention to Combat Desertification (UNCCD) in collaboration with

Fact Findings:

- The UN report **'Global Drought Snapshot'** illuminates the pressing need for global resilience against droughts, highlighting **severe drought conditions in China, food insecurity in the Horn of Africa, and reduced crop production in regions like Brazil-Argentina.**

the International Drought Resilience Alliance (IDRA) at **COP28 in Dubai**. **About UNCCD:** The United Nations Convention to Combat Desertification (established in 1994) focuses on fostering good land stewardship, enabling sustainable land management, and assisting communities and countries in securing food, water, and energy.	• The report underscores the detrimental impact of drought on agriculture, forests, and water conditions worldwide, leading to crop damage, loss of grazing land, and low water levels in rivers. **Future Endeavors:** • Nature-based solutions like land restoration have the potential to offset up to 25% of CO2 emissions. Highlighting the urgency of proactive measures by nations to mitigate drought impacts and respect planetary boundaries. • Emphasizing the importance of respecting planetary boundaries, restoring degraded landscapes, urban intensification, family planning, and curbing rapid population growth. • Replacing half of animal products consumed with sustainable alternatives could potentially prevent almost 100% conversion of global forests and natural land for agriculture. • Switching to micro-irrigation (drip irrigation) systems could potentially reduce water **waste by 20 to 50%.** • Global disaster-related losses **covered by insurance increased to 45% in 2020** but remain low in many developing countries.

Wildlife Justice Commission (WJC) Report
 	
New Excerpt: The **Wildlife Justice Commission (WJC)** has published a report titled **"Convergence of Wildlife Crime with Other Forms of Organized Crime: A 2023 Review."**
 	
Wildlife Justice Commission (WJC)
WJC is an international foundation set up in **2015**, with headquarters in **Hague, Netherlands.** It works to curb wildlife crime.
	Summary of the report:
	• **The link between Wildlife and Organized Crime:**
	  ○ The report emphasizes the connection between **wildlife trafficking and other crimes**, such as human trafficking, fraud, migrant smuggling, **protection rackets, extortion, murder, money laundering, illicit drugs, tax evasion, and corruption**.
	• **Environmental Crime and Sand-Mining:**
	  ○ It is the first time that the report highlights **sand mining as a form of environmental crime,** noting that sand is the second-most-used resource globally.
	  ○ **Sand extraction**, which is poorly regulated in many countries and **lacks a global treaty**, has severe environmental consequences, including erosion, damage to communities and livelihoods, aquifer depletion, and biodiversity loss.
	  ○ **Illegal sand mining** operations are often organized and operated by violent sand mafias.
	  ○ The report identifies cases of violence and killings related to sand mining in various countries, including **India, Indonesia, Kenya, Gambia, South Africa, and Mexico**.
	  ■ **In India**, 35 individuals, including journalists, activists, and government officials, were killed by sand mafias between January 2019 and March 2022 for opposing illegal sand mining.

WWF Plowprint Report, 2023 **News Excerpt:** The World Wildlife Fund **(WWF)** has released the **Plowprint Report 2023**.	**Report Findings:** • **Significance**: Grasslands are crucial for **agriculture**, **food security**, **rural communities**, and the **economy**, providing

About World Wildlife Fund (WWF):

- It is an international **non-governmental** organization that works to protect and conserve the natural world and its species.
- It was established in **Switzerland** on **April 29, 1961**.
- It is currently operational in **over 100** nations worldwide.

water supply, **soil health**, **climate resilience**, **biodiversity**, and **carbon sequestration**.

- **Challenges**: However, grassland loss has significant impacts, including increased **carbon emissions**, frequent **droughts**, and **aquifers not replenishing** due to lost infiltration and increased **run-off**.

Birdwatch Report: 2023

News Expert: India's iconic raptors are declining fast, warns State of India's Birds Report 2023. The report indicates that the Long-Term Trends of Species showing a 60% decline and has identified 178 species of birds that needed immediate priority for conservation (High Priority).

About the State of India's Birds Report (SoIB):

- SoIB is published by the State of India's Birds Partnership, a group of 13 government and non-government organisations. The first SoIB report was published in 2020.
- A total of 942 out of the 1358 species recorded in India (as of May 2023) are considered in SoIB. The 942 species are selected based on the availability of data for trends, endemic status, and the importance of India in their global range.

Important findings of the Report:

This report assesses using data uploaded by birdwatchers to the online platform eBird. The assessments are based on three indices.

- **Two are indices of change in abundance:**
  - **Long-term Trend** (i.e., change over c. 30 years): (Determined for 338 species.) Of these 338 species, 204 have declined in the long term, 98 are stable, and 36 have increased.
  - **Current Annual Trend** (i.e., annual change over the past 8 years): (For 359 species) (of which 142 are declining (64 in Rapid Decline), 189 are stable, and 28 are increasing.
- **Distribution Range Size within India:** The range Size of most species (39%) is Moderate, while that of 28% is Restricted or Very Restricted, and that of a further 33% is Large or Very Large.
- Using these three indices, together with the IUCN global Red List of Threatened Species 2022 (were classified into categories of Conservation Priority for India: 178 as High Priority, 323 as Moderate Priority and 441 as Low Priority.
- **Other important findings:**
  - **Generalist birds** that can live in multiple habitat types are doing well as a group.
  - **Specialist birds** are more threatened than generalists. Grassland specialists have declined by more than 50%.
  - **Migratory species**, such as long-distance migratory birds from Eurasia or the Arctic, have declined by more than 50%, followed by short-distance migrants.
  - **Birds that feed on invertebrates,** including insects, are declining rapidly.
  - **Birds that feed on fruits and nectar** are doing well.

International Methane Emissions Observatory 2023 Report

News Excerpt:

The **International Methane Emissions Observatory's (IMEO)** third annual report - '**An Eye on Methane'** has been published.

The UN's Food and Agriculture Organization (FAO) is set to present a plan for emission reduction.

About the IMEO Report:

- UNEP, through IMEO and the **Climate and Clean Air Coalition (CCAC**), is the designated implementation partner for the GMP (Global Methane Pledge).
- **Aim:** UNEP's IMEO is catalyzing a **methane data revolution** and building the infrastructure to ensure that data accelerates methane action.
- **Key highlights of IMEO Report 2023:**
  - **The methane data platform** is under design.
  - **The Methane Alert and Response System (MARS**) has issued alerts on 127 plumes to the responsible authorities.

It provides decision-makers with a framework of action to track and monitor methane emissions to plan targeted and ambitious actions for their mitigation.

Why is methane a concern?

- Methane is a relatively short-lived gas, with an atmospheric lifetime of around a decade, whereas carbon dioxide affects the climate for hundreds of years**. Methane absorbs much more energy while in the atmosphere and causes swift damage.**
- **Global warming potential**: It is a metric used by the Intergovernmental Panel on Climate Change (IPCC). One **tonne of methane exhaust is likely equivalent to over 25 tonnes of carbon dioxide over a century.**
- **The 2021 Sixth IPCC Assessment Report** says that anthropogenic methane accounts for almost a third of the planet's warming observed so far.
- A 2018 study found **sheep, goats, beef cattle and buffaloes** to be big emitters.
    - **20 IMEO-funded and coordinated peer-reviewed studies** have been published, and 7 studies have been submitted or are under review.
    - **114 oil and gas companies –** covering 37% of production – joined UNEP's measurement, reporting and verification program OGMP (Oil & Gas Methane Partnership) 2.0 September 2023 cut-off.
    - **Funding is secured** for baseline studies that will provide an empirical and actionable assessment of emissions across methane-emitting sectors for selected countries.

Initiatives for curbing methane emissions around the Globe:

- There is extensive coverage at the United Nations Climate Conference in **Egypt (COP27)** and the **Global Methane Pledge (GMP)** growth since 2022. **Under the GMP, more than 150 countries have committed** to collectively reducing their methane emissions by **30%** across **all sectors by 2030.**
- At **COP28 in Dubai**, United Arab Emirates, **IMEO launched the new Methane Alert and Response System (MARS).**
    - This system collects data from multiple satellites and issues alerts to countries and companies when emissions are detected.

State of the Global Water Resources Report 2022

News Excerpt:

On **12th October 2023**, the **World Meteorological Organization (WMO)** released the **State of the Global Water Resources Report 2022,** an extensive assessment of the World's Water Cycle.

It highlighted that the global hydrological cycle is being disrupted by climate change and human activity.

Key Findings of the State of the Global Water Resources Report 2022:

- **Hydrological Assessment:**
    - **River discharge**: In 2022, over 50% of global catchment areas experienced below-normal river discharge conditions, with many areas being drier than usual.
    - **Inflow to reservoirs**: More than 60% of major water reservoirs were identified with below-normal inflow.
    - **Soil moisture**: Presence of anomalies in soil moisture throughout 2022. **For instance**, Europe faced a major heat wave and drought-like conditions, challenging agricultural production and access to water to power plants.
- **Cryosphere Changes (Frozen water):**
    - The **Asian Water Tower (AWT)** is vital for the water supply of 2 billion people.
    - AWT comprises the **Third Pole regions** including The Tibetan Plateau, the Himalayas, the Karakorum, the Hindu Kush, the Pamirs and the Tien Shan Mountains. It is experiencing a notable glacier mass loss and decreased snow cover. From 2000-2018, total glacier mass has receded by more than 4%.
    - **For instance**, there was an outburst at the recent South Lhonak Glacial Lake in North Sikkim.
- **Status of Rivers:**

	○ Severe droughts in Europe, low water levels in the **Mississippi River,** and prolonged drought in the **Yangtze River basin** had various impacts on water resources and economic activities. ○ A megaflood in the **Indus River Basin in Pakistan**, killing at least 1700 and affecting 33 million, caused significant damage and loss of life.
NDC Synthesis Report **News Excerpt:** Nationally Determined Contributions (NDC) Synthesis Report by the United Nations Framework Convention on Climate Change (UNFCCC) shows inadequate climate pledges, with a projected 87% depletion of the global carbon budget by 2030. **About Nationally Determined Contributions (NDC):** ● Individual **country-level commitments** that outline the efforts and actions a country intends to take **to reduce its greenhouse gas (GHG) emissions**. ● Each participating country in the **2015 Paris Agreement** was required to submit its own NDC, reflecting its **national circumstances, capabilities, and priorities**. ● Countries are encouraged to **enhance their NDCs every five years** to reflect increased ambition in tackling climate change. ○ **Conditional elements in NDCs:** A country's commitments contingent upon certain conditions being met. For example, a country might pledge to reduce emissions only if it receives financial support or technology transfer from the international community. ○ **Unconditional elements in NDCs**: The core, non-negotiable commitments a country pledges to achieve irrespective of external factors or without additional support.	**Key Findings of the report:** ● If the NDCs of all countries are implemented, **global emission levels will be 2% lower** in **2030 compared to 2019** levels. ● The 2% reduction falls significantly short of the **43% emission** reduction required by 2030 to limit global temperature increase to under 1.5 degrees Celsius, as recommended by the Intergovernmental Panel on Climate Change (IPCC). ● Despite improved ambition in updated NDCs, **51.6 gigatonnes of carbon dioxide equivalent (GtCO2e) will be emitted in 2030**, using up 87% of the remaining global carbon budget. ● Global emissions may peak before 2030 if **conditional elements in NDCs** are met. However, implementing only **unconditional NDCs** would result in a **1.4%** increase in emissions by 2030 compared to 2019 levels. ● About **43%** of countries outlined **long-term mitigation plans** in their NDCs. ● The collective emissions of countries with **Long-Term Low-Emission Development Strategies (LT-LEDS)** will be **35.9 GtCO2e** in 2030, representing a 6% reduction from 2019 levels. ● However, **Net Zero targets** are uncertain, and 43% of LEDS indicate the need for more ambitious emissions reduction measures. ● The reports are expected to feed into the culmination of the first-ever **Global Stocktake**, an assessment of countries' progress towards their climate commitments, at COP28. ○ Following the findings of the NDC synthesis report, the Global Stocktake offers an **opportunity to strengthen target implementation and improve the flow of finance to achieve commitments from developed to developing countries.**

Biennial Report on Global Infrastructure Resilience: CDRI **News Excerpt**: The Coalition for Disaster Resilient Infrastructure (CDRI) will launch the first edition of its Biennial Report- Global Infrastructure Resilience in September 2023.	**About the Report:** **Focus**: Global attention on the critical and multi-faceted challenges of disaster and climate-resilient infrastructure, especially nature-based infrastructure solutions. **Coordinating Agency**: United Nations Development Programme (UNDP) **Core initiative:** • It is expected to inform planning, decision-making, and investment in disaster and climate-resilient infrastructure by providing **credible and fully comparable probabilistic risk metrics** covering every country and territory worldwide. • The Report comprises thematic chapters on nature-based solutions, financing for resilient infrastructure and a proposal to monitor future progress.
All India Tiger Estimate Report (AITE) **News Excerpt:** All-India Tiger Estimate **(AITE) report** was released by the **Environment Ministry** on **Global Tiger Day.** **Key Concerns:** • **16 Tiger reserves**, referred to as **"bottom reserves"**, contain **only 25 tigers**, which is less than 1% of the national tiger population. None of them has more than 5 tigers, 7 of them have only one tiger each and **5 of them have no tigers at all**. • **45%** of India's tiger population is concentrated in another **16 reserves**. • **Uneven tiger distribution** can be attributed to lack of protection, habitat fragmentation, poor management, and lack of prey base. • **Since 2018, tiger habitat** has been lost in Mizoram, Nagaland, Jharkhand, Goa, Chhattisgarh, and Arunachal Pradesh.	**About** • India currently harbours almost **75%** of the **world's tiger population**, with **53 reserves** spread across **75,796 square km**, effectively covering **2.3%** of India's total **land area**. • The tiger population is estimated to be 3925 and the average number is **3682 tigers**, reflecting an **annual growth rate** of **6.1%** per annum. • The largest tiger **population** of **785** is in **Madhya Pradesh**, followed by **Karnataka (563)** & **Uttarakhand (560)**, and **Maharashtra (444)**. • The **tiger abundance** within the Tiger Reserve is highest in **Corbett (260)**, Bandipur (150), Nagarhole (141), Bandhavgarh (135), and Dudhwa (135). • **Central India**, **Shivalik Hills** and **Gangetic Plains** witnessed a notable **increase** in tiger population, particularly in the states of Madhya Pradesh, Uttarakhand, and Maharashtra. • However, certain regions, such as the **Western Ghats**, experienced localized **declines.**

POLLUTION

Plastic Pollution

News Excerpt:

Recent research based on an **Earth system model** found that carbon leaching out of **existing plastic pollution has a negligible impact.**

About Plastic Pollution:

• Plastic pollution is the accumulation of **synthetic plastic items in the environment** to the point where they cause difficulties for wildlife and their habitats, as well as human populations.

• **Global problem**: **Every year, between 19 and 23 million tonnes** of plastic waste enter aquatic environments, damaging lakes, rivers, and seas.

• Plastic packaging accounts for the majority **(36 percent)** of plastic production. However, **46 percent** of plastic waste is landfilled, **22 percent** becomes litter**, 17 percent** is incinerated, and **15**

percent is collected for recycling, with less than **9 percent** recycled after losses.

Globally Initiatives Taken for Plastic Pollution:

- Global Treaty to End Plastic Pollution:
  - In March 2022, at the resumed fifth session of the **UN Environment Assembly** (UNEA-5.2), a historic resolution was adopted to develop an international legally binding instrument on plastic pollution, including in the marine environment.
  - The resolution requested the Executive Director of the UN Environment Programme (UNEP) to convene an **Intergovernmental Negotiating Committee (INC)** to develop "the instrument," which addresses the full life cycle of plastic, including its production, design, and disposal.
  - The INC began its work during the second half of 2022, with the ambition to complete the negotiations by the end of 2024. The first session of the INC (INC-1) took place in Uruguay, followed by a second session (INC-2) in Paris, France. The third session (INC-3) is now scheduled from 13 to 19 November 2023 at the UNEP Headquarters in Nairobi, Kenya.
  - The goal is to complete discussions and produce a **global, legally binding plastics treaty by the end of 2024.**
- **Global Tourism Plastics Initiative:** It was undertaken by **the United Nations World Tourism Organization (UNWTO). UNWTO** unites the tourism industry behind a shared vision for addressing the core causes of plastic waste.
- The United Nations Environment Programme (UNEP) launched the **Tide Turners**, the world's largest youth-led movement against the plastic crisis.
- The UN launched the United Nations Convention on the Law of the Seas (**UNCLOS**).

Plastic Overshoot Day:

- The Earth witnessed Plastic Overshoot Day on July 28, 2023.
- This marks the point in the year when the **amount of plastic waste generated exceeds the global waste management capacity.**
- The **Plastic Overshoot Day Report** by Swiss-based research consultancy **Earth Action** (EA) illuminates the alarming issue of plastic pollution and its environmental implications.
- Plastic Overshoot Day is determined based on a country's **Mismanaged Waste Index (MWI).** The gap in waste management capacity and plastic consumption is called MWI.
- **Plastic Pollution catastrophe**: According to the estimate, 68,642,999 tonnes of plastic trash will be released into the environment in 2023, signalling a serious plastic pollution catastrophe.
- 12 nations are named in the report as being in charge of 52% of the world's improperly handled plastic garbage. India is one among them.
  - The three African nations with the greatest percentages of improperly handled trash are Mozambique (99.8%), Nigeria (99.44%), and Kenya (98.9%).
  - **In the MWI, India comes in fourth place with 98.55% of the generated trash.**
  - **Short-life Plastics:** About 37% of all plastic used each year is made of short-life plastics, such as plastic packaging and single-use plastics.
- **Indian Scenario**:
  - Central Pollution Control Board (CPCB)-India generates close to **26,000 tonnes of plastic daily**, and over 10,000 tons of plastic waste remains uncollected.
  - India's per capita plastic consumption is less than 11 kg, nearly tenth of the USA's (109 kg).

- **Circular Economy Action Plan:** In **2015**, the EU created a **Circular Economy Action Plan**, which later consisted of the **European Strategy for Plastics in a Circular Economy**.
- **India:**
  - **Ban on Single-Use Plastics: India** banned single-use plastic products from **1st July 2022,** under the **Plastic Waste Management Amendment Rules, 2021**.
  - This ban covers the production, distribution, and use of single-use plastic products such as straws, cutlery, earphones, and plastic sticks.
  - **Extended Producer Responsibility guidelines** were made applicable to plastic producers.
  - **Plastic waste management (Amendment) Rules, 2022-** strengthens the circular economy of plastic packaging waste development of recycling infrastructure.
  - **India Plastic Pact:** It is an ambitious and collaborative initiative to bring stakeholders together to reduce, reuse and recycle plastics within the material's value chain.

The G7 and G20 have hosted several initiatives to tackle plastic pollution:

Understanding Plastic Recycling:

Mechanical recycling
● Sorting and cleaning plastic waste, shredding it into small pieces, and then melting and reforming the shredded plastic to create new plastic products. ● Suitable for plastics that can be easily melted and reprocessed, such polyethylene (PE) and polypropylene (PP).
Feedstock/chemical recycling
● Breaking down plastic waste into its basic chemical components through various chemical processes. ● Recovery of valuable chemicals and monomers for the production of new plastics. ● Eg: pyrolysis, depolymerization, and gasification.
Energy recovery (Waste-to-Energy)
● Non- recyclable plastic waste is incinerated to generate energy. ● The heat generated is used to produce electricity or heat for industries. ● Reduces the volume of plastic waste while harnessing the energy content.
Plastic-to-fuel conversion
● Plastic waste can be converted into liquid fuels, such as diesel or gasoline, through processes like pyrolysis or gasification. Offers an alternative to traditional fossil fuels and reduces dependency on crude oil.
Upcycling
● Transforming plastic waste into higher-value products with improved quality functionality ● Creative reuse and repurposing of plastic materials to create new products.

Microplastic Pollution

News Excerpt

The Union Ministry of Environment, Forest and Climate Change (MoEFCC) stated that in India, Municipal areas generate 133,760 metric tonnes per day of microplastics, out of which less than 10% is recycled.

Pre-Connect

- Plastic debris can come in all shapes and sizes, but those that are **less than five millimetres in length** are called "microplastics."
- **Primary microplastics** are tiny particles **designed for commercial use**, such as cosmetics, and microfibers shed from clothing and other textiles, such as fishing nets.
- **Secondary microplastics** are particles that result from the **breakdown of larger plastic items**, such as water bottles.
- The **Global Partnership on Marine Litter (GPML)** was initiated during the Earth Summit in 2012 following a request outlined in the Manila Declaration.
    - As part of this declaration, 65 signatory nations reasserted their dedication to crafting policies aimed at diminishing and managing issues related to wastewater, marine litter, and pollution originating from fertilizers.

Sources of Microplastics:

- **Cosmetics and Personal Care Products**: Microbeads and exfoliants are used in products like face scrubs, body washes, and toothpaste.
- **Textiles**: Synthetic fabrics such as polyester, nylon, and acrylic.
- **Industrial Processes**: Certain industrial processes generate microplastics, such as plastic pellet handling and processing, as well as microplastics used in abrasive blasting (e.g., for cleaning surfaces).

- **Plastic Pellets**: Small plastic pellets are used as raw materials in plastic manufacturing.
- **Degradation of Larger Plastics**: Larger plastic items like bottles, bags, and packaging materials break down over time due to weathering, sunlight, and mechanical action.
- **Land-based Litter**: Litter and debris from urban areas can be transported by wind, rain, or rivers and eventually break down into microplastics.
- Microplastics are extremely small and can be **found virtually everywhere, including oceans, freshwater bodies, soil, and even the air.** This widespread distribution makes it challenging to collect and manage them effectively and microplastics may require different recycling methods.
    - **E.g.**, polyethene, polypropylene, and other polymer types.
- Microplastics often become **contaminated with organic matter, sediment, and other pollutants**. This contamination makes sorting and separating microplastics from other materials difficult, especially when considering recycling.

PLASTIC PELLETS

News Excerpt:

The International Maritime Organization (IMO) should categorise plastic pellets as environmentally hazardous due to the chemicals added to them and the threat they pose to marine biodiversity.

What are Plastic Pellets?

- Plastic pellets are lentil-sized pieces of plastic ranging between **1 millimetre (mm) to 5 mm** that are melted together to create almost all plastic items in existence.
- These are made up of polymers like **polyethene, polypropylene, polystyrene, polyvinyl chloride,** etc.
- They have been extremely strong and durable for many years.
- The top 3 major exporters of plastic pellets **as of 2023 are Indonesia, India and China.**

Initiatives Taken for Pellet Pollution:

- **The Convention for the Protection of the Marine Environment of the North-East Atlantic**, commonly known as the **OSPAR Convention**, recognised the need for comprehensive action on pellets.

International Maritime Organization (IMO):

- It is a specialized agency of the United Nations responsible for improving the safety and security of international shipping and preventing pollution from ships.
- It was established by means of a UN Convention adopted in 1948 and met for the first time in January 1959.
- IMO currently has 175 Member States.
- India joined the IMO in 1959. The IMO currently lists India among the 10 states with the 'largest interest in international seaborne trade'.

OSPAR Convention:

- It was open for signature at the Ministerial Meeting of the Oslo and Paris Commissions in 1992.
- In this decade, the Convention will be implemented through **OSPAR's North-East Atlantic Environment Strategy 2030.**
- Series of Annexes contained with the Convention:
    - Annex I: Prevention and elimination of pollution from land-based sources.
    - Annex II: Prevention and elimination of pollution by dumping or incineration.
    - Annex III: Prevention and elimination of pollution from offshore sources.
    - Annex IV: Assessment of the quality of the marine environment.
    - Annex V: On the protection and conservation of the ecosystems and biological diversity of the maritime area.

MARPOL Convention:

It was adopted on **2 November 1973 at IMO.**

It is the main global regulatory mechanism for preventing ship pollution of the marine environment from operational or accidental causes, preventing oil pollution, and regulating the discharge of more than 250 marine pollutants.

- In 2022, the **European Commission** consulted on regulatory options, including a supply chain approach that addresses the handling and transport of plastic pellets at all stages of their life cycle.
- The **International Convention for the Prevention of Pollution from Ships** is also called the **MARPOL Convention**.
- **International Convention on Liability and Compensation for Damage in Connection** with the Carriage of **Hazardous and Noxious Substances by Sea (HNS Convention)** launched by the **IMO:**

- It sets out the rules covering compensation to be paid in the event of accidents at sea involving hazardous and noxious substances.
- It establishes the principle of **'polluter pays'** by ensuring that the shipping and HNS industries provide compensation to those suffering loss or damage resulting from an HNS incident.
- The current HNS Convention was adopted in **2010,** amending a previous instrument that had been **adopted in 1996.** However, the 2010 HNS Convention has still not entered into force.

- In **2016, a new IMO** regulation entered into force requiring the **gross mass of a container to be verified before it is loaded onto a ship.**

Champions of the Earth 2023

News Excerpt:

The Champions of the Earth Awards for 2023 have been announced by the **United Nations Environment Programme (UNEP)** as nations prepare to meet in **Nairobi** to discuss a **globally binding Plastic Treaty.**

About Champions of The Earth Award, 2023:

- Since 2005, the UN's highest environmental honour- **'Champions of the Earth Award'** recognizes **individuals, groups, and organizations** whose efforts have a significant environmental impact.
- The winners for 2023 are working to **eliminate plastic pollution** through solutions and legislation.
- Champions of the Earth are celebrated in **four** categories:
  - Policy leadership
  - Inspiration and action
  - Entrepreneurial vision
  - Science and Innovation

Worldwide Initiatives Covered Under Champions of the Earth Award 2023:

- According to the **United Nations Environmental Program (UNEP),** "Plastic pollution is a deeply concerning strand of the triple planetary crisis."
  - **Triple Planetary Crisis** refers to the three main **interlinked issues** that humanity currently faces: **climate change, pollution and biodiversity loss.**
  - There are UN agencies dedicated to each of the planetary **crises:**
    - **UN Climate Change** tackles climate change;
    - **UN Environment** tackles pollution and
    - **UN Biodiversity** focuses on biodiversity.
    - The **UN Convention to Combat Desertification** focuses on land and mitigating the effects of drought.

The Champions of the Earth awardees for 2023:

- **Mayor Josefina Belmonte (Philippines)** was recognized in the **Policy Leadership category** for her initiatives, including single-use plastic restrictions, a plastic pollution trade-in scheme, refill stations for necessities, and advocacy for strong global plastics regulation.
- The **Ellen MacArthur Foundation (United Kingdom)** was awarded in the **Inspiration and Action category** for its leadership in mainstreaming a lifecycle approach, including plastics.
- **Blue Circle (China)** was recognized in the **Entrepreneurial Vision category.** It uses blockchain technology and the Internet of Things to monitor and track the entire lifecycle of plastic pollution, from collection to regeneration, re-manufacturing, and re-sale. It is the **largest marine plastic waste collection** initiative in China.
- **José Manuel Moller (Chile)** was also recognized in the **Entrepreneurial Vision category.** He is the founder of Algramo, a social enterprise dedicated to offering refill services that minimise plastic pollution.

E-WASTE

News Excerpt:

Aditya Birla Group Company Hindalco Industries will be investing ₹ 2,000 crore in a copper **e-waste recycling facility**.

About E-waste:

- E-waste covers items of all types of Electrical and Electronic Equipment (EEE) and its parts discarded by the owner as waste without the intention of reuse.
- Rapid technological growth, technological innovations' upgradation, and a high rate of obsolescence in the electronics industry have led to one of the fastest-growing waste streams in the world. This stream consists of end-of-life EEE products containing toxic materials, such as Refrigerators, Washing machines, Computers and Printers, Televisions, Mobiles, and iPods.

Problem of Electronic Waste in the World: According to a UN report, the world generated **48.5 million tons of electronic waste in 2018**. This highlights the growing importance of recycling and shows that only 20% is recycled. If we continue to generate this much electronic waste, **the UN estimates that we could reach 120 million tons by 2050.**

E-Waste Recycling:

- **Reprocessing and reuse** of these electronic wastes.
- Process of extracting valuable materials after shredding the e-waste into tiny pieces that could be reused in a new electronic appliance.
- It has the potential to reduce environmental hazards and pollution and also protect humans and other life forms existing in our world.

E-waste Rules and Regulations in India:

- The Government has taken several steps to formalize the e-waste recycling sector.
- The **E-Waste (Management) Rules, 2016**, provide for **compulsory** authorization of the dismantling and recycling units from the concerned State Pollution Control Boards (SPCBs)/ Pollution Control Committees (PCCs). The CPCB has issued guidelines/SOPs for the processing of e-waste. The CPCB and SPCBs monitor the units and take necessary steps to mainstream and modernize the recycling industry with the help of MeitY.

Fukushima Water Issue

News Excerpt:

Japan recently received approval from the International Atomic Energy Agency (IAEA) to release over a million tons of treated radioactive water from the damaged Fukushima Daiichi nuclear power plant.

- The IAEA stated that nuclear plants worldwide use a similar process to dispose of wastewater containing low-level concentrations of tritium and other radionuclides.
- Fukushima uses an Advanced Liquid Processing System (ALPS) technology that eliminates the majority of radioactive elements present in contaminated water, excluding tritium.
- Water is released from nuclear power plants for various reasons, including cooling and managing excess or contaminated water.
- Although water is treated even after ALPS, radioactive Tritium remains in contaminated water.

- The International Atomic Energy Agency (IAEA) is an autonomous international organization that deals with nuclear energy.
- **IAEA is composed of-**
  - **General Conference**: It consists of representatives from all member states and meets annually to discuss policy matters, approve the budget, and make decisions regarding the agency's activities.
  - **Board of Governors**: The Board is comprised of 35 member states elected by the General Conference. It meets several times a year and provides policy guidance and oversight of the IAEA's activities.

  Secretariat: The Secretariat is the operational arm of the IAEA, headquartered in Vienna, Austria. It is headed by the Director General, who is appointed by the Board of Governors and oversees the agency's day-to-day activities.

International Tribunal for the Law of the Sea (ITLOS) – Ocean Pollution

The UN maritime court -the International Tribunal for the Law of the Sea (ITLOS), will hear the landmark case brought by **Small Island Developing States (SIDS)** seeking protection of the world's oceans from catastrophic climate change.

About the Issue

- The International Tribunal for the Law of the Sea (ITLOS) has been tasked by 9 SIDS to determine whether or not carbon dioxide emissions absorbed by the oceans qualify as pollution and, if so, what obligations nations have to avoid it.
- The move at the U.N. had been led by **Vanuatu,** one of the island nations that brought the case before the ITLOS.
- The other island states joining the ITLOS case are **the Bahamas, Niue, Palau, St. Kitts and Nevis, St. Lucia, St. Vincent, and the Grenadines**. Another 34 state parties will participate in the court hearing.
- The purpose here was **to force the countries to implement substantive measures against climate change.**

About ITLOS:

- It is an **independent judicial body** established by the 1982 **United Nations Convention on the Law of the Sea (UNCLOS).**

- It has jurisdiction over any dispute concerning the interpretation or application of the Convention and over all matters specifically provided for in any other agreement which confers jurisdiction on the Tribunal.

Ocean Pollution- is defined as the introduction of toxic materials such as plastic, oil, chemicals, agricultural waste, and industrial waste into the ocean waters.

Ways to protect Small Island Developing States (SIDS) from ocean pollution and the effects of climate change

- **Emission Reduction:** This involves transitioning to cleaner energy sources and reducing carbon emissions.
- **Marine Protected Areas (MPAs):** Establish and expand MPAs to safeguard marine ecosystems and critical habitats.
- **Plastic Pollution Control:** Implement measures to reduce and manage plastic pollution, including reducing single-use plastics and improving waste management systems.
- **Climate-Resilient Infrastructure:** Invest in climate-proof infrastructure to protect coastal areas, including building sea walls, roads, and sanitation systems that can withstand climate-related challenges.
- **Sustainable Development Projects:** Support sustainable development projects that help SIDS adapt to climate change and build resilient communities.
- **International Collaboration:** Foster international cooperation, including sharing best practices, technology transfer, and financial assistance to assist SIDS in its efforts.

Cleaning Our Rivers Due to Polluted Basins

News Excerpt:

Namami Gange initiative can work for the polluted river stretches.

About Polluted River Stretches (PRS):

Two or more polluted locations identified on a river in a continuous sequence are considered as a stretch and defined as a **PRS**. If there is a single location on a river or stream that does not comply with Biological Oxygen Demand (BOD), it is identified as a **Polluted Location.**

- According to a report published in **2022** by the **Central Pollution Control Board (CPCB),** there are approximately **311 Polluted River Stretches** in 279 rivers (out of 603 rivers analyzed).
- The **CPCB)** executes the **National Water Quality Monitoring Programme (NWMP)** for the assessment of the water quality of aquatic resources in the country.

Central Pollution Control Board (CPCB)

- It is a statutory organization constituted in **September 1974 under the Water (Prevention and Control of Pollution) Act.**
- It **advises** the Ministry of Environment Forest and Climate Change on the implementation of the Environment (Protection) Act of 1986.
- The CPCB's primary functions, **as outlined in the Water (Prevention and Control of Pollution) Act of 1974 and the Air (Prevention and Control of Pollution) Act of 1981,** are (i) **to promote the cleanliness** of streams and wells in various areas of the States by **preventing, controlling, and abating water pollution**, and (ii) **to improve air quality** and prevent, control, or abate air pollution in the country.

According to the **Report 'Polluted River Stretches for Restoration of Water Quality- 2022':**

- It is observed that in the year 2015, **70% of rivers monitored (275 out of 390)** were identified as polluted, whereas, in the year 2022, **only 46% of rivers monitored (279 out of 603) were identified as polluted.**
- The state of **Maharashtra** has the highest number of polluted river stretches i.e. **55,** followed by **Madhya Pradesh (19), Bihar (18), Kerala (18).**
- In 18 states/UTs, **46 polluted river stretches** have been recognized in **Priority Class - I,** with **Gujarat and Uttar Pradesh** having the maximum number (6 each).

Most Polluted River Basin: The Ganga River Basin:

- It **flows down** from its glacier source **(Gangotri)** in the **high Himalayas,** through **five states in the northern plains,** and into **the Bay of Bengal** through the **Sunderbans delta**, the world's largest mangrove system.
- The Ganga River Basin comprises **11 states and 17 major tributaries,** including **Yamuna, Kosi and Chambal.**
- **Area of the basin: 860,000 km2**, i.e. **26%** of India's landmass.
    - According to estimations, the five states through which the river flows – **Uttarakhand, Uttar Pradesh, Bihar,**

Jharkhand, and West Bengal – create around **11,765 MLD of sewage, of which only 20%** is currently executed. In addition to **agricultural runoff**, wastewater from industries is a cause of pollution.

- The Ganga basin is home to over **2,500 species of flora and wildlife**, and there are around **49 PRS** throughout the basin.

High Levels of Toxic Heavy Metals

News Excerpt:

Recently, **High levels of cancer-causing heavy metals such as lead and chromium** have been found in eight wetlands in Odisha, including Hirakud. The Hirakud reservoir is one of the largest human-made reservoirs in India.

Key points:

- According to the researchers, anthropogenic activities such as urbanization, industrialization and agricultural practices deposit heavy metals in wetlands, which act as heavy metal sinks.
- They recorded the highest concentrations of lead (51.25 micrograms per gram) and chromium (266 micrograms per gram) in Hirakud.
- They found the highest concentration of copper at the Bhadrak site, with 34.27 micrograms per gram. Koraput showed a higher abundance of zinc.
- As for carcinogenic risk, Hirakud topped the list among adults and children. "Industrial development in the study area poses carcinogenic effects due to the addition of heavy metals from the effluents to the soil.

Impact of such pollution:

- Heavy metal pollutants commonly accumulating in wetlands due to human activity include lead, chromium, cadmium, copper, mercury, nickel, zinc, manganese and arsenic. These metals can enter crops through the soil, which humans then consume.
- The researchers also calculated the ecological risk posed by heavy metal accumulation. The ecological risk index measures the potential **ecological risk (RI) factor** of all metals tested together.
    - **The highest RI was found in Hirakud, followed by Talcher, Bhadrak, Titlagarh, Chilika, Chandaneswar, Koraput and Daringbadi.**

Groundwater is a Major Source of Pollution on Great Barrier Reef: Study

News Excerpt:

Scientists have revealed that substantial pollution infiltrates the Great Barrier Reef through underground water sources.

About:

- Nearly 1/3rd of dissolved inorganic nitrogen and 2/3rd of dissolved inorganic phosphorus in the waters surrounding the Great Barrier Reef originate from underground sources.
- Researchers collected water samples and analyzed them for radium isotopes, which serve as markers for pollution.
- Too much nutrient can lead to losses of coral biodiversity and coverage.
- It also increases the abundance of algae and the ability of coral larvae to grow into adult coral. This impacts seagrass coverage and health, crucial for fisheries and biodiversity.
- The current efforts to preserve and restore the reef's health may require a new perspective.
    - Better land management practices to ensure fewer nutrients enter groundwater aquifers.
    - Use of ecological and hydrological practices at groundwater discharge hotspots.
    - Reuse nutrient-rich groundwater for agricultural use can be explored.

Phosphorus Recycling

News Excerpt:

Phosphorus (P), which starts as a fertilizer in the Indian fields, is a part of the water cycle. But India is running out of phosphorus.

- Phosphorus is an essential ingredient in fertilizers and a major pollutant, and we need to address both issues.
- Phosphorus is scarce and exists only in limited quantities in certain geological formations. Not only are we running out of it, but it is also polluting the environment. It doesn't exist as a gas, which means it can only move from land to water, where it leads to algal blooms and eutrophication.

Phosphorus as a fertilizer:

The **low phosphorus content in Indian soils** (98% of the districts have low or medium phosphorus levels) makes Indian agriculture heavily dependent on fertilizer imports (90%). Phosphorus-based chemical fertilizers are necessary for plant growth and the development of roots. This puts a huge subsidy burden on the Indian Government.

Significance of Phosphorus:

- **Key macronutrient**:
- **The most abundant minerals in the human body** are **human DNA and RNA**, in addition to their role in forming bones and teeth. (Phosphorus works with calcium to help build bones. You need the right amount of both calcium and phosphorus for bone health)
- **Role in plant's life cycle**: critical for **growth**, **reproduction, energy production, photosynthesis**, and other activities in the plant's life cycle.
- **Acts as a limiting factor:** Phosphorus deficiency in the soil **causes the lesser dry weight** of the parts of the plant as well as hampers the uptake of other minerals, like nitrogen, thus acting as a limiting nutrient for plant growth.
- **The linkage between phosphorus and food security**: With India's **high malnutrition rates** and a **high proportion of the population suffering from stunting and being underweight**, it has become important to ensure enhanced agricultural productivity to meet the needs of a growing population.

Phosphorus regions found across the globe:

Only a handful of countries control most of the world's phosphorus reserves. This is a major geopolitical concern. The world's largest reserves are in **Morocco and the Western Sahara region**. But here also, phosphorus **coexists with cadmium**, a heavy metal that can accumulate in animal and human kidneys when ingested. **Removing cadmium is also an expensive process.** Only six countries are known to have substantial cadmium-free phosphorous reserves, which makes it extremely valuable.

Phosphorus as a pollutant:

- **Excessive application of fertilizers**: Only about a fifth of the phosphorus mined is consumed through food. Much of it is **lost directly to water bodies** as **agricultural run-off** due to the excessive application of fertilizers.
- **Untreated sewage in India**: Most of the phosphorus people consume is sewage. Most sewage in India is still not treated, and it is only treated up to the secondary level. Even if the organic matter is digested, the effluent discharged from Sewage Treatment Plants (STPs) still contains nitrates and phosphates. Of these, nitrates can be digested by denitrifying bacteria and released safely as nitrogen gas into the atmosphere, while phosphorus **remains trapped in the sediments and water column.**
- **Algal blooms**: The phosphorus in the water bodies is then absorbed by the algal blooms, which grow in response to the high nutrient supply. When they decompose, the bacteria that feed on them consume **the dissolved oxygen**. The result: **water bodies become oxygen-starved**, leading to **fish deaths**. The algal blooms are also **toxic, causing respiratory issues, nausea**, and other ailments to people exposed to them.

Limiting factor in plant growth: The available quantity of this nutrient controls the pace at which fruits and flowers are produced.

Is mining urban sewage the answer to the phosphorus crisis?

- Increasing interest is in closing the phosphorous loop by mining urban sewage to produce high-quality phosphorus. Interest in '**circular water economies'** has prompted the **European Union** – which has almost no phosphorus reserves – to rethink the urban water cycle.

Sewage recycling already occurs in some form in India today, such as:

- Nutrient-rich wastewater is applied directly to agriculture at the **KC Valley-Kolar project**, which transports Bengaluru's wastewater to the water-scarce regions of Kolar. However, **there are concerns** that the quantity of nutrients may be **too high and eventually degrade the soil.**
- Similarly, farmers have already removed the sludge from STPs in many cities and towns, but it is **bulky to transport**. So, while farmers may be willing to pay to transport sludge, they cannot afford to pay STP for the sludge itself.

Un Bonn Summit: Global Framework on Chemicals

News Excerpt:

Recently, Delegates at **the UN Bonn summit**, held in Germany, adopted a **new framework to reduce risks from hazardous chemicals.**

Strategic Objective A: Legal Framework, institutional Mechanism and Capacity.

Strategic Objective B: Comprehensive and Sufficient knowledge, data and information.

Strategic Objective C: Issues of concern are identified, prioritized and addressed.

Strategic Objective D: Safer alternatives and innovative and sustainable solutions.

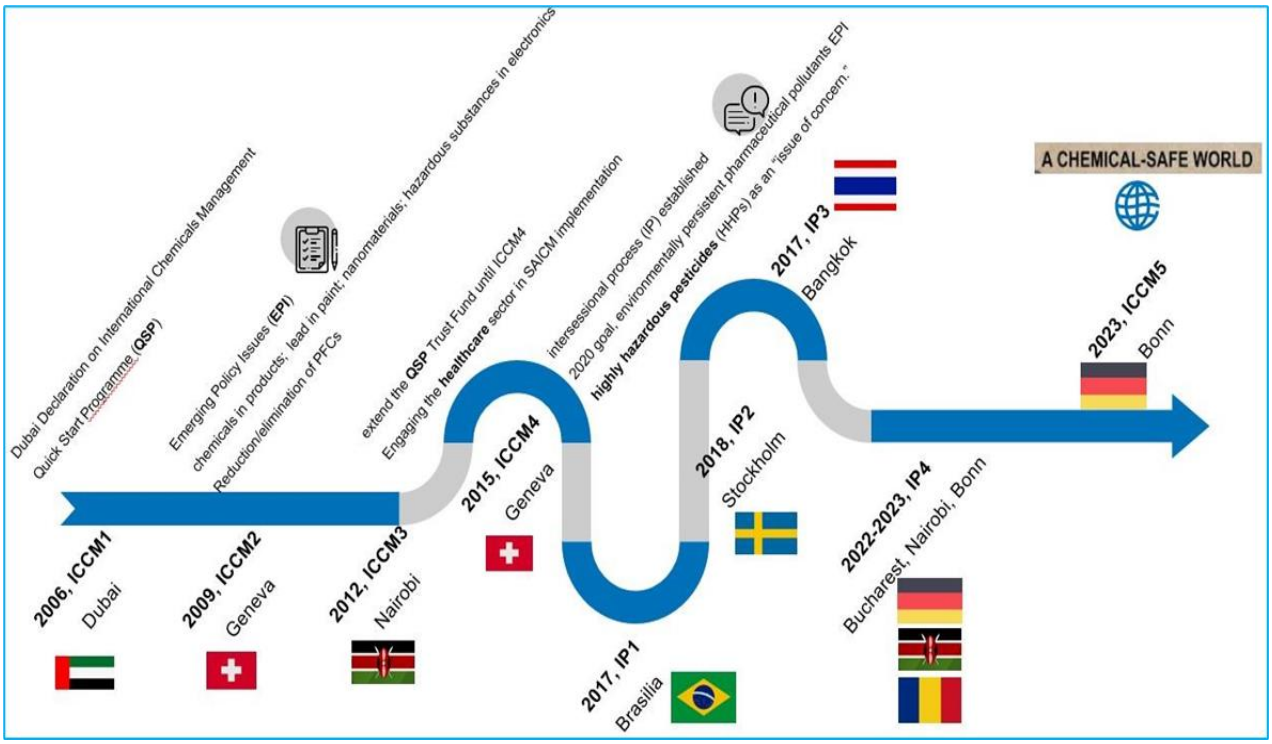
About the Global Framework on Chemicals:

- This Framework provides a **vision for a planet free of harm from chemicals and waste** and for a safe, healthy, and sustainable future.
- It was officially adopted by the **fifth International Conference on Chemicals Management (ICCM5)** for the integrated management of chemicals and waste after 2020.
- It is an important part of the wider tapestry of agreements, such as the Sustainable Development Goals, the Kunming-Montreal Global Biodiversity Framework and the global treaty on plastic pollution under negotiation.
- It sets concrete targets and guidelines across the lifecycle of chemicals.
- The Framework is based on **28 targets**. (There is a target on strengthening links between the new instrument and the Climate, biodiversity, human rights and health agendas).
- It is designed to improve **responsible management of chemicals and waste.**
- The Framework aims to **phase out lethal agricultural pesticides by 2035.**
- It also encourages countries to support the **transition to circular economies** and to develop substitutes for chemicals.

ABOUT ICCM5

- Organized by UNEP.
- It is hosted by the Government of Germany, which holds the presidency of this fifth session of the Conference.
- The International Conference on Chemicals Management (ICCM) is responsible for guiding and monitoring the Strategic Approach to International Chemicals Management (SAICM)

SAICM: SAICM is a global multi-sectoral, multi-stakeholder, and voluntary policy framework. It offers a forum to discuss and address many challenges related to the adoption and implementation of national policies to safely manage chemicals.



Discharge of Mining Waste into Rivers

News Excerpt:

In a recent study, the University of Lincoln, the United Kingdom, has unveiled groundbreaking research on the far-reaching consequences of metal mining pollution in rivers and floodplains worldwide.

Key observations:

- The number of people exposed to pollution originating from the continuous discharge of mining waste into rivers is nearly 50 times higher than those immediately affected by incidents of tailings dam (embankment used to store byproducts of mining) failures, noted the findings of the research published in October 2023.
- Around 23.48 million people inhabit the impacted floodplains, sustaining a population of 5.72 million livestock and covering an expansive area of over 65,000 square kilometres of irrigated land.
- The study assessed potentially detrimental substances like lead, zinc, copper and arsenic.
    - These hazardous elements are frequently carried downstream from mining sites and tend to accumulate over extended durations within river courses and floodplains.
    - Rapid growth in global metal mining is crucial if the world transitions to green energy.

Air Pollution

News Excerpt:

There is an increase in air pollution in urban India and cities like Delhi and Mumbai, which has impacted economic growth.

- Also, the Supreme Court banned the use of barium chemicals in firecrackers all over India.
- Delhi-NCR's air quality has deteriorated due to increased instances of Stubble burning.

About Air Pollution:

Over the years, there has been a massive-scale expansion in industries, population density, anthropogenic activities, and the increased use of automobiles, that has degraded the air quality in India.

Pollution In Mumbai:

Recently, the **Air Quality Index (AQI)** went beyond 300 in some parts of Mumbai. **(An AQI of 200 or above is considered 'poor' air quality, while 300 and above signifies 'very poor' air.)**

Reason for deteriorating air quality of Mumbai this year in 2023:

- **The big temperature gradient between the city and the nearby hilly regions in the Sahyadri ranges (meteorological condition) was triggered by the heavy pollutants.**
- **El Nino:** This year, the El-Nino factor played a role in deteriorating Mumbai's air quality.

Mumbai's municipality needs to catalyze innovation, sensitize builders and provide them with information to reduce construction-sector emissions.

Pollution In Delhi:

Delhi gets the most attention for its notoriously high pollution levels.

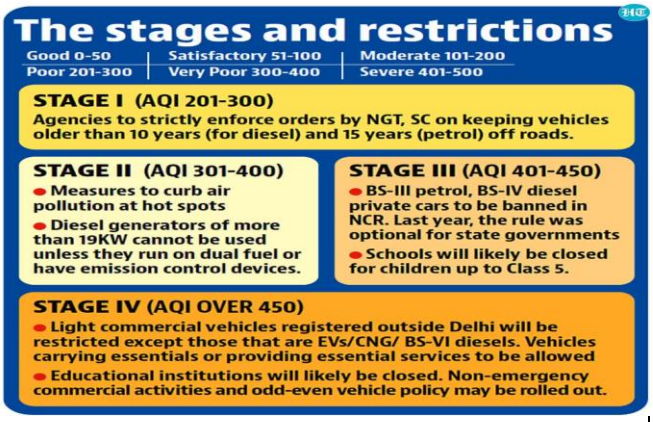
Reasons for Delhi Air Pollution:

Stubble Burning:

- **Stubble (parali) burning is a method of removing paddy crop residues from the field to sow wheat from the last week of September to November.**
- It is a process of setting the straw stubble on fire, which is left after the harvesting of grains, like paddy, wheat, etc.
- It is one of the **major causes of air pollution in parts of north India, deteriorating the air quality.**
- The **major reason** behind Stubble burning is the **short time available between rice harvesting and the sowing of wheat**, as delay in sowing wheat affects the wheat crop. Between the harvesting of the paddy crop and the sowing of the next crop, there is only a two to three weeks' three-time window left.
- Northwesterly winds usually help **carry smoke from crop residue burning to Delhi.**

Initiative taken for Delhi Air Quality:

- **The Graded Response Action Plan (GRAP)** has already been enforced due to the rising pollution.
    - **GRAP is a set of emergency measures** that kick in to prevent further deterioration of air quality once it reaches a certain threshold.
    - For this, the **Commission for Air Quality Management (CAQM)** relies on air quality and meteorological forecasts by the **Indian Institute of Tropical Meteorology (IITM) and the India Meteorological Department (IMD).**
- **Baler Machine:** A baler is a piece of farm machinery used to compress a cut and raked crop (such as hay, cotton, flax straw, salt marsh hay, or silage) into compact bales that are easy to handle, transport, and store.



- 'Baler' machines have been around for a decade, and currently, around 2,000 of them operate in Punjab. Of these, 1,268 are highly subsidized (50-80%) under **the Centre's Crop Residue Management (CRM) scheme.**
- The Punjab government will provide **30 balers to farmer groups or custom hiring centres (CHCs) at a subsidy of 65%.**
- Since 2018, the Centre has funded Punjab's **Crop Residue Management (CRM)** programme, with a grant of **₹1,370 crores sanctioned for the state from 2018 to 2022.**
- **For the current season,** ₹350 crores have been sanctioned, with the condition that **Punjab contributes 40% (₹140 crores) and the rest (₹210 crores) will be contributed by the Centre.**

Firecrackers:

The apex court **banned** the production and sale of **all crackers except 'green crackers'** and those with **reduced emissions (improved crackers).**

What is a firecracker made of?

- Firecrackers typically consist of **four primary ingredients — oxidiser, fuel, colouring agents, and binder.**
- **An oxidiser** is required for the cracker to catch fire.
- **The fuel** sustains the fire, and the colouring agents give it the colours and sparkles.
- **The binder** holds this mixture in place till the cracker has spent itself.
- **Chemicals like barium are colouring agents** and were banned because of their harmful impact on human health, such as irritation in the respiratory tract, skin allergies, breathing difficulties, and even cancer.

Barium As a Harmful Chemical:

- Barium is used to produce the green colour in firecrackers.
- Barium monoxide is a substance that can cause skin irritation, discomfort in the nose, throat, and lungs, and even lead to eye damage resulting in vision loss.

Solution: Green crackers:

- Green crackers that "do not contain harmful chemicals" cause air pollution.
- The three broad categories of green crackers are SWAS, SAFAL, and STAR, which were developed by CSIR.
  - **SWAS- "safe water releaser."**
  - **STAR- safe thermite cracker.**
  - **SAFAL- safe minimal aluminium**.

overnment of India Acts related to Air Pollution:

- **The Factories Act and Amendment in 1948** expressed concern for the working environment of the workers. The **amendment of 1987** sharpened its environmental focus and expanded its application to hazardous processes.
- **The Air (Prevention and Control of Pollution) Act, 1981** provides for the control and abatement of air pollution. It entrusts the power of enforcing this act to the CPCB.
- **The Air (Prevention and Control of Pollution) Rules, 1982** defines the procedures of the meetings of the Boards and the powers entrusted to them.
- **The Atomic Energy Act of 1982** deals with radioactive waste.
- **The Air (Prevention and Control of Pollution) Amendment Act, 1987** empowers the central and state pollution control boards to meet with grave emergencies of air pollution.
- **The Motor Vehicles Act of 1988** states that all hazardous waste is to be properly packaged, labelled, and transported.

Initiatives Taken for Air Pollution:

- The Central Government has launched the **National Clean Air Programme (NCAP**) under the Central Sector "Control of Pollution" Scheme as a long-term, time-bound, national-level strategy to tackle the air pollution problem across the country comprehensively with **targets to achieve 20 % to 30% reduction in PM10 and PM2.5** concentrations **by 2024 keeping 2017 as the base year** for the comparison of concentration.
- The Central Government notified a **Comprehensive Action Plan (CAP) in 2018**, identifying timelines and implementing agencies for actions identified for prevention, control and mitigation of **air pollution in Delhi and NCR**.
- **Farmer education:** Farmers will find it difficult to forget the practice of burning Stubble, so they need to be educated about its negative effects and offered an attractive alternative.

SPECIES	News Excerpt	Details
Leopard Toby Puffer Fish 	Recently a **"Super Rare"** Leopard Toby Puffer Fish Spotted **Near Australia.** **IUCN: Least Concern**	**Features**: ● It is a **deep-water reef species**. ● It has both stripes on its anterior and spots along its sides, with touches of iridescent blue highlighting the eyes and tail. ● The Leopard Puffer needs a **varied diet of meaty foods to help wear down their ever-growing teeth.** ● It is usually found in the waters of **the Philippines, Indonesia, Guam and Micronesia.** ● This is the first time it has been spotted in **Coastal Sea Marine Park of Australia.**
Vaquita porpoise **IUCN status: Critically Endangered**	**News Excerpt:** The International Whaling Commission (IWC) has issued an extinction alert for the endangered **vaquita porpoise**, whose population is estimated to have shrunk to less than a dozen, marking the institution's first-ever extinction warning.	● The vaquita is only found in the northern-most part of the Gulf of California, Mexico. ● They are the world's smallest porpoise. ● Numbers have fallen from a population of ~570 in 1997 to ~10 in 2018. ● Maximum body length of 150 cm (4.9 ft) (females) or 140 cm (4.6 ft) (males). ● It has a large dark ring around its eyes and dark patches on its lips that form a thin line from the mouth to the pectoral fins. ● They are most often found close to shore in the Gulf's shallow waters, although they quickly swim away if a boat approaches. **Issues leading to extinction:** ● Caught as bycatch in gillnets meant for totoaba (its swimbladders are prized in Chinese cuisine). ● An illegal, international trade in totoaba fish, has complicated efforts to end gillnet fishing.
Candolleomyces albosquamosus 	Researchers identified a new mushroom species from the Western Ghats and described it as 'Candolleomyces albosquamosus'.	**Features:** ● The new species has been named **Candolleomyces albosquamosus** - 'albosquamosus' for the white woolly scale-like structures on its pileus or cap. ● It has a **honey-yellow cap**. ● The 'stipe' – the stem of the mushroom is white in colour and cylindrical. ● New species are essential for decomposing plant litter in tropical forests contributing to nutrient cycling in the ecosystem. ● Its habitats include dead logs or bamboo culms in the natural forest. ● Western Ghats is the hotspot of the mushroom.
Paintbrush swift Butterfly (Baoris farri)	The paintbrush swift butterfly has been **sighted** for the **first time** in Himachal Pradesh.	**Features:** ● It is a butterfly species of the **Hesperiidae family**. ● Distribution: Common in northeast, central and south India, and rare in North India.

	**Schedule IV** of the Wildlife (Protection) Act, 1972.	• Other closely related s pecies are **Blank Swift**, **Eight Swift** and **Rice Swift**. • Their habitat is **declining** due to scarcity of larval host plants, an increase in pesticide use, deforestation, and climate change.
Vairengte bent-toed gecko 	Researchers discovered a new species of gecko endemic to Mizoram, taking the number of geckos native to the state to 6, and 22 across northeast India. IUCN - **'data deficient'**	**Features:** • The new species has been named **'Cyrtodactylus vairengtensis'** after the town **Vairengte in Mizoram's Kolasib district**, while the common name is **'Vairengte bent-toed gecko'.** • This new species is distinguished from others in the **Cyrtodactylus families** by the number of femoral pores**.** ○ Femoral pores, found on the underside of lizards' hind legs and secrete a mixture of lipids and proteins, are considered to attract mates and mark territory. **About Gecko species:** • Geckos are **small**, **primarily** carnivorous **lizards** found on all continents except **Antarctica.** • **Carphodactylidae, Diplodactylidae, Eublepharidae, Gekkonidae, Phyllodactylidae, and Sphaerodactylidae are the six** families of geckos. • There are **335 gecko species worldwide, 42 of which are found in India.**
Indian Red  **Scorpion**	Novel therapeutic formulation developed for improved treatment of Indian red scorpion sting.	**Features:** • The Indian red scorpion (**Mesobuthus tamulus**) is one of the world's deadliest scorpions, with stings causing a potentially deadly medical emergency. • This species is found over the Indian subcontinent, including **eastern Pakistan, Nepal, and Sri Lanka**. • Indian red scorpions are found throughout **western Maharashtra, Saurashtra, Kerala, Andhra Pradesh, Tamil Nadu, and Karnataka** in India. • Its stings induce the release of **catecholamine,** which leads to **pathophysiological abnormalities** in the victim. • **Composition of Venom: 110 proteins** from **13 different venom** protein **families.** The significant pharmacological efficacy is mostly due to non-enzymatic **Na+ and K+ ion channel** poisons with low molecular mass.
Lysionotus Namchoomii	Scientists of the **Botanical Survey of India (BSI)** discovered a new species of epiphytic plant ***Lysionotus namchoomii*** from the	**Features:** • The native range of the **genus Lysionotus** is **the Himalayas to Japan and Indo-China.** • 50% of the species found are **endemic.** • Species of the genus **are mostly** epiphytic**, lithophytic, or terrestrial evergreen erect or climbing subshrubs.**

	**Pakke-Kessang district of Arunachal Pradesh.**
	
	IUCN Status- **Critically Endangered.**
		• The new species bears **thick leaves and attractive purple flowers.**
		• The species is named in honour of the **late Chau Phunkyoo Namchoon,** a well-known social reformer from Arunachal Pradesh's **Khapti community.**
		• **It is an Epiphytic plant,** which are mostly found in **tropical and subtropical forests.**
		• **Another plant species, the *Strobilanthes sunhangii* (Acanthaceae)** also recorded from the **Pakke Kesang district,** was recently added to the list of flora of India from **Arunachal Pradesh.**
		  ○ The plant grows in **moist evergreen forests** at an **elevation of 1,200-1,800 metres.**
		  ○ It is a **terrestrial shrub** that grows to a **height of about two metres and bears beautiful white flowers**

Attenborough echidna (Zaglossus attenboroughi) 	Elusive Attenborough echidna rediscovered in Indonesia. **IUCN status**: Critically Endangered CITES: Appendix II	**Features:** It is named after famed British naturalist David Attenborough and **was last seen in 1961.** **About Echidnas**: • There are four echidna species. • Three have **long beaks**, with the Attenborough echidna, and the western echidna considered critically endangered. • Echidnas are nocturnal and shy; they are members of the monotremes -- an egg-laying mammal (the only other member is the duck-billed platypus). • They eat through toothless beaks. • Found in **Australia, Tasmania, and New Guinea.**

Sperm Whale
 
	Dominica creates the world's first marine reserve for sperm whales, safeguarding a unique population and their vital role in fighting climate change.
	
	IUCN Status- Vulnerable
	American Endangered Species Act- endangered
		Features:
		• The sperm whale (**Physeter macrocephalus)** is the largest of the toothed whales and the largest toothed predator.
		• In the pre-whaling days, an estimated two million sperm whales roamed the Earth's deep waters before being hunted for oil to burn lamps and lubricate machinery. Now, some **800,000 are left**.
		• Frequently hit by **ships**, entangled in **fishing gear** and affected by agricultural runoff.
		• **Habitat**: Lives in the Cyclops Mountains, nearer to the cities of Sentani and Jayapura in the Indonesian province of Papua.
		• Role in Protecting Environment:
		  ○ Feed on **deep-sea squid** and **fertilize surface waters** with buoyant faeces.
		  ○ **Plankton blooms**, resulting from whale faeces, **capture atmospheric carbon dioxide**.
		  ○ When the blooms die, **carbon sinks** to the ocean depths, aiding in climate change mitigation.

		• The marine reserve aims to conserve these **"carbon heroes"** and their unique cultural heritage.
Rafflesia flower 	One of the 42 species of Rafflesia (the largest flower in the world) is facing the risk of extinction. **Protection Status**: IUCN: Critically Endangered	**Geographical Range/ Habitat:** Tropical Forest of Southeast Asia. Primarily Brunei, Indonesia, Malaysia, Phillippines, and Thailand. **Unique Feature**: • It is a parasite known as the Corpse flower. • Famous for their overwhelming decaying odour.
King Cobra 	Genera is currently under Earth's ongoing 6th mass extinction. **King Cobra:** IUCN: Vulnerable	• King Cobra: Rain forests and Plains of India, Southern China and South-East Asia.
Gharial crocodile 	Genera is currently under Earth's ongoing 6th mass extinction. **Gharial:** IUCN: Critically Endangered WPA: Schedule 1 CITES: Appendix 1	**Geographical Range/ Habitat:** • Gharial: The Natural Habitat of Gharial is freshwater of Nepal and India. **Unique Features:** • The population of Gharial is an indicator of clean water. • Other Extinct Species: ○ Elephant birds & sloth lemurs of Madagascar ○ The Tasmanian tiger, the flightless moa of New Zealand. ○ The Yangtze River dolphin, the passenger pigeon of North America ○ The saddle-backed giant the tortoise of Rodriguez Island in the Indian Ocean.
African Elephant 	African **Elephant:** IUCN: Vulnerable	• African Elephant: Southern and Eastern African countries, including Botswana, Zimbabwe, Tanzania, Kenya, Namibia, Zambia, and South Africa • Elephants are led by a female matriarch.
Sloth Bear 	Ratanmahal Sanctuary (Gujarat) Hosts Sloth Bears. IUCN: Vulnerable WPA: Schedule 1 CITES: Appendix 1	**Geographical Range/ Habitat:** • They are native to India, Bhutan, Nepal and Sri Lanka. • They inhabit both Dry and moist deciduous Forests and Grasslands. **Unique Features:** • Out of the total eight species, four – Asiatic Black Bear, Sloth Bear, Brown Bear and Sun Bear – are found in India.

Mithun 	Food Safety and Standards Authority (FSSAI) has recognized Mithun with a "food animal" tag to promote its meat for commercial purposes. IUCN: Vulnerable CITES: Appendix 1	**Unique Features:** ● It is also called Gayal. ● It is also known as "Cattle of Mountain." ● State animal of Arunachal Pradesh and Nagaland. ● ICAR (Indian Agricultural Research Institute) launched the M-ANITRA app to register Mithun farmers as "buyers" and "sellers" to help them do business at competitive prices. **Geographical Range/ Habitat:** ● Endemic in Northeast India (Arunachal Pradesh, Nagaland, Manipur and Mizoram), Bangladesh, Myanmar, China, Bhutan
Gurnard fish 	The scientists of the Zoological Survey of India (ZSI) discovered a new species of gurnards from Digha Mohana in West Bengal. IUCN: Least Concerned	**Unique Features:** ● Commonly called 'Sea Robbins". ● Vibrant Orange coloured fish. ● Distinct pectoral fin with black membranes on the inner surface, white posterior margin, and three small white spots basally in the fin.
Fish Mint/ Chameleon Plant (Scientific name: Houttuynia Cordata) 	This herb tastes and smells like Fish with medicinal properties and health benefits.	**Geographic Habitat:** ● Native of Southeast Asia. ● Endemic in Northeast India: Manipur, Assam, Arunachal Pradesh, Meghalaya ● Found in China, Vietnam, Japan, and Nepal. **Unique Feature:** ● Grows in moist soil and is resistant to flooding. ● Local names: Meghalaya- ja mardoh, Manipur-tokning-khok, Assam-masunduri, etc. ● Its medicinal properties and documented in ancient texts of Chinese and Japanese medicine and Ayurveda and Siddha schools. **Medicinal properties:** used to treat asthma; reduce body weight, epididymal fat, and insulin resistance; prevent pneumonia, acute respiratory distress syndrome, and infectious oral diseases; as an ingredient of cosmetics.
Vibiro Vulnificus 	The marine bacterium could become a major threat to the coastal population.	● This marine bacterium naturally lives in warm, salty or brackish water. ● **Rise with climate change:** Warmer oceans create a more welcoming environment for the bacteria and increase the frequency of hurricanes and people's exposure to floodwaters. ● This is capable of causing necrotizing fasciitis ("flesh-eating" infection). It eats away the skin, muscles, nerves, fat and blood vessels around infected wounds, bites or cuts in contact with seawater. People are exposed to the bacteria while eating or preparing raw seafood.

Conocarpus (Saptaparni or buttonwood) Trees 	Gujarat Government bans its planting due to environmental and health hazards.	**Habitat**: • It is a hardy, exotic, evergreen mangrove species found in shorelines and riverbeds in subtropical and tropical regions. **Features**: • Pollinates twice a year- Rise in diseases like cold, cough, asthma, allergy etc. • Roots go deep inside the soil and develop extensively- Damage telecommunication lines, drainage lines and freshwater systems. • Water-guzzler- sucks in soil moisture and speeds up the evaporation process. • Doesn't serve any purpose in enriching biodiversity other than beautification — no birds nest in it. • They are not palatable for wild herbivores or domestic animals. • Invasive- overpower indigenous species over time.
Damselfly 	A new damselfly species has been discovered in Kerala's southern Western Ghats.	**Geographical Range/ Habitat:** • Its only habitat is primary montane streams, where it thrives beneath dense canopy cover. **Unique Feature:** • It is named 'Armageddon reedtail' or protosticta armageddonia after climate change's impact on insects. • This name is a direct reference to the term 'ecological armageddon'- used to describe the devastating decline of insect populations around the world. • This phenomenon, also called insect apocalypse, affects entire ecosystems because insects pollinate, cycle nutrients and provide food for other animals.
Vilayati Kikar (Prosopis Juliflora) 	The National Security Guard replaces invasive Vilayati kikar using the Miyawaki Technique, with other local trees to regreen the 5km Manesar campus.	**Geographical Range/ Habitat:** • Native species to: Mexico, South America and the Caribbean. • Invasive weed in: Africa, Asia, Australia. **Unique Feature:** • The most common invasive species found are: Subabool, Lentana, Jal kumbhi, Gajar Ghas. • It has weedlike properties such as fast growth in arid conditions, killing any competition and water-table depletion. • It is counterproductive to cut it down. It can regenerate from the root. • About the Miyawaki technique: It involves planting two to four different types of indigenous trees within every square meter. • The trees become self-sustaining and grow to their full length within three years without regular maintenance like manuring and maintenance.

Talapia 	Talapia Parovirus(TiPV) was reported for the first time in Tamil Nadu among the farm bred Talapia fish	**Geographic Range/ Habitat:** ● Freshwater fish inhabiting in shallow ponds, streams, ponds, and rivers, are less commonly found in brackish water. ● Native to Africa and the Levant region. **Unique Feature:** ● TiPV is a DNA virus that causes mortality ranging from 30% to 50% in the farm and 100% mortality in the laboratory. ● It is called "poor man's fish." ● It is an invasive species. ● It can survive in low oxygen.
Bufoides bhupathyi (New toad species) 	A new toad species found in Dampa Tiger Reserve (Mizoram). **IUCN**: Critically Endangered	● Only found in the Dampa Tiger reserve of Mizoram as of now. ● Named after S Bhupathy (Herpetologist).
Dancing frog 	The 2nd Global Amphibian Assessment was conducted by the Wildlife Trust of India. **IUCN**: Critically Endangered	**Geographical Range/ Habitat**: ● Endemic to Western Ghats. ● They prefer habitats with a thick canopy cover, typically around 70-80 %, and are often found near slow-moving perennial streams within the Western Ghats. **Unique Feature:** ● Most threatened genus of the amphibian genus of India. ● Behaviour: unique display to mate by "foot-flagging." ● The males stretch up their hind legs one at a time and wave their webbed toes in the air in a rapid motion akin to a dance.
Dolphin (Platanista gangetica) 	A recent study revealed that 19 Gangetic River dolphins had been rescued from the irrigational canals of Ganga Ghagra basin in Uttar Pradesh. IUCN: Endangered CITES: Appendix 1 Indian Wildlife Protection Act: Schedule I	**Geographical Range/ Habitat:** ● Distributed in major river systems Ganga - Brahmaputra -Meghna Delta and Karnaphuli-Sangu of India, Nepal, and Bangladesh. **Unique Features:** ● National Aquatic Animal. ● It can only live in freshwater. ● It is essentially blind and hunts by emitting ultrasonic sounds to see an image in their mind. ● It cannot breathe in water and must surface every 30-120 seconds. ● It is also known as 'Susu' because of the sound it produces when breathing. **Related Government Initiatives:** ● Project Dolphin Vikramshila.

		• Ganges Dolphin Sanctuary has been established in Bihar. • National Ganga River Dolphin Day (5th October).
Arabian Leopard 	Judean desert- World's smallest wolf and leopard **IUCN** - Critically Endangered	• Nimr is the Arabic term for the Arabian leopard (Panthera pardus nimr) respectively, found across the whole of the Arabian Peninsula. • **The Arabian leopard** is extinct in its entire northern range, including all historic distribution ranges on the Sinai Peninsula, the Negev, and the Judaean Desert. Remnant nuclei of Arabian leopards are today restricted to Oman, Yemen, and possibly some animals in the southern part of Saudi Arabia.
Arabian Wolf 	World's smallest wolf and leopard in Judean desert. **IUCN** - Critically Endangered	• Dhib is the Arabic term for the Arabian wolf (Canis lupus arabs) found across the whole of the Arabian Peninsula. • The **Arabian wolves** are native to the Arabian Peninsula, including regions such as the Negev Desert in southern Israel and parts of the Middle East**.**
Gray whale- Devil Fish 	Gray whales in the eastern North Pacific, have faced significant population drops due to the changing conditions in the Arctic Ocean. **IUCN**- Western Grey whale (Critically endangered) and Eastern Grey whale (Least concern)	• Gray whales possess individually unique pigmentation and markings. • Commercial whaling rapidly brought Pacific Gray whales to near extinction, leading them to become a protected species. • When the availability of their prey in the Arctic is low, and the whales cannot reach their feeding areas because of sea ice, the gray whale population experiences rapid and major shocks.
Gambusia Fish/ Mosquitofish: 	A new study has revealed that the two species of mosquitofish have **invaded various ecosystems across India.** To combat the mosquito problem, several governmental and non-governmental organizations in **Andhra Pradesh, Odisha, and Punjab** have released	• **Gambusia affinis** and **Gambusia holbrooki** are two species of mosquitofish. • Gambusia was first introduced to India in 1928, during the British reign to prey on mosquito larvae, decreasing the mosquito number as they have a high breeding capacity. • Gambusia was **no longer recommended by the World Health Organization as a mosquito control agent in 1982** due to the following concerns: ○ Among the **top 100** harmful **invasive alien species** due to **Voracious eating habits** and **aggressive behaviour** in newly introduced habitats. ○ Poses a danger to the **native aquatic biodiversity**.

	mosquitofish into nearby water bodies.	• In **2018**, the government of India's **National Biodiversity Authority declared** G. affinis and G. holbrooki as invasive alien species.
Noa-Dihing Music Frog (Nidirana noadihing) 	Scientists have identified a new '**Music Frog species in Arunachal Pradesh.**	• Noa-dihing frog is named after the ***Noa-Dihing river of Arunachal Pradesh***. • This new frog comes from the **genus Nidirana,** which has been found for the first time in India. ○ The Nidirana species is originally from Japan, Taiwan, China, Vietnam, Laos, and Thailand. • This frog has "Rounded" snout and "smooth" skin with bony protrusions on its back.
North American Wolverine 	The North American wolverine gained U.S. protection as a **threatened species** citing threats to the animal's snowy habitat from climate change. **IUCN status:** Least concerned. Classified as **threatened only in Montana**, Idaho, Wyoming and Washington states.	• It is the largest land-living species in the **weasel family or mustelids.** Ferrets, badgers, martens, otters are other members of mustelid family. • Wolverines have a wide variety of nicknames: **glutton, woods devil, Indian devil, ommeethatsees (a Cree Indian word), carcajou, quickhatch, nasty cat, and skunk bear.** • **Range:** Alaska, Canada, and Russia, • **Diet:** Ferocious predators- prey mostly on mammals such as **rabbits and rodents.** • Scavengers- eating the carrion (carcasses) of large animals.
Black leopards 	Through video traps deployed for the ongoing tiger census, Odisha forest officials discovered two black leopards, or **melanistic leopards** in two separate jungle locales. **Protection Status:** **IUCN status:** Vulnerable	• A black leopard is usually called a black panther or jaguar. • A black leopard is dark in color due to 'melanism'- it's a condition, wherein the whole skin of the animal, including its spots, is black. • A black panther has **darkish brown (or black) fur with black rosettes** and is sometimes **visible under favourable light conditions**. • Besides India, Panthera pardus fusca is also **found in Nepal, Bhutan, and parts of Pakistan.** • Black leopards are **found more in regions with the highest rainfall and dense foliage.** • They are **found in all kinds of forests – rainforests, deciduous forests, and alpine coniferous forests**. • There are a total **9 subspecies of leopards** found in the world: • African, North China, Persian, Sri Lankan, Indian, Javan, Arabian, Indochinese, Amur
Red Panda:	In **exchange for t**wo **Siberian Tigers**, the Padmaja Naidu Himalayan Zoological	• It is a small **arboreal** mammal found in **Sikkim**, **Arunachal Pradesh,** Darjeeling, and Kalimpong districts of **West Bengal.** • It is the **state animal** of **Sikkim.**

	Park sent two **Red Pandas** to Cyprus's Pafos Zoo. **Protection Status:** **Red Pandas:** ● IUCN Red List: Endangered ● CITES: Appendix I **Giant Pandas:** ● **IUCN:** Vulnerable ● **CITES**: Appendix I	● Outside India, it is found in **Nepal**, **Bhutan**, the northern mountains of **Myanmar,** and **China.** ● It thrives best at **2,200-4,800m** in **mixed deciduous** and **conifer forests** with dense understories of bamboo. ● The world has **two panda species**: the **Giant Pandas** and the **Red Pandas**. India is home to both **subspecies** of Red Panda: ○ **Himalayan red panda** ○ **Chinese red panda** ● **The Siang River** in Arunachal Pradesh splits the two phylogenetic species.
Giant ancient salamanders 	The video of giant ancient salamanders living inside caves in southwest China has sparked awe and concern within the scientific community. **Protection Status:** **IUCN Status:** Critically Endangered	● They are one of the **largest amphibians** (**5.9 feet long** and **weighs 140 pounds)** with a **large head**, **small eyes**, and **dark, wrinkled skin.** ● They have **poor eyesight,** so their **skin is covered by sensory nodes that detect vibrations and help them find prey.** ● Adults can **absorb oxygen directly through their porous skin.** ● These are mostly **aquatic and live in cold, fast-flowing water where oxygen is in good supply.** ● Salamanders live all over the world**, including Europe, Asia, North America and South America. (USA** has the largest population). ● **Threats:** Overexploited for the luxury food market, farming practices, over-harvested from the wild, habitat loss.
Indian Star Tortoise (*Geochelone elegans)* 	The Border Security Force (BSF) has thwarted a cross-border wildlife smuggling attempt and rescued 296 Indian star tortoises that were being smuggled to Bangladesh. **Protection Status:** ○ Wild Life Protection Act 1972: **Schedule IV** ○ CITES: **Appendix I** ○ IUCN Red List: **Vulnerable**	● Indian star tortoises are mostly found in west **Pakistan**, **Sri Lanka**, and the central and southern regions of **India**. ● It usually inhabits dry, arid, open environments including grasslands and scrub woodlands. ● There are three major populations of the species — in the western part and the southern part of India, and Sri Lanka. ● It is extremely **fragmented habitat** is heavily impacted by rising urbanization and agricultural operations. ● **90% of the trafficking** in star tortoises comes from the **global pet market**, according to the Wildlife Crime Control Bureau.

Indian Tent Turtles
 
	Directorate of Revenue Intelligence (DRI), Zonal Unit, Lucknow, seized 436 baby Indian Tent turtles.
	
	Protection Status:
	IUCN: Least Concern
	Wildlife Protection Act, 1972: Schedule I
	CITES: Appendix II
		• The species is native to **India**, **Nepal** and **Bangladesh**, with **three subspecies** recorded from the region viz., P. t. tentoria, P. t. circumdata and P. t. Flaviventer.
		• The **colour** varies according to each subspecies.
		  ○ **Tentoria:** olive or brownish head with a red postocular spot, and the carapace is brown in colour.
		  ○ **Circumdata**: olive green head with pink postocular spot; the carapace is brownish olive green in colour.
		  ○ **Flaviventer**: brownish olive colour head with pink patch behind the eyes, the carapace is brownish olive.
		• Its habitats include still **water pools** on the riverside and slow-running water near the river banks.

Santjordia pagesi 	Scientists discovered the rare **St. George's cross medusa jellyfish** near a Japanese volcanic crater in 2002. Now they have confirmed it is a new species altogether named Santjordia pagesi.	• **Name Origins:** The name "Santjordia" is derived from Saint George in Catalan, symbolizing the distinctive cross-shaped stomach that sets this jellyfish apart. • **Habitat**: This jellyfish has been exclusively found at considerable depths of 2,700 to 2,800 feet near the Sumisu Caldera, a volcanic crater near the **Ogasawara Islands, located around 600 miles southeast of Tokyo, Japan.** • **Potential Venom:** It might possess a novel type of venom characteristic to cnidarians, indicating potential uniqueness in its venomous properties compared to other jellyfish species.
Sangai (Rucervus eldii eldii) 	The Manipur government has conveyed concerns to the Centre regarding a **hydroelectric modernization plan** in the state's renowned Loktak Lake. **Protection Status:** **IUCN Status:** Critically endangered **Schedule 1 of the Wildlife (Protection) Act 1972**	• The Sangai deer is also called a **dancing deer.** It is the **state animal** of Manipur. • The Sangai deer has a very **long brow line**. It has **uniquely distinctive antlers** that can reach a **height of 1 m or 100 cm.** • The Sangai deer are **only** found in **Keibul Lamjao National Park in Manipur.** • A ten-day festival is celebrated every year from November 21st to November 30th. It is called the **Sangai festival.**

Pangolin 	Genomic analyses reveal **poaching hotspots** and **illegal trade** in pangolins from Africa to Asia. Pangolins are among the most **trafficked mammals** in the world—with demand primarily in **Asia** and in growing amounts in **Africa**—for their meat and scales.	• Pangolins are nocturnal animals that live in **burrows** and eat **termites and ants**. They are also called **scaly anteaters** because of their preferred diet. • There are **eight species** of pangolin: ○ **4 Species in Africa:** Black-bellied pangolin, White-bellied pangolin, Giant ground pangolin and Temminck's ground pangolin. ○ **4 Species in Asia:** Indian pangolin, Philippine pangolin, Sunda pangolin and the Chinese pangolin. • It may thrive in a variety of environments, such as **grasslands**, **agricultural** areas, and **bamboo forests**, **tropical forests**. • The Indian pangolin is distributed throughout the **Indian subcontinent.**
Ghol or Black spotted Crocker (Protonibea  **diacanthus)**	The state Government of Gujarat has announced the Ghol species as the **State Fish of Gujarat** at the Global Fisheries Conference India 2023.	• It is widely distributed in the **Indo-Pacific from the Persian Gulf to the Pacific Ocean.** • It is exported to countries of south-east Asia (Hong Kong, Singapore and Malaysia). • **Usage**: ○ Ghol fish's skin has been recognized as a good source of **high-quality collagen** (used for wine, beer and cosmetics. ○ **Traditional medicine** (believed to prevent bleeding in patients with urinary problems). ○ The **heart** of the Ghol fish is believed to boost immunity. • Its **fins** are used to make soluble fins.
Pedicularis Revealiana 	Scientists from the Botanical Survey of India (BSI) Prayagraj centre have discovered a new hemi-parasitic (partially parasitic) plant species, Pedicularis Revealiana in the untouched forest of Katao in the state of Sikkim.	• It is named in honour of the eminent botanist James Lauritz Reveal of the University of Maryland. • It belongs to the species group of Pedicularis, with radical and opposite or **whorled cauline leaves, hooded cilia and distinctly longer beaks.** • This new flora is **found in remote forests**, which are covered with snow for most of the year. • Along with making its own food, it can gather nutrients from the roots of trees and plants located nearby. • This species is **hemi-parasitic** (partially parasitic) and is unique among all Pedicularis species. • Pendicularis revealiana is the 83rd species reported and the plantis commonly known as a perennial herb.

White's Seahorse 	Seahorses released into Sydney Harbour to boost population numbers. **IUCN status:** Endangered **CITES: Appendix II**	• The White's Seahorse, commonly known as **New Holland seahorse**, **Sydney seahorse**, is a species of marine fish of the **family Syngnathidae**. • It is thought to be **endemic** to the **Southwest Pacific**, from Sydney, New South Wales, and southern Queensland (Australia) to the Solomon Islands. • It lives in **shallow**, **inshore habitats**, both natural and anthropogenic. This species is **ovoviviparous,** with **males brooding eggs** in a **brood pouch** before giving birth to live young. • Sydney Institute of Marine Science captured **three pregnant males** and helped raise their babies in **captivity** to improve their chances of survival. The 380 juveniles were released with tags that will enable researchers to monitor their growth and reproductive success in the wild.

Entamoeba Moshkovskii
 
	A new diarrhoea causing parasite found in Kolkata.	• Entamoeba Moshkovskii (Amoeba pathogen) had turned pathogenic, it was the leading cause of amoebic infections in humans; **more than half** of the amoebic infections were caused by this pathogen.
		• **Concern-** infections caused by E. histolytica, which used to be the predominant amoeba pathogen that caused amoebiasis, were decreasing and the newly pathogenic E. moshkovskii was taking its place.
		  ○ Research showed mutations of new pathogenic parasite in adapting to the gut environment of humans or in acquiring other enteric pathogens.
		  ○ Diarrhoea can be **caused by** bacteria, viruses and amoeba pathogens.
		  ○ **Seasonal Anomaly**- Infections caused by E. histolytica usually peaked during the wet season and gradually decreased with the arrival of the dry season.
		• The seasonal pattern of E. moshkovskii infection had two infection peaks coinciding with summer and post-fall season.

Cicada species (Purana Cheeveeda) 	Cicada species are now considered as endemic to India.	• Cicada species known as **Purana Cheeveeda** used to be mistaken for Purana Tigrina, which is of Malaysian origin. • **New findings**- Based on the differences in their morphological characteristics, the Association for Advancement in Entomology has **corrected the error in taxonomic identification and has excluded the Malaysian species from the South Indian cicada fauna.**

		• Cicadas are **hemipteran insects** known for their loud, complex and species-specific acoustic signals or songs. • The generic diversity of cicadas in India and Bangladesh ranks the highest in the world, followed by China. • Most cicadas are **canopy dwellers and are found in natural forests with large trees.** • Cheeveeda could extend across the tropical evergreen forests ranging from Goa to Kanyakumari.
Spotted Pond turtles 	Three persons engaged as mahouts in the Kaziranga National Park and Tiger Reserve have been arrested for capturing and consuming a rare species of a freshwater turtle. **IUCN status:** Endangered **CITES**: Appendix I.	• **Physical description:** it is a medium-sized freshwater turtle having a black shell with yellow streaks. • **Scientific name:** Geoclemyshamiltonii. • **Size:** They can grow up to about 40.5 centimeters (16 inches). • Spotted pond turtles are named for the yellow or white spots on their black heads, legs and tails. • They have large heads and short snouts, and their webbed feet help them swim. • The pond turtle's carapace, or upper shell, is generally black with bright patterns that fade with age. • Males have concave carapaces and larger, thicker tails than females. • **Native Habitat:** Theyy are found in the northern region of the Indian subcontinent in the Indus and Ganges River drainages. • Their range includes parts of Pakistan, northern India, Bangladesh, and Nepal. They are semi-aquatic and can typically be found in shallow, standing waters, such as oxbow lakes, ponds and marshes. • **Lifespan:** Spotted Pond turtles typically live 15-20 years in zoos.
Naegieria Fowleri 	A 15-year-old boy in Kerala's Alappuzha district has died due to a rare infection caused by Naegleria fowleri or "brain-eating amoeba".	• **About-** Naegieria Fowleri is a single-cell organism found in a warm freshwater environment such as lakes, hot springs and even in poorly maintained **swimming pools**. • It is so small that it can **only** be seen with a microscope. • Only one species of Naegleria, Naegleria fowleri, infects people. • **Naegieria Fowleri** is found in warm natural water bodies and enters the body through the **nasal cavity**, causing fatal brain infection known as **primary amebic meningoencephalitis (PAM)**. • Naegleria fowleri infection does not spread from person to person, nor does it manifest symptoms when contracted in other forms.

		• The amoeba survives on bacteria found in the sediment in lakes and rivers. But it **doesn't** survive in saline conditions and is hence not found in sea water.
Axolotl 	A new research aims to uncover insights into the mechanisms behind axolotl regeneration, with the ultimate goal of applying this knowledge to enhance our own potential for regenerative capabilities.	• Axolotl is now almost **extinct in the wild.** • The axolotl is a species of salamander (lizard-like amphibians) originally found in Lake Xochimilco, near Mexico City. • Researchers investigate the remarkable regenerative abilities of axolotls, examining their capacity to regrow limbs, gills, tails, eyes, and even parts of the head. • Axolotls, like humans, contain two copies of every gene – one inherited from the father and the other from the mother. • The cell created as a result of an axolotl sperm fertilising an axolotl egg is called a zygote. The zygotes develop into larvae, which go on to become adults.
Alligator Gar Fish 	Recently, a non-native alligator gar fish, **known for its crocodile-like head and razor-sharp teeth,** was found in one of Kashmir's idyllic lakes, raising apprehensions about its impact on the native fish species.	• The **alligator gar** is a close relative of the bowfin species. It is a **ray-finned euryhaline fish and is one of the biggest freshwater fish in North America and the largest species in the 'gar' family.** • Alligator gar fish is **not an Indian species**, but in recent years it was also found in some parts of India like **Bhopal, Kerala and from the waterbodies of Maharashtra and Kolkata.** • It can eat all types of fishes and therefore poses a threat to native species and to the overall ecosystem. For example, gar fish grows rapidly and has a life span of 20-30 years. • Gar fishes are **euryhaline and can grow up to eight feet**. During winter, they can even sustain in the cold waters of Dal because the temperature they mostly live in is 11-23 degrees Celsius. **Concern related to alligator gar fish:** • The finding sent alarm bells ringing among the scientists; they fear that the presence of non-native fish species will spell doom for the eco-fragile flora and fauna of the waterbody. • It would kill all fingerlings of fish species already present in the waterbody and has a tendency to destroy natural aquatic life of Dal Lake. • They can be dangerous for indigenous fish species.