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PATHFINDER
CURRENT AFFAIRS FOR CIVIL SERVICES

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Topic 1. BRAZIL GEF MEET: AGREEMENT ON NEW BIODIVERSITY CONSERVATION FUND; TO BE RATIFIED IN AUGUST

Important for subject: Environment

The **64th Global Environment Facility's (GEF) governing board** has approved plans to establish a **new fund** to finance the implementation of the **Kunming Montreal Global Biodiversity Framework** adopted in December 2022.

- Council members agreed on the establishment of a **new trust fund**, called the **Global Biodiversity Framework Fund** and the programming directions for it.
- Nearly 50 per cent of its funds are to be used for biodiversity-related work.
- **GEF** will provide **$1.4 billion** to support efforts on **environmental protection**.
- The members also agreed to support the **new agreement** under the **United Nations Convention on the Law of the Sea** on the **conservation and sustainable use of marine biological diversity in areas beyond national jurisdiction.**

The proposed fund allocations are as follows:

- **20 per cent** will go to **Indigenous Peoples and local communities (IPLC).** This is an aspirational goal.
- **25 per cent** will go to **GEF agencies** and must be enforced.
- **Allocation of funds** to **IPLCs** would be reviewed two years after ratification in August. **Small Island Developing States (SIDS)** and **Least Developed Countries (LDC)** will get **36 per cent** and **3 per cent**, respectively. This would be reviewed three years after ratification.

What is Kunming-Montreal Global Biodiversity Framework (GBF)?

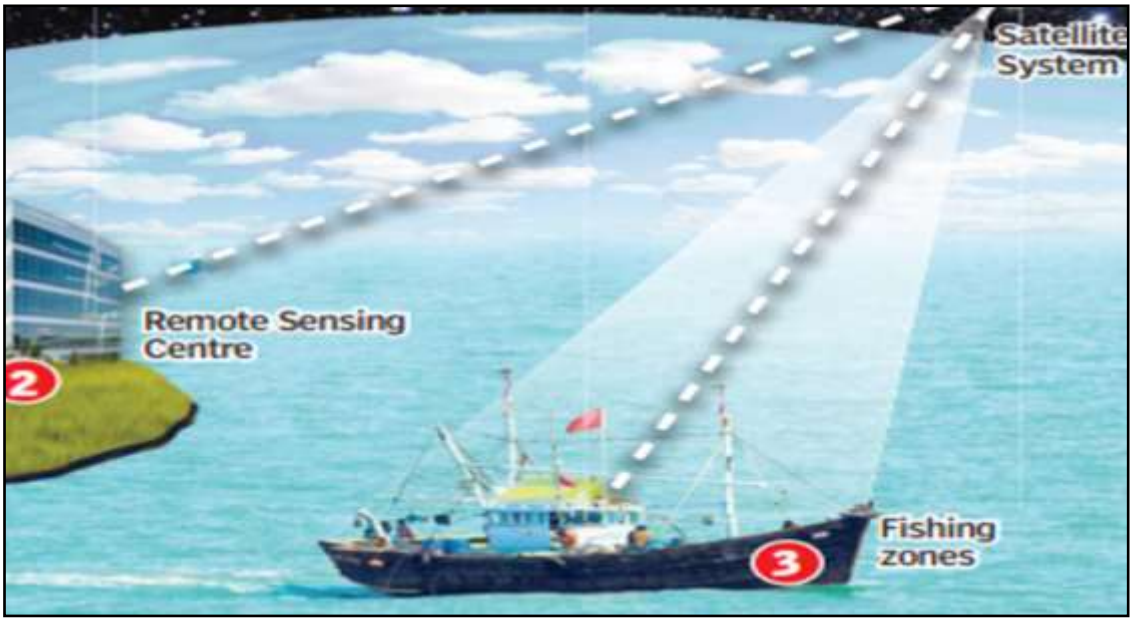
- The **15th Conference of Parties (COP15)** to the **UN Convention on Biological Diversity (CBD)** adopted the **Kunming-Montreal Global Biodiversity Framework (GBF)** on December 2022.
- The framework has **23 targets** that the world needs to achieve by **2030**.
- The countries will **monitor and report every five years** or less on a large set of indicators related to progress.

What is the BBNJ treaty?

- The **BBNJ Treaty** also called the **Treaty of the High Seas**, is an international agreement that aims to **preserve and sustainably use the marine biodiversity of areas beyond national jurisdiction.**
- This includes the **high seas**, which are outside of countries' exclusive economic zones and make up nearly half of the Earth's surface.
- These areas are currently poorly regulated and only 1% of them are protected.
- The **High Ambition Coalition on BBNJ** was launched in February **2022** to negotiate and achieve a comprehensive and ambitious outcome.

Topic 2. TRANSPONDERS TO BE INSTALLED IN SEA VESSELS ACROSS INDIA'S COASTAL AREAS TO PROTECT MARINE LIFE

Important for subject: Environment



The central government has approved "a project for the national rollout of vessel communication and support systems including transponders on approximately 100,000 fishing vessels in all coastal states and Union territories of India.

- **Transponders** are **wireless tracking devices** that use **radio frequencies** to operate.
- The project has been approved at the request of the **Odisha government** and in consultation with **coastal states and UTs**.
- The devices will help the vessels avoid sea creatures that suffer injuries coming in

contact with boats and fishing trawlers.

- Many of them are caught in the fishing nets cast by the trawlers and die.

Identified sites are:

- **Gahiramatha** in Kendrapara district, **Rushikulya river mouth** in Ganjam district and **Devi river mouth** near Astaranga in Puri district in **Odisha** have been identified as the **major mass nesting sites** of the Olive Ridley turtles.
- **Project implementation:**
- The project will be implemented under the **Pradhan Mantri Matsya Sampad Yojana scheme** with **100 per cent government** funding on a **60:40 costsharing basis** between the Centre and state.

Implementing agency:

- The central government has entrusted **New Space India Ltd**, a **central public sector undertaking** under the **Department of Space,** as the implementing agency for the project.

What are the other important initiatives taken to improve India's coastal security?

- An **Automatic Identification System (AIS)** was made compulsory for all vessels **above 20 metres** after the **2008 terrorist attacks in Mumbai**.
- **Online ReALCraft (Registration and Licensing of Fishing Craft):** Through this, verification and monitoring of a large number of Indian fishing vessels is carried out.
- This information is available to the Indian Navy and Coast Guard.
- **Biometric identity cards:** These biometric identity cards have been issued to the majority of fishermen. The maritime security agencies through the composite card readers enable biometric verification of the identity of fishing vessel crews at sea.
- **Indo-Pacific Maritime Domain Awareness (IPMDA) initiative:** It was announced by the **Quad grouping** at the **Tokyo summit in 2022.** It is a part of overall efforts for **Maritime Domain Awareness (MDA)** on the high seas.
- The initiative will track **"dark shipping"** and build a "faster, wider, and more accurate maritime picture of near-real-time activities in partners' waters." Further, the initiative will also integrate three critical regions in the Indo-Pacific – the Pacific

Islands, Southeast Asia, and Indian Ocean Region (IOR).

Pradhan Mantri Matsya Sampada Yojana (PMMSY)

- It is a flagship scheme for focused and sustainable development of the fisheries sector in the country with an estimated investment of 20,050 crore for its implementation during 2020-21 to 2024-25 as part of Aatmanirbhar Bharat package.
- **Ministry:** Ministry of Fisheries, Animal Husbandry and Dairying.
- **Aim:**
- To bring about a blue revolution through sustainable and responsible development of the fisheries sector in India.
- To double the incomes of fishers and fish farmers, reducing post-harvest losses from 20-25% to about 10% and the generation of gainful employment opportunities in the sector.

Implementation:

- It is implemented as an umbrella scheme with two separate components namely
- **Central Sector Scheme:**
- The project cost will be borne by the Central government. The entire project/unit cost will be funded by the Government of India (GoI) (i.e., 100% GoI Funding).
- **Centrally Sponsored Scheme:**
- All the sub-components/activities will be implemented by the States/UTs and the cost will be shared between Centre and State.
- North Eastern & Himalayan States: 90% Central share and 10% State share.
- Other States: 60% Central share and 40% State share.
- A **well-structured implementation framework** would be established for the effective planning and implementation of **PMMSY.**
- For optimal outcomes, **'Cluster or area-based approach'** would be followed with requisite forward and backward linkages and end-to-end solutions.

Approach:

- **'Cluster or Area based approaches** and many new interventions such as fishing vessel insurance, Aquaculture in saline/alkaline areas, Sagar Mitras, FFPOs, Nucleus

Breeding Centres, etc.

Achievements:

- From **2019–20** to **2021–2022**, the **Fisheries sector** had an incredible growth of **14.3%**.
- **Fish production** has increased from **141.64 lakh tonnes** in **2019-20** to **161.87 lakh tonnes (provisional)** in **2021-22.**
- The sector achieved **all-time high exports** of **13.64 lakh tonnes**, reaching **Rs 57,587 crores (USD 7.76 billion)**, topped by shrimp exports.

Topic 3. INDIA ADDS 664 ANIMAL SPECIES TO ITS FAUNAL DATABASE IN 2022, 339 TAXA TO ITS FLORA

Important for subject: Environment

India added **664 animal species** to its **faunal database in the year 2022**. These comprise **467 new species** and **197 new records** [species found in India for the first time].

- The country also added **339 new plant taxa** – **186 taxa** that are **new to science** and **153 taxa as new distributional records** from the country in **2022.**
- Released by **Union Minister for Environment, Forest and Climate Change.**
- The **faunal discoveries have been compiled** in a publication by **Zoological Survey of India (ZSI)** titled **Animal Discoveries – New Species and New Records 2023**, whereas **floral discoveries** are contained in **Plant Discoveries 2022** published by the **Botanical Survey of India (BSI)**.

Fauna species discovered are:

- The year **2022** witnessed the **highest number of new discoveries** in the last **10 years**.
- With the new discoveries and new records, the **fauna diversity of the country increased to 1,03,922.**
- The **maximum number of new faunal discoveries** has been of **invertebrates** with **583 species**, while **vertebrates constitute 81 species.**
- **Insects** dominate among invertebrates with **384 species**, whereas **fish** dominated among **vertebrates**, followed by **reptiles, amphibia, mammals** and **aves.**

Among the major fauna species discovered are:

- **Three new species** and **one new record of mammals; Two new records of birds; 30 new species and two new records of reptiles; Six new species** and **one new record of amphibia**; and **28 new species** and **eight new records of fish.**
- The **mammal species** discovered include **two species of bats**: Miniopterus phillipsi, a long-fingered bat, and Glischropus meghalayanus, a bamboo-dwelling bat – both from **Meghalaya**.
- **Sela macaque (Macaca selai)**, a **new macaque species** discovered in **western and central Arunachal Pradesh** and named after the **Sela Pass**.

The new records include:

- **Macaca leucogenys, a white-cheeked macaque** earlier found in **Modog, southeastern Tibet**, and sighted in **India** for the **first time in 2022** in **West Siang, Arunachal Pradesh**.
- **Ficedula zanthopygia, the yellow-rumped flycatcher**, earlier known from **Mongolia**, **Transbaikal, southern China, Korea, and western Japan**, and was found last year in **Narcondam Island** of the **Andaman archipelago**

Statewise discovery of fauna:

- In **2022,** the **maximum new discoveries** were recorded from As many as **82 animal species new to science** and **15 new records were from Kerala,** which contributes to **14.6%** of the new species and new records.
- **Karnataka** followed with **64 new species** and **24 new records** accounting for**2%.**
- **Tamil Nadu** saw **71 new discoveries** and **13 new records** contributing to **6%** of all the new discoveries and new records in the country.
- The **Andaman and Nicobar Islands** contributed to about **4%** of the discoveries, whereas **7.6 %** of discoveries were from **West Bengal** and **5.7%** from **Arunachal Pradesh.**

Flora's discoveries include:

- **'Plant Discoveries 2022'** contains an enumeration of **339 taxa**, which have been added to the Indian flora during 2022.
- These comprise **319 species** and **20 infraspecific taxa** as new to the Indian flora.

- Of these, **186 taxa** are **new to science** and **153 taxa** are **new distributional records from India**.

Among the new discoveries:

- **37%** are **seed plants, 29% fungi**, **16% lichen, 8% algae, 6% bryophytes, 3% microbes** and the **remaining 1% pteridophytes**.
- **Seed plants contributed the maximum discoveries**, of which **dicotyledons** contribute **73%** and **monocotyledons 27%**.
- The **Plant Discoveries 2022**, includes **125 angiosperms, one gymnosperm, five pteridophytes, 19 bryophytes, 55 lichens, 99 fungi, 27 algae** and **nine microbes.**

Statewise discoveries:

- About **21%** of the **total discoveries** were made from the **western Himalayas** followed by **16%** from the **Western Ghats**.
- A **State-wise analysis** of the **plant taxa** points out that **maximum discoveries** of **57** were made in **Kerala**, which alone **accounts for 16.8%** of all plant discoveries in the country in the year **2022**.
- The **plant discoveries in 2022** include **wild relatives of many potential horticultural, agricultural, medicinal**, and **ornamental plants** such as **begonia, impatiens (balsams), legumes, zingibers, orchids etc**.

Among the new genus of plants discovered are:

- **Nandadevia Pusalkar**, a genus common throughout the foothills and warm outer valleys of the **Uttarakhand Himalayas**, and **Nilgiriella Pusalkar, endemic** to the **southern Western Ghats** of India and distributed in **Karnataka, Kerala and Tamil Nadu**.

Among the new records in orchid species:

- **Calanthe lamellosa**, earlier recorded in **China** and **Myanmar**, and found for the **first time in India** in the **Japfu mountain range** in **Kohima, Nagaland.**

Topic 4. THIS NEW TOOL CAN DRIVE INDIA'S ECO-RESTORATION INITIATIVES; HERE'S HOW

Important for subject: Environment

Researchers have devised a tool that enables appropriate **agroforestry** and aids **systematic ecosystem restoration**.

About the tool- Diversity for Restoration (D4R):

- **Diversity for Restoration (D4R) tool**, devised by **Bioversity International**, was later modified by **Ashoka Trust for Research in Ecology and the Environment (ATREE)** to adapt it to the Indian context.
- The tool is developed with **information on 237 socio-economically important native trees** from the **Western Ghats**, and the **numbers and geographies will increase** over time.
- The tool will help **improve the effectiveness of restoration programmes** by providing manifold benefits to interested stakeholders while **promoting sustainable development**.
- **Non-profits, nature lovers** and **others working on plantations** and increasing forest cover often face challenges in **identifying the tree species** to plant and their **ecological benefits.**
- On many occasions, they also struggle to understand which **plant species** would best suit their given **geographic location**.
- The online tool **precisely aims to help better decision-making** and bring the **best outcome** for those **plantation programmes.**
- It could **improve socio-ecological perspectives** and help stakeholders in decision-making.

The tool will help in:

- **Identifying species that match their restoration objectives.**
- **Identifying species that can resist local stresses and adapt to evolving environmental conditions**.
- **Pinpointing areas and regions to procure the seeds** for the required species.

- The **tool has information about 100 plant functional traits** that have been considered to offer the best possible solution.
- **Functional traits** include **information on economic and ecological uses** from the tree species chosen for plantation.
- **Information provided by the tool is:** the tool could **identify windbreakers** — the trees can act as a barrier against high winds.
- The user can also know **if the species offers better nitrogen fixing** and whether it **serves as a good pollinator for birds and bees**.
- Informs the user **whether the tree species offers timber, fruit, manure** or **other commercial benefits.**
- Informs if the **tree is resilient to physiological stresses** such as **extreme high or low temperatures, salinity or acidity tolerance in the soil** among others.
- The **tool is already being used** in countries such as **Malaysia, Ethiopia, Columbia, Peru, Burkina Faso, Cameroon etc.**
- It provides a **score of a particular tree species for plantations**. This **score helps determine and decide how well the species match the given site conditions** and restoration objectives.
- The tool also provides varied recommendations that help in maximising the chances of restoration along with propagation information and monitoring suggestions.

UN Decade of Ecological Restoration:

- The **Decade for Ecosystem Restoration** was **declared on 5 June 2021.** It called for a biosphere restoration equal to the total land area of China. In addition, more
- stringent efforts towards climate mitigation as well were needed to preserve the ecological makeup of the earth.
- The **Decade on Ecosystem** was **first proposed by El Salvador** during the **Bonn Challenge meeting** in **March 2018**. The proposal put forward by **El Salvador** called for a restoration of about **350 million hectares of degraded ecosystems by 2030.**

What is Ecological Restoration?

- The **UN** define **ecosystem restoration** as "the process of halting and reversing degradation, resulting in improved ecosystem services and recovered biodiversity".

- In practice, a **particular restoration can involve quite different transitions**, depending on what best suits the local conditions.

What is Agroforestry?

- It is the **practice of combining trees and farming;** it demonstrates how food production and nature can co-exist.
- It is a resilient and future-proof sustainable agricultural method that could effectively mitigate the climate crisis.

According to FAO:

- **Agroforestry** is a collective name for **land-use systems and technologies** where **woody perennials** (trees, shrubs, palms, bamboo, etc.) are deliberately used on the same **land-management units** as **crops and/or animals,** in some form of spatial arrangement or temporal sequence.
- In **agroforestry systems**, there are **both ecological and economical interactions** between the different components.
- **Agroforestry** can also be defined as **a dynamic, ecologically based, natural resource management system** that, through the **integration of trees on farms and in the agricultural landscape,** diversifies and sustains production for increased social, economic, and environmental benefits for land users at all levels.
- In particular, **agroforestry is crucial to smallholder farmers and other rural people** because it can **enhance their food supply, income, and health.**
- Agroforestry systems are **multifunctional systems** that can provide a wide range of **economic, sociocultural, and environmental benefits**.

Topic 5. IMPACT OF CLIMATE CHANGE ON KASHMIR'S MUSHROOM PICKERS

Important for subject: Environment

Unpredictable weather patterns, early springs, and above-average temperatures have left gucchi mushroom hunters in distress, facing another season of low yield for the second consecutive year

About Gucchi Mushroom:

- A variety of fungus also known as **Moral.**
- Preferred for its nutty, earthy flavour.
- Gucchis can vary in colour from **blonde** to **dark black**.
- The **truffle-like fungi** can fetch prices upward of **Rs 40,000 a kg** due to their scarcity and short growing season.
- **Location:** They can normally be found on southerly slopes and sunny areas before showing up on the northern side of hills or in the shade.
- Mainly grown in the Himalayan region of Jammu and Kashmir, Mountains of **Ramban, Kupwara** and **Anantnag districts.**

Climatic conditions required:

- **Temperature: 15-20O Celsius** is most suitable Ideal weather conditions for the great morel are when daytime Celsius is between 15 and 20 and night-time temperatures are in the five to nine the thunder and rain allow the mushrooms to sprout.
- Gucchi mushrooms are **difficult to spot on the wooded floor** and often **blend perfectly with their surroundings.**
- But their **spongy and honeycomb-looking top** gives them a distinctive appearance. The mushroom does not grow in the same spot many times.

Impact of climate change: Gucchis are **weather dependent,** triggered by the temp and moisture. The past few years have been bad for pickers of morel mushrooms in Jammu and Kashmir.

The cultivation is impacted due to:

- Above average temperature
- Reduced rainfall during March and April months Erratic spring weather **Gucchi** is becoming rarer because of **climate change, deforestation**, and **habitat destruction**.
- The **Jammu and Kashmir forest department** data shows **morel mushroom production** has **shrunk from 2,000 quintals in 1991** to **around 45 quintals in 2021.**
- **Wild mushrooms** are **sprouting early because of climate change,** and it gets wasted because there is no one to pick them up at that time.

Topic 6. THIS TOOL CAN HELP COMPANIES TRACK DIGITAL CARBON

FOOTPRINT OF STORED DATA

Important for subject: Environment

Scientists have come up with a **new tool that can calculate carbon emissions caused by digital data,** especially by companies that want to offset their carbon footprint.

Data carbon ladder:

- Researchers from **Lough borough University, the United Kingdom** created and launched the tool named **'Data carbon ladder'**.
- A **data carbon ladder** can help businesses measure the carbon dioxide output of their digital data.
- The inclusion of the **data CO2 footprint** is a crucial factor missing from global decarbonisation policies.

How will it help in measuring the carbon emission?

- By using the tool, believed to be the **first of its kind,** companies can **make data-driven decisions** that **benefit the environment** and **save money** by reducing the need for **carbon offsetting**.
- The tool can also **help businesses and organisations improve their data projects' sustainability** by reducing their environmental impact and creating a more efficient and sustainable solution.
- It is the **first publicly available tool to calculate the data CO2 footprint across the data journey,** from the origin of a dataset through to its end use — for example, **AI analytics.**
- The **tool enables organisations to see the environmental impact of data at key stages** along the data journey, providing **stage-by-stage CO2 output** as well as an **overall CO2 footprint for new data projects**.
- It helps determine the a**ppropriate size of the dataset(s) required**, **the optimal frequency for updates, the most suitable storage location**, and **the analytics necessary for projects**.

Data and carbon emission:

- **Data centres** are responsible for **2.5 per cent to 3.7 per cent** of all human-induced

carbon dioxide — more than the aviation industry (2.1 per cent).

- By **2025,** it is estimated that the **global data will surpass 180 zettabytes** and the **amount of digital data is doubling every two years.**
- A **typical data-driven business employing 100 full-time employees** will generate approximately **2,203 tonnes of CO2 emissions annually** due to new data.

Topic 7. ORCHIDS ARE BLOOMING EARLIER THAN USUAL IN THE NORTHEAST — AND IT'S NOT GOOD NEWS

Important for subject: Environment

Changing climatic conditions in Assam have disrupted the blooming cycle of the foxtail orchid, traditionally associated with the Assamese new year, causing premature flowering and wilting.

Climate and orchids migration:

- **Orchids** are **good bioindicators** of the **health of an ecosystem.**
- They are usually **not widely spread**, found **only over a smaller geographical area**.
- They **do not tolerate pollution or change in their environment well.**
- It is for this reason that the **kopou phool** is now blooming and wilting away almost **10 days before Bihu in April.**
- Assam has **411 recorded orchid species.** In addition to the **foxtail orchid** (Rhynchostylis retusa) other species such as the **Dendrobium aphyllum, D. moschatum**, and **D. lituiflorum** are also **flowering early**.
- Other changes that orchids are exhibiting include **changes in flower colour, abnormal growth and shift to higher altitudes**.

Orchids are mainly of **three kinds:**

1. Those that grow on the ground, or terrestrial;
2. Those that grow on trees, or epiphytic; and
3. Those that derive nutrients from mycorrhizal fungi, or myco-heterotrophical.

- **Almost 60%** of all orchids found in **India** are **epiphytic**.
- The issue of survival, especially for **epiphytic orchids**, is of concern.
- **Orchids** (usually terrestrial ones) are **perennial herbs** they may begin to shift up

easily. **But the epiphytic ones may not be able to find a suitable habitat**, so there are chances many will perish.

- Though the host trees will also tend to shift, it will take years before they become mature enough to be able to host orchids.
- If there is **no pollinator,** then there will be **no new recruitment through seed germination** and gradually the plants will vanish too.
- **Not all orchids are pollinator-dependent** so those species may **survive longer** than others.
- A **shrinking forest cover** is a major challenge when it comes to orchid conservation. **Orchids don't inhabit all trees.** The indiscriminate cutting down of trees is posing a threat to these plants.

The illegal orchid trade:

- In India, **11 species of orchids** are protected under the **Wildlife (Protection) Act 1972**.
- Orchids are high in demand for ornamental purposes, for medicinal purposes, and for research.

Assam's vulnerability to climate change:

- **Assam** is the most vulnerable to climate change among **12 states and union territories** in the **Indian Himalayan Region**.
- Between **1951-2010**, the **annual mean temperature** in the state **increased by 0.59 degrees Celsius,** while **rainfall** has **reduced** by **2.96 mm per year**.
- **Continued warming of the atmosphere** and the **ensuing change in precipitation pattern** is impacting the **state's water resources, agriculture, forests,** its unique biodiversity and the habitats of people.
- The erratic rainfall or evaporation rate will misbalance the soil moisture, vegetation and microclimate of forest areas or grassland. It will likely impact the terrestrial orchid population.

Changes observed in other areas:

- Changes in orchid flowering patterns are being observed in **Arunachal Pradesh** too.

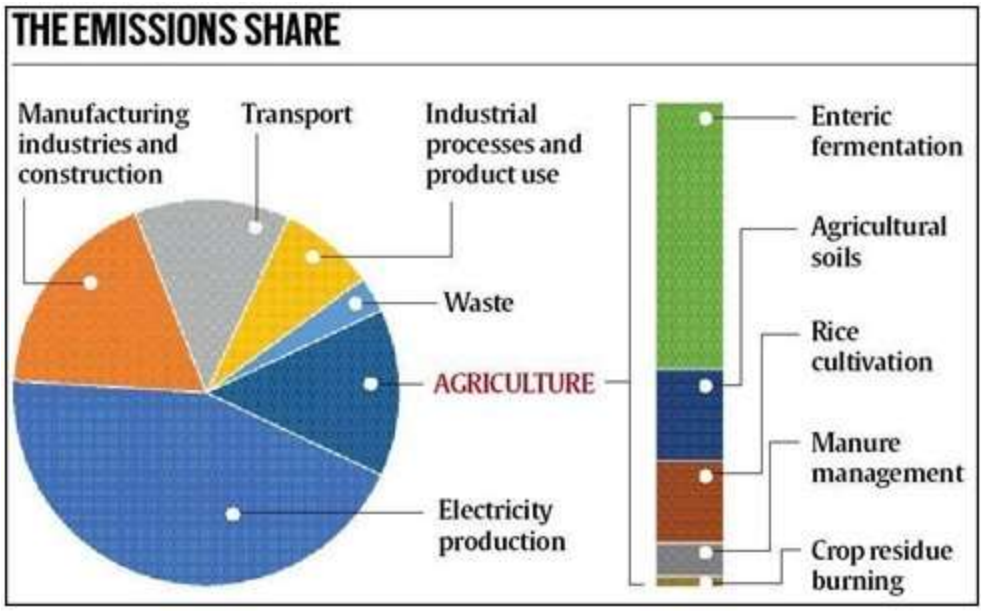
- This is considered the **orchid state of India** with **40% of the total orchid species found in India**.
- **India** has **1,256 recorded orchid species** of which **307 are endemic to our country**.

Resilience and evolution of orchids:

- Orchids are also known for their **resilience.**
- Orchids are the first ones to inhabit a new habitat.
- Although climate change is impacting the phenology of some orchids, **globally scientists are not considering it a serious problem** because **similar changes have happened earlier,** about 100 years earlier, and **orchids have evolved**.

Topic 8. WORLD NEEDS OVER $75 BN FOR A 75% SLASH IN ENERGY-RELATED METHANE EMISSIONS

Important for subject: Environment



Over **$75 billion** in funding is required to slash **just energy-related methane emissions** by **75 per cent by 2030**, **two-thirds** of which would be generated through **oil and gas operations**, a new report by the **International Energy Agency (IEA)** said.

- Around **$55 billion** would be required in **upstream oil and gas facilities** that **extract non-renewable energy sources** from the **onshore or offshore ground** and over **$20 billion** would be required in **downstream facilities,** which involve refining and

distribution to consumers.

Methane emissions:

- **Methane** is the **second biggest contributor to global warming** after **carbon dioxide**.
- It is **84 times** more potent than **carbon** but it does not last as long in the atmosphere before it breaks down.
- This makes it a **critical target for reducing global warming** more quickly while simultaneously working to reduce other greenhouse gases (GHGs).
- The energy sector contributes to nearly **40 per cent of anthropogenic methane emissions**, while methane emissions are also generated from **agriculture** and **waste**.
- **Methane (CH4)** accounts for **15–35%** of the **rise in greenhouse gas emissions** that are caused by human activity.
- Over the past **ten years**, the **atmospheric methane growth rate (MGR)** has **increased** significantly, most likely due to **rising fossil fuel** and **microbial source emissions**.
- **Methane emissions** increased from **9.9 parts per billion (ppb)** in **2019** to around **15 ppb in 2020.**
- **Human-related methane emissions** fell by **1.2 teragrams (Tg)** year in **2020**.

Curbing methane emission:

- The **extraction** and **transportation of oil, gas** and even **coal** release **methane through defective valves or pipes**, referred to as **fugitive emissions**.
- **Fixing** the **malfunctioning parts and processes** by employing **leak detection and repair (LDAR) programmes** prevents methane emissions amounting to **13 million tonnes (Mt)**
- Around **6 Mt of methane emissions** may be avoided using **vapour recovery units** by capturing the gas before leakage either through **flaring** or **venting** by **2030**.
- The **practice of burning pressurised natural gas** during **oil extraction,** either as a safety concern or because of being **uneconomical to sell**, is known as **flaring and releases methane emissions.**
- Similarly, **venting** is the **process of directly releasing methane gas** into the atmosphere during oil and gas extraction.

- **Around 21 Mt of methane** release can be avoided by **replacing pumps, controllers, compressors and other equipment** with **low- or zero-emissions alternatives.**
- Globally, the sale of captured methane would fetch oil and gas producers returns at **$45 billion** on financing methane emission technologies.
- **Non-binding pledges** like the **Global Methane Pledges** are unlikely to drive this action.

Global initiatives

- **Methane Alert and Response System (MARS):** MARS will integrate data from a large number of existing and future satellites that have the ability to detect methane emission events anywhere in the world, and send out notifications to the relevant stakeholders to act on it.
- **Global Methane Pledge:** At the **Glasgow climate conference (UNFCCC COP 26)** in 2021, nearly 100 countries had come together in a voluntary pledge, referred to as the **Global Methane Pledge**, to cut methane emissions by at least 30% by 2030 from 2020 levels.
- **Global Methane Initiative (GMI):** It is an international public-private partnership focused on reducing barriers to the recovery and use of methane as a clean energy source.

Indian initiatives:

- **Harit Dhara' (HD): Indian Council of Agricultural Research (ICAR)** has developed an anti-methanogenic feed supplement **'Harit Dhara' (HD)**, which can cut down cattle methane emissions by **17-20%** and can also result in **higher milk production**.
- **India Greenhouse Gas Program:** The **India GHG Program** led by **WRI India** (non-profit organization), **Confederation of Indian Industry (CII)**, and **The Energy and Resources Institute (TERI)** is an industry-led voluntary framework to measure and manage greenhouse gas emissions.
- **National Action Plan on Climate Change (NAPCC):** NAPCC was launched in **2008** and aimed at creating awareness among the representatives of the public, different agencies of the government, scientists, industry, and the communities on the threat posed by climate change and the steps to counter it.

- **Bharat Stage-VI Norms:** India shifted from Bharat Stage-IV (BS-IV) to Bharat Stage-VI (BS-VI) emission norms.

Topic 9. DR. A.P.J. ABDUL KALAM KNOWLEDGE CENTRE AND SPACE MUSEUM TO BE READY IN 18 MONTHS

Important for subject: Science and Technology

The **Dr. A.P.J. Abdul Kalam Knowledge Centre and Space Museum** is expected to be ready in 18 months at **Kowdiar** in the State capital (Kerala).

- The Centre is jointly promoted by the **State government** and the **Vikram Sarabhai Space Centre (VSSC).**
- The project, planned on 1.3 acres close to the Kowdiar Palace, was originally conceived in 2016, but was delayed on account of the heritage committee objecting to the initial design.

Contributions of Dr. A.P.J. Abdul Kalam:

Pioneer in Fiberglass Technology:

- He was a pioneer in **fibreglass technology** and led a young team to initiate this effort in **ISRO** from design, and development leading to the production of composite rocket motor cases.

Satellite Launch Vehicle (SLV-3):

- He made a significant contribution as **Project Director** to develop India's **first indigenous Satellite Launch Vehicle (SLV-3)** which successfully injected the **Rohini satellite** into **Near-Earth Orbit** in **July 1980** and made India an exclusive member of the Space Club.
- He was responsible for the evolution of **ISRO's launch vehicle programme,** particularly the **PSLV configuration**.

Indigenous Guided Missiles:

- After working for two decades in **ISRO** and mastering launch vehicle technologies, he took up the responsibility of developing Indigenous Guided Missiles at the **DRDO.**
- He was the **Chief Executive of Integrated Guided Missile Development**

Programme (IGMDP).

- He led to the weaponization of strategic missile systems and the Pokhran-II nuclear tests in collaboration with the Department of Atomic Energy, which made India a nuclear weapon State.

Technology Vision 2020:

- In **1998**, he put forward a countrywide plan called **Technology Vision 2020,** which he described as a road map for transforming India from a less-developed to a developed society in 20 years.
- The plan called for, among other measures, increasing agricultural productivity, emphasising technology as a vehicle for economic growth, and widening access to health care and education.

Medical and Healthcare:

- **APJ Abdul Kalam** in collaboration with **cardiologist B. Soma Raju** designed a **cost-effective coronary stent** known as **'Kalam-Raju Stent'** for coronary heart disease which made healthcare accessible to all.
- The device led to a reduction of prices of imported coronary stents in India by more than 50%.

Light Combat Aircraft project:

- He was deeply involved in the country's **Light Combat Aircraft project.**
- He had been associated with avionics. He also became the first Indian
- Head of State to fly a fighter plane. His first aeronautical project led him to design India's first indigenous hovercraft 'Nandi".
- A hovercraft is a vehicle that can travel over land, water, mud and ice by lifting itself off the ground with large blowers that create an air cushion beneath the craft.

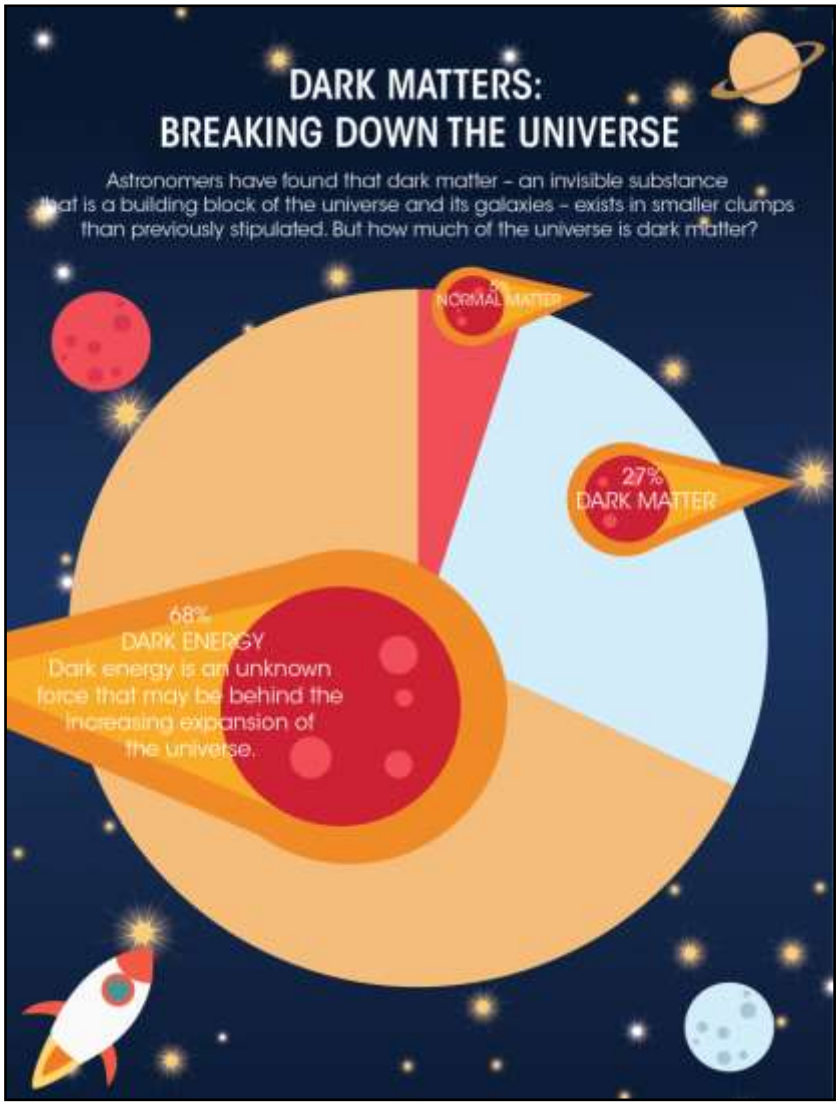
Others:

- He was passionate about bringing rural prosperity through **PURA (Providing Urban Amenities to Rural Areas)**, in which science and technology have to play a key role.
- Based on his diverse experience he propagated the concept of a **World Knowledge Platform** through which the **core competencies of organizations and nations can**

be synergized to innovate and create solutions and products for the challenges of the 21st century.

Topic 10. DARK MATTER: AN INVISIBLE GLUE THAT MAY NOT EVEN EXIST

Important for subject: Science and Technology



The new **Euclid space telescope,** set for launch on July 1, will play a key role is the search for Dark matter. Our largest space-based telescope, the **James Webb Space Telescope** is also on the case.

- JWST has released an image of the universe, in which there is an image of **Stephan's Quintet**, **a group of five galaxies**, as they have never been seen before.

About Dark Matter:

- Scientists cannot define dark matter with any certainty and it has never been detected, only speculated. But scientists estimate that up to **85% of the matter in the universe** could be made of what's called **dark matter.**

An accidental discovery of Dark Matter:

- In the **19th century, Lord Kelvin**, **a Scottish-Irish physicist**, wanted to estimate the **mass of our galaxy, the Milkyway,** using data on **how fast stars moved around the galaxy's core.**
- But **Kelvin** found **discrepancies or anomalies in the data,** things which could not be explained and were attributed to **"dark bodies"** that we cannot see.
- The galaxy seems to be rotating much faster than it should, based on estimates.
- The theory is that there is an **"invisible matter" responsible for the speed at which our galaxy rotates**. And that may be true of other galaxies as well.
- **Stars** have been observed to travel at **higher-than-estimated speeds**, especially at the edges of galaxies.
- Astronomers have speculated that stars should have ripped and flown off at the speed with which they are travelling, but they do not.
- The only explanation is that there must be some invisible matter (or dark matter) holding the stone in range.
- **We can't see dark matter but we may see its effects**
- The reason we are unable to see or detect this invisible matter is that **it does not interact with electromagnetic forces** — things like **visible light, X-ray or radio waves**.
- We can, however, **observe some of the effects of dark matter through its gravitational force**.
- But we still want to **detect dark matter** in its own right. **CERN's Large Hadron Collider** can help in detecting dark matter.
- A decade ago, experiments at the **LHC** proved the **Standard Model of particle physics** by detecting the **Higgs boson particle** — a particle which itself had long proved to be elusive.
- The **Standard Model** is the idea that everything in the universe is made of a few fundamental particles and that those are governed by **four fundamental forces** — **the**

strong nuclear force, the weak nuclear force, the electromagnetic force, and the gravitational force.

- The **dark matter** can't interact with light or electromagnetism. It can't interact with the strong force, and it may interact through the weak force that causes radioactivity.

Measuring dark matter by what's missing:

- The **Large Hadron Collider** smashes particles together to create collisions. The collisions produce debris that gets caught by particle detectors.
- We smash the **fundamental particles** up and they split and spray against the **LHC detectors**, and if we piece them back together, we should be able to account for all the bits that made those **original particles.** And if we found something missing (especially mass or energy), that could be **an indication of the presence of dark matter.**
- The **Higgs boson** interacts with all the other elements that have **mass**. And so the **dark matter** must [also] have mass in order to fulfil the effect that we see in the galaxies.

New theories about dark matter:

- Some scientists suggest we should think outside of the **Standard Model**.
- One of those scientists is the **physicist Mordehai Milgrom.**
- Milgrom has developed an **alternative theory of gravity,** one that suggests that **gravitational force operates differently at different distances from the core of a galaxy.**
- While **Newton's theory of gravity** explains most **large-scale movements in the cosmos, Milgrom's Modified Newtonian Dynamics** suggests that **a force acts differently when it is weak, such as at the edge of a galaxy.**
- Advocates of the theory say it predicts the rotation of galaxies and the speed of the stars better than Newton's theory.

Topic 11. CHIP INDUSTRY TO FUEL DEMAND FOR ULTRAPURE WATER

Important for subject: Science and technology

Ultrapure water is needed throughout semiconductor manufacturing, for rinsing chips with tiny components.

- There will be a **growing demand for ultrapure water (UPW) in the coming years due largely to the growth of the semiconductor industry,** Ashish Bhandari, MD & CEO of Pune-based Thermax Ltd., said in an interview.

Ultrapure water (UPW)

- Ultrapure water (UPW), **high-purity water or highly purified water (HPW) is** water that has been purified to uncommonly stringent specifications.
- Ultrapure water is a term commonly used in manufacturing to emphasize the fact that the **water is treated to the highest levels of purity for all contaminant types, including**: organic and inorganic compounds; dissolved and particulate matter; volatile and non-volatile; reactive, and inert; hydrophilic and hydrophobic; and dissolved gases.
- **UPW and the commonly used term deionized (DI) water are not the same**. In addition to the fact that UPW has organic particles and dissolved gases removed, a typical UPW system has three stages: a pretreatment stage to produce purified water, a primary stage to further purify the water, and a polishing stage, the most expensive part of the treatment process

Ultra-Pure Water in Semiconductor Industry

- They are the heart of any electronic device. It is important to know that there are only a handful of manufacturers in the world who deal in its making.
- It requires a very finest level of accuracy in making a wafer chip; even a nano mistake can make it a waste. Semiconductors require a huge amount of pure water, or you can say even ultrapure water in their manufacturing.
- For general knowledge, it must be known that a standard 30cm. wafer chip requires 2200 gallons of water (1 gallon is approximately equal to 4 liters).
- So, you can imagine the amount of water to manufacture chips in bulk daily. And the most important; is not just water, it is ultrapure water.
- With such a high level of purity, the amount of impure or wastewater generated during manufacturing is also a large quantity.
- This **wastewater is very toxic due to the presence of heavy metals and toxic solvents**, and it is almost impossible to treat such water with 0% purity output.
- So, apart from manufacturing a chip, dealing with water is also a major challenge and technology in this industry.

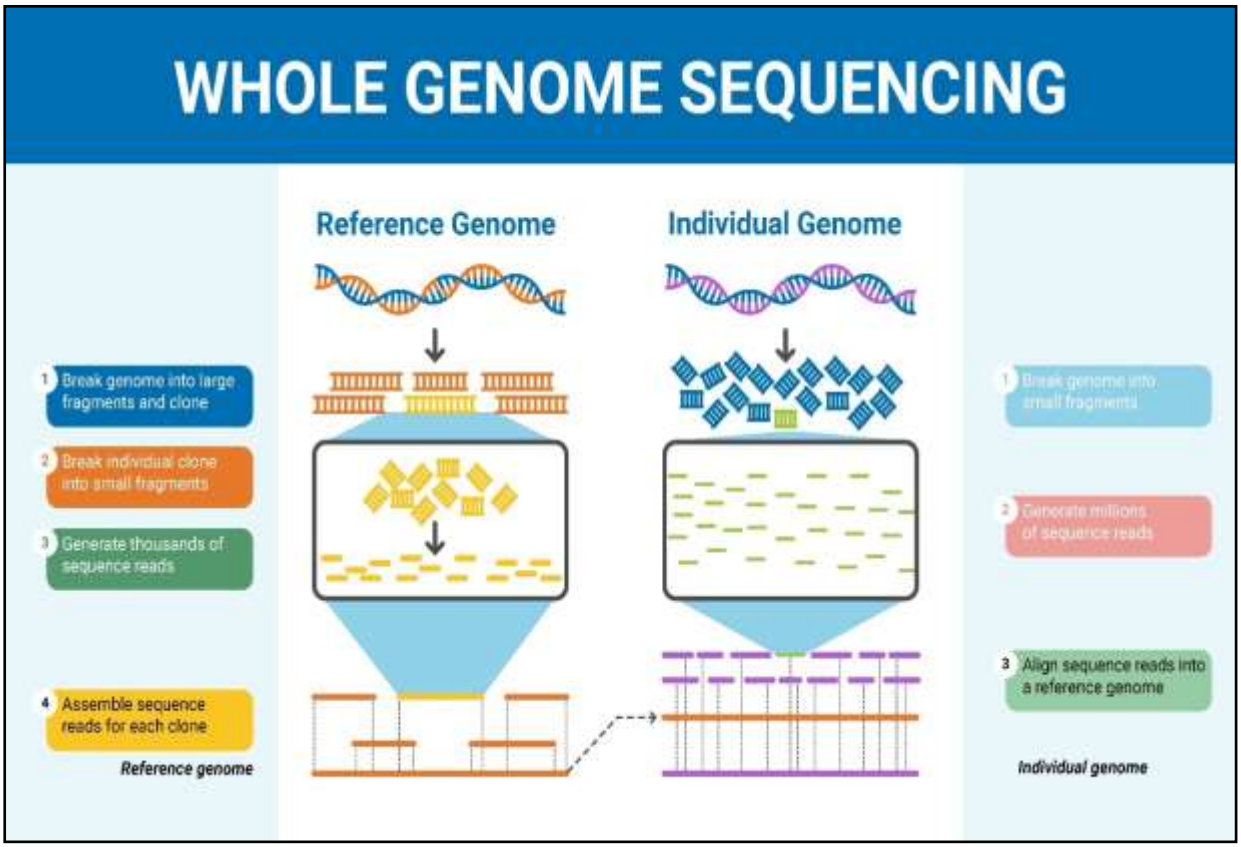
Why such a high amount of pure water is required?

- A semiconductor contains a number of transistors and other power electronic devices.
- Semiconductors are built-in layers on silicon wafers into integrated circuits.
- It is important to know that after each one of several dozen layers of semiconductors are added to a silicon wafer, it must be rinsed and cleaned properly to remove waste (ions, particles, silica, TOC, dissolved oxygen) from it.
- This prevents chips from getting contaminated. Even a minute layer of impurity can make the chip unusable.
- Ultrapure water is produced through many critical stages of water treatment. In general, let us consider the steps commonly used everywhere.
- The first stage starts with the pre-treatment process. Here, raw water is passed through filter stages like MMF (Mixed Media filter), ACF (Activated Carbon filter), and Softener, and then passes through RO (Reverse Osmosis).
- The second stage consists again of the 2nd pass RO system. The output from this RO is passed to a UV lamp where residual ozone is destroyed.

- Then follows processes of vacuum de-aeration, passing water through mixed beds, resin regeneration, etc.
- Finally, in the third stage, water is distributed to various points where pure water is required. Before reaching the final points, water again passes through UV oxidation, polishing mixed beds and degasifier.
- The final output is very pure and contains very minute particles, which are mostly negligible and will not harm the chips (less than 1 particle>0.05uM per mL).
- As discussed earlier, wastewater generated from purification stages needs to be treated before disposing it off in the drains. So, effluent treatment systems are then used to treat wastewater.
- The chip industry demands the purest form of water for cleaning chips and an equal amount of treatment for wastewater. Any malfunction in both these processes can make the industry unusable.

Topic 12. NEWBORN GENOME SEQUENCING UNLOCKS THE BLUEPRINT OF HEALTH

Important for subject: Science and Technology



Genetic diseases:

- There are **6,000** or so genetic diseases, of which around **3,500 diseases have been documented**, and a much smaller number have had their molecular and/or genetic defects mapped.
- A significant number of diseases in the population are also treatable but are nevertheless prevalent.
- **Newborn screening programmes** are now in vogue in different countries, and have been deployed in some states in India as well.

Why is it important to sequence newborn genomes?

- The **rarity of many genetic diseases, the narrow window of opportunity, the long diagnostic paths,** and **the unfortunate deaths of ill newborns** make it very difficult to document and understand these diseases.
- However, **population-scale genome-sequencing efforts** have provided insights into the **prevalence** of many of these diseases in an unbiased manner.
- Discoveries in the last few decades have allowed doctors **to diagnose and treat genetic diseases through genomic sequencing in newborns**, **especially sick newborns**.
- The **whole-genome sequencing** could provide a **much higher number of positive cases with a diagnosis**, around **40%**, with **26%** of the diagnosed children benefiting from reduced severity of illness due to the rapid diagnosis and, consequently, a significant reduction in the cost of treatments.

Why sequence healthy newborns?

- The **U.K. National Health Services** recently launched a **nationwide programme to sequence 100,000 sick newborns**.
- The **BabySeq project** funded by the **U.S. National Institutes of Health** is one of the most comprehensive studies to evaluate the sequencing of newborns for routine newborn care.
- One study found that **just over 10% of infants had an unanticipated risk of genetic diseases.**
- When these infants were followed **up for three to five years,** sequences revealed the

causes of disease in three infants; in the remaining **14,** a better picture of the risk made way for better medical surveillance.

- The **sequencing** also warranted additional **at-risk family members of 13 infants** to have their **genes sequenced**. Three of them benefited from subsequent surgeries.

Challenges:

- Newborn whole genome sequencing presents **multiple ethical challenges.**
- The issue of **disclosing and managing incidental and secondary findings** raises concerns about **privacy and the psychological impact on families.**
- The **equitable distribution of benefit**s and burdens associated with accessing and utilising this technology also invokes issues of **justice and fairness**.

What is a genome?

- The **genome** is the **entire set of DNA instructions** found in a **cell.** In humans, the **genome consists of 23 pairs of chromosomes** located in the **cell's nucleus**, as well as a small chromosome in the **cell's mitochondria**.
- **A genome contains all the information needed for an individual to develop and function**.
- **All of the DNA of an organism** is called its **genome**. Some genomes are incredibly small, such as those found in viruses and bacteria, whereas other genomes can be almost unexplainably large, such as those found in some plants.
- The **human genome contains about 3 billion nucleotides.**
- The **rare Japanese flower** called **Paris japonica** has a **genome size of roughly 150 billion nucleotides,** making it **50 times the size of the human genome**.

Genome vs gene

- A **gene is a part of the DNA** while a **genome is the total DNA in a cell.**
- **Gene** is the **hereditary element of genetic information** while the **genome is the complete set of nuclear DNA**.
- **Gene encodes protein synthesis,** whereas **genome encodes both protein and regulatory elements of protein synthesis**.
- The length of the gene is about a few hundred bases while the genome of a higher

organism has about a billion base pairs.

- Variations in genes are naturally selected, while horizontal gene transfer and duplication cause variations in the genome.

What is whole genome sequencing (WGS)?

- All organisms (microorganisms, plants, mammals) have a **unique genetic code, or genome**, that is composed of **nucleotide bases**– **adenine, thymine, cytosine, guanine (A, T, C, and G).**
- If you know the sequence of the bases in an organism, you have identified its unique DNA fingerprint or pattern, and determining the order of bases is called **sequencing.**
- **Whole genome sequencing** is a **laboratory procedure** that determines the **order of bases in the genome of an organism at a single time.**
- This includes **sequencing all of an organism's chromosomal DNA as well as DNA contained in the mitochondria and, for plants, in the chloroplast**.
- **Whole genome sequencing** should not be confused with **DNA profiling**, which only establishes the probability that genetic material originated from a specific person or group and does not provide details on genetic relationships, the origin of the genetic material, or a person's susceptibility to particular diseases.
- **Whole genome sequencing** has primarily been utilized as a tool for research, but it was first made available to clinics in 2014.
- **Whole genome sequence** data may be a crucial tool in the future of personalized medicine to direct therapeutic intervention.

Topic 13. WHY DETECTING CARBON MOLECULES IN SPACE MATTERS?

Important for subject: Science and Technology

The **CH3+ molecule,** which is also known as **methyl cation**, has been **detected in space for the first time** by the **James Webb Space Telescope (JWST).**

Life as we know it is carbon-based:

- One of the most important unsolved problems of modern science is: **How did life arise from non-living matter?**
- We still don't know but we have a good idea of what the required steps are, for instance, the **formation of complex organic molecules**, like **amino acids**, from

simpler ones, like **CH3+**, or **methylium**.

- **CH3+** is a **very simple organic molecule,** just **one carbon atom** and **3 hydrogen atoms.** But it reacts with other molecules to form more complex ones. Its presence in space tells us that basic building blocks for life are out there.
- **Organic molecules are carbon-based**. They contain **carbon atoms** bonded to hydrogen atoms but can also bond to other elements, such as oxygen, nitrogen or phosphorus.
- **Everything that makes us and all life on Earth is carbon-based.**

Looking for molecular fingerprints in space:

- Scientists found the **fingerprints of the CH3+ molecule** in the **light coming from a swirling disk of dust and gas around a young star**.
- The **disk** is in the **Orion Nebula**, **1,350 light years from Earth**.
- The **Orion Nebula** is visible to the naked eye although you may only see a dot on Orion's sword slightly below the belt.
- **Visible light** is just a **fraction of the whole picture**. But every atom and molecule absorbs or emits light uniquely, with its own specific colour palette.
- For example, **hydrogen,** the simplest of atoms, **when excited, emits a red glow**, and if you view it through a prism, you will see four characteristic lines that make up its spectrum.
- Scientists call this technique **spectroscopy** and in space, they use the **James Webb Space Telescope** to do it.

An unexpected discovery:

- When astronomers captured the spectrum of this **planet-forming disk**, they took the help of **Schlemmer's lab.**
- The lab had been studying the **fingerprint of molecules and analyzed CH3+ in detail.** And that enabled scientists to **match the unknown fingerprint detected by the JWST to this specific, life-giving molecule.**

About James Webb Space Telescope (JWST):

- The telescope is the result of an **international collaboration** between **NASA**, the

European Space Agency (ESA) and the **Canadian Space Agency** which was launched in **December 2021.**

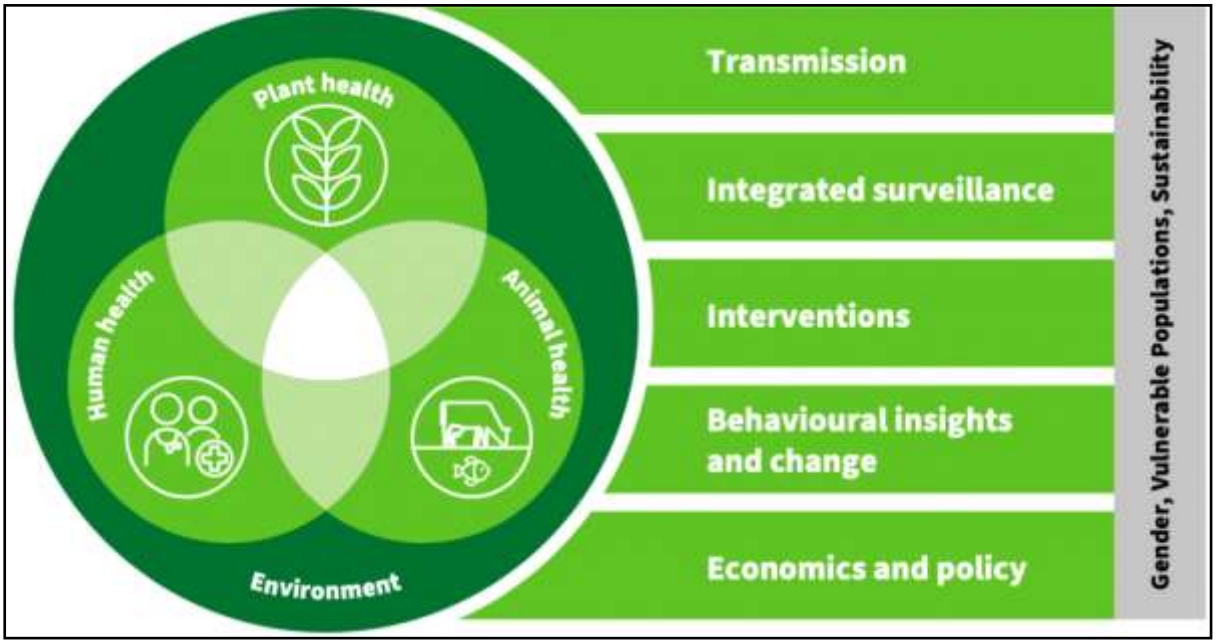
- It is currently at a point in space known as the **Sun-Earth L2 Lagrange point, approximately 1.5 million km beyond Earth's orbit** around the Sun.
- The **Lagrange Point 2** is one of the **five points** in the orbital plane of the Earth-Sun system.
- Named after **Italian-French mathematician Josephy-Louis Lagrange,** the points are in any revolving two-body system like Earth and Sun, marking where the gravitational forces of the two large bodies cancel each other out.
- **Objects placed at these positions are relatively stable and require minimal external energy or fuel** to keep themselves there, and so many instruments are positioned here.
- It's the **largest, most powerful infrared space telescope** ever built.
- It's the **successor to Hubble Telescope.**
- It **can see backwards in time to just after the Big Bang** by looking for galaxies that are so far away that the light has taken many billions of years to get from those galaxies to our telescopes

Objectives:

- **It will examine every phase of cosmic history:** from the **Big Bang** to the **formation of galaxies, stars, and planets** to the **evolution of our own Solar System**.
- The goals for the Webb can be grouped into **four themes.**
- The **first** is to look back around 13.5 billion years to see the first stars and galaxies forming out of the darkness of the early universe.
- **Second**, to compare the faintest, earliest galaxies to today's grand spirals and understand how galaxies assemble over billions of years.
- **Third,** to see where stars and planetary systems are being born.
- **Fourth**, to observe the atmospheres of extrasolar planets (beyond our solar system), and perhaps find the building blocks of life elsewhere in the universe.

Topic 14. ONE HEALTH: FAO, UNEP, WHO AND WOAH LAUNCH RESEARCH AGENDA FOR ANTIMICROBIAL RESISTANCE

Important for subject: Science and technology



Four multilateral agencies have launched a priority research agenda on June 28, 2023 to better advocate for increased research and investment in **antimicrobial resistance (AMR)**.

Initiatives on AMR:

- The **'Quadripartite'** released the **One Health Priority Research Agenda on Antimicrobial Resistance** through a webinar. **Quadripartite** includes:

1. The United Nations (UN) Food and Agriculture Organization (FAO),
2. The UN Environment Programme (UNEP),
3. The World Health Organization (WHO) and
4. The World Organisation for Animal Health (WOAH)

- The organisations work specifically in the areas of human, animal, plant, and environmental health.
- **WHO** also launched a **global research agenda for AMR in human health** on June 22, 2023.
- The agenda prioritises **40 research topics** for **evidence generation** to inform policy and interventions by 2030.
- It also **aims** to guide a variety of stakeholders in **generating new evidence to address**

antimicrobial resistance, with a focus on **low- and middle-income countries**.

- The **agenda** will serve as a **guide for countries, research institutes** and **funding bodies** to support **One Health AMR research**. It will also allow policymakers, researchers, and the multidisciplinary scientific community to collaborate across sectors.

One Health:

- It defined **'One Health'** as an **integrated, unifying approach** that **aims to sustainably balance and optimise the health of people, animals and ecosystems.**
- The **concept** acknowledges the **health of humans, domestic and wild animals, plants, and the larger environment, including ecosystems, are inextricably linked and interdependent**.
- At this **One Health interface**, addressing **global health issue**s necessitates a multisectoral, multidisciplinary response to AMR.
- Using a **mixed-methods approach,** global experts identified **five key pillars** as well as **three cross-cutting themes,** namely **gender, vulnerable populations, and sustainability,** as follows:

Transmission

- This pillar focuses on the **environment, plant, animal, and human sectors** where **AMR transmission, circulation** and **spread** occur.
- This includes what drives this transmission across these areas, where these interactions occur, and the impact on different sectors.
- **Integrated surveillance**
- This pillar **aims to identify cross-cutting priority research questions** in order to improve common technical understanding and information exchange among **One Health stakeholders**.
- The surveillance **aims** for harmonisation, effectiveness, and implementation of integrated surveillance with a focus on LMICs.

Interventions

- This pillar focuses on **programmes, practises, tools, and activities aimed at preventing, containing, or reducing the incidence, prevalence, and spread of**

AMR.

- This also calls for the best use of existing vaccines, as well as other One Healthrelated measures to reduce AMR.

Behavioural Insights and Change

- The priority research areas under this pillar are concerned with **comprehending behaviour across various groups and actors** involved in the development and spread of AMR at the One Health interface.
- It focuses on research addressing human behaviour that affects AMR, including ways to combat it.

Economics and policy

- From a **One Health** standpoint, this pillar **addressed investment and action in AMR prevention and control.**
- This pillar also takes into account the **cost-effectiveness of an AMR investment case,** financial sustainability, and long-term financial impact.

About Antimicrobial Resistance (AMR):

- Antimicrobial Resistance is the **resistance acquired by any microorganism** (bacteria, viruses, fungi, parasites, etc.) **against antimicrobial drugs** that are used to treat infections.
- It occurs when a microorganism changes over time and no longer responds to medicines making infections harder to treat and increasing the risk of disease spread, severe illness and death.
- The **World Health Organisation (WHO)** has identified **AMR** as one of the **top ten** threats to global health.
- **Microorganisms** that develop antimicrobial resistance are sometimes referred to as **"superbugs"**.

Topic 15. WHO RELEASES POLICY RECOMMENDATIONS TO PROTECT CHILDREN FROM THE HARMFUL EFFECTS OF FOOD MARKETING

Important for subject: Science and technology

The **World Health Organization (WHO)** released July 3, 2023 **new guidelines on shaping policies to protect children from the harmful impacts of food marketing** that promote unhealthy dietary choices.

WHO initiative:

- In **March 2023,WHO** published a **set of nutritional criteria** which **aimed to protect children from marketing that promoted unhealthy food and nonalcoholic beverages.**
- The **WHO Europe nutrient profile model** helped in the classification of food products to determine whether they are healthy enough to be advertised to children.

WHO Guidelines and Recommendations:

- The guidelines build on the **2010 WHO 'Set of recommendations on the marketing of foods and non-alcoholic beverages to children'** and take into consideration more recent evidence specific to children and to the context of food marketing.
- The guideline recommends the **implementation of comprehensive mandatory policies** to protect children of all ages from the **marketing of foods and nonalcoholic beverages that are high in saturated fatty acids, trans-fatty acids, free sugars and/or salt (HFSS)**.
- There has been limited national action and children continue to be exposed to marketing for **HFSS foods.**
- Policies should include the **country's nutritional situation, cultural context, locally available foods, dietary customs, available resources and capacities, and existing governance structures and mechanisms** among others.
- **WHO** recommended **mandatory regulation of marketing of HFSS foods** and **non-alcoholic beverages,** having previously made more allowances for a range of policy approaches.
- Another change is the **guideline's use of the definition of a child** from the **Convention on the Rights of the Child** to be unequivocal that policies should protect

all children.

- The **guideline** called for countries to **use a nutrient profile model** and adopt policies comprehensive enough to **minimise intra- and inter-medium migration** to avoid restrictions on marketing in regulated channels or settings.

Food marketing:

- The **most frequently marketed food categories** were fast food, sugar-sweetened beverages, chocolate and confectionery, salty and savoury snacks, sweet bakery items and snacks, breakfast cereals and desserts.
- Evidence showed that food marketing mainly promoted HFSS foods.
- **Food marketing** was prevalent in places such as **schools and sports clubs** where children gather; **during children's television viewing times;** in **digital spaces popular among young people** and in magazines targeting children and adolescents.
- New marketing media have also evolved, most notably digital marketing, which poses a growing concern.
- Research and studies show that the marketing of HFSS foods remains pervasive and persuasive across the globe.

Unhealthy Food as global public health risk:

- Unhealthy diets are a leading cause of global public health risk contributing to **undernutrition, micronutrient-related malnutrition, overweight, obesity** and **diet-related noncommunicable diseases (NCD)**.
- According to a survey 'Know your diet-School children survey' conducted by the **Centre for Science and Environment (CSE):**
- Most school children were not eating a balanced diet, with **about 66 per cent of children having a low frequency of intake of cereals** and **millets**.
- **Around 45 per cent of children** had a **low frequency of intake of vegetables**.
- The packaged food was more popular among children than non-packaged food and **around 53 per cent children consumed packaged food or beverages** at least once a day.

What are the 7 Key Processes that FSSAI Follow?

1. Set standards for food products

2. Develop safe food practices
3. License food businesses
4. Ensure compliance through inspections
5. Test food for standards
6. Train and build capacity
7. Citizens Outreach

What is FSSAI?

- **Food Safety and Standards Authority of India (FSSAI)** is an autonomous statutory body established under the **Food Safety and Standards Act, 2006 (FSS Act).**
- **Ministry of Health & Family Welfare,** Government of India is the administrative Ministry of FSSAI.
- **Headquarters:** Delhi.

What are the Functions of FSSAI?

- Framing of regulations to lay down the standards and guidelines of food safety.
- Granting FSSAI food safety license and certification for food businesses.
- Laying down procedures and guidelines for laboratories in food businesses.
- To provide suggestions to the government in framing the policies.
- To collect data regarding contaminants in food products, identification of emerging risks and introduction of rapid alert system.
- Creating an information network across the country about food safety.
- Promote general awareness about food safety and food standards.

Topic 16. A SEMAGLUTIDE 'MIRACLE': REPURPOSING DIABETES DRUG FOR WEIGHT LOSS

Important for subject: Science and technology

People who have been struggling to cope with being overweight or obese and trying to shed a few kilos, over the past few years, have it seems been offered a silver bullet.

- While initially on trial for once-a-week diabetes therapy, an **unexpected side effect – weight loss – swept the drug (semaglutide)** off the shelves of a pharmacy and put it in the celebrity section on social media.

- Initial results seemed like a fantasy, as stunning weight loss was recorded in those put on the drug as a treatment for diabetes, and celebrities, even those without diabetes, did not take too long to cotton on, starting oral and injectible semaglutide doses to lose weight.

Semaglutide

- Semaglutide is a **glucagon-like peptide-1 receptor agonist (GLP-1 RA) drug** that **increases the secretion of insulin (which helps decrease blood sugar levels) after a meal while reducing the production of glucagon** (which helps increase blood sugar levels).
- Besides regulating glucose levels in the body, the drug also aids in weight loss, lowers the risk of hypoglycemia, and improves heart health and kidney function.
- The drug was approved by the US Food and Drug Administration in 2017.
- According to a study, semaglutide specifically showed greater weight loss in Important for subjects than other GLP-1 RA drugs. It roughly reduced body weight by 4kgs, as compared to other drugs which saw reductions of 1.4-2.5 kgs.
- Apart from regulating glucose, it also increases gastric emptying time, meaning food takes longer to pass through the gastrointestinal tract and it makes you feel full for a longer period of time

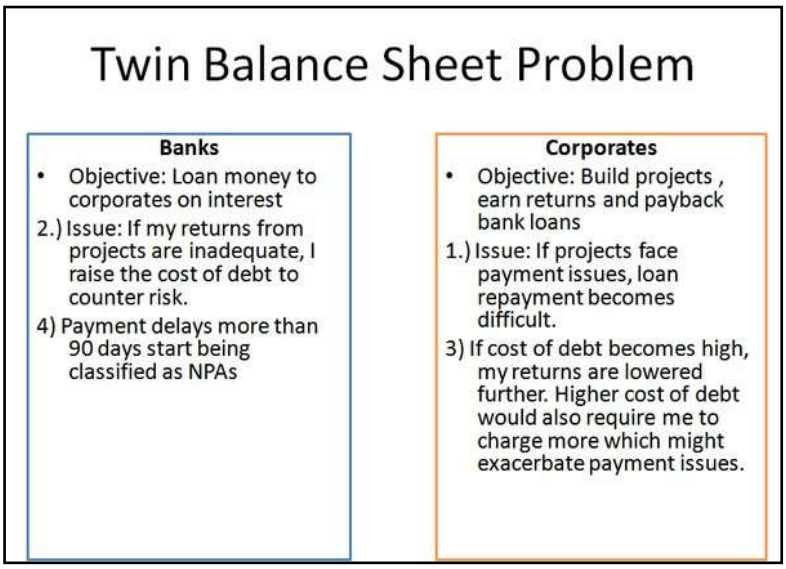
Drug repurposing (DR)

- It is (also known as drug repositioning) is a process of identifying new therapeutic use(s) for old/existing/available drugs.
- It is an effective strategy in discovering or developing drug molecules with new pharmacological/therapeutic indications.
- In recent years, many pharmaceutical companies are developing new drugs with the discovery of novel biological targets by applying the drug repositioning strategy in drug discovery and development program.
- This strategy is highly efficient, time saving, low-cost and minimum risk of failure.
- It maximizes the therapeutic value of a drug and consequently increases the success rate. Thus, drug repositioning is an effective alternative approach to traditional drug discovery process.

- Finding new molecular entities (NME) by traditional or de novo approach of drug discovery is a lengthy, time consuming and expensive venture.
- Drug repositioning utilizes the combined efforts of activity-based or experimental and in silicobased or computational approaches to develop/identify the new uses of drug molecules on a rational basis.
- It is, therefore, believed to be an emerging strategy where existing medicines, having already been tested safe in humans, are redirected based on a valid target molecule to combat particularly, rare, difficult-to-treat diseases and neglected diseases.

Topic 17. LESSONS FROM TWIN BALANCE SHEET PROBLEM

Important for subject: Economy



What is the twin balance sheet problem?

A twin balance sheet is a scenario where **banks are under severe stress** and the **corporates are overleveraged** to the extent that they cannot repay.

- This generally happens in a boom cycle when the banking system provides easy credit flow to the corporate sector which too keeps taking loan (debt increase relative to equity = leverage increase).

India's TBS story:

- As a result of excess credit expansion from 2000-2008 the Public Sector banks (PSBs) were pushed into severe stress due to **high levels of non-performing assets (NPAs),**

high provision requirements, low profits, and low capital adequacy ratios (CAR).

- The corporates were equally under stress due to over-leveraged balance sheets to the extent that they could not repay their loans.
- PSBs had to resort to the restructuring of loans and **evergreening of NPAs** (giving of a new loan to take care of the earlier bad loan). This was more pronounced beginning 2008-09 following the global financial crisis.
- **RBI intervention- detection to peak**: introduced the **Central Repository of Information on Large Credits (CRILC)** to enable banks to share information on loans of Rs.5 crores and above.
- Data of Special mention Accounts (SMA -0/1/2) where overdue loans of up to 30/60/90 days were to be captured, reported, and monitored by banks.
- These sets of information played a big role to curb the further pile-up of NPAs with proactive intervention and follow-up of loans.
- RBI brought in stricter norms on restructuring of loans to remove the tendency of evergreening of loans.
- For independent assessment of NPA's RBI implemented an **asset quality review (AQR)** – a special audit of NPA classification in September 2015. AQR classification of **NPAs** as per prudential norms, found the total gross NPAs in the banking system **at Rs. 10.3 trillion working out to 11.5 percent** by FY18.
- The combination of PSBs loaded with high NPAs and over leveraged balance sheets of corporates posed further challenge.

RBI intervention- resolution and recovery:

- The solution was infusion of large capital in PSBs. A set of bank reforms was set as the precondition for this infusion Another measure was the '**Enhanced Access to Service Excellence' (EASE)** reforms in PSBs in collaboration with BCG in January 2018.
- The format of EASE reforms got modified from year ago to moving the model from EASE 1.0 to EASE 5.0 now in use.
- During 2017-21, there were large-scale mergers among PSBs bringing them down from 27 to 12 and turning them into stronger entities with potential higher risk appetite.

- **National Asset Reconstruction Company Ltd (NARCL)** – Bad bank also had to be formed to tackle toxic assets.
- The measures were helped by the **Insolvency and Bankruptcy Code**.

Lessons from TBS:

- Addressing the twin balance sheet problem in an appropriate manner has now helped India achieve a **Twin balance sheet advantage** for growth. provision coverage ratio (PCR) from 40.1 percent in June 2016 to 74 percent in March 2023 gross non-performing assets (GNPAs) of banks sharply fell from 11.5 percent in FY18 to 3.9 percent in FY23
- The stakeholders need to learn from the TBS and avoid excess risk taking.
- The tools of risk governance, such as a sub-committee of the board on risk management along with systemic controls and monitoring mechanisms are essential to avoid such a trap again.

Banking stability indicator (BSI)

- RBI brings out the index in its biannual Financial Stability Report (FSR) BSI is an overall assessment of changes in underlying conditions and risk factors that have a bearing on the banking sector's stability during a period.
- The **six composite indices** represent risks in **six dimensions** – soundness, asset quality, profitability, liquidity, efficiency, and sensitivity to market risk.

Topic 18. NPA WRITE-OFFS : PRIVATE BANKS MORE AGGRESSIVE THAN PSBS

Important for subject: Economy

Private sector banks (PVBs) have been more aggressive in writing-off bad loans than public sector banks (PSBs) as per the latest financial stability report by RBI.

- Banks write off to rid their balance sheets of these loans and improve the impaired loans/NPA
- The write-offs to gross non-performing assets (GNPAs) ratio of **PVBs** at **9 per cent** in FY23 was much higher than **22.2 per cent** of **PSBs**
- Both categories of banks stepped up write-offs vis-a-vis preceding two years.

This difference is explained by:

- PVBs resort to technical write-offs to **improve market sentiments** towards their stock as the balance sheet shows reduced GNPA ratio. This is an important tool for PVBs as they raise capital in the form of equity or debt more often than PSBs.
- Strong PVBs with **higher net interest margin and significant non-interest income** (over 30 per cent), are able to post higher operating profit. So, they are in a position to make higher provisions than PSBs.
- By removing the assets from the balance sheet the **taxable income of banks gets reduced**.
- PVBs generally resort to **first year write-off** in case of **unsecured account** even in the of it becoming impaired. PSBs even with provision availability, write-off only after **two years**.
- **Write-offs to GNPAs ratio** is the ratio of write-off (including technical/prudential writeoffs and compromise settlement) during a financial year to GNPA at the beginning of the year.
- **Technical write-off** refers to cases where the NPAs remain outstanding at borrowers' loan account level, but are derecognised by the lenders only for accounting purposes.

Meaning of Write-off

- A write-off is an accounting term for the formal recognition in the financial statements that a borrower's asset no longer has value. Usually, loans are written off when they are 100 per cent provisioned and there are no realistic prospects of recovery.
- These loans are transferred to the off-balance sheet records. Write-off **does not preclude the** recovery of the loan. The borrower still owes money to the bank; however, the bank has de-recognised this asset from its financial statements due to uncollectibility.
- Bank remains free to enforce, sell, or transfer the credit to another entity.
- In case the borrower resumes servicing its debt, or the exposure is sold, a recovered amount would be directly recorded in the profit and loss (P&L) account.

Impaired vs Non performing Asset

- A loan is considered to be **impaired** when it is **probable** that not all of the related principal and interest payments will be collected.
- **Impairment** is an **accounting term**: the removal of the affected assets is just on the Financial Statements.
- **Non-performing asset** is a regulatory term: Meaning its treatment will be as per the prudential regulatory framework, eg: RBI's instruction of recognizing NPA on non-payment for 90 days.
- The accounting and regulatory frameworks are distinct and there is no formal relationship between the categories introduced by the two.
- In practice one would normally expect **impaired assets to be also classified as non-performing**, but not vice-versa.

Topic 19. INTERNATIONALISATION OF RUPEE

Important for subject: Economy

The Reserve Bank of India's (RBI) inter-departmental group (IDG) has recommended a roadmap to achieve the internationalisation of the rupee.

What is Internationalisation?

- Internationalisation is a process that involves increasing the use of the rupee in **cross-border transactions**, similar to the other **reserve currencies** such as the US dollar, the Euro, the Japanese yen and the pound sterling.
- It involves promoting the rupee for **current account transactions** including import and export trade, and eventually capital account transactions.
- It requires further opening up of the **currency settlement** and a strong swap and forex

market.

- **Full convertibility** of the currency on the **capital account** is also needed along with cross-border transfer of funds without any restrictions. (India has allowed only full convertibility on the current account as of now.)

Why do it?

- India remains one of the fastest-growing countries and showing remarkable resilience in the face of major headwinds, the rupee has the potential to become an internationalised currency.

Impact of Sanctions on Russia:

- Timing of recommendation is significant as it comes at a time when the economic sanctions imposed by the US on Russia for invading Ukraine is resulting in countries looking at an **alternative to the US dollar**.
- Countries also want to reduce theri dependence on dominant international payment mechanisms based on the **Society for Worldwide Interbank Financial Telecommunications (SWIFT) messaging system**.
- Countries are realising that having a strong foreign exchange reserves to manage external shocks, is no longer a sufficient defence against the threat of economic sanctions.

Advantages of internationalisation of the rupee:

- **Reduced currency risk:** The use of the rupee in cross-border transactions mitigates currency risk for Indian businesses.
- **Reduced volatility:** With wider adoption of a currency its value is more stable.
- Protection from currency volatility not only reduces the cost of doing business, it also enables better growth of business, improving the chances for Indian businesses to grow globally.
- **Freedom from reserve:** Internationalisation of the rupee reduces the need for holding foreign exchange reserves. Reducing dependence on foreign currency will make India less vulnerable to external shocks.
- **Bargaining power**: As Rupee's acceptance in the world grows the bargaining power of Indian businesses would improve, as they can price goods in Rupee and not worry

about currency fluctuations.

- **Short term volatility**: Internationalisation may initially result in increased volatility in the exchange rate of INR.
- **Monetary policy difficulties**: There will be monetary implications as the global obligations towards supplying currency to meet the global demand may conflict with its domestic monetary policies objectives. (This is known as the Triffin dilemma)
- **External Shock**: Internationalisation of a currency may magnify external shocks, given the open channel of the flow of funds into and out of the country and from one currency to another.
- **Financing**: International currency use can have an undesirable impact on financing conditions, especially when a country is a net receiver of capital flows in the form of FDI and FPI.
- **Cost of additional demand:** Costs of meeting the additional demand for money along with the increase in the volatility of the demand pose other challenges.

Exorbitant Privilege

- The term refers to the many benefits enjoyed by the US on account of all other countries of the world using the US dollar as their currency in most of their international transactions.
- This special position is supported by a range of factors such as:
- the size of the US economy
- the reach of its trade and financial networks
- the depth and liquidity of US financial markets
- a history of macroeconomic stability currency convertibility.

Topic 20. CAPITAL ACCOUNT CONVERTIBILITY

Important for subject: Economy

India is on the cusp of fundamental shifts in the capital account convertibility space, with increased market integration in the offing and freer non-resident access to debt on the table

- **Capital account** of any country records **the net changes in its foreign assets and liabilities**, while **convertibility refers to the ability to convert domestic currency into foreign currencies and vice versa for making payments for balance of**

payments (BoP) transactions.

- **BoP refers to financial transactions undertaken** by a country with other nations across the world during a particular period of time, normally one year.
- The **Tarapore Committee (2006**) defined **capital account convertibility as the "freedom to convert local financial assets into foreign financial assets and vice versa."**
- The country is also on the cusp of witnessing some fundamental shifts in this space with greater market integration expected in the near future.
- The rate of capital account convertibility will also accerate through measures like freer non-resident access to debt and greater market integration.
- There is an effort to liberalise foreign portfolio investment (FPI) debt flows further, with the introduction of the Fully Accessible Route (FAR), which places no limit on non-resident investment in specified benchmark securities.

What is Capital Account Convertibility?

- The balance of payments account, which a statement of all transactions made between a country and the outside world, consists of two accounts — current and capital account. While the current account deals mainly with import and export of goods and services, the capital account is made up of cross-border movement of capital by way of investments and loans.
- Current account convertibility refers to the freedom to convert your rupees into other internationally accepted currencies and vice versa without any restrictions whenever you make payments.
- Similarly, capital account convertibility means the freedom to conduct investment transactions without any constraints. Typically, it would mean no restrictions on the amount of rupees you can convert into foreign currency to enable you, an Indian resident, to acquire any foreign asset. Similarly, there should be no restraints on your NRI cousin bringing in any amount of dollars or dirhams to acquire an asset in India.
- India has come a long way in liberating the capital account transactions in the last three decades and currently has partial capital account convertibility.
- Some of the recent moves include increasing the foreign portfolio investment limits in the Indian debt markets, introducing the Fully Accessible Route (FAR) — through

which non-residents can invest in specified government securities without any restrictions and the easing of the external commercial borrowing framework by relaxing end-user restrictions. Inward FDI is allowed in most sectors, and outbound FDI by Indian incorporated entities is allowed as a multiple of their net worth.

Why is it important?

- Developing are usually cautious in opening up their capital account. This is because inflows and outflows of the foreign and domestic capital, which are prone to volatility, can lead to excessive appreciation/depreciation of their currency and impact the monetary and financial stability.
- India's prudence in opening up its capital account was lauded after the currency crisis in East Asian countries in 1997 exposed the problems arising from the potent combination of high current account imbalances, dependence on short-term capital flows and the whimsical nature of these flows.
- The SS Tarapore committee's report on fuller capital account convertibility released in 2006 argued that even countries that had apparently comfortable fiscal positions have experienced currency crises and rapid deterioration of the exchange rate, when the tide turns.
- The report further points that most currency crises arise out of prolonged overvaluation in exchange rates leading to unsustainable current account deficits.
- An excessive appreciation of the exchange rate causes exporting industries to become unviable, and imports to become much more competitive, causing the current account deficit to worsen. Thus, it suggests transparent fiscal consolidation is necessary to reduce the chances of a currency crisis.
- If you are an investor looking to park money overseas or an NRI wanting to invest in Indian assets, full convertibility on capital account may give you a greater opportunity to diversify investments and reduce geographical risk.
- Note that crossborder investments are allowed even now under RBI's Liberalized Remittance Scheme but within the overall limit of $250000.

Topic 21. FINANCE MINISTRY STRESSES ON REFORMS FOR HIGHER FDI INFLOWS

Important for subject: Economy

Finance Ministry has pointed to the importance of reforms in key areas to push-up the FDI inflows. FDI flows, have dropped since last year and may remain subdued in the near term.

- Gross FDI flows moderated 16% last year from the record high of $84.8 billion in 2021-22 Net FDI inflows to emerging market economies declined 36% in 2022.

The major observations were as follows:

- India needs to **resolve challenges faced by global investors**, including lastmile infrastructure issues, labour availability and the inability to set up larger factories.
- FDI flows may also be impacted by "political distance more than geographical distance" as "**geopolitics has dominated geography**". This is seen in the "**Friend shoring**" of FDI as more FDI movement restricted between
- Geo-politically aligned countries, this is leading to a fragmentation in FDI flows across the globe India faces external sector challenges such as **escalation of geopolitical stress**, enhanced **volatility in global financial systems**, sharp price correction in global stock markets, a high magnitude of **El-Nino impact**, and modest trade activity and FDI inflows owing to frail global demand could constrain growth.
- Remarkably the flows from **foreign portfolio investors (FPIs)** into the Indian markets have become **less volatile.**
- European Union's introduction of the **Carbon Border Adjustment Mechanism (CBAM)**, for which carbon content reporting will be mandatory from October 1, 2023, as an impending downside risk to India's exports.

Topic 22. GST COUNCIL TO DISCUSS DEMAND OF CGST AND IGST REFUND IN 11 HILL STATES

Important for subject: Economy

GST Council is likely to discuss a demand of industrial units located in 11 Himalayan and North-Eastern states for reimbursement of full Central GST and 50% of net Integrated GST (IGST) paid.

- Currently, the Centre reimburses **58% of net CGST** and **29% net IGST** under the **Scheme of budgetary support** notified in October 2017.
- But the industrial units located in the Himalayan and North-Eastern states have been seeking implementation of a mechanism for reimbursement of balance 42% of the CGST and 21% of the IGST paid by them in cash along with appropriate interest.
- States are reluctant to reimburse their share of CGST and IGST collection they receive on account of tax devolution **citing unsatisfactory revenue growth** and **implementation of similar schemes** by the state to incentive industries.
- In the pre-GST era of excise duty, industrial units in J&K, Himachal Pradesh, Uttarakhand, Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and Tripura enjoyed a tax holiday.

Scheme of budgetary support (SBS)

- The Department of Industrial Promotion and Policy (DIPP) has notified a scheme to extend budgetary support to manufacturing units operating in the **backward areas**, which were availing central excise benefits under the **erstwhile areabased exemption** notifications under different Industrial Promotion Schemes of the Government of India.
- This includes all the 11 hill states of India, namely, Jammu and Kashmir, Himachal Pradesh, Uttarakhand, Arunachal Pradesh, Manipur, Nagaland, Sikkim, Assam, Tripura, Nagaland and Meghalaya

Topic 23. GLOBE RULES PILLAR II TO COME IN ACTION SOON

Important for subject: Economy

Organisation for Economic Co-operation and Development (OECD)'s **Base Erosion and Profit Shifting (BEPS)** emerged in 2015 in an effort to set rules for taxing international business income especially in the digitalised and globalised business environment.

- OECD's BEPS 1.0, published in 2015, comprised **15 action plans** that aimed to enhance transparency, prevent treaty abuse, align taxation with substance, and ensure that **profits are taxed where the economic activities generating the profits are conducted** and **where value is created**.
- India's **adoption of the equalisation levy**, **significant economic presence, interest**

limitation rules, and **country-by-country reporting (CbCR)** under BEPS 1.0 aimed to capture tax revenues from the digital economy and prevent profit shifting.

- BEPS 1.0 Action Plans while changing the international tax systems to a certain extent failed in addressing the **tax challenges arising from the digitalisation of the economy**.
- To achieve the unfinished work of BEPS 1.0 the **Global Anti-Base Erosion (GloBE) Rules Pillar One** It proposes to tax large multi-national enterprises (MNEs), defined as having a global turnover of more than 20 billion euros—in jurisdictions where they have a significant consumer presence, even if they lack a physical presence .
- Initially the Pillar One targeted MNEs engaged in the business of **Automated Digital Services (ADS)** and **Consumer Facing Businesses (CFB)**, the **revised framework** issued in 2021 **expanded the scope** to all MNEs satisfying the turnover threshold criteria.
- Although the reforms are steered by the OECD, developing countries have been involved in it indirectly. An **Inclusive Framework (IF)** was formed by 142 countries (including India) and all of them, except Pakistan, Sri Lanka, and Nigeria, have come together to endorse the BEPS 2.0 proposals.
- India is an IF member and a signatory to the 'common approach', whereby it has committed to respect the rights of other IF countries to impose legitimate top-up taxes on eligible entities.

Relevance for India:

- It is not necessary under the Pillar Two-GloBE Rules for **each IF jurisdiction** to adopt the GloBE rules **to trigger a compliance obligation** for the MNEs. Thus these will be applicable to India too.
- The GloBE Rules have been framed and agreed to be applied as a **'common approach'**. This means that jurisdictions are **not required to formerly adopt the GloBE rules**, but if they choose to do so, they agree to implement and administer them in a way that is consistent with the agreed outcomes set out under those rules.
- One jurisdiction accepts the application of the GloBE Rules by another in respect of MNEs operating in its jurisdiction. This implies that India-headquartered MNEs having presence in jurisdictions which have already adopted the GloBE Rules need to

gear up and be prepared to comply with the legislative provisions of the rules.

Global Anti-Base Erosion (GloBE) Rules

- **Pillar One: Profit Allocation and Nexus**
- Pillar One, which applies to large multinationals, will reallocate certain amounts of taxable income to market jurisdictions, resulting in a change in effective tax rate and cash tax obligations, as well as an impact on current transfer pricing arrangements.
- the scope of covered businesses has moved far from the original intention of highly digitalized business models. Extractives and regulated financial services are exempt, but other industries are generally in scope.

Pillar Two: Global Minimum Taxation

- Pillar Two aims to ensure that income is taxed at an appropriate rate and has several complicated mechanisms to ensure this tax is paid. The rules are complex and will require substantial new forms of financial data that tax departments may not currently have access to within their organization.
- In 2021, the OECD/G20 **Inclusive Framework (IF)** on **Base Erosion and Profit Shifting (BEPS)** released **Model Global Anti-Base Erosion (GloBE) rules (Model Rules)** under Pillar Two. These Model Rules set forth the "**common approach**" for a Global Minimum Tax at **15 percent** for multinational enterprises with a turnover of more than **EUR750 million**.

Topic 24. BANK LOCKER AGREEMENTS: RBI'S CONDITIONS, CUSTOMER COMPLAINTS

Important for subject: Economy

The Reserve Bank of India's (RBI) stipulation that **bank locker owners should renew their locker agreements on a stamp paper within a set of new deadlines** has sent locker owners scrambling to comply, as banks have started asking customers for inking new agreements on stamp papers and hiking charges across the board.

- The central bank had asked banks to notify **all their customers of the revised requirements by April 30, 2023** and **ensure that at least 50 per cent and 75 per cent of their existing customers have executed the revised agreements** by June 30

and September 30, 2023 respectively.

- A **New Bank Locker Rule has come into effect from January 1, 2023, according to a Reserve Bank of India (RBI) notification**.
- Over the past few days, many Banks have sent text messages to customers to renew their safe deposit locker agreements. As part of this, **existing locker depositors were required to furnish proof of eligibility for a renewed locker arrangement**.
- Additionally, they were **required to sign a renewal agreement** by December 31, 2022.
- While some customers have received messages regarding the bank locker agreement from their lenders, others are saying that they haven't got any such instructions from their banks. This, indeed, leaves a question mark on the consequences for such locker-holders as the deadline has already lapsed.
- It is in this context, that RBI has extended the deadline for banks to renew locker agreements with existing locker customers in a phased manner to December 31, 2023.

Locker Agreement:

- At the time of allotment of the locker to a customer, the bank shall enter into an agreement with the customer to whom the locker facility is provided, on a paper duly stamped.
- A copy of the locker agreement in duplicate signed by both parties shall be furnished to the locker- hirer to know his/her rights and responsibilities. Original
- Agreement shall be retained with the bank's branch where the locker is situated.

Topic 25. HOW A LITHIUM DEAL BETWEEN TWO COMPANIES IN FRANCE & UK IS AN OPPORTUNITY FOR INDIA'S EV SECTOR

Important for subject: Geography

A deal between a **French minerals company** and a **British startup** aims to produce enough lithium to run half a million EVs a year, according to media reports.

- **Imerys**, a **Paris-based industrial supplier,** acquired **80 per cent** of **British Lithium**, a small private company based in the **United Kingdom** that's extracting lithium from Cornwall in southwest England.
- Jointly, they will develop a mine that they estimate will ultimately provide enough

lithium to produce **20,000 tonnes of lithium carbonate** a year.

- **India**, **France** and **the U.K.** being part of the **Mineral Security Partnership,** can establish a **trilateral strategic partnership** to establish a **secure and reliable lithium supply chain.**

India's efforts for the EV sector:

- **India** has been pushing for **indigenous manufacturing** of **EV batteries** to foster an **electric mobility ecosystem** and achieve **30 per cent electrification** of its national fleet by the year **2030**.
- India joined the **Mineral Security Partnership** recently, to secure the supply chain of critical minerals.
- Recently **ministry of Mines** has released a **list of 30 critical minerals.**
- The **S&P Global India Manufacturing Purchasing Managers' Index (PMI)** rose from **57.2** in April to **58.7** in May 2023, indicating growth in the country's manufacturing sector.

Lithium:

- Lithium (Li), sometimes also referred to as **'White gold'** due to its high demand for rechargeable batteries, is a **soft and silvery-white metal**.

Extraction:

- Lithium can be extracted in different ways, depending on the type of the deposit — generally either through **solar evaporation of large brine pools**, or from **hard rock extraction of the ore**.

Uses:

- Lithium is an important component of **electrochemical cells used in batteries of EVs, Laptops, Mobiles** etc.
- It is also used in **thermonuclear reactions**.
- It is used to make alloys with **aluminium and magnesium**, improving their strength and making them lighter.
- **Magnesium-lithium alloy** – for armour plating.
- **Aluminium-lithium alloys** – in aircraft, bicycle frames and high-speed trains.

Major Global Lithium Reserves:

- **Lithium Triangle:** Chile, Argentina, Bolivia.

Lithium Reserves in India:

- A preliminary survey showed estimated lithium reserves of 14,100 tonnes in a small patch of land surveyed in Southern Karnataka's Mandya district.

Other potential sites:

- Mica belts in Rajasthan, Bihar, Andhra Pradesh.
- Pegmatite belts in Odisha and Chhattisgarh.
- Rann of Kutch in Gujrat.

Topic 26. INDIA URGES ADHERENCE TO 2016 RULING FAVOURING THE PHILIPPINES IN THE SOUTH CHINA SEA

Important for subject: Geography

India called for adherence to the **2016** arbitration decision in favour of the **Philippines**, which has been rejected by China.

- The negotiations are continuing between **China** and the **ASEAN bloc** for a **code of conduct** in the **South China Sea** — which diplomatic sources described as a **"complex exercise"** involving **11 countries.**

Conflict over South China Sea:

- The **Philippines** instituted an **arbitration proceeding against China** in the **Permanent Court of Arbitration** under **UNCLOS** on January 22, 2013.
- The court ruled in favour of Manila on **July 12, 2016**, but this was rejected by **China**, which had called it **"null and void."**
- China does not recognise the ruling and **did not participate in the deliberations** at **The Hague.**
- **China**, which claims rights to most of the **resource-rich South China Sea** up to the **nine-dash line**, has become more assertive in recent years.

South China Sea:

- **Location:** South China Sea is an arm of the **western Pacific Ocean** in **Southeast Asia.** It is **south of China, east & south of Vietnam**, **west of the Philippines** and **north of the island of Borneo.**
- It is **connected by Taiwan Strait** with the **East China Sea** and by **Luzon Strait** with the **Philippine Sea.**
- **Bordering states & territories (clockwise from north):** The People's Republic of China, the Republic of China (Taiwan), the Philippines, Malaysia, Brunei, Indonesia, Singapore and Vietnam.
- **Strategic Importance:** This sea holds **tremendous strategic importance for its location** as it is the **connecting link between the Indian Ocean and the Pacific Ocean** (Strait of Malacca).
- According to the **United Nations Conference on Trade And Development (UNCTAD) one-third of the global shipping passes through it**, carrying trillions of trade which makes it a significant geopolitical water body.

Reasons for Dispute in the South China Sea:

Contesting Claims Over Islands:

- The **Paracel Islands** are claimed by **China, Taiwan** and **Vietnam.**
- The **Spratly Islands** are claimed by **China, Taiwan, Vietnam, Brunei** and **the Philippines**.
- The **Scarborough Shoal** is claimed by **the Philippines, China** and **Taiwan.**

China's Assertion:

- Since **2010**, **China** has been **converting uninhabited islets into artificial islets** to bring them under **UNCLOS** (examples would include Haven Reef, Johnson South Reef and Fiery Cross Reef).
- **China** has been **changing the size and structure of the reefs** by modifying their physical land features. It has also established airstrips on Parcel and Spratly.
- **Chinese fishing fleets** are engaged in **paramilitary work on behalf of the state** rather than the commercial enterprise of fishing.
- The **US** is very critical of this building of artificial islands and terms these actions of China as building a 'great wall of sand'.

Other Issues:

- The undefined geographic scope of the **South China Sea** disagreement over dispute settlement mechanisms.
- The **undefined legal status** of the **Code of Conduct (COC)** adds to it.
- The different histories of distant, largely uninhabited archipelagos of the sea make the matter more complicated and multifaceted.

Topic 27. INDIA AND CHINA RAMP UP INFRA ON NORTH BANK OF PANGONG LAKE

Important for subject: Geography

Three years after the violent clash between Indian and Chinese forces in Galwan both countries ramp up infrastructure on north bank of Pangong Tso.

About Pangong Tso lake:

- It is one of the most famous lakes in Leh Ladakh, derives its name from the Tibetan word, "Pangong Tso", which means "high grassland lake".
- It is also known as Pangong Lake which is a long narrow, endorheic (landlocked) lake situated at a height of more than 14,000 ft (4,350 meters) in the Ladakh Himalayas.
- It is the world's highest saltwater lake.
- India holds one-third of the 135 km-long boomerang-shaped Pangong lake.
- One-third of the Pangong Lake lies in India and the other two-thirds in China.
- It is also known to change colours, appearing blue, green, and red at different times.

Topic 28. DEEP SEA MINING PERMITS MAY BE COMING SOON. WHAT ARE THEY AND WHAT MIGHT HAPPEN?

Important for subject: Geography

The **International Seabed Authority** — the **United Nations body** that regulates the **world's ocean floor** — is preparing to resume negotiations that could open the international seabed for mining, including for materials critical for the green energy transition.

WHAT IS DEEP SEA MINING?

- **Deep-sea mining** involves **removing mineral deposits and metals from the ocean's seabed**.
- There are **three types of such mining:** Taking **deposit-rich polymetallic nodules** off the ocean floor, Mining massive seafloor sulphide deposits and Stripping cobalt crusts from rock.
- These **nodules, deposits** and **crusts contain materials,** such as **nickel, rare earths, cobalt** and more, that are needed for **batteries and other materials used in tapping renewable energy** and also for **everyday technology like cellphones and computers**.
- **Technology involved:**
- **Engineering and technology used for deep sea mining are still evolving**. Some techniques considered by the companies are:
- **Vacuuming the materials from the seafloor using massive pumps.**
- **Developing artificial intelligence-based technology that would teach deep sea robots how to pluck nodules from the floor**.
- **Using advanced machines that could mine materials off the side of huge underwater mountains and volcanoes**.

HOW IS DEEP-SEA MINING REGULATED NOW?

- **Countries manage their own maritime territory and exclusive economic zones,** while the **high seas and the international ocean floor** are governed by the **United Nations Convention on the Law of the Seas**.
- It is considered to apply to states regardless of whether or not they have signed or ratified it.
- Under the **treaty**, the **seabed and its mineral resources** are considered the **"common heritage of mankind"** that must be managed in a way that protects the interests of humanity through the sharing of economic benefits, support for marine scientific research, and protecting marine environments.
- **Mining companies** interested in **deep sea exploitation** are partnering with countries to help them get **exploration licenses**.
- **More than 30 exploration licenses have been issued so far**, with activity mostly focused in an area called the **Clarion-Clipperton Fracture Zone**, which **spans 1.7**

million square miles (4.5 million square kilometers) between **Hawaii and Mexico.**

WHY IS THERE PRESSURE ON THE ISA TO ESTABLISH REGULATIONS NOW?

- In **2021** the Pacific island nation of **Nauru** — in partnership with mining company **Nauru Ocean Resources Inc**, **a whollyowned subsidiary of Canada-based The Metals Company** — applied to the **ISA** to **exploit minerals in a specified deep sea area**.
- That triggered a **clause** of the **UN treaty** that requires the **ISA to complete regulations governing deep sea exploitation** by **July 2023**.
- **If no regulations are finalized, Nauru can submit an application to conduct the mining without any governing regulations.**
- Other countries and private companies can start applying for provisional licenses if the UN body fails to approve a set of rules and regulations by **July 9**.

WHAT ARE THE ENVIRONMENTAL CONCERNS?

- **Only a small part of the deep seabed** has been **explored** and conservationists worry that **ecosystems will be damaged by mining**, especially **without any environmental protocols**.
- Damage from mining can include **noise, vibration** and **light pollution**, as well as possible **leaks and spills of fuels** and other **chemicals used in the mining process**.
- **Sediment plumes from some mining processes** are a major concern.
- Once valuable materials are taken extracted, **slurry sediment plumes are sometimes pumped back into the sea.**
- That can harm **filter-feeding species** like **corals** and **sponges** and could **smother or otherwise interfere with some creatures**.
- Scientists have warned that **biodiversity loss is inevitable and potentially irreversible**.

WHAT'S NEXT?

- The **ISA's Legal and Technical Commission,** which **oversees the development of deep-sea mining regulations**, will meet in early July **to discuss the yet-to-bemining code draft**.

- In the meantime, some companies — such as **Google, Samsung, BMW** and others — have backed the **World Wildlife Fund's call to pledge to avoid using minerals that have been mined from the planet's oceans.**
- More than a dozen countries—including **France, Germany and several Pacific Island nations**— have **officially called for a ban**, **pause or moratorium on deep sea mining** at least **until environmental safeguards are in place**.
- Other countries, such as **Norway**, are proposing opening their waters to mining.

About International Seabed Authority:

- It is an **autonomous international organization** established under the **1982 United Nations Convention on the Law of the Sea (UNCLOS).**
- **Mandate:** It has the mandate to ensure the effective protection of the marine environment from harmful effects that may arise from deep-seabed-related activities.
- It has its **headquarters** in **Kingston, Jamaica**
- Its primary function is to regulate the exploration of poly-metallic nodules.

What are poly-metallic nodules?

- Polymetallic nodules are rounded accretions of manganese and iron hydroxides that cover vast areas of the seafloor.
- These are most abundant on abyssal plains at water depths of 4000-6500 metres.
- They are mainly found in the north-central Pacific Ocean, the southeastern Pacific Ocean, and the northern Indian Ocean.

Topic 29. JOWAR CAN EMERGE AS INDIA'S SUSTAINABLE ALTERNATIVE TO WHEAT, SAYS STUDY

Important for subject: Geography

Climate experts have been warning that an **increase in temperatures due to climate change could adversely impact the yield of wheat,** causing concern among wheat-growing countries such as India.

Jowar (sorghum) as an alternative:

- **Wheat is highly sensitive to increases in maximum daily temperature** during

multiple stages of its growth in the post-monsoon and dry winter seasons.

- **Jowar (sorghum)** can step in as a viable alternative.
- **Jowar** is able to **handle increases in temperature** with far less impact on yields.
- **Wheat requires 1.4 times more water than jowar** owing to the extension of its growth cycle into summer.
- The **wheat yields are likely to decrease by 5 per cent** coupled with a **significant increase in water footprint by 2040.Jowar,** in that case, is **India's best bet with its meagre 4 per cent increase in water footprint** with the same climatic projections.
- The **traditionally grown sorghum or jowar** offers resilience to projected climate changes and requires significantly less water than wheat.
- In addition to **sorghum (jowar),** we can explore **millet crops** such as **pearl millet (bajra), finger millet (ragi), foxtail millet, barnyard millet,** etc., as a suitable replacement for rice or wheat.

Wheat production in India:

- **India** is the **world's second-largest producer of wheat**, which recorded a **whopping 40 per cent** increase in production since the early 2000s.
- There is an urgent need for **climate-smart agriculture interventions,** particularly in the **rabi season.**
- The **total wheat production** in the country has **gone up** since the turn of the century due both to **increases in yield (26 per cent)** and **increases in area (17 per cent).**
- The **production of jowar**, on the other hand, **declined by 5 per cent** in the same time period. This decline is despite a **37 per cent increase in yields** and is attributed to a **21 per cent loss in the area under production**.

Jowar (Sorghum) crop:

- An important food and fodder crop cultivated across India.
- It can be cultivated in both **Rabi** and **Kharif seasons**.
- Jowar is the **5th most important cereal crop** in the world after **rice, wheat, maize & barley.**
- The **nutritional value of sorghum** is the same as that of corn and that is why it is gaining importance as **livestock feed**.

- Sorghum (or) Jowar is also used for **ethanol production, producing grain alcohol, starch production, production of adhesives** and **paper** other than being used as food and feed for livestock.
- Jowar (or) Sorghum cultivation is gaining popularity due to its **nature of extreme drought tolerance**.

Health benefits of jowar:

- Sorghum/Jowar has packed with **calcium, iron, potassium, phosphorous, protein** and **fibre.**
- It provides **good antioxidants.**
- It contains **B vitamins** like **thiamin** and **riboflavin.**
- Sorghum/Jowar is also known to be **heart-healthy** and **'Jowar Roti'** is widely used in India for its health benefits.
- Jowar helps in **weight loss.**

Major Sorghum or Jowar production states in India:

1. Maharashtra
2. Karnataka
3. Madhya Pradesh
4. Andhra Pradesh
5. Telangana
6. Tamilnadu
7. Gujrat
8. Uttar Pradesh
9. Rajasthan
10. Haryana

Local Names of Jowar in India:-

- Great Millet/Sorghum (English), Juar (Bengali, Gujarati, Hindi), Jwari (Marathi), Jola (Kannada), Jonnalu (Telugu),Cholam (Tamil, Malayalam), Janha (Oriya).

Climatic requirements for Sorghum (or) Jowar Farming:-

- Basically, jowar or sorghum is a **tropical crop.**

- It thrives well at a **temperature between 25°C and 32°C** but **below 16°C is not good** for the crop.
- **Jowar crop** requires **rainfall of about 40 cm annually.**
- Jowar is an extremely drought-tolerant crop and is recommended for dry regions.
- Too much of **moist and prolonged dry conditions are not suitable** for jowar cultivation.

Soil Requirements for Sorghum (or) Jowar Farming:-

- Sorghum or Jowar crop adapts a **wide range of soils** but **grows well in sandy loam soils** having good drainage.
- Soil pH range of **6 to 7.5** is ideal for its cultivation and better growth.
- The main field should be **ploughed and leveled** to a **fine tilth for weed-free sowing.**

Topic 30. WAS INDIA'S HOT SUMMER OF 2023 A PORTEND OF THINGS TO COME?

Important for subject: Geography

India has been experiencing more and more instances of severe heatwaves, rendering these months more and more dreadful.

Increasing trends of heatwaves:

- A recent report from the **India Meteorological Department (IMD)** indicated an **increasing trend in the number and duration of heatwaves**, based on data from March to June from **1961** to **2020**.
- This year, **heatwaves** started as early as **March 3,** and many areas reported temperatures that were higher than average. **The number of days with temperatures exceeding 30 degrees Celsius has also increased of late**.
- The **U.N. Intergovernmental Panel on Climate Change's Sixth Assessment Report** warned of **prolonged rain-free periods** along with **excessive rainfall in many parts of the world.** In recent decades, **India** has recorded several such extreme events.
- An **October 2017 study** conducted by the **Indian Institute of Tropical Meteorology (IITM), Pune,** reported that there was a **three-fold increase in widespread extreme**

events from 1950 to 2015.

Changing weather patterns

- Climate change is increasing both the **frequency** and the **intensity** of **extreme weather events**.
- The Indian monsoon is becoming short but intense with bursts of rain, and delayed withdrawal.
- **High monsoon rainfall variability** and **continuous warming** raise the **probability of dry and hot extremes,** with profound implications for **agriculture, water resources, and India's overall economy.**
- Due to **changes water cycle**, some weather events have become drier while others have become wetter which leads to **more evaporation and eventually causes more precipitation.**
- There is also a **strong connection between land and ocean heatwaves** driven by atmospheric circulation, increase in sea-surface temperature, and feedback mechanisms that exacerbate the intensity and duration of extreme temperatures.

Role of Marine heatwaves:

- The **oceans** play a key role in the **formation of monsoon winds** and in **keeping the monsoon alive.**
- When extreme heat warms their waters, the change in temperature can lead to cascading effects, such as **marine heatwaves, ocean acidification, sea-level rise,** and **ice melting faster at the poles.**
- **Marine heatwaves** are **periods of temperature much higher than the average seasonal temperature** in that region.
- The **Indian Ocean** recorded **six marine heatwaves** over a period of **52 days** in **2021.** They used to be rare in this water body but today are an annual occurrence.
- A **low pressure develops over the Indian subcontinent** when the land heats up during the summer. The **moisture for monsoon rains** is thus carried by the winds as they blow in from the Indian Ocean.
- However, **rainfall over the land decreases when ocean heatwaves occur,** as the winds are drawn to areas over the ocean instead of land.

Climate risk amplification:

- **Amplification** is what happens when certain **climate-related factors and/or events** interact with each other or happen at the same time, **intensifying or exacerbating the overall risks and consequences** associated with climate change.
- A good example is the **warm and dry conditions** that have put Canada on course for its **worst-ever wildfire destruction** this year.
- Such amplification happens in the form of various **feedback loops and interconnected processes** in the **earth's climate system** and also occurs as a result of an **El Niño, prolonged hot days, dry monsoons, and/or ocean heatwaves occurring** together, compounding risks across sectors.
- Such a combination will also affect **water availability, soil moisture, and crop output** while **increasing food prices** and **lowering incomes**.
- The **co-occurrence of heatwaves and droughts** can also lead to **wildfires, tree mortality, and a higher risk of thermal powerplant failures**.
- Ultimately, the **risks** can push sensitive and vulnerable systems over a **tipping point**, ultimately avalanching into drastic consequences for socio-ecological systems

Topic 31. JAPAN SAYS RUSSIAN WARSHIPS SPOTTED NEAR TAIWAN AND OKINAWA ISLANDS

Important for subject: International Relations

Japan and Taiwan both claim that they have spotted Russian military ships near their coastal areas.

- Japan and Taiwan have joined the United States and its allies in imposing wideranging sanctions on Russia after its invasion of Ukraine last year.
- The Japanese ministry said **two Steregushchy-class frigates** were first spotted **70 km** (40 miles) **southwest of Japan's westernmost island of Yonaguni,** in **Okinawa** prefecture near Taiwan.
- Spotted again in the waters between **Miyako** and **Okinawa islands**.
- **Russia** said that a detachment of ships of the **Russian Pacific Fleet** had entered the s**outhern parts of the Philippine Sea** to perform tasks as part of a long-range sea passage.

Japan-Russia dispute over Kuril Island:

- The **Kuril Islands dispute** between **Japan** and **Russia** is over the **sovereignty of South Kuril Islands.**
- The **South Kuril Islands** comprise **Etorofu island, Kunashiri island, Shikotan island** and the **Habomai island.**
- These islands are claimed by **Japan** but occupied by **Russia** as the successor state of the Soviet Union.
- **Japan** is also having a similar dispute regarding **Northern territories** with **South Korea**. **South Korea** refers to as **Dokdo islands**.

What is the Geographic Location and Significance of the Kuril Islands?

- **Location:**
- The **Kuril Islands** are stretched from the **Japanese island of Hokkaido** to the southern tip of **Russia's Kamchatka Peninsula** separating the **Okhotsk Sea** from the **North Pacific Ocean.**
- The chain is part of the belt of geologic instability circling the **Pacific (Ring of Fire)** and contains **at least 100 volcanoes**, of which **35 are still active, and many hot springs**.

Significance:

- **Natural resources:** The islands are surrounded by rich fishing grounds and are thought to have offshore reserves of oil and gas.
- **Strategic Importance:** Russia has deployed missile systems in the region. Russia also plans a submarine project and intends to prevent any American military use of the islands.
- **Cultural Importance:** The Japanese people, especially conservatives in Hokkaido, are emotionally attached to the islands.

Topic 32. WHAT ARE THE RISKS FACED BY ZAPORIZHZHYA, THE NUCLEAR POWER PLANT IN A WAR ZONE?

Important for subject: International Relations

In June, a **Lithuania-based NGO** named the **Bellona Foundation** published a report, analysing the **risks** associated with the hostilities around, near, or at the **Zaporizhzhya NPP,** based on the facility's design, safety measures, and the local geography.

What is the reactor design at Zaporizhzhya?

- **Zaporizhzhya NPP** is located **southwest of Zaporizhzhia city**, along the **Dnieper River**.
- It has **six VVER-1000 reactors** providing a total power-generation capacity of 6 GW.
- The **reactor complex** consists of the **reactor vessel**, in which **fuel rods are submerged in water**.
- **Control rods** are **inserted at the top**.
- The **water acts as both coolant and moderator**.
- A **pressuriser** holds the water at a **high** but **constant pressure** (around 150 atm) to prevent it from boiling. This is the **primary cooling circuit.**
- As the water heats up, the heat is moved to a **secondary cooling circuit**, where it converts a separate resource of water into steam. This steam is fed to turbines that generate electricity.
- In this design, the **primary coolant and the moderator** are the **same substance (water),** and it doesn't leave the reactor vessel at any time.

Is Zaporizhzhya comparable to Chernobyl?

- The report says that any damage to the **Zaporizhzhya NPP** is unlikely to play out in the same fashion or at the same scale.
- The **principal difference** between **Chernobyl** and **Zaporizhzhya** is that the **former had RBMK reactors** and the latter has **VVER-1000 reactors** (this is the same reactor design installed at the **Kudankulam NPP** in **India**).
- **Zaporizhzhya** also takes advantage of safety measures installed in the aftermath of the Chernobyl and Fukushima disasters.
- In **RBMK reactors** like at **Chernobyl**, the **coolant and the moderator are different**

(light water and nuclear graphite, respectively). And the **coolant,** which is **radioactive from having been exposed to the nuclear fuel**, flows out of the reactor vessel.

- One of the reasons **Chernobyl** was so bad is that **when the reactor was breached, the superhot graphite caught fire** when it came into contact with air.
- Unlike Chernobyl, the **VVER-1000 reactor** and its **power-generation units** at **Zaporizhzhya** are also placed inside a **large airtight chamber** called a **containment**. Its walls are **120-cm thick** and made of **pre-stressed concrete.**

Risk factors:

- The **principal danger** here is that the **primary water circuit could depressurise** as steam and escape into the air, along with **radioactive material** and other volatile substances.
- This **mixture** will contain the **isotope iodine-131**, which is easily dispersed by winds and accumulates in and damages the **thyroid gland in humans**. It has a **half-life of around eight days** and so it would only pose a threat for several weeks.
- A breach and **depressurisation** would also release **caesium-137**, which has a **half-life of 30 years** and was responsible for contaminating much of **Chernobyl's** surroundings after the accident.

Report recommendations:

- On June 6, 2023, the **Kakhovka dam**, which is downstream of the **Zaporizhzhya NPP** and in whose reservoir the plant is located, was breached.
- The **Bellona report** suggested that the **walls of the pond were built to withstand a water-level differential of 6 metres.**
- After considering the possibility of this breach as well, the report made the following recommendations (reworded):
- All reactors should be in shutdown or cold-shutdown states
- There should be no effort to move fuel at the same time as hostilities around the plant Hostilities should be kept out of the territory of the plant itself If/when Russian troops withdraw from the plant, plant staff should be rehabilitated

Kudankulam Nuclear Power Plant:

- Kudankulam NPP or KKNPP is the **largest nuclear power station in India**, situated in **Kudankulam** in the **Tirunelveli district** of the southern Indian state of **Tamil Nadu**.
- Construction on the plant began on 31 March 2002, but faced several delays due to opposition from local fishermen.
- KKNPP is scheduled to have **six VVER-1000 reactors** built in collaboration with **Atomstroyexport,** the **Russian state company** and **Nuclear Power Corporation of India Limited (NPCIL)**, with an installed capacity of **6,000 MW of electricity**.

Topic 33. NEW PARLIAMENT BUILDING: IN PHASE 2 OF ART PROJECT, FOCUS ON INDIAN TRADITIONS AND FREEDOM MOVEMENT

Important for subject: History

The **new Parliament building** houses an extensive collection of around **5,000 artworks**, but, just over a month into its **inauguration**, plans are already afoot for the next phase of the art project, which will focus on the freedom movement and Indian traditions.

- The cost of the overall building project is estimated to be **more than Rs 1,200 crore**.
- The next phase will include around **eight new galleries** — split equally between the **Lok Sabha and Rajya Sabha Foyers** — besides artwork to adorn the dining halls.

Lok Sabha Foyer:

- A gallery dedicated to India's **"fight for esteem, pre-1857"** will come up on the **upper ground floor** of the **Lok Sabha Foyer**, besides another highlighting the **freedom struggle (1857 to 1947).**
- The **Indira Gandhi National Centre for the Arts (IGNCA)** will execute the project under the aegis of the Ministry of Culture.

The **first floor** will also have **two galleries**:

- One on the role of women in the nation's development and Another one showcases the role of tribal leaders in the freedom movement.
- The **Samudra Manthan mural,** which adorns the **Lok Sabha wall** in the **Central Foyer,** signifies the **churning of ideas and thoughts for public welfare**.

Rajya Sabha Foyer:

- The **Rajya Sabha Foyer** will have **two new galleries** on the upper ground floor (on **India's knowledge and Bhakti traditions**) and **two on the first floor** (on the **Indian connection with nature and traditional sports**).
- The other walls of the building will be decorated with shlokas and other sacred symbols.
- The basic idea was to **keep Indian ethos in mind** and showcase **Bharat and Bharatiyata.**

Diverse representation:

- A decorated wall of the **Central Foyer,** named **Jan Janani Janmabhoomi,** had **75 women artisans** create crafts representing **28 states and eight UTs**.
- Another gallery called **Shilp Deergha** had more than **250 craft pieces** sourced from 400 artisans from across the country.

Present Parliament:

- The **present Parliament building** was inaugurated in **1927,** this was designed by **Lutyens and Baker.**
- The **Rashtrapati Bhavan** was designed by **Edwin Lutyens** and the secretariat that includes both **north and south block** was designed by **Herbert Baker**.
- The **"North"** and **"South" Blocks** are named so for their location north and south of the Rashtrapati Bhavan.

Topic 34. THE JOURNEY OF BENGAL ART AND PAT PAINTING

Important for subject: History

Bengal art is a journey of different perspectives, of creative expressions through the cultural and political lens, of personal and private trials and tribulations, pathos of the great Bengal famine, many incidents of devastation during Partition and more.

- Artworks of **Abanindranath Tagore, a pioneer of the Bengal School, Jamini Roy, Gaganendranath Tagore, Benode Bihari Mukherjee, Nandlal Bose, Hemen Majumdar, Paresh Maity, Anjolie Ela Menon, Arpita Singh** and several others highlight the artist's contribution to creating a comprehensive understanding of Indian art.

Pattachitra painting:

- This form of art is **closely related to the cult of Shri Jagannath and the temple traditions in Puri.**
- It is believed to have originated as early as the 12th century

Region:

- The art is based in the eastern **Indian states of Odisha, West Bengal and parts of Bangladesh.**
- People in Odisha practice it to this day.

Etymology:

- It is a Sanskrit word.
- When broken down into its two parts, Patta means cloth, and Chitra means picture.
- Hence, Pattachitra is a picture painted on a piece of cloth.

Painting process:

- Traditionally the painters are known as chitrakars.
- Chitrakars follow a traditional process of preparing the canvas.
- A gauze-like fine cotton cloth is coated with white stone powder and gum made out of tamarind seeds.
- This makes the canvass ready to accept the paint, made of natural colors.
- The gum of the kaitha tree is the chief ingredient, used as a base for making different pigments by adding available raw materials.
- Following completion of a painting, the canvas is held over a charcoal fire and lacquer is applied to the surface.
- In recent days Chitrakars have also painted on palm leaves and Tussar silk and have created wall hangings and showpieces.

Significant features:

- Pattachitra is **predominantly icon painting**.
- A floral border is a must around the paintings, and so is the use of natural colors.
- The paintings are executed primarily in profile with elongated eyes.
- Generally, there are no landscapes, perspectives, and distant views.
- The dress style has Mughal influences.

Some of the **popular themes of this religious art are:**

- The **Badhia**(a depiction of the temple of Jagannath); Different "**Vesas" of Shri Jagannath, Balabhadra and Subhadra.**
- **Krishna Lila** (an enactment of Jagannath as Lord Krishna displaying his powers as a child);
- **Dasabatara Patti** (the ten incarnations of Lord Vishnu); and
- **Panchamukh**i (a depiction of Lord Ganesh as a five-headed deity).

Topic 35. PUBLIC IMPACT, SENSITIVITY AND RIGHTS VIOLATION: FACTORS THAT CAN OPEN SC'S PORTAL

Important for subject: Polity

Saturday saw the Supreme Court constitute two separate Benches, one after the other, to hear a plea by activist Teesta Setalvad for interim protection from arrest, sending a strong signal that questions of personal liberty cannot wait after the weekend.

- Whether a case deserves to be listed urgently during the weekend in the top court is **entirely the Chief Justice of India's discretion.**
- **Public impact of a particular case, political sensitivity involved, dire risk to a guaranteed right** may be some of the factors which guide judges to list a case on a weekend.
- The past few years, there have been Special Benches constituted during the weekends on various matters.

Divison Bench of SC

- Judges sit on **division benches**, **which often have two or three people**.
- The **Chief Justice of India is granted the power** to name benches as part of his administrative responsibilities under the Supreme Court Rules.
- To hear conflicts between parties, rule on legal issues, and finally administer justice to the wronged and innocent, there must be one judge or several benches of judges.
- These benches have been established over the years to decide a variety of situations of legal significance.
- Every case must be heard by the division bench, a two-judge panel selected by the Chief Justice of India, in accordance with the Supreme Court Rules of 2013.
- The **Chief of India may also convene a full bench of three judges or a constitutional bench of five or more judges to hear cases of greater importance.**

Constitution Bench

- A **Constitution Bench is a special bench of the Supreme Court having 5 or more judges on it.**
- These benches are not a common phenomenon. Constitution Benches are exceptions,

set up only if ;

- The case involves a significant question of law pertaining to the interpretation of the Constitution [**Article 145(3) of the Constitution, which mandates that such matters be heard by a bench of not less than five judges]**
- Two or more benches of the Supreme Court have delivered conflicting judgments on the same point of law.
- The Constitution Benches are **set up on an ad hoc basis** and when the need arises.
- Constitution Bench is constituted in rare cases to decide important questions of fact or legal and/or constitutional interpretation.

Topic 36. CRIMINALIZATION OF POLITICS: WHY ADR HAS APPROACHED THE ECI

Important for subject: Polity

Recently, the Association for Democratic Reforms (ADR), wrote to the Election Commission seeking **action against parties that fail to publish details of criminal antecedents of candidates as per orders of the Supreme Court and the poll panel.**

- ADR is an electoral watchdog established in 1999 by a group of professors from the Indian Institute of Management (IIM) Ahmedabad.

Criminalization of politics

- The criminalization of politics refers to the phenomenon where individuals with criminal backgrounds, including those charged or convicted of criminal offenses, actively participate in politics.
- Several politicians with criminal records have managed to secure positions in legislative bodies, ranging from local municipalities to the national Parliament.
- This trend cuts across party lines and affects politicians from various political parties.

2018 Judgement

- In September 2018, the Supreme Court decided that political parties must share information about the criminal cases pending against their candidates.
- This includes publishingsuch information on the websites of respective political parties in a format specified by the Election Commission of India.

- The candidates did declare the cases pending against them in their election affidavits to the ECI before the ruling.
- However, the Supreme Court order made it mandatory for the information to be widely published.
- It directed parties to publish the details of criminal cases pending against a candidate in bold letters and told the candidate with pending cases to inform the party about these cases.
- The court also ordered that the candidate and the party have to publish the information at least thrice after filing the nomination.

2020 Judgement

- In February 2020, the apex court reiterated that the parties would have to publish the details of candidates with pending criminal cases.
- SC was hearing a contempt petition regarding its 2018 order not being implemented.
- It also added that they would have to include the reasons for selecting such a candidate.
- As per the court, the reasons as to selection shall be with reference to the qualifications, achievements and merit of the candidate concerned, and not mere winnability at the polls.
- According to this ruling, political parties must publish the information about criminal cases against their candidates in a local vernacular newspaper, a national newspaper, and on their official social media platforms.
- They must do this within 48 hours of candidate selection or at least two weeks before the first nomination date, whichever comes earlier.
- The parties would then have to submit a compliance report with the ECI within 72 hours.

How are political parties flouting the Supreme Court's orders?

- According to ADR, political parties are flouting the Supreme Court's orders and the ECI's subsequent directions.
- Many political parties did not have functional websites to publish the information.
- Those that did had not maintained the information and/or had inaccessible website

links.

- The ADR letter point out that parties were citing chances of winning, the popularity of the person as among the reasons.
- The SC had said that a party cannot use winnability as a reason for selecting a candidate with criminal antecedents.
- The parties were also copy-pasting the similar justifications for multiple candidates.

Topic 37. CENTRE'S POTABLE WATER MISSION MAY MISS 2024 TARGET

Important for subject: Government Schemes

The government's ambitious **Har Ghar Jal initiative** to provide **all rural households in India with potable water connections by 2024** under its flagship **Jal Jeevan Mission** is likely to fall short of its target.

- Only **75%** of village homes are likely to have taps delivering drinking water by April 2024.
- At the time of the announcement of the scheme in 2019, o**nly 16% of rural households** had tap water.

The scheme got delayed due to:

- The COVID-19 pandemic, A dearth of qualified manpower in the States to make tanks, cisterns and water connections of acceptable quality.
- The scale of the exercise, State-specific issues and The ongoing Russia-Ukraine war led to a shortage of steel and cement for the construction of pipes.

Expected timeline for completion of the project:

- About **75% of households** are to be covered by **March 2024** and **80% by December.**
- Of the **nearly 19.5 crore households** that are targeted under the scheme, there are **about one crore households (5% of the total)** where work hasn't even begun.

Jal Jeevan Mission:

- Launched in **2019** Comes under the **Jal Shakti ministry.**
- The **Jal Jeevan Mission** has a **financial outlay of ₹3.60 lakh crore,** with the **Centre funding 50%** of the cost and the remainder being borne by States and Union

Territories.

- The **mission's stated objective** is to provide **'functional' tap connections that give at least 55 litres per person per day, of potable or drinking water.**
- So far, according to data on the **Jal Shakti Ministry portal**, about **63% of rural households have tap connections,** meaning that **about 9.1 crore households** have benefitted from the programme since 2019.

System of certification under the scheme:

- There is a **system of 'certification'** wherein the **gram panchayats in a village** which **district and block level authorities report** as fully connected call a **quorum**, and upload a video attesting the veracity of the claim.
- Of the nearly **1,68,000 villages** that are reported as **'Har Ghar Jal'** where all houses have tap water, **only 58,357 villages have been so 'certified',** suggesting that the gap between reported and verified connections is wide.

Two mechanisms for independent verification:

- **An independent audit agency** conducts a survey by preparing a representative sample and interviewing respondents on whether the installed water connections are actually delivering water to their satisfaction.
- **A panel of National WASH (Water, Sanitation and Hygeine) experts** who appraise a section of villages on the quality of services provided. Their feedback is immediately provided to States and to us.
- One such survey was **conducted in October 2022**, covering **13,303 villages,** of which **5,298** were reported as **Har Ghar Jal villages** and consisting of nearly **300,000** households.
- It was found that **only 62% of households had fully functional connections**.

A scenario in various states:

- Of the **top 10 States** that have reported **over 96% of coverage**, **two** — **Bihar** and **Telangana** — have **zero villages that have certified their connection status.**
- This was because **both States did not rely on Central funds** for their drinking water supply programmes.
- **Only eight States and Union Territories** so far have reported all their villages as

100% connected, but nearly **all of them were well connected in 2019 itself**, according to data on the web portal.

- **Haryana, Gujarat and Punjab** – the largest of these States – already had **over 50% coverage in 2019.**
- In **Uttar Pradesh**, **only 5.1 lakh (or 1%)** of households **reported tap connections** in 2019.
- This grew to **32 lakh by August 2021** and then **grew slower to 42 lakh by August 2022**.
- In the **last 10 months,** it jumped to **1.3 crore** or **about half the total rural households** in the State.
- However, of **U.P.'s 98,455 villages, only 13,085 have reported being fully connected and only 2,837 of them have certified themselves**.
- Thus, **only about 3% of U.P. villages** can be said to be **100% certified as Har Ghar Jal villages**.
- **In Rajasthan**, **11 lakh households** had tap connections in **2019**, which has risen to about **44 lakh in June 2023**.
- Of its **43,249 villages**, **only 1,146 are reportedly fully connected, only half of which have been certified so.**
- **In West Bengal**, where the number of connected households **grew from 2.1 lakh to 62 lakh between 2019 and 2023**, the number of villages **reporting 100% connections are 2,654** or about **6%** of the State's villages Of these, only about a fourth are certified.