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PIONEER ACADEMY's

PATHFINDER

CURRENT AFFAIRS FOR CIVIL SERVICES

Topic 1. CLEAN MARINE HUBS

Important for the subject :Economy

Clean Energy Marine Hubs initiative is a new global platform to **scale up low carbon fuel production and achieve greener supply chains globally.**

To move to low carbon fuels in addition to production, the logistics networks needs to be an integral part of the global clean energy transition.

- The first of its-kind platform brings together the private sector and governments across the **energy maritime value chain** to transform maritime transportation and production hubs for future low-carbon fuels.
- The initiative is jointly led by players in the private sector and governments working in close collaboration.
- The initiative is backed by canada, norway, panama, uruguay and the uae, in partnership with the **international chamber of shipping (ICS)** and the **international association of ports and harbours (IAPH).**

Clean Energy Ministerial (CEM)

- It is a partnership project of the worlds key economies work-ing together to accelerate the global clean energy trans-ition.
- CEM brings together the world's largest and leading countries, international organisations and companies to achieve a single mission: accelerate clean energy transitions.
- Initiatives and campaigns are based on areas of common interest among participating governments and other stakeholders.
- The 29 participating CEM Members are: Australia, Brazil, Canada, Chile, China, Denmark, the European Commission (on behalf the European Union), Finland, France, Germany, India, Indonesia, Italy, Japan, Korea, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Russia, Saudi Arabia, South Africa, Spain, Sweden, South Africa, the United Kingdom, and the United States.
- The Framework for the Clean Energy Ministerial, reaffirmed at the twelfth Clean Energy Ministerial in 2021, defines the CEM governance structure and outlines the mission statement, objectives, membership, and guiding principles.
- The CEM Secretariat is hosted by the IEA since 2018.

Challenges:

- The maritime energy value chain is far from ready to transport the in-flux of low carbon fuels that are expected between now and 2050.
- To feed the demand, the shipping industry is expected to transport at least 50 per cent of all traded low carbon fuels by 2050, according to the **International Renewable Energy Agency (IRENA).**
- The production centres, vessels and port infrastructure required to accommodate expected demand do not currently exist at commercial scale.

- For **hydrogen derivatives**, such as ammonia and other low carbon fuels moved by ships, the scale is far from what heavy industries, transport and other sectors would require.
- Clean hydrogen refers to hydrogen produced with renewable or nuclear energy, or fossil fuels using carbon capture.

International Renewable Energy Agency (IREA)

- IRENA is an intergovernmental organization that supports countries in their transition to a sustainable energy future, and serves as the principal platform for international cooperation, a centre of excellence, and a repository of policy, technology, resource and financial knowledge on renewable energy.
- It promotes the widespread adoption and sustainable use of all forms of renewable energy, including bioenergy, geothermal, hydropower, ocean, solar and wind energy in the pursuit of sustainable development, energy access, energy security and low-carbon economic growth and prosperity. IRENA was officially established in Bonn on 26 Jan 2009.
- Currently, 100 countries including the US, UK, India and most of the European States, have signed or signaled that they will sign it's statute.

Topic 2. FISHERS GROUPS ASK GOVT NOT TO RATIFY 'UNEQUAL' WTO PACT

Important for the subject: Economy

Fishermen trade bodies **urge the government to not sign** the **fisheries subsidies agreement** which is being ratified at the WTO saying it will not be favourable for Indian fishing communities.

- A trade trade body representing thousands of fish workers in India has urged the commerce and industry minister Piyush Goyal to not sign the **Fisheries Subsidies agreement** at the World Trade Organization (WTO) during the upcoming **ministerial conference in Geneva**, arguing that it would destroy fishermen's livelihoods and food security for millions in the country.
- The representation by the trade body has appealed to the government to get together with other developing nations to ensure that the **"unequal" pact** does not come into effect.

What is the Fisheries Subsidies Agreement?

- The WTO proposal aims to **eliminate subsidies** for i**llegal, unreported, and unregulated** fishing and **promote sustainable fishing**.
- The Agreement on Fisheries Subsidies was concluded at the **12th Ministerial Conference (MC12)** of the WTO in **Geneva** in June 2022 and it is now being ratified by members individually.
- India is pressing for a **longer transition period** under the agreement as the sector is still at a nascent stage.
- India has highlighted that developing countries not engaged in distant water fishing

should be exempted from overfishing subsidy prohibitions for at least 25 years.

Why the pact is "unequal"?

- The agreement **caps the subsidies** for all countries based on fishing area, which indirectly favors the developed countries. The subsidy should be on the basis of per fisher subsidy, but the WTO agreement does not acknowledge this fact.
- The negotiations so far failed to make a distinction between small subsidisers and large subsidisers.
- India had demanded that there should be discipline in use of **non-specific subsidies** (which are not specific to the fishing sector but general fuel subsidies) but it **was rejected in the negotiations** and ignored in the final agreement.
- The **Special and Differential Treatment (S&DT) provisions** for developing countries and LDCs in the agreement were highly inadequate as they allowed a **transition period** of **only two years** from the date of entry into force of this agreement.
- Developed countries have obtained '**reverse S&DT'**, where they do not have to cut their subsidies if they can show these as sustainable and replenishing fish stocks.

Way out?

- Instead of ratifying the Fisheries Subsidies Agreement, India should begin talks on the **Comprehensive Agreement** which is already mandated on **disciplines for industrial fishing nations** under **Article 5** pertaining to **overcapacity and overfishing**.
- This should specifically target the **infrastructural subsidies** which are overwhelmingly provided by the developed countries and thus need to be disciplined.

Topic 3. SEBI TO REVIEW DELISTING REGULATION AMONG OTHER MEASURES

Important for the subject: Economy

SEBI to 1. Review regulations for **delisting of shares** by considering a fixed price option, and 2. Review **trading plans for insiders** 3. To bring in a mechanism of **instantaneous settlement** in exchanges.

- At present, 90 per cent stake by the parent or promoter is the threshold for delisting and price discovery is through a **reverse book-building process**.
- SEBI is reviewing in view of certain constituents who have made it their business model to **corner shares in the market** before the delisting process and **jack up prices**, which may not be the fair price of the stock.
- An advisory **committee under Keki Mistry** has been formed to relook at the delisting regulations, which is expected to be ready by the end of the year. One of the options being discussed is to have a **fixed price for delisting of the shares**.

Reverse Book Building

- It is the reverse of the process followed in case of listing, here the purpose is to discover

the right price to buy back all publicly held shares in order to achieve delisting.

- In the Reverse Book Building scenario, the Acquirer/Company offers to buy back shares from the share holders. The Reverse Book Building is basically a process used for efficient price discovery.
- It is a mechanism where, during the period for which the Reverse Book Building is open, **offers are collected from the shareholders at various prices**, which are above or equal to the floor price. The **final buy back price is determined** after the offer closing date.

Other Measures to come:

- SEBI is looking at the prospect of **introducing instantaneous settlement** in exchanges so that pay in and payout, both of shares and funds can take place in real time through the use of UPI. Buch said that the technology was already there for it. SEBI would be looking at the response to the **ASBA-like product** in secondary market transactions in order to gauge its success before introducing instantaneous settlements.
- **Prohibition of insider trading regulations** are also being revised, as the trading plan has to be declared in advance by companies **locking them in to a certain price**, and **providing no flexibility** for changes while deciding on the materiality of transactions. An advisory committee is looking into the regulations and a consultation paper on this is also in the works.
- SEBI is also set to reform the way its **disclosure regulations are being implemented** by industry. It has required that corporations make **disclosures with regard to rumours of a price-sensitive nature**. The industry feedback is that this will be a challenge especially when news on companies is appearing in diverse media outlets. One solution being proposed is the setting up of industry devised standards.

Topic 4. ₹33000 CR BACKSTOP FUND FOR BONDS TO BE LAUNCHED

Important for the subject: Economy

Finance Minister to launch ₹33,000 crore backstop fund for the corporate bond market and limited purpose clearing corporation for repo transactions in corporate bonds Earlier this year the capital markets regulator had approved setting up a **backstop facility** for the **Corporate Debt Market Development Fund** in the form of an alternative investment fund.

- During times of stress in the bond market the corpus would be utilised to buy illiquid investment grade corporate debt.
- The fund will be managed by SBI Asset Management Company. The fund is small relative to Rs 39 lakh crore ($471 billion) Indian corporate bond market, but its size could be increased later.

What is the Corporate Debt Market Development Fund ?

- SEBI introduced the "Corporate Debt Market Development Fund", a **backstop facility** for **specified debt funds** during **market dislocations** and to prevent recurrences of events such as the one with Franklin Templeton MF.

- The need for a buyer and seller of last resort for corporate bonds was highlighted by Franklin Templeton India's move to stop redemptions from six debt funds in April 2020 as investors withdrew money and the fund house was unable to sell debt investments in the market.
- This backstop facility fund comes out of Indian market peculiarity that the bonds are **investment grade and still illiquid**. The market for secondary corporate bonds is **thin** which is why there is a need for a **buyer and seller of last resort**, which the backstop fund will act as.

What is Backstop?

- There exists several ways in which a company can raise the required amount of capital. One of the ways is going public. When a company issues shares in the open market to raise the required funds, there is **no guarantee that the shares issued will be fully subscribed**. The **backstop guarantees financial arrangements** in case of insufficient funds.
- The backstop provider **takes the risk and thus mitigates the uncertainties** of fund requirements. To some extent, it is similar to an insurance policy as it covers the need of scarcity of source of funds.
- In a Backstop, the underwriter provides the guarantee of full subscription to the issuer, by **purchasing an unsubscribed portion of shares**. The contract between the issuer company and backstop purchaser is known as a **firmcommitment underwriting contract.**
- In other contexts backstop arrangement refers to financier of the last resort, where in the absence of market finance or liquidity the backstop provider steps in.

Topic 5. SEMICONDUCTORS: WHAT EXACTLY IS INDIA GOING TO MANUFACTURE?

Important for the subject: Economy

In a major setback, **Foxconn Technology Group** recently **withdrew its support from its joint venture with Vedanta, Ltd**. to establish a semiconductor manufacturing plant in **Gujarat**.

- Initially, the plan was to establish a **manufacturing unit for a 40-nm node.**
- After Foxconn's withdrawal, Vedanta has maintained that it acquired the relevant technologies from another major company. It is also in the process of acquiring the technologies for the **28-nm, 63-nm, and 90-nm nodes**.

What is a semiconductor chip?

- A semiconductor chip is composed of **transistors**, which in turn are meticulously crafted from a specially selected material, typically **silicon**.
- **One major function** of a **transistor** is to **encode information in the form of 0s and 1s**, and to manipulate them to produce new information.

- These transistors have **three parts:the source, the gate,** and **the drain** (or the sink).
- The **flow of current** between **the source** and **the drain points** is regulated by the **voltage applied to the gate**. This arrangement gave rise to the specific meaning of **'gate'** in computing – analogous to a physical gate, but operating with electrical means rather than mechanical ones.
- By manipulating the gate to **'open'** or **'close'**, **the transistor stores and manipulates the data in a semiconductor chip.**
- The **semiconductor stores information in the form of bits.** Each bit is a logical state that can have one of two values (represented by voltage levels) at a time.
- The more bits a semiconductor can store and the more quickly it can manipulate them, the more data transistors can process.
- The **three parts** of a transistor are connected to **multiple metal layers** on top of them that apply voltages, forming a complex mesh of electrical connections with the transistors.
- The **metal layers allow selective access to a transistor** and provide the versatility required for the chip to execute multiple tasks.

What does the node number mean?

- Through history, the names of **semiconductor nodes** have been based on **two numbers:**
- The **length of the gate** and the **distance between adjacent metal strips connected to the gate;**
- The latter, when measured centre to centre, is called the **pitch**. These dimensions were often equal.
- **The size of transistors has progressively shrunk over the years.** The smaller a transistor becomes, the more of them can be fit on a semiconductor chip, the more data the chip can store, the more computing power there will be.
- Yet as transistors continued to become smaller, researchers spotted a **discrepancy between the gate length and the metal pitch,** rooted in the fact that while smaller transistors generally resulted in faster operation, reducing the size of metal wires created different problems, including **not being able to transport data fast enough**.
- **Since 1997**, as the miniaturisation continued, **both the half-pitch and gate length ceased to contribute to the node name**.
- From a technical standpoint, **node names hold no significance vis-à-vis the actual physical dimensions.** Instead, marketers use them to mean one node is better than a previous iteration.
- In fact, different companies have also been using **"nm"** in the name to mean different things. **The only information that can be derived from the node number of a particular company is that it is an improvement on its predecessor**.

Does India need legacy nodes?

- The choice of nodes involves compromises. While **advanced nodes range from 10 nm to 5 nm**, **India's** current focus is around **28 nm or higher**.
- Starting with **legacy nodes** can offer numerous advantages, including **equipping us for**

long-term success.

- Many applications require **legacy nodes**, including **robotics, defence, aerospace, industry automation tools, automobiles, Internet of Things,** and **image sensors** – because they are more cost-effective.
- The **principal revenue source** for any **fabrication facility,** or **'fab'**, is its most advanced node. But almost every commercial fab also maintains the production of legacy nodes to fulfil demands in the aforementioned areas.
- As the demand for electric cars and electric equipment in the car increases, the demand for legacy nodes will also increase.

What are the Initiatives related to Semiconductors?

Semi-conductor Laboratory (SCL):

- MeitY will take requisite steps for modernization and commercialization of Semi-conductor Laboratory (SCL).

For Compound Semiconductors:

- Government will support fiscal support of 30% of capital expenditure to approved Compound Semiconductors units.

Production Linked Incentives:

- Incentive support to the tune of **55,392 crore (7.5 billion USD)** have been approved under **Product Linked Incentive (PLI)** for Largest Scale Electronics Manufacturing, PLI for IT Hardware, **SPECS Scheme** and **Modified Electronics Manufacturing Clusters (EMC 2.0) Scheme**.

India Semiconductor Mission (ISM):

- Launched in **2021** with a total financial outlay of **Rs76,000 crore** under the aegis of the **Ministry of Electronics and IT (MeitY).**
- The programme aims to provide financial support to companies investing in semiconductors, display manufacturing and design ecosystem.

Topic 6. ICMR ARGUES FOR CONTROLLED HUMAN INFECTION STUDIES

Important for the subject: Economy

- India has taken its first step to introduce **Controlled Human Infection Studies (CHIS)**, used in many countries for vaccine and treatment development.

About CHIS:

- The CHIS is proposed by the **Indian Council of Medical Research's (ICMR) Bioethics Unit**.
- **Outside of India,** this relatively new research model which involves **intentionally**

exposing healthy volunteers to pathogens in a controlled environment, has been used to study malaria, typhoid, dengue, etc.

- The deterrents include technical, clinical, ethical and legal contentions, amid unique socio-cultural context.

Concerns include:

- **India** has so far stayed away from **CHIS**, because regardless of the potential scientific benefits, these studies are **ethically sensitive and raise concerns about contentious research ethics issues like:**
- deliberate harm, possible disproportionate payment and hence inducements, third-party risk, withdrawal from the study and research with vulnerable participants.

Need for the CHIS:

- **India** carries a **high burden of morbidity and mortality** from infectious diseases.
- They contribute about **30%** of the disease burden in the country. Finding **novel, efficient, and cost-effective alternatives to existing methods of research** in these diseases and their prevention is imperative to reduce this burden.
- **CHIS** is a relatively new research model that helps provide unique insights into disease pathogenesis and can accelerate the development of novel medical interventions.
- **CHIS** offers **accelerated, cost-effective, and efficient outcomes** using **smaller sample sizes** in comparison to **large clinical trials**.

Its social value includes:

- potential contributions to public health response to diseases of concern, healthcare decision-making, policies and economic benefits, improved pandemic preparedness, and community empowerment.
- **ICMR** has also cautioned that **CHIS is a highly complex area and may require collaborations at different levels** between researchers, institutions, organisations and/or between different countries.
- These studies may play a **crucial role in advancing the scientific understanding of infectious diseases** and thereby **accelerating the development of treatment strategies.**

About ICMR:

- The Government of India **funds** ICMR.
- It comes under the **Department of Health Services (DHS), Ministry of Health and Family Welfare (MoH&FW).**
- The **headquarters** of ICMR is in **New Delhi**. It is **neither a statutory body nor a regulatory body**.
- ICMR hosts **Clinical Trials Registry – India (CTRI).** It was established on **20th July 2007.**
- It is a free and online public record system for the registration of clinical trials being

conducted in India.

- Till 15th June 2009, the **clinical trial registry** was a voluntary measure; after which the **Drugs Controller General of India (DCGI)** has made trial registration at CTRI mandatory.
- **Importance** – It encourages registration of clinical trials before the enrolment of the first participant.
- It has been publishing the **Indian Journal of Medical Research (IJMR)** since **1913.**
- **ICMR's National Institute of Nutrition (NIN)** was established in **1918** as **'Beri Beri Enquiry'** at the **Pasteur Institute, Coonoor, Tamil Nadu.**
- **Sir Robert McCarrison** was the founder of the **'Beri Beri' enquiry unit** now known as **NIN.**
- **Union Health Minister of India presides over the governing body of ICMR**. **Prof. Balram Bhargava**, secretary of DHS, is the **Director-General of ICMR.** There are **27 institutes/regional medical research centres** under ICMR.

Topic 7. SCIENTISTS FIND A WAY TO MAKE FLUOROCHEMICALS PRODUCTION MUCH SAFER

Important for the subject: Economy

Scientists from the **University of Oxford** have come up with **a new way to obtain fluorine atoms**, used to manufacture important chemical compounds used in industry and research, in a **much safer** and **less energy-intensive way**.

Process of Fluoro chemicals production:

- **Fluorine** is a **highly reactive element** used to make **fluorochemicals**, which in turn are used to produce **plastics, agrochemicals, lithium-ion batteries**, and **drugs**.
- **Fluorine** comes from a **calcium salt** called **calcium fluoride,** or **fluorspar**. **Fluorspar** is **mined** and then **treated with sulphuric acid** at a **high temperature** to release **hydrogen fluoride (HF). HF** is then made to react with other compounds to create **fluorochemicals**.

Drawback of this process:

- A major downside of this process is that **HF** is an **extremely poisonous** and **corrosive liquid** that irritates the eyes and respiratory tract even at low concentrations.
- It also **requires special transportation and storage requirements**. Despite stringent safety regulations, **HF spills** have occurred numerous times in the last decades, sometimes with fatal accidents and detrimental environmental effects.

What is the new method?

- The new method produces fluorochemicals **through calcium phosphate biomineralisation.** Scientists ground **fluorspar** in a ball-mill with **potassium phosphate**.
- While **fluorine is very reactive, calcium atoms prefer phosphorus even more**, so the milling created **calcium phosphate** and another compound with **fluorine atoms.** They

called the latter **Fluoromix.**

- When **Fluoromix** was reacted with **organic compounds**, it could create around **50 fluorochemicals** with up to **98% yield**.
- Future steps of the research group include producing **Fluoromix** at a larger scale and to figure out how its cost will scale.

Topic 8. IS THERE A RURAL BIAS IN NATIONAL SURVEYS?

Important for the subject :Economy

The Government of India has **appointed a panel under the chairmanship of Pronab Sen, former Chief Statistician of India**, to **review the methodology of the National Statistical Organisation (NSO).**

About

- **Need for review**: The usage of outdated survey methodology by national surveys such as the National Sample Survey (NSS), National Family Health Survey (NFHS) and Periodic Labour Force Survey (PLFS), have systematically underestimated India's development.
- **Significance of survey/data collection**: National level data is a key resource for research, policymaking and development planning, so it is of utmost importance to understand and analyse both claims in the light of existing evidence.
- **Agencies involved**: For this purpose, we will be taking a closer look at NFHS data, which is being conducted by the Ministry of Health and Family Welfare for the last 30 years with the International Institute of Population Sciences (IIPS) as the nodal agency.

Data collection survey method

- Data collection surveys **collect information from a targeted group of people about their opinions, behaviour, or knowledge.**
- Common types of example surveys are written questionnaires, face-to-face or telephone interviews, focus groups, and electronic (e-mail or website) surveys.

What are claims against the present methodology?

- **Rural bias**: There is evidence of rural population underestimation by NFHS-3.
- Overestimation of rural population seems to have taken place by NFHS-2 and NFHS-5.
- Only NFHS-1 and NFHS-4 estimates seem to be really close to World Bank estimates and projections based on Census data. However, these errors seem random rather than systematic.
- **Less scope to overcome errors**: Generally, there are higher percentages of noresponse in urban areas compared to rural areas. However, this also does not seem to have any systematic relation with either rural or urban bias in estimation. No response or not, there seems to be room for improvement in minimising the errors and the way sample weights are assigned.

Topic9. SEBI CHIEF SAYS INSTANT SETTLEMENT OF TRADES IN THE WORKS

Important for the subject: Economy

The securities market regulator has said it is **working on real-time settlement of transactions in India's stock exchanges.**

- The announcement by Madhabi Puri Buch, chairperson of the Securities and Exchange Board of India (SEBI), came after the regulator shortened the settlement cycle to trade-plus-one (T+1) from T+2.

Trade Settlement

- 'Settlement' is a two-way process that involves the transfer of funds and securities on the settlement date. As of now, there is a lag between trade and settlement — the settlement date is different from the trade date. A **trade settlement is said to be complete once purchased securities of a listed company are delivered to the buyer, and the seller gets the money.**
- The **current cycle of 'T+1' in India** means **trade-related settlements happen within a day, or within 24 hours of the actual transaction**. The migration to the T+1 cycle came into effect in January this year.
- India became the second country to start the T+1 settlement cycle in top listed securities after China, bringing operational efficiency, faster fund remittances, share delivery, and ease for stock market participants.

Instant Settlement

- SEBI has said it is working on a plan for "instantaneous" settlement of trades in the securities market. Same-day, or 'T+0', settlement of trades will be possible with the real-time payment system — Unified Payments Interface (UPI), online depositories, and technology stack.
- Under the current T+1 settlement cycle, if an investor sells securities, the money gets credited into her account the following day.
- Under the T+0 settlement cycle, if investors sell shares, they will get the money in their account instantaneously, and the buyers will get the shares in their demat accounts the same day.

Application Supported by Blocked Amount

- SEBI chairperson said the ASBA (in the secondary market) goes smoothly, then the next step is instantaneous settlement.
- SEBI approved a framework for an **Application Supported by Blocked Amount** (ASBA)-like facility for trading in the secondary market. It is aimed at safeguarding investors' money which is with stockbrokers, and also at bringing transparency.

Topic 10. FULL RESERVE BANKING: WHERE BANKS ACT SOLELY AS CUSTODIANS OF CUSTOMERS' MONEY

Important for the subject : Economy

Owing to the failures of three United States banks and one major European investment bank in March this year, it is important to understand the working type of the banks. (Full-Reserve Banking and Fractional reserve banking).

Full-Reserve Banking System

- Full-reserve banking is also known as 100% reserve banking. Full-reserve banking is a system where banks are prohibited from lending out the money they receive as demand deposits from customers.
- Instead, they are required to keep all customer funds in their vaults at all times. In this model, banks only act as custodians for depositors' money and may charge a fee for this service.
- This stands in contrast to the current banking system, where banks pay interest to customers on their demand deposits.
- Under full-reserve banking, banks must maintain reserves equal to 100% of their demand deposits to ensure they can meet withdrawal requests and prevent a bank run, even if all depositors decide to withdraw their funds simultaneously.

How full-reserve banking system lend money?

- Time deposits are deposits that customers can withdraw from the bank only after a certain period of time that is agreed upon between the bank and its customers.
- Under a full-reserve banking system, banks can only lend money that they receive as time deposits from their customers.
- This arrangement gives banks the time to lend these deposits to borrowers at a certain interest rate, collect repayments from the borrowers, and finally repay depositors their money along with a certain amount of interest.

What is Fractional reserve banking?

- The current banking system operates on fractional-reserve banking, where banks primarily hold cash deposits from customers in their vaults.
- However, they can lend out more money than the physical cash they possess, as most lending occurs in the form of electronic money.
- This practice creates electronic loans that can exceed the actual cash reserves. If borrowers demand cash withdrawals exceeding the bank's physical cash, it can lead to a bank run due to insufficient cash to meet the demand.

Why Bank runs are rare?

- Bank runs are rare due to several reasons.

- Non-cash instruments: Firstly, most transactions in modern economies occur through checks and non-cash instruments, reducing the demand for physical cash.
- This lessens the likelihood of a large number of customers seeking immediate cash withdrawals simultaneously.
- Bail out: Secondly, central banks intervene by providing emergency cash to banks, ensuring they can meet sudden increases in customer cash demands.

Topic 11. WEF'S 'SAAGU BAAGU' PILOT BENEFITS TELANGANA FARMERS

Important for the subject :Economy

Telangana's **"Saagu Baagu" (agricultural advancement)** pilot project with the guidance of the World Economic Forum (WEF) has impacted the lives of over 7,000 **chilli farmers** in the State and the second phase of the project is set to take off.

- The impact on the lives of these farmers has been created by providing them access to agtech services such as AI-based advisories, soil testing, produce quality testing and e-commerce under **"Saagu Baagu" pilot project**.
- Artificial Intelligence for **Agriculture Innovation" (AI4AI) initiative** is the crux of the "Saagu Baagu" project, addressing the challenges of fragmented technological infrastructure, high costs of operations, lack of access to data and limited technical expertise, while hampering the scale of their impact.
- AI4AI aims to transform the agriculture sector in India by promoting the use of artificial intelligence (AI) and other emerging technologies.
- The "Saagu Baagu" project focuses on **transformation of each agriculture value chain** by easing **agri-tech services delivery** to the end customer through administrative, policy support and through digital public infrastructure. aim to empower farmers with data-driven crop advisories and market intelligence, ultimately striving to foster agricultural prosperity
- The project was initiated in 2022 and is being implemented by **Digital Green** (in consortium with three agritech start-ups) with support from the **Bill and Melinda Gates Foundation**.
- In 2nd phase the project will be scaled up from 2023 onwards to 20,000 **chilli and groundnut farmers** in three districts.
- India's first **agricultural sandbox**, an agricultural data exchange and agri-data management framework will be included in this phase to support agritech services.

Agriculture Innovation" (AI4AI) initiative

- The vision of AI4AI is "to transform the state of agriculture by **deploying emerging technologies in an inclusive and sustainable way**."
- It seeks to evolve scalable frameworks for enabling the use of these technologies for constructive outcomes, while underlining the challenges and unintended consequences they may bring.
- While the programme focuses on technological innovation, it recognizes that it is also

essential to invest in low-tech interventions, create new and bold policies, improve resource efficiency, build trust and transparency, align towards common objectives and collaborate across independent working groups.

The key objectives of AI4AI are:

- to enhance digital and financial inclusivity among smallholder farmers; to build trust and transparency through quality and traceability; to protect the environment from unsustainable practices; and to establish sustainable farm incomes.

Topic 12. STATE DEBT PROFILE: TAMIL NADU TOPS WITH HIGHEST OUTSTANDING DEBT

Important for the subject :Economy

Tamil Nadu has the highest amount of outstanding debt among all States and Union Territories. The State's outstanding debt stood, as per budget estimates for 2022- 23, at ₹7.54-lakh crore followed by Uttar Pradesh at ₹7.10-lakh crore, as per figues presented in the parliament

- The outstanding liabilities of Maharashtra, the country's largest economy measured in terms of Gross State Domestic Product (GSDP), stood at ₹6.80-lakh crore as per budget estimates for 2022-23. It was followed by West Bengal (₹6.08-lakh crore),
- Rajasthan (₹5.37-lakh crore) and Karnataka (₹5.35-lakh crore). The union territory of Puducherry had the lowest outstanding debt of ₹11,651 crore.
- Tamil Nadu has budgeted an outstanding debt ₹7.26-lakh crore for FY24. This constitutes 25.63 per cent of GSDP in 2023-24, well within the 29.1 per cent for limit set by the Fifteenth Finance Commission.
- Tamil Nadu topping the list of States with highest debt is not surprising as the State has consistently been the highest market borrower in the last three years.
- Market borrowings of States are done through issue of bonds under **State Development Loans (SDLs).**

State Development Loans

- State Development Loans are dated securities issued by states for meeting their market borrowings requirements. Purpose is to meet the budgetary needs of state governments. The higher the fiscal strength of a state, the lower will be the interest rate (yield) it has to pay for the SDL borrowings.
- Purpose of issuing State Development Loans is **to meet the budgetary needs of state governments**. Each state can borrow upto a set limit through State Development Loans.
- The SDL securities issued by states are credible collateral for meeting the SLR requirements of banks as well as a collateral for availing liquidity under the RBI's LAF including the repo.
- One remarkable feature of **SDL is that it is a market oriented instrument** for states to mobilise funds from the open market. Higher the fiscal strength of a state, lower will be

the interest rate (yield) it has to pay for the SDL borrowings.

- SDLs are basically securities and **they are auctioned by the RBI through thee Kuber which is dedicated electronic auction system** for government securities and other instruments. RBI holds SDL auctions once in a fortnight.
- The rate of interest or yield of SDL securities are determined through auction. Still the interest rate will be slightly higher than that of Central Government securities (G-secs) of matching tenure. The **investors in SDL are basically commercial banks, mutual funds, insurance companies** who are attracted by the slightly higher interest rate of SDL (compared to central government securities).

Topic 13. SPICEJET COMES OUT OF DGCA'S ENHANCED SURVEILLANCE REGIME

Important for the subject :Economy

Directorate General of Civil Aviation (DGCA) has removed SpiceJet from its **enhanced surveillance regime**, signaling a resolution to the airline's recent challenges.

- The low-cost carrier had been facing several challenges that prompted the regulator to closely monitor its operations.

The air carrier was put on surveillance twice due to following reasons:

- The airline experienced repeated safety incidents due to which the regulator. placed it under intense scrutiny to ensure **compliance with safety protocols**. These restrictions were later lifted on October 30 of the same year.
- The company also faced financial struggles later, when multiple lessors sought to repossess aircraft leased to the carrier. DGCA then decided to place the airline under enhanced surveillance again. The payment issues in these cases were eventually settled by the airline. Consequently, DGCA reinstated the enhanced surveillance regime.

What is the enhanced surveillance regime?

- DGCA on receiving any report of any incident that may affect safety or air worthiness of the aircraft, may bring the airline under enhanced surveillance.
- Enhanced surveillance involves increased night surveillance and spot checks to ensure the airline's adherence to safety standards. It may be triggered by financial difficulties too, as this can have indirect effect on aircraft maintenance and safety.

Directorate General of Civil Aviation (DGCA)

- It is the regulatory body in the field of Civil Aviation, primarily dealing with safety issues. It is responsible for regulation of air transport services to/from/within India and for enforcement of **civil air regulations, air safety, and airworthiness standards**.
- The DGCA also co-ordinates all regulatory functions with the International Civil Aviation Organisation (ICAO).

Topic 14. RECOVERY IN INDIA'S FOREX RESERVES

Important for the subject :Economy

India's forex reserves breach $600 billion-mark, hover around 15-month high.

- India's forex reserves are seeing a significant jump owing to various factors, definitively reversing the downtrend that started in March 2022, when dollar appreciated after the US Fed hiked rates and India's balance of payment (BoP) saw lower net capital inflows.
- This trend reversed with the dollar index peaking in October 2022 as expectations of further Fed rate hikes waned.
- Forex reserves jumped this year primarily due to **revaluation gains** as the dollar weakened and capital flows rose. Also, **oil imports from Russia are not settled in dollar**, which has also added reserves.
- India stands fourth among countries with the highest forex reserves. China, Japan and Switzerland are the top three, respectively.

What explains India's forex reserves?

- Most countries, barring India, run large and persistent current account surpluses since they have a competitive exports market.
- India, Brazil, and the US have built reserves through capital flows instead of huge current account surplus.

How are forex reserves measured?

- The RBI's forex reserves refer to the assets the central bank holds to provide import cover and protect against external shocks. It has **four components**: Foreign currency assets (FCA) Gold, Special Drawing Rights and Reserve position in the IMF.
- RBI revalues these assets every week. Forex reserves are influenced by movements in exchange rates and gold prices. A depreciation of the US dollar or higher gold prices causes valuation gains. A strong dollar or fall in gold prices brings down the value of the non-dollar portion of the reserves.

Is this level of forex reserves sustainable?

- Rate hikes in the US trigger an inflow of foreign investments to the US treasury and, simultaneously, an outflow of capital from India.
- The US Fed has hiked rates by 75 basis points so far this year. Expectations are that the Fed may deliver a final rate hike of 25 basis points when it meets this week.
- This could increase capital outflows from emerging markets such as India. Also, there is a significant improvement in the Balance of Payment (BoP) with the **current account deficit** now projected at **less than 2%** of GDP.
- There is also a resumption in equity capital flows with India continuing to attract maximum flows among emerging market peers.

Topic 15. MISSILE BOAT KIRPAN DECOMMISSIONED FROM INDIAN NAVY, HANDED OVER TO VIETNAM AS GIFT

Important for the subject :Science and Technology

The **indigenous missile corvette INS Kirpan** is decommissioned after **32 years** in the **Indian Navy**, and was handed over to **Cam Ranh, Vietnam**.

- **India's indigenous shipbuilding** prowess is also an "assurance to our friends and partners" that the Indian Navy is capable and ready to support our collective security needs in the region, said the Navy Chief R. Hari Kumar.
- This is the **first-ever occasion** that **India** is offering a **fully-operational corvette** to any friendly foreign country.

India and Vietnam ties:

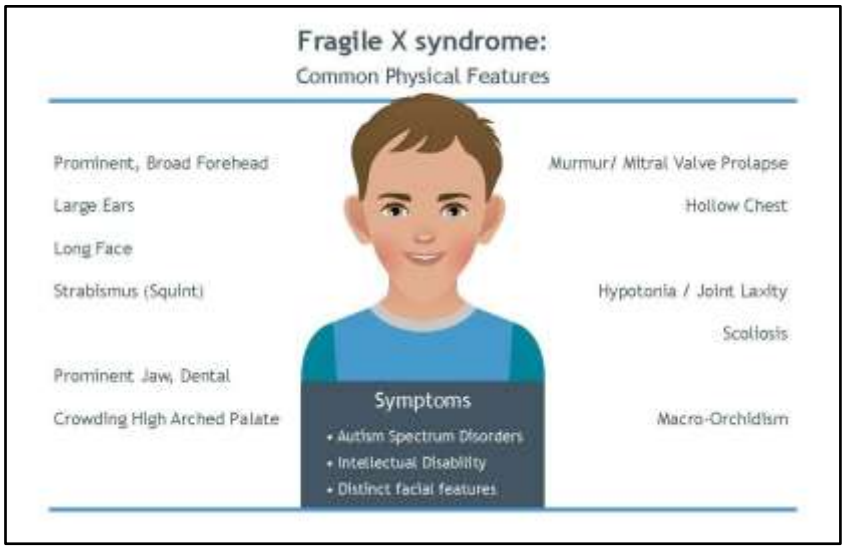
- Recently, **India** and **Vietnam** has signed the **'Joint Vision Statement on IndiaVietnam Defence Partnership towards 2030'** to enhance the scope and scale of existing security collaboration and ensure that no 'single' nation can unilaterally alter or misinterpret rules to serve its own interests in the Indo-Pacific Region.
- India has in the past trained Vietnamese Air Force pilots on SU-30 aircraft as well submarine crew of VPN on Kilo class submarines.

About INS Kirpan:

- It is an **indigenously-built in-service missile corvette.**
- It is a **Khukri class missile corvette** commissioned into the Navy on January 12, 1991.
- **Kirpan** is **90** metres long and **10.45** metres in width with a maximum displacement of **1,450 tons.**
- It is capable of a **speed** of more than **25 knots**.
- The **Khukri class** are equipped with **Diesel Engines** assembled in India.
- The ship is fitted with a **medium-range gun, 30 mm close-range guns, chaff launchers, and surface-to-surface missiles.**
- It performs a wide variety of roles, including coastal and offshore patrol, coastal security, surface warfare, anti-piracy, and Humanitarian Assistance and Disaster Relief (HADR) operations.

Topic 16. FRAGILE X SYNDROME

Important f or the subject: Science and technology



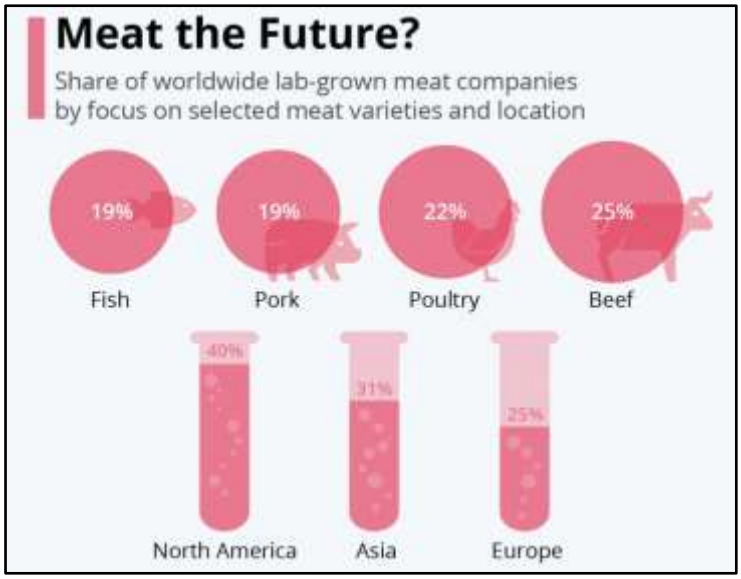
On the occasion of **World Fragile X Day**, which raises awareness about the rare **genetic illness — Fragile X or Martin-Bell syndrome** — that causes intellectual disability and autism, India Gate gleamed teal on Saturday.

About Fragile X Syndrome

- Fragile X syndrome (FXS) is a **genetic disorder**. It is also known as **Martin-Bell syndrome or Marker X syndrome.**
- The syndrome is the leading inherited cause of autism in 4% of the population. Boys often have a more serious form of it than girls.
- **Caused by:** The syndrome is caused by **changes in a gene called FMR1**, which makes an **important protein (FMRP**). This protein is required for brain development. Children with Fragile X syndrome make too little or none of it.
- **Symptoms:** The symptoms are learning difficulty, speech delay, aggressive behaviour, hyperactivity, attention deficit, problems in motor skills, etc.
- Passed on from A mother who is a carrier of FXS has a 50% chance of passing the mutated gene to her children, who will either be carriers or have FXS. Men who are carriers do not pass the pre-mutation to their sons, but only daughters, who become carriers.
- **Estimated cases of Fragile X Syndrome in India**: It is estimated there are 4 lakh individuals who have been identified with mutated FMRI in India and 40 lakh undiagnosed carriers of the gene.
- **Diagnosis:** The simplest tool for timely detection of Fragile X Syndrome is a DNA test.
- **Treatment:** The disorder cannot be cured, but early therapy can improve the individual's quality of life.

Topic 17. LAB GROWN MEAT

Important for the subject : Science and technology



We have had two recent reports in the Indian press about making meat in the lab: one in The Statesman, and the second one in The Hindu.

- They both **focussed on the Indian efforts in making meat in the laboratory, rather than killing animals on the farm or in specially constructed slaughterhouses.**
- In fact, the **making of meat in the laboratory has been going on both in the U.S. and Europe.**
- The **idea is not to kill the animal for flesh but to save it and grow its meat in the laboratory**.
- As the article in The Statesman points out, there are several reasons why labcultured meat is a better option: there is **zero cruelty; lab meat can be made with much less fat, no cholesterol and no saturated fats, thus healthier for the consumer; once the lab meat is available in the future, it may become cheaper than conventional meat and; lab meat will have less environmental impact.**
- In India, the Department of Biotechnology (DBT) offered a grant to the Centre for Cellular and Molecular Biology, Hyderabad for culturing meat in the lab from animal cells. Currently, there are a few private labs in India that produce cultured meat.

Lab-Grown Meat

- Lab-grown meat, officially known as **cell-cultivated meat**, refers to meat that is grown in a laboratory setting using isolated cells derived from animals.
- These cells are provided with the necessary resources, such as nutrients and a suitable environment, to replicate and grow into edible meat.
- The process typically **takes place in bioreactors**, **specialized containers** designed to support the cellular cultivation process.

- The first country to approve the sale of alternative meat was Singapore in 2020.

How is lab-grown or cultured meat different from plant-based meat?

- The latter is made from plant sources such as soy or pea protein, while cultured meat is grown directly from cells in a laboratory.
- Both have the same objective: to offer alternatives to traditional meat products that could feed a lot more people, reduce the threat of zoonotic diseases, and mitigate the environmental impact of meat consumption.
- In terms of cellular structure, cultured or cultivated meat is the same as conventional meat — except that cultured meat does not come directly from animals.

Cell-Cultivated Chicken:

- Cell-cultivated chicken refers to chicken meat grown in a laboratory setting using isolated cells that have the resources needed for growth and replication.
- Bioreactors, specialized containers designed to support a specific biological environment, are commonly used to facilitate the cultivation process.
- Once the cells reach a sufficient number, they are processed, often with additives, to enhance texture and appearance, and prepared for consumption.

Topic 18. AI – GAME CHANGER

Important for the subject: Science and technology

Alpha Fold – AI Tool

Alpha Fold is an **AI-based protein structure prediction tool**. It is based on a computer system called deep neural network.

- Inspired by the human brain, neural networks use a large amount of input data and provides the desired output exactly like how a human brain would. The real work is done by the black box between the input and the output layers, called the hidden networks.
- Alpha Fold is fed with **protein sequences as input. When protein sequences enter through one end, the predicted three-dimensional structures come out through the other.**

How does Alpha Fold work?

- It uses processes based on "training, learning, retraining and relearning."
- The first step uses the available structures of 1,70,000 proteins in the Protein Data Bank (PDB) to train the computer model. Then, it uses the results of that training to learn the structural predictions of proteins not in the PDB.
- Once that is done, it uses the high-accuracy predictions from the first step to retrain and relearn to gain higher accuracy of the earlier predictions.
- By using this method, Alpha Fold has now predicted the structures of the entire 214 million unique protein sequences deposited in the Universal Protein Resource (UniProt)

database.

UNEP – World Environment Situation Room

- The **World Environment Situation Room implements the Big Data Initiative**.
- The project is global with overarching environmental policy relevance and impact.
- It includes **geo-referenced, remote-sensing and earth observation information** integrated with statistics and data on the environmental dimension of sustainable development.
- The themes of this Global platform cover complementary dimensions for **Global Green Solutions for the Environment.**
- It targets country policy makers, top environmental policy makers, the environmental scientific community, business and interested citizens.
- The platform is essential as a knowledge instrument to support progress on delivering the environmental dimension of **Agenda 2030 for Sustainable Development.**
- The **World Environmment Situation Room** will be **implemented in different cities, countries and regions.**
- This platform will facilitate in tranforming data into information products and services which can be used by non-data experts.

Topic 19. WILL GENERIC SUPPLY OF BEDAQUILINE BE ACCESSIBLE?

Important for the subject: Science and technology

Bedaquiline has now become the cornerstone to cure **drug-resistant tuberculosis (DR-TB).**

- **Johnson & Johnson's patent** on **bedaquiline** expired on July 18. This expiry will **allow generic manufacturers to supply the drug**.
- **J&J** has **filed secondary patents** over **bedaquiline** till **2027**, which were granted in **66 low-and middle-income countries**. It includes **34** countries with **high burden of TB, multidrug-resistant TB (MDR-TB)**, and **TB/HIV.**

About Tuberculosis (TB):

- **TB** is caused by a **bacterium** called **Mycobacterium tuberculosis,** belonging to the **Mycobacteriaceae family** consisting of about **200 members**.
- Some of Mycobacteria cause diseases like **TB** and **Leprosy** in humans and others infect a wide range of animals.
- In humans, **TB** most commonly affects the **lungs (pulmonary TB)**, **but it can also affect other organs (extra-pulmonary TB).**
- **TB** is a very ancient disease and has been documented to have existed in **Egypt** as early as **3000 BC.**
- TB is a treatable and curable disease.

Transmission:

- TB is spread from person to person through the air. When people with lung TB cough, sneeze or spit, they propel the TB germs into the air.

Symptoms:

- Common symptoms of active lung TB are cough with sputum and blood at times, chest pains, weakness, weight loss, fever and night sweats.

Global Impact of TB:

- In **2019**, **87%** of new TB cases occurred in the **30 high TB burden countries.**

Eight countries accounted for two thirds of the new TB cases:

- India, Indonesia, China, Philippines, Pakistan, Nigeria, Bangladesh and South Africa.
- **India** reported **1.8 million TB cases** between January and December 2020 as compared to 2.4 million the year before.
- In **2019**, **MDR-TB** remained a public health crisis and a health security threat. **MultiDrug Resistant Tuberculosis (MDR-TB)** is a strain of TB that cannot be treated with the two most powerful first-line treatment anti-TB drugs.
- **Extensively Drug Resistant Tuberculosis (XDR-TB)** is a form of TB caused by bacteria that are resistant to several of the most effective anti-TB drugs.

Who made bedaquiline?

- **Janssen Pharmaceutical (a subsidiary of J&J)** made **bedaquiline** around **2002**.
- Following the **2012 approval of bedaquiline** several research institutes further document the safety, efficacy and optimal use of **bedaquiline** in **DR-TB regimens.**
- The recent **WHO** recommendation of bedaquiline being a **core drug for the treatment of DR-TB** is largely based on the evidence produced through these collective efforts.
- However, **J&J has claimed sole ownership of it,** protected by its aggressive patenting strategies.

Will the drug be available in India?

- Other **DR-TB drugs** like **linezolid** have **decreased in prices by over 90%** with generic competition once **Pfizer's patent expired in 2015**.
- Therefore, **national TB programmes** are waiting for the **generic supply of bedaquiline** from Indian manufacturers to reduce prices.
- In **India**, a **'pre-grant opposition'** was filed by a **patient group and two TB survivors — Nandita Venkatesan from India**, and **Phumeza Tisile from South Africa.**
- As a result of their legal challenge, in a landmark decision before **World TB Day**, the **Indian Patent Office rejected the U.S. corporation J&J's secondary patent which would have extended its monopoly for four more years**.
- **Indian manufacturers will now be able to supply affordable, quality assured generic versions of bedaquiline in India** as the primary patent expired on July 18.

- However, they will not be able to export the medicine to **34** of the **43** countries with a high burden of TB.
- **Will the J&J GDF deal solve the problem and make the generic of bedaquiline accessible?**
- Not just yet. The GDF deal claims to cover the majority of low-and middle-income countries but some of the countries hardest hit by DR-TB will not benefit.
- **Eastern European countries** and **China** with a high **burden of TB** are believed to be **out of the agreement.**
- Countries like **South Africa** are not purchasing from **GDF** and with the evergreening patent inforce till 2027, it will not get access to generic Bedaquiline.

Global Drug Facility (GDF):

- Since its creation in **2001, GDF** has grown into a **one-stop bundled procurement and supply mechanism** providing a unique package of services that combine strategic procurement of **TB products** and coordination of market activities, with technical assistance and capacity-building for TB programmes.
- This unique approach has made **GDF** the **largest global provider of qualityassured TB products to the public sector** and was recognized by world leaders in the **United Nations Political declaration of the high-level meeting of the General Assembly on the fight against tuberculosis**, which encouraged all nations to utilise GDF service.

Topic 20. ONEWEB TO SET UP INDIA'S FIRST 'SATELLLITE NETWORK PORTAL SITE' IN GUJRAT

Important for the subject: Science and technology

The **Gujarat government** through its **Department of Science and Technology (DST)** signed a memorandum of understanding with **OneWeb India Communications Pvt Ltd** for setting up a **'satellite network portal site'** — **a first for India** — at **Mehsana** in **Gujarat**.

LEO and satellite communication:

- **Satellite constellations in low Earth orbit (LEO)** are gaining traction with **Star Link, Kuiper** and **One Web** among many others, the world is increasingly moving towards relying on **LEO satellite communications**.
- **LEO satellites** operate at an altitude of **500 to 1,200 km**, making it ripe for **high speed and low latency** — a lower time lag between a user seeking data, and the server sending that data, compared to **geostationary Earth orbit positioned satellites**.

Satellite network portal (SNP) site:

- The **satellite network portal (SNP) site** will serve as a **signal and data downlink and uplink terminal** or **base station on the ground**, an intermediary for data transmission through satellite tracking antenna systems.
- To cover the entire Earth, **OneWeb** need **40 such SNPs** but **for India it needs at least 2**

such SNPs because **India is such a large geography** and they decided to set up **one in Gujarat** and another in the southern part of India, likely to be in **Tamil Nadu**.

- As per the **financial year 2021-2022 annual report of OneWeb**, it had **nine operational SNP sites** serving the **live coverage area and at the time,** had agreements to build **38 SNPs** in **27 different countries.**

Investment, Infrastructure, Regulatory Approvals:

- **OneWeb India Communications** plans to invest up to **Rs 100 crore** in this project, which would create **500 direct and indirect jobs**.
- Apart from **civil infrastructure,** setting up an **SNP** like this will also require a slew of regulatory approvals from the **Indian National Space Promotion and Authorisation Centre (IN-SPACe)** and **spectrum allocation** from the **Telecom Regulatory Authority of India (TRAI).**

Why Gujarat and the role of DST, Gujarat in this deal:

- The decision to set up an **SNP** in **Gujarat** was a combination of **geographical and business interests**.
- **Suitable geography** that **covers/caters to the maritime sector also. Gujarat has the longest coastline in India.** The kind of policy and incentives available.

Favourable business climate

- **DST** handles **telecommunications** and it also handles the **Gujarat Electronics Policy** (effected in October 2022, valid till 2028).

OneWeb's growing footprint in India

- Though **OneWeb** is **UK-based,India's Bharti Enterprises** serves as a **major investor** and **shareholder in the company,** and **Bharti Enterprises' founder Sunil Bharti Mittal** serves as **OneWeb's executive chairman.**
- **OneWeb** has **648 satellites** orbiting at **1,000-1,200 km** making **13 orbits per day,** covering the entire globe.
- **India** launched the **36 GEN 1 satellites of One Web** on March 26 this year from aboard **Launch Vehicle Mark-3 from Sriharikota**.
- For the **SNP set-ups in India, OneWeb India Communications** will be receiving the capacity from the UK parent company to sell in India.
- Earlier, **HCIPL** and **OneWeb**, in **January 2022**, announced a **strategic six-year Distribution Partner agreement** to provide **low Earth orbit (LEO) connectivity services** across **India**, to deliver services to enterprises and government with **OneWeb capacity,** especially in areas outside the reach of fibre connectivity.

Topic 21. ISRO: THE SHAPE OF ROCKETS TO COME

Important for the subject: Science and technology

With **seven straight successful** launches so far, the **LVM3 rocket** — which most recently ferried the **3.9-tonne Chandrayaan-3 spacecraft** to the dropoff point **180 km** above earth — has proved to be a reliable one.

- Now **ISRO** is working on upgrading it to **carry 6 tonne payloads right up to the geostationary transfer orbits (GTO)**.
- **ISRO** is working on a bunch of rocket technologies. **Here is a quick look at a few of them.**

Air-breathing rockets:

- These rockets have **scramjet engines** that can accelerate by themselves mid flight through the atmosphere, **conserving chemical fuels for later use.**
- **'Scramjet'**, or **supersonic ram jets**, have **funnel like** openings, with the mouth of the funnel facing the direction of flight.
- During flight, **air enters the funnels at high speeds** and becomes compressed as it passes through the thin end of the funnel.
- The **compressed air** is fed into the **combustion chamber,** where it meets the **vaporise fuel** (as in an automobile engine) and **self ignites**.
- This creates a **thrust**. In a **ramjet,** air is fed into the combustion chamber at **speeds less than the speed of sound (subsonic);** in a **scramjet**, it happens at **supersonic speeds.**

Ramjets and **scramjets** are commonplace in **missile technology**.

- **India's Brahmos missile** has **ramjets;** a **supersonic variant** has a **scramjet engine.**
- However, **scramjets** have not been successfully used in rockets, **which travel not at supersonic speeds (Mach 1.25) but at hypersonic speeds (above Mach 5)**.
- **One Mach** is the **speed of sound**, roughly **1,225 km per hour. S**ome years ago, **ISRO** successfully tested an **air breathing engine** on a **sounding rocket**, but is now working on a bigger engine (called **air frame integrated air breathing engine**) that can sustain for longer durations in flights.
- The engine is under manufacture for testing, but **ISRO** is already in talks with industry for producing the rockets.

LOx methane engines:

- **Methane engines** are taking rocketry to the next level.

The advantages are:

- **Liquid methane** — essentially **LNG** — is not as potent a fuel as hydrogen.
- But the temperature at which it is stored in rocket tanks is much higher than in the case of hydrogen — **minus161 degrees C versus minus253 degrees C.**

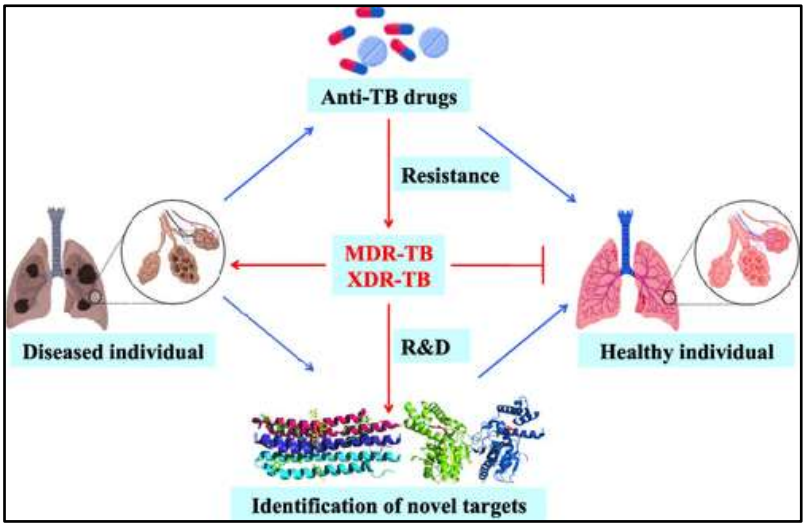
- **It does not leak** — **methane molecules are much bigger than hydrogen**.
- And, methane is a lot **cheaper** and abundantly available. So every space company is eyeing methane rockets, or rather **liquid oxygen methane (LOx)** — because you need an oxidiser to burn methane.
- **The liquid methane rockets are not commonplace yet**, **because a few challenges remain unresolved.**
- One is the problem of **'coking',** or **'soot deposition'.** As the gas approaches the combustion chamber, some of it splits into **carbon and hydrogen**, and the **carbon** gets deposited as soot on the insides of the tubes, leading to a host of problems such as **combustion instability.**
- Solutions considered include use of **soot resistant materials** such as **ceramics,** and specially designed additives for the fuel to cut soot.
- Further, **industry** must be made aware of this technology to **inspire confidence and attract investment for manufacturing**.
- The **first to deploy a methane engine in a space flight was the Chinese company Landscape,** with its **Zhuque2 rocket**.

HAVA — India's space shuttle:

- **ISRO** is working on a **space shuttle** — a vehicle that can **deliver payloads to orbit**.
- Called **HAVA**, for **hypersonic airbreathing vehicle assembly**, it can deliver payloads **up to 500 kg** to **low earth orbit**.
- Based on the **'reusable launch vehicle'** technology the **HAVA** is like a **space shuttle**; it will fly on the back of a **'geosynchronous satellite launch vehicle'** or **GSLV**, deliver the payload, and return to land on an airstrip, like an aeroplane. A prototype is expected to be ready for testing in a couple of years.
- There are several other technologies, too, that ISRO is working on, such as: **Vertical takeoff and landing (VTOL)**,
- Electric propulsion, Nuclear propulsion, Additive manufacturing in space, and Research into functional materials.

Topic 22. BATTLING TB IN SPEED MODE

Important for the subject: Science and technology



Why in the news?

Recent research by the **Department of Community Medicine and Family Medicine**, **All India Institute of Medical Sciences, Bhubaneswar**, suggests that the country **stands a chance of eliminating it by 2025, five years ahead of the global target**.

Tuberculosis (TB) eradication program:

- The **National Tuberculosis Programme (NTP)** was launched in **1962**, and the **National Tuberculosis Elimination Programme (NTEP)** was established in **2020** with the **stated aim** of **eradicating TB from the country. India accounts for a quarter of tuberculosis cases worldwide**.

There are multiple challenges that include:

- Insufficient budget, inadequate diagnostic facilities, Underreporting, low success rate, high dropout rate, social stigma.
- Shortage of funds hinders the adoption of comprehensive strategies, and the expansion of diagnostic facilities and treatment options.
- **The WHO (World Health Organisation)** has launched a **joint initiative"Find. Treat. All. ENDTB"** with the **Global Fund and Stop TB Partnership**. **WHO** also releases the **Global Tuberculosis Report**.

EARLY DETECTION:

- **Enhanced diagnostic capability** is another **key aspect** of the battle against **TB**.
- It is essential to **equip healthcare facilities with advanced diagnostic technologies** to accurately detect **TB** and determine drug resistance.
- **Newer tools** such as the **Gene Xpert MTB/ RIF assay** and **MERM (medical event**

reminder monitor) can **revolutionise TB diagnosis** and choice of treatment.

- **Early detection of the disease is vital for higher success rates**.

SOCIAL FACTORS:

TB has two forms:

- **pulmonary** (affecting the lungs) and **Extra pulmonary** (it can affect any part of the body, making diagnosis challenging).
- There is a need to address the social, economic, cultural, and nutritional vulnerabilities in the fight against tuberculosis.
- Factors such as **overcrowding, migration, social stigma,** and **poor nutritional status** contribute to the **spread and persistence of the disease**.
- To **prevent tuberculosis**, focusing on the **overall health and immune system** is essential.
- **Dietary tips** include **incorporating a variety of fruits and vegetables, opting for whole grains,** including **pulses and legumes**, **consuming dairy products**, and **staying hydrated with traditional beverages**.

PRIVATE SECTOR:

- India's TB treatment is not centralised as it is not uniform.
- Nearly **50 percent** of TB patients are diagnosed in the **private sector** and the rest by the government sector.
- Although the **private sector reporting of tuberculosis has gone up from 4 per cent to 25 percent,** there is a **huge gap due to underreporting**.
- An added **challenge** is **TB's coinfection with diseases like HIV and diabetes.**
- Integrating TB services with existing health programmes can optimise resources and improve outcomes for those with dual burdens.

About the Stop TB Partnership Board:

- It was established in **2001** and is mandated to **eliminate Tuberculosis as a public health problem.**
- The organisation was conceived following the meeting of the **First Session of the Ad Hoc Committee on the Tuberculosis Epidemic** held in **London** in **March 1998**.
- In its inaugural year itself, the **Stop TB Partnership** through the **Amsterdam Declaration** gave a call for collaborative action from ministerial delegations from 20 countries that bear the highest burden of TB.
- In **2019,** it launched the updated **Global Plan to End TB 2018-2022.**

Topic 23. ISRO TO LAUNCH PSLV-C56, CARRYING SINGAPORE'S NEW IMAGING SATELLITE

Important for the subject : Science and technology

Recently, the Indian Space Research Organisation (ISRO) announced that the launch of the PSLV-C56 carrying Singapore's DS-SAR satellite will take place on July 30.

About PSLV-C56:

- The PSLV-C56 carrying DS-SAR satellite along with six co-passengers will be launched from the Satish Dhawan Space Centre in Sriharikota.
- It is configured in its core-alone mode, similar to that of C55. It would launch DS-SAR, a 360 kg satellite into a **Near-equatorial Orbit (NEO**) at 5 degrees inclination and 535 km altitude.

DS-SAR satellite

- It is developed under a partnership between DSTA (representing the Government of Singapore) and ST Engineering.
- It will be used to support the satellite imagery requirements of various agencies within the Government of Singapore.
- ST Engineering will use it for multi-modal and higher responsiveness imagery and geospatial services for their commercial customers. It carries a Synthetic Aperture Radar (SAR) payload developed by Israel Aerospace Industries (IAI).
- This allows the DS-SAR to provide for all-weather day and night coverage and is capable of imaging at 1m resolution at full polarimetry.

Along with DS-SAR, the PSLV-C56 will carry

- **VELOX-AM**: A 23 kg technology demonstration microsatellite.
- **ARCADE** : Atmospheric Coupling and Dynamics Explorer (ARCADE), an experimental satellite.
- **SCOOB-II:** A 3U Nano satellite flying a technology demonstrator payload; **NuLIoN :**An advanced 3U Nano satellite enabling seamless IoT connectivity in both urban and remote locations;
- **Galassia-2:** A 3U Nano satellite that will be orbiting at low earth orbit.
- **ORB-12 STRIDER**: Satellite is developed under an International collaboration.

Topic 24. THE ARDUOUS QUEST TO FIND THE SHAPE OF THE ELECTRON'S CHARGE

Important for the subject : Science and technology

Physicists use extreme precision tests to search for flaws in the Standard Model. A new study

used a strong electric field in a molecule to measure the electric dipole moment of its valence electrons, and concluded by **finding no evidence of 'new physics'.** The result precludes the existence of certain hypothetical particles

Standard Model of Elementary Particle Physics

- The standard model of elementary particles is a theoretical construct in physics that describes particles of matter and their interaction.
- It describes the elementary particles of the world as being connected by mathematical symmetry, just as two objects are connected by bilateral (left-right) symmetry.
- These are mathematical groups generated by continuous transformations from, say, one particle to another.
- According to this model there are a finite number of fundamental particles which are represented by the characteristic "eigen" states of these groups.
- The particles predicted by the model, such as the Z boson, have been seen in experiments.
- The last to be discovered, in 2012, was the Higgs boson which gives mass to the heavy particles.

Why is the Standard Model believed to be Incomplete?

- Because it gives a unified picture of only three of the four fundamental forces of nature — electromagnetic, weak nuclear, strong nuclear and gravitational interactions — it totally omits gravity.
- So, in the grand plan of unifying all forces so that a single equation would describe all the interactions of matter, the standard model was found to be lacking.
- Also, it does not include a description of dark matter particles. So far these have been detected only through their gravitational pull on surrounding matter.

How are the Symmetries related to Particles?

- The symmetries of the standard model are known as gauge symmetries, as they are generated by "gauge transformations".
- Gauge transformations are a set of continuous transformations (like rotation is a continuous transformation). Each symmetry is associated with a gauge boson.
- For example, the gauge boson associated with electromagnetic interactions is the photon. The gauge bosons associated with weak interactions are the W and Z bosons. There are two W bosons — W+ and W-.

Topic 25. SUN'S UPPER ATMOSPHERE: THE CORONA

Important for the subject :Science and technology

Sun's Corona

Nature and Location

The corona is the Sun's **outermost atmospheric layer.** It extends thousands of kilometres

above the visible surface of the Sun. Gradually transforms into **the solar wind** that permeates the solar system. Envelops all planets, including Earth, in an **extended atmosphere**.

The Challenge of Observing the Corona

- Corona is usually **concealed** due to the **Sun's overwhelming brightness. Total solar eclipses** provide unique opportunities to see the corona.
- Moon temporarily **blocks the Sun's surface light**, revealing the corona's wispy, white **streamers**. The corona's **dynamic nature** leads to constant shape and size changes. **Corona's Temperature Discrepancy**
- The corona is significantly hotter than the Sun's surface: **about 1 million °C compared to 5,500 °C.** The exact cause of this temperature difference is **still under investigation**.

Possible Explanations for Corona's Heat Nanoflares Hypothesis:

- Microscopic explosions (nanoflares) at the solar surface may contribute to heating.
- **Solar Tornadoes**: Giant vertical plasma spirals interacting with the Sun's magnetic field might raise temperatures.

Solar Wind and Solar Flares

- **High-speed particles in the corona** create the solar wind, influencing the entire solar system.
- **Solar flares release immense energy,** affecting Earth's atmosphere, power grids, and satellite communications.
- A special instrument called a **coronagraph** is used to observe the corona and monitor solar flares.
- Space missions like **NASA's Parker Solar Probe** offer crucial insights into the Sun and the corona.
- The **ISRO** will launch India's first space mission to study the **sun's atmosphere, Aditya L1**, on September 2, 2023

Parker Solar Probe's Achievements

- Launched in 2018, the Parker Solar Probe is designed to **study the Sun's corona up close.**
- In **December 2021**, the probe approached the corona at a distance of 8.2 million miles, providing unprecedented data.

Magnetic Fields and Coronal Features

- The **Sun's magnetic fields** shape the corona's appearance.
- **Coronal loops, streamers, and other features** arise due to interactions between magnetic fields and charged particles.

Solar Atmosphere Layers

Photosphere: Innermost Visible Layer

- The photosphere emits sunlight and is the **lowest layer of the solar atmosphere.** It ranges in temperature from **6,125 to 4,125 degrees Celsius**. **Sunspots and granules** are prominent features in the photosphere.

Chromosphere: Emission of Reddish Glow

- The chromosphere emits **super-heated hydrogen**, seen as a **reddish glow.**
- Visible as a **red rim during a total solar eclipse.** It may play a role in **conducting heat to the corona.**

Corona: Outermost Layer

- The corona is the outermost layer, visible during total solar eclipses or with specialized instruments. White streamers or plumes of ionized gas flow outward into space. Temperatures in the corona can reach up to **2 million degrees Celsius.**

Topic 26. PRAGYAN CONFIRMS SULPHUR NEAR SOUTH POLE OF MOON; SEARCH ON FOR HYDROGEN

Important for the subject :Science and technology

Pragyan Rover's Discoveries on Moon's Surface

The Chandrayaan-3 mission's rover, **Pragyan**, has confirmed the presence of **sulphur** on the moon's surface, for the first time specifically **near its south pole**.

- Apart from sulphur, preliminary analyses identified elements like **aluminum, calcium, iron, chromium, titanium, manganese, silicon, and oxygen** on the lunar surface.
- In-situ measurements were conducted by the **Laser-Induced Breakdown Spectroscopy (LIBS)** instrument aboard the rover.
- Unlike the orbiters, which couldn't provide such information, the rover's direct measurements have established the unambiguous presence of sulfur.
- The ISRO is currently conducting a search for **hydrogen** (H), another element of interest.

Laser-Induced Breakdown Spectroscopy (LIBS) Explained

Introduction:

- LIBS is a **rapid chemical analysis technology** that employs **short laser pulses to create micro-plasma on a sample's surface.**

Advantages of LIBS:

- Requires **no sample preparation**. Offers rapid measurements, often within a **few seconds.** Covers a **wide range of elements**, including lighter ones.

- Supports **versatile sampling protocols**, including surface rastering and depth profiling.

Process of Laser-Induced Breakdown:

- A **short-pulse laser** is focused on the sample, causing **ablation** (removal of sample mass).
- Ablated mass interacts with the trailing laser pulse, forming a high-energy plasma.

Plasma Formation and Cooling:

- Plasma temperature can exceed **30,000K** in its early phase.
- Plasma cools, **causing electrons to fall to ground states and emit light with discrete spectral peaks**.

Emission of Spectral Peaks:

- Unique spectral peaks correspond to different elements in the periodic table.
- By identifying these peaks, the chemical composition of the sample can be determined.

Additional Information:

- The Union Cabinet commemorates Chandrayaan-3's success and designates **August 23 as National Space Day.**

Topic 27. INVASIVE WEED THREATENS ELEPHANT HABITATS IN TAMIL NADU

Important for the subject :Environment

An aquatic weed is threatening elephant habitats and foraging areas in Valparai, Tamil Nadu hill station close to the Kerala border, and reviving the risk of human elephant conflicts in the

region.

About the weed:

- The weed is **native** to some countries in **Central and South America**, including **Peru**. **Ludwigia peruviana**, which grows fast along water bodies, locally known as **vayals,** has invaded the foraging areas of elephants.
- The rapid large-scale spread of the weed- which was probably introduced as an **ornamental plant for its tiny yellow flowers-** has shaken the balance of these perennial foraging grounds, **limiting the growth of grass and native plants** that are palatable to elephants and other animals including **gaur**.
- It mainly spreads along the **swamps in the middle of the tea estates** and forms thickets.
- These swamps are known for **excellent grass covers, sedges** and **water sources** that are very good for **herbivores** like **gaur** and **elephant** in particular.

Threat from Ludwigia peruviana:

- Swamps are unique habitats that support amphibians and otters besides the large herbivores. They act as water storage areas that need to be preserved.
- If Ludwigia colonises, it completely chokes swamps and does not allow grasses to grow.
- The wildlife that had been depending on such swamps will move to other areas and it might lead to negative interactions.
- Though **Ludwigia** is among the **22 priority invasive plants in Tamil Nadu,** the State's drive to remove exotic species from its forests is now largely focused on **Lantana camara, Senna spectabilis** and **Acacia mearnsii (wattle)**.

Challenges in removal of Ludwigia peruviana:

- Unlike other invasive plants, Ludwigia poses a unique challenge as it grows in swamps and there is little scope to use machinery which may further destroy the ecosystem.
- Even if Ludwigia is pulled out manually, the soft plant easily breaks and it spreads again from the root or broken stems that fall in the swamp.

Valparai hills:

- Located within the **Annamalai Tiger Reserve**, **Valparai's** mosaic landscape of **tea estates** and **fragmented forest patches** still serve as **key habitats for the elephants** that move between Tamil Nadu and Kerala.

Senna spectabilis:

- Senna spectabilis is a plant species of the legume family (Fabaceae) native to South and Central America.
- They are often grown as ornamental plants due to their bright yellow flowers that bloom during the summer months.
- They are also known as golden wonder tree, American cassia, popcorn tree, Cassia

excelsa, golden shower tree or Archibald's cassia.

- The plant has become an invasive alien species in parts of Africa such as Kenya, Malawi, Tanzania and Uganda, and also in South India after it was introduced for resources such as firewood as well as to help combat deteriorating ecosystems affected by deforestation and desertification.

Lantana Camara:

- Lantana camara (common lantana) is **a species of flowering plant** within the verbena family (Verbenaceae), native to the American tropics.
- Lantanas arrived in **India** as a **decorative shrub during British colonial period** but quickly took over several ecosystems as an invasive plant.
- The shrub can spread on the forest ground, climb over trees a creeper and entangle with other native plants with ease.
- It is a very adaptable species, which can inhabit a wide variety of ecosystems.
- Once it has been introduced into a habitat it spreads rapidly between 45ºN and 45ºS and more than 1,400 metres (4,600 feet) in altitude.

Topic 28. CAPTIVE-BRED VULTURES FLYING HIGH IN FOREST EXPANSES

Important for the subject :Environment

Why in news:

In **2020**, **eight critically endangered Oriental white-backed captive-bred vultures** were released into the wild for the **first time** ever in **India** from the **Jatayu Conservation Breeding Centre** in **Pinjore, Haryana**.

Close to three years later, **five survive** and **two** have paired and successfully nested, in the untamed habitat of the **Shivalik range** in the foothills of the Himalayas.

- There has been no report of veterinary **non-steroidal anti-inflammatory drug (NSAID)** related mortality.
- There is a concern over the uncontrolled veterinary use of **NSAIDs** especially the **illegal use** of the banned drug **diclofenac** that has caused vulture deaths.
- 3 drugs fatal for vultures are: **Diclofenac, Ketoprofen and Aceclofenac.**

Vultures:

- In **1993** there was an estimated population of **40 million vultures in India**.
- The population of **three species** — **the Oriental white-backed, the long-billed**, and **the slender-billed** — has declined by over **97%** since the **1990s.**
- The **Oriental white-backed vulture** prevalence has gone down by an astonishing **99.9%.**
- **All three species** are classified as **critically endangered** by the **International Union for the Conservation of Nature (IUCN)**.

- The species come under **schedule 1 of the Wildlife Protection Act, 1972**, meaning they enjoy the highest level of protection.
- **India** is home to **9 species of Vulture** namely the Oriental white-backed, Long billed, Slender-billed, Himalayan, Red-headed, Egyptian, Bearded, Cinereous and the Eurasian Griffon.
- Most of these 9 species face dangers of extinction.

Conservation efforts:

- The **BNHS** and **Royal Society for Protection of Birds (RSPB)** have been managing **four Jatayu conservation breeding centres** across the country in partnership with the State governments of **Haryana, Madhya Pradesh, West Bengal**, and **Assam.**
- Through this conservation breeding programme, the **BNHS-RSPB** has bred more than 700 birds in captivity since 2004.
- **BNHS** has started the construction of **soft release centres** in **Madhya Pradesh, Assam, Rajasthan,** and at three tiger reserves in **Maharashtra**.
- The **Drug Technical Advisory Board (DTAB)** in its meeting on May 10, 2023, agreed to **prohibit the manufacture, sale and distribution** of the drugs **Ketoprofen** and **Aceclofenac**, and their formulations for animal use.
- The DTAB also suggested that a list of all drugs which affect animal health or the environment be prepared for further action.

Oriental white-backed vultures:

- They are **medium-sized, dark vultures.**
- **Scientific name:** Gyps bengalensis
- **Distribution:** Pakistan, India, Bangladesh, Nepal, Bhutan, Myanmar (Burma), Thailand, Laos, Cambodia, and southern Vietnam.
- **Habitat:** Found mostly in plains and less frequently in hilly regions. Can also be seen in villages and cities near to cultivation.

Features:

- Adults are 75 to 85 cm tall.
- White neck ruff, rump and under wing coverts.
- Adults tend towards black coloration, while younger individuals are browner.
- Their wing span is 180 to 210 cm
- Weight: Ranges from 5 to 7.5 kg
- **IUCN Status:** Critically Endangered

Royal Society for the Protection of Birds (RSPB):

- The Royal Society for the Protection of Birds (RSPB) is a **charitable organisation** registered in **England** and **Wales** and in **Scotland.**
- It was founded in **1889**.

- It works to promote conservation and protection of birds and the wider environment through public awareness campaigns, petitions and through the operation of nature reserves throughout the United Kingdom.

Topic 29. ETHANOL IMPETUS

Important for the subject: Environment

Prime Minister Narendra Modi, at a G20 Energy Ministers' meet recently, said that India has rolled out 20% ethanol-blended petrol this year and aims to "cover the entire country by 2025".

About Biofuel:

- Biofuel is a **fuel that is produced over a short time span from biomass, rather than by the very slow natural processes** involved in the formation of fossil fuels, such as oil**.**
- Since biomass can be used as a fuel directly (e.g., wood logs), some people use the words biomass and biofuel interchangeably.
- However, the word biofuel is usually reserved for liquid or gaseous fuels, used for transportation.
- Most of biofuel consumption occurs as a blend with refined petroleum products such as gasoline, diesel fuel, heating oil, and kerosene-type jet fuel.
- However, some biofuels do not require blending with their petroleum counterparts and are referred to as drop-in biofuels.

The **most common biofuels now are** –

- Bioalcohols such as ethanol, propanol, and butanol (a substitute for petrol/gasoline); Biodiesel (a substitute for diesel); Bio-oils (substitutes for kerosene).

Generations of Biofuel:

- Biofuels are also divided into four categories depending on their origin and production technologies.

First Generation

- 1G biofuels are produced from consumable food items containing starch (rice and wheat) and sugar (beets and sugarcane) for bioalcohols, or vegetable oils for biodiesel.
- However, the yields of 1G biofuels are low and can have negative impacts on food security.

Second Generation

- 2G biofuels are mainly obtained from non-food feedstocks such as forest/industry/agricultural wastes and waste or used vegetable oils.

Third Generation

- 3G biofuels, known as 'algae fuel', are derived from algae in the form of both, biodiesel and bioalcohols.
- Although the yield of 3G biofuels is approximately 10 times higher than 2G biofuels, producing adequate algal biomass and scaling up extraction techniques are as yet unresolved challenges.

Fourth Generation

- Like the third generation, 4G biofuels are made using non-arable land. However, unlike the third, they do not need the destruction of biomass.
- This class of biofuels includes electro fuels and photo-biological solar fuels.

Ethanol Blending

- Ethanol is a **biofuel, naturally produced by the fermentation of sugars by yeasts or by petrochemical processes like ethylene hydration**.
- Ethanol is high in oxygen content, allowing an engine to more thoroughly combust fuel.
- In ethanol blending, a blended motor fuel containing ethyl alcohol derived from agricultural products is blended with petrol specifically.

How is Ethanol Produced?

- In India, the nodal department for the promotion of fuel-grade ethanol-producing distilleries is the **Department of Food and Public Distribution (DFPD).**
- Ethanol is produced or procured from sugarcane-based raw materials which are– C & B heavy molasses, sugarcane juice, sugar syrup, surplus rice with Food Corporation of India (FCI) and maize.
- A paper released by the NITI Aayog stated, that in 2019, over 110 billion liters of ethanol fuel was produced globally.
- The **US and Brazil account for 84% of the global production** followed by the European Union, China, India, Canada and Thailand.

India's Biofuel Policy:

- In 2021-22, the **Central government amended the Biofuel Policy (2018) to set a target of country-wide blending rates of 20% ethanol and 5% biodiesel by 2025.**
- According to the Roadmap for ethanol blending in India 2020-2025 report from NITI Aayog, India will need to increase ethanol production capacity from the expected 3.3 billion liters (in 2020–2021) to at least 10.2 billion liters (5.5 billion liters from sugarcane and 4.7 billion liters from grains) by 2025.

Topic 30. A DIFFERENT KETTLE OF FISH: KASHMIR WANTS EUROPE TO TASTE ITS TROUT

Important for the subject : Environment

Introduced in the early 1900s, **trout fish has become a staple on the Valley's menu,** and an increasing number of farmers are now eyeing opportunities to export trout to meet European demand.

- The **favourable water and climatic conditions in Kashmir, similar to Europe**, attracted small farmers initially, and now educated unemployed youth are joining the sector.
- The demand for trout is high, leading to solid profits for farmers, and the government offers subsidies to support the establishment of trout farms. However, climate change poses a potential threat to the industry, as the fish require specific conditions to thrive.
- Despite this challenge, the government is taking measures to combat climate change's impact by offering subsidies to set up Recirculating Aquaculture Systems (RAS) for trout farming.

Trout Farming

- Trout are classified as **oily fish** and have been important food fish for humans.
- As **mid-level predators,** trout prey upon smaller aquatic animals including insects, crustaceans, baitfish and tadpoles, and themselves in turn are also important staple prey items for many wildlifes including brown bears, otters, raccoons, birds of prey (e.g. sea eagles, ospreys, fish owls), gulls, cormorants and kingfishers, and other large aquatic predators.
- Discarded remains of trout also provide a source of nutrients for scavengers, detrivores and riparian florae, **making trout keystone species across aquatic and terrestrial ecosystems.**
- Trout are closely related to salmon and have similar migratory life cycles. Most trout are **strictly potamodromous**, spending their entire lives exclusively in freshwater lakes, rivers and wetlands and migrating upstream to spawn in the shallow gravel beds of smaller headwater creeks.

Topic 31. RAIGAD LANDSLIDE BRINGS BACK FOCUS ON MADHAV GADGIL REPORT

Important for the subject : Environment

A landslide in Maharashtra's Raigad district last week claimed 27 lives, flattened an entire village, and brought **back into focus the 2011 Dr Madhav Gadgil report on conservation of the Western Ghats.**

During a discussion in the Maharashtra Assembly, state congress chief asked what had happened to the **Madhav Gadgil Committee report on ecologically sensitive zones in the Western Ghats.**

Madhav Gadgil Report

- In 2010 a **Western Ghats Ecology Expert Panel (WGEEP**) was created which was chaired by **ecologist Dr Madhav Gadgil**.
- The commission submitted its report to the Centre in 2011.
- The report recommended **classifying 64 percent of the Western Ghats, spread over six states, into Ecologically Sensitive Zones called ESZ 1, ESZ 2 and ESZ**
- It also recommended **designating the entire region as an Ecologically Sensitive Area (ESA).**
- Almost all developmental activities like **mining, construction of thermal power plants, dams were to stop along with the decommissioning of similar projects that have completed their shelf life in ESZ 1.**
- It said that both the Athirappilly and Gundia hydel project sites should not be accorded environmental clearance as they fall in this zone.

Permissions and Prohibitions:

- Genetically modified crops should not be allowed, Use of plastic bags be prohibited, Special Economic Zones should not be permitted, New hill stations should not be allowed, Changing the land use from farmland to non-farm land and Stoppage of diversions of rivers to protect the ecology of the region, Public lands should not be converted into private lands.

Recommendations:

- The report also **suggested a bottom-to-top approach** instead of a top-**to-bottom approach in governance** of the environment, indicating decentralization and more powers to local authorities.
- It recommended the establishment of a **Western Ghats Ecology Authority** under the **Environment (Protection) Act, 1986,** as a professional body to manage the ecology of the region and to ensure its sustainable development.
- A ban on growing single commercial crops like tea, coffee, cardamom, rubber, banana and pineapple, which have led to fragmentation of forest, soil erosion, degradation of river ecosystems and toxic contamination of the environment.
- A policy shift is urgently warranted curtailing the environmentally disastrous practices and switching over to a more sustainable farming approach in the Western Ghats.
- Taking **critical steps to involve citizens, including proactive and sympathetic implementation of the provisions of the Community Forest Resources of the Forest Rights Act.**

Resistance to the Implementation of the WGEEP's Recommendations:

- Stakeholder states resisted the Gadgil panel recommendations **amid fears of hindrance to development and loss of livelihood.** In particular, **Kerala had objected** to –
- The proposed ban on sand mining and quarrying, Restrictions on transport infrastructure and wind energy projects, Embargos on hydroelectric projects and inter-basin transfer of river waters, and The complete ban on new polluting industries.
- In 2012, the **Union Environment Ministry constituted a High-Level Working Group on Western Ghats under former ISRO chief Dr K Kasturirangan, to formulate a report to replace WGEEP.**

Recommendations of the Kasturirangan-led Panel:

- It **notified only 37% (against 64% by Gadgil commission**) of the area as ecologically sensitive.
- It also split the **Western Ghats into cultural (human settlements) and natural (non-human settlements) region.** It was suggested that cultural lands be designated as an ESA.
- It also consisted of **red, orange and green categories. The red list entailed a ban on mining, stone quarrying, thermal plans and certain construction and township projects.**
- The **orange category had activities that would be regulated** and taken up with appropriate permissions. The **green category allows all agricultural and horticultural activities and commercial activities.**

Gadgil vs Kasturirangan Reports:

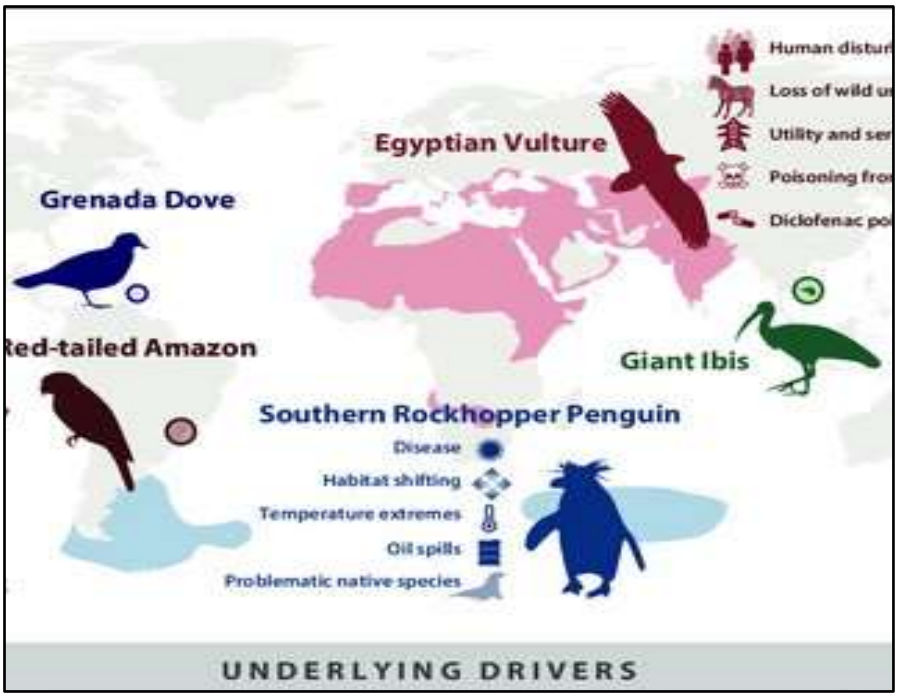
- The WGEEP was a pro-nature, pro-people report based on sound scientific information and feedback from central and state governments, zila parishads, gram panchayats and people.
- Gadgil criticised the Kasturirangan report as faulty and unscientific because local communities have no role in economic decisions, clearly in violation of constitutional provisions.

Actions Taken

- In 2017, the Environment Ministry issued a draft notification, demarcating an area of 56,285 sq km in the Western Ghats as ESA as opposed to the 59,940 sq km recommended by the Kasturirangan committee.
- By 2022, the Centre announced a high-powered committee constituted by the Ministry of Environment, Forest and Climate Change (MoEF&CC) to conduct physical landscaping and submit a detailed report in a year's time. Gadgil claimed that implementing its recommendations would have lessened the severity of the floods and landslides in Kerala in 2018.

Topic 32. DECLINING BIRD POPULATIONS ARE A 'GRIM' REMINDER OF RAPID BIODIVERSITY LOSS, SAYS NEW REPORT

Important for the subject: Environment



Around **60 percent of birds in India** have experienced **population decline** over the **long term of 30 years**, says 2**023 State of India's Birds report.**

Details:

- **Birds occupying open natural ecosystems**, such as grasslands, have seen **steep declines in numbers.** In terms of **diet**, **birds** that **feed on vertebrates and carrion** have **declined** the most, followed by **birds** that **feed on insects**.
- **Targeted, systematic, periodic monitoring of bird populations** and using consistent methods can help species management.

Ecosystem services provided by birds:

- Aiding in seed dispersal and pollination, Acting as predators and scavengers.
- Indicator of surrounding environments Balance the species population by feeding them like: Rodents, insects etc.

Consequences of declining bird population:

- The decline in raptors could result in increased populations of rodent communities.
- The great Indian bustard is on the brink of extinction because of land use changes and habitat loss.
- Birds that feed on vertebrates and carrion have declined the most, suggesting that this food resource either contains harmful pollutants or is declining in availability, or both.

- Agrochemicals lower survival rates in some raptors.

Threats:

- **India** has **Protected Areas** and **laws** like the **Wildlife Protection Act**, but these measures are not sufficient to stop the declining populations of birds in India.
- The report locates **declining bird populations within eight broad threats**: environmental pollutants, forest degradation, Urbanisation, avian disease, illegal hunting and trade and climate change.
- The **spread of monocultures** through commercial plantations or afforestation programmes have reduced biodiversity.
- Expansion of renewable energy infrastructure

Recommendations:

- Not planting trees in monocultures, but rather ecological restoration of multiple habitats including non- forest habitats like grasslands.
- Mitigate the considerable negative effects of small-scale infrastructure such as wind energy.
- Targeted, systematic, periodic monitoring of bird populations, using consistent methods, over long periods of time.
- Monitoring changes in factors such as disturbance, climate, and land-use

Steps taken to conserve these bird species:

- In **2020**, the **Indian government** announced a **10 year Visionary Protection Plan (VPP)** for the **conservation of avian diversity, ecosystems, habitats** and **landscapes.**
- The Plan outlined steps to be taken in the near, middle, and long term to effectively monitor and raise awareness about bird conservation.
- The **Salim Ali Centre for Ornithology and Natural History (SACON)** is one of the **focal institutes** supporting the **VPP**.
- **17 states and union territories** have initiated work on their own **VPPs,** while **five** — **Uttarakhand, Delhi, Telangana, Andhra Pradesh,** and **Meghalaya** — have completed the process.
- By **2030,** we expect states to pay more attention to bird conservation issues and work to mitigate priority areas.
- The **amended Wildlife Protection Act** took into consideration some of the findings from the **SoIB 2020 report**.

Indian Bird Conservation Network (IBCN):

The **Indian Bird Conservation Network** is a collaboration of:

- The Bombay Natural History Society, BirdLife International, Royal Society for Protection of Birds, Salim Ali Centre for Ornithology & History, Indian Institute of

Public Administration, Wildlife Institute of India and other NGO's on the ground.

- It **aims** at conservation actions through sound research. It is **open to all who believe that conservation of birds can contribute to the conservation of all biodiversity,** and in return, be beneficial in the spiritual and material well-being of human life.

Bird Sensitivity Mapping Tool:

- The **Union environment ministry** has approved a **three-year study** called the **'Bird Sensitivity Mapping Tool'** to chart the **pathways of migratory birds** under the **Central Asian Flyway (CAF) across India.**
- Globally, migratory flyways have been identified under the **Convention of Migratory Species (CMS).**
- The study was announced on the sidelines of the **International Conference on Wetlands and Migratory Waterbirds of the Asian Flyways** in **Lonavala, Maharashtra, India**.

Topic 33. INVASIVE ALIEN SPECIES IN FOCUS AT 10TH PLENARY OF IPBES

Important for the subject: Environment

The **140+ members** of the **Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES)** have gathered at **Bonn, Germany** for the body's **10th plenary.**

- On agenda is the **scientific assessment report** on **"Invasive Alien Species and their Control"**.
- **Invasive alien species** are a k**ey driver of biodiversity loss** and they are part of the targets set under the **Kunming-Montreal Global Biodiversity Framework (GBF)** to be achieved by **2030**.
- **Target 6**– by **2030**, the impacts of **invasive alien species on biodiversity and ecosystem services** would be **eliminated, minimised, reduced** and **mitigated.**
- The **aim** is to prevent and reduce the rate of introduction and establishment of invasive alien species by **at least 50 per cent by 2030.**
- **IPBES10** is the first meeting of this global body since the adoption of **GBF.**

The **organization** is currently working on **three more assessments,** that will be **completed by 2030:**

- The assessment of the interlinkages among biodiversity, water, food and health (nexus assessment)
- The assessment of the underlying causes of biodiversity loss and the determinants of transformative change and options for achieving the 2050 Vision for Biodiversity (transformative change assessment)
- The methodological assessment of the impact and dependence of business on biodiversity and nature's contributions to people (business and biodiversity assessment).

What is IPBES?

- It is an independent intergovernmental body, established by member States in 2012, with the objective to strengthen the research, evidence-based policy making for the conservation and sustainable use of biodiversity.
- The work of IPBES works include: – Assessments, Policy Support, Building Capacity & Knowledge Secretariat: **Bonn, Germany.**
- For details of Invasive Alien Species:

Topic 34. FOUR FACTORS DRIVING 2023'S EXTREME HEAT AND CLIMATE DISASTERS

Important for the subject : Environment

A recent study determined that the weeks long **heat wave** in **Texas** and **Mexico** that started in **June 2023** would have been virtually impossible without Humancaused global warming.

- Human activities that release **greenhouse gas emissions** into the atmosphere have been increasing temperatures gradually, at an **average of 0.2 degrees**

Fahrenheit (0.1 Celsius) per decade.

- **Three additional natural factors** are also helping drive up global temperatures and fuel disasters this year:
- El Niño, Solar fluctuations and A massive underwater volcanic eruption.

How is El-Nino involved?

- **El Niño** is a climate phenomenon that occurs every few years when **surface water in the tropical Pacific reverses direction and heats up**.
- That warms the atmosphere above, which influences temperatures and weather patterns around the globe. The atmosphere becomes warmer than usual during El-Nino years, that is why **2016 is the warmest year on record**.
- A weak **El Niño** also occurred in **2019-2020**, contributing to **2020 becoming the world's second-warmest year**.
- **El Niño's opposite, La Niña,** involves **cooler-than-usual Pacific currents flowing westward,** absorbing heat out of the atmosphere, which cools the globe.
- The world just came out of **three straight years of La Niña (2021-2023)**, meaning we're experiencing an even greater temperature swing. June 2023 was the hottest in modern record.

Which is a case of the combined effect of global warming and El-Nino.Solar Fluctuations:

- The sun's radiating energy changes over many different time scales known as the **solar cycle** which is of **11 years**.

- **Rapid convection** within our **Sun** both **generates a strong magnetic field aligned with its spin axis** and causes this field to **fully flip** and reverse every **11 years**. This is what causes the **11-year cycle in emitted solar radiation**.
- **Earth's temperature increase during a solar maximum**, compared with average solar output, is **only about 0.09 F (0.05 C),** roughly **a third of a large El Niño**. The opposite happens during a solar minimum.
- The current solar cycle will peak in **2025**.

A massive volcanic eruption

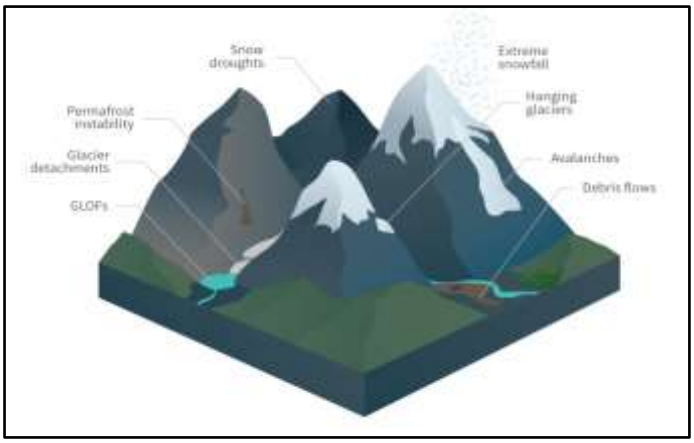
- Volcanic eruptions can also significantly affect global climates. They usually do this by **lowering global temperatures** when **erupted sulfate aerosols shield and block a portion of incoming sunlight** – but not always.
- The **largest volcanic eruption** of the **21st century** so far, the **2022** eruption of **Tonga's Hunga Tonga-Hunga Ha'apai** is having a warming and not cooling effect.
- The **eruption released an unusually small amount of cooling sulfate aerosols** but an enormous amount of **water vapor.**
- The **molten magma exploded underwater,** vaporising a huge volume of ocean water that erupted like a geyser high into the atmosphere.
- **Water vapor** is a powerful greenhouse gas, and the eruption may end up warming Earth's surface by about 0.06 F (0.035 C).

Underlying it all: Global warming

- All of this comes on top of anthropogenic, or human-caused, global warming. Humans have increased the amount of carbon dioxide in the atmosphere by 50%, primarily through combustion of fossil fuels in vehicles and power plants.

Topic 35. HIMALAYAS LOSING GLACIERS AND SNOW: MORE HAZARDS IN THE OFFING, A NEW STUDY FINDS

Important for the subject: Environment



A recent report on the **effect of climate change on the Hindu Kush Himalaya** warns of glacier volume loss of **30%** to **50%** by **2100.**

- The rapid melting of glaciers, snow and permafrost is making the mountain region more hazardous. More meltwater will be drained into the rivers till mid-century after which the water availability will steadily decline.
- The ecosystem and societies in the region are facing a hard limit for adaptation if the global warming levels are allowed to escalate.
- **Water, ice, society and ecosystems in the Hindu Kush**

Himalaya or the HI-WISE report:

- Released by **Nepal**-based **International Centre for Integrated Mountain Development (ICIMOD).**
- The **HI-WISE report** follows the **HKH Assessment Report (2019),** which assessed literature published till **2017**, focusing on aspects of climate change, cryosphere, water and biodiversity. The report focuses on the **cryosphere-hydrosphere-biosphere-society linkages** in the **Hindu Kush Himalayan region.**
- The **HI-WISE report aims** to inform the people of the **Hindu Kush Himalaya,** as well as decision-makers, practitioners and the global community on the rapidly changing cryosphere in the region and its impacts on water, biodiversity, and societies.
- The report highlighted the **ecosystem degradation** and **changes in species structure and composition**.

Significance of Himalayan glaciers:

- The Himalayas are known as the **Water Tower of Asia,** as Himalaya is the **water source** for **16 countries**, including **India** and **China,** feeding over **two billion people** living in various river basins.
- Even the people living downstream are heavily reliant on meltwater originating from mountains for agricultural, domestic, and industrial uses.

Karakoram anomaly:

- A projected **30%-50% loss** in glacier volume by the end of the century at the global warming level between 1.5 degrees Celsius to 2 degrees Celsius.
- The **Karakoram range,** too, is **losing glaciers**, making the **"Karakoram Anomaly"** a thing of the past.
- **Karakoram Anomaly** refers to the **anomalous growth and stability of glaciers in central Karakoram**, in contrast to the retreat of glaciers in other parts.

Consequences:

- It would result in increased water discharge into the rivers.
- More **extreme weather events** like **glacier lake outburst floods (GLOFs)** that happened in Chamoli or Melamchi are a possibility.

- The **snow cover days** have **declined at an average rate of five days per decade** with most of the changes at lower elevations. Seasonal shift in the snow cover with a notable decrease during the summer and winter months.

Climate change and permafrost thawing:

- **Permafrost** is essentially any ground that **stays frozen** — 0 degree Celsius or lower — **for at least two years straight**.
- These permanently frozen grounds are **often found in Arctic regions** such as Greenland, Alaska (the United States), Canada, Russia and Eastern Europe. Permafrost is also present in **higher altitudes of the mountains** like the **Himalayas.**
- **Thawing permafrost** in the Himalayas has been reported to be a cause for impending climate disasters.
- **Permafrost thaw** makes surfaces, slopes and infrastructure unstable, making a good case for a change in government policies on large hydropower projects in the region.
- **Permafrost thaw** leads to **increased sedimentation in rivers** which damages dams and turbines.

Topic 36. GPS DATA COULD DETECT LARGE EARTHQUAKES HOURS BEFORE THEY HAPPEN

Important for the subject :Geography

A systematic global analysis of GPS time-series data from nearly 100 large earthquakes suggests the **existence of a precursory phase of fault slip** that occurs about two hours before seismic rupture. Though predicting large earthquakes is still challenging.

The Challenge of Short-term Earthquake Prediction:

- Short-term earthquake prediction, which involves **issuing a warning** anywhere from minutes to months before a quake, depends on the **presence of a clear and observable geophysical precursor signal**.
- Prior retrospective studies have proposed that **a slow aseismic slip can be seen in faults ahead of the main shock,** serving as a possible precursor.
- However, the connection between these observations and seismic ruptures remains unclear.
- This uncertainty arises as these observations do not directly precede an event and often occur without an ensuing earthquake, leaving the existence of a precise precursory signal for predicting large earthquakes in question.

Significance and Limitations of the Study:

- These findings suggest that many large earthquakes initiate with a precursory phase of slip, or the observations may represent the concluding part of a longer and more challenging to measure process of precursory slip.

- The **current earthquake monitoring instruments** lack the necessary coverage and precision to detect or monitor for precursory slip at the scale of individual earthquakes.
- It is not clear whether such slow-slip accelerations are distinctly associated with large earthquakes or whether they could ever be measured for individual events with the accuracy needed to provide a useful warning.

What are faults?

- Faults are fractures in Earth's crust where rocks on either side of the crack have slid past each other.
- Sometimes the cracks are tiny, as thin as hair, with barely noticeable movement between the rock layers. But faults can also be hundreds of miles long, such as the **San Andreas Fault in California** and the **Anatolian Fault in Turkey**, both of which are visible from space.
- There are **three kinds of faults: strike-slip, normal** and **thrust (reverse) faults**.
- Each type is the outcome of different forces pushing or pulling on the crust, causing rocks to slide up, down or past each other.Each describes a different kind of relative motion.

Types:

- **Strike-slip faults** indicate rocks are sliding past each other horizontally, with little to no vertical movement. Both the San Andreas and Anatolian Faults are strike-slip.
- **Normal faults** create space. Two blocks of crust pull apart, stretching the crust into a valley. The Basin and Range Province in North America and the East African Rift Zone are two well-known regions where normal faults are spreading apart Earth's crust.
- **Reverse faults**, also called thrust faults, slide one block of crust on top of another.
- These faults are commonly found in collisions zones, where tectonic plates push up mountain ranges such as the Himalayas and the Rocky Mountains.

Difference among these faults:

- **Strike-slip** faults are usually vertical, while **normal** and **reverse faults** are often at an angle to the surface of the Earth. The different styles of faulting can also combine in a single event, with one fault moving in both a vertical and strike-slip motion during an earthquake.

Topic 37. FARMERS MAY STOP SOWING COTTON AS YIELDS AND PRICES SLUMP IN TAMIL NADU

Important for the subject : Geography

Area under cotton cultivation in Tamil Nadu is likely to fall next sowing season as farmers harvesting cotton now struggle to get remunerative prices.

Cotton crop

Conditions of Growth

- Cotton is the crop of tropical and subtropical areas and requires uniformly high temperatures varying between 21°C and 30°C.
- Frost is enemy number one of the cotton plant and it is grown in areas having at least 210 frost-free days in a year.
- The modest requirement of water can be met by an average annual rainfall of 50- 100 cm.
- About 80 per cent of the total irrigated area under cotton is in Punjab, Haryana, Gujarat and Rajasthan.
- Moist weather and heavy rainfall at the time of boll-opening and picking are detrimental to cotton as the plant becomes vulnerable to pests and diseases.
- High amounts of rainfall in the beginning and sunny and dry weather at ripening time are very useful for a good crop.
- Cotton is a Kharif crop which requires 6 to 8 months to mature. In the peninsular part of India, it is sown up to October and harvested between January and May because there is no danger of winter frost in these areas.
- In Tamil Nadu, it is grown both as a kharif and as a rabi crop. Cotton cultivation is closely related to deep black soils (regur) of the Deccan and the Malwa Plateaus and those of Gujarat. It also grows well in alluvial soils of the Satluj
- Ganga Plain and red and laterite soils of the peninsular regions. Cotton quickly exhausts the fertility of the soil. Therefore, regular application of manures and fertilizers to the soils is very necessary.

Production

- India has the largest area under cotton cultivation in the world though it is the world's third largest producer of cotton after China and the USA. Currently it is grown over 6 per cent of the net sown area.

Distribution

- In India, cotton is grown in three distinct agro-ecological zones, viz., Northern (Punjab, Haryana and Rajasthan), Central (Gujarat, Maharashtra and Madhya Pradesh) and Southern zone (Andhra Pradesh, Tamil Nadu and Karnataka).
- Maharashtra is the largest producer and produces 29.78 per cent of the total cotton production of India. Maharashtra is a traditional producer of cotton. Over 80 per cent of the production comes from Khandesh, Vidarbha and Marathwada regions.

Topic 38. FARMERS' PROTEST BRINGS WATER TO CHAMBAL CANALS AFTER 2 DECADES

Important for the subject: Geography

Following a fortnight-long stay by farmers in front of the **Chambal Command Area Development office** in **Kota,** water was released after **two decades** into the driedup

irrigation canals between **Gandhi Sagar Dam** and **Kota Barrage** earlier this week. **Hadoti Kisan Union** led the protest.

The **Hadoti region**, comprising **Kota, Baran, Bundi** and **Jhalawar** districts.

- Irrigation water from the **Chambal river** will facilitate sowing of traditional kharif crops, including rice, soybean, and sugarcane, in **Kota** and **Bundi districts**.
- **Agricultural production in the command area**, measuring **2.29 lakh hectares**, was earlier valued at an estimated **₹10,000 crore** annually, when water was supplied through the canals during the **two main rabi** and **kharif crop seasons.**
- The water supply was stopped in **2001** due to technical reasons. **Rajasthan's only agriculture-based cooperative sugar mill,** set up in **1970** and situated at **Keshoraipatan in Kota district,** also went **defunct in 2004** because of **financial losses**, affecting the livelihood of sugarcane farmers and agricultural labourers.
- Rivers like **Banganga, Gambhir** and **Ruparel** in **eastern Rajasthan** were gradually drying up, while **Chambal river** water was flowing into the **sea**.

Kota Barrage:

- The **Kota Barrage** is situated upstream of **Kota city**. Water released after power generation at **Gandhi Sagar Dam, Rana Pratap Sagar Dam** and **Jawahar Sagar**
- **Dam** was earlier diverted by the **Kota Barrage** for irrigation in **Rajasthan** and **Madhya Pradesh** through canals on the left and the right sides of the Chambal river.

Garlic cultivation:

- Farmers in the region began the cultivation of **garlic,** a labour-intensive crop, after 2012. It gave profits in the initial years, but its uncontrolled production has led to a price crash during the recent years.

About the Eastern Rajasthan Canal Project:

- It **aims** to **harvest surplus water available during rainy season in rivers in Southern Rajasthan** such as **Chambal** and its tributaries, including **Kunnu, Parvati, Kalisindh,** and use this water in **south-eastern districts** of the state, where there is scarcity of water for drinking and irrigation.
- **ERCP** is planned to meet drinking and industrial water needs of the southern and south eastern Rajasthan, for humans and Livestock till the year **2051.**
- It proposes to provide drinking water to 13 districts of Rajasthan and provide irrigation water for 2.8 lakh hectares of land through 26 different large and medium projects.
- **13 districts:** Jhalawar, Baran, Kota, Bundi, Sawai Madhopur, Ajmer, Tonk, Jaipur, Karauli, Alwar, Bharatpur, Dausa and Dholpur.

Benefits:

- A significant area of land will get irrigation facilities.

- It intends to improve the ground water table in the rural areas of the state.
- Positively influencing the socio-economic conditions of the people.
- It adds special emphasis on the Delhi Mumbai Industrial Corridor (DMIC) and envisages that sustainable water sources will enhance and help industries grow in these areas.
- Resulting in investment and revenue.

Chambal River:

- It is **one of the most pollution-free rivers of India.**
- It originates at the **Singar Chouri peak** in the **northern slopes of the Vindhya mountains** (Indore, Madhya Pradesh). From there, it flows in the **North direction** in **Madhya Pradesh** for a length of about **346 km** and then follows a **north easterly direction** for a length of **225 km through Rajasthan**.
- It enters **U.P.** and flows for about **32 km** before joining the **Yamuna River** in **Etawah District.**
- It is a rainfed river and its basin is bounded by the **Vindhyan mountain ranges** and the **Aravallis.** The **Chambal** and its tributaries **drain the Malwa region of north western Madhya Pradesh.**
- The **Hadauti plateau** in **Rajasthan** occurs in the **upper catchment of the Chambal River** to the southeast of the Mewar Plains.

Tributaries: Banas, Kali Sindh, Sipra, Parbati, etc.

- **Main Power Projects/ Dam:** Gandhi Sagar Dam, Rana Pratap Sagar Dam, Jawahar Sagar Dam, and Kota Barrage.
- The **National Chambal Sanctuary** is located along river **Chambal** on the **trijunction of Rajasthan, Madhya Pradesh and Uttar Pradesh**. It is known for **critically endangered gharial, the red-crowned roof turtle,** and the **endangered Ganges river dolphin**.

Topic 39. HIMACHAL FLOODS: A MAN-MADE DISASTER?

Important for the subject :Geography

Flash floods during this year's monsoon season have caused unprecedented damage to both lives and assets in **Himachal Pradesh.** The death toll has crossed **150**, and the estimated total loss amounts to **₹10,000 crore.**

Other than climate change, human induced disasters resulting from planned development have played a significant role in causing such colossal losses. **In the last five years (before 2022), 1,550 people lost their lives** and nearly **12,444 houses were damaged**.

Increased precipitation in Himalayan region:

- The **IPCC (Intergovernmental Panel on Climate Change) VI report** has clearly stated that the **Himalayas and coastal regions of India will be the hardest hit by climate change**.

- In the **Himalayas**, there is a noticeable pattern of **increased precipitation occurring in shorter periods of time.**
- The **India Meteorological Department** data shows that the **normal rainfall** during this period is expected to be between **720mm** and **750 mm**.
- This year, the precipitation so far has been attributed to the **combined effect of the south-west monsoon with western disturbances.**

Anthropogenic factors:

- Apart from climate change, anthropogenic factors have significantly contributed to the disaster:
- The **State Development Model** initiated in **1971** and with the **Dr. Parmar model** (named after the founding Chief Minister, Dr. Y.S. Parmar) of development, **Himachal Pradesh ranking second in social development indices.**
- However, to generate the financial resources the **exploitation of natural resources,** including forests, water, tourism, and cement production have started.

This led to:

- **Rapid construction of hydropower projects**, often causing damage to rivers and their ecosystems, **Widening of roads** without proper geological and engineering assessments, **Expansion of cement plants** altering land use patterns, and **a shift in agricultural practices to cash crop economies** that affected the landscape and river systems.

Role of Hydropower plants in these man-made disasters:

- Currently, there are **168 hydropower projects** in operation, generating **10,848 MW of electricity.**
- By 2030, **1,088 hydropower projects** will be commissioned to harness **22,640 MW of energy.**
- One of the main reasons for the **devastating impact of floods in the region is the uncontrolled construction of these hydropower projects.**
- The **"run of the river" dams**, diverts water through tunnels burrowed into the mountains, and the **excavated material (muck)** is often disposed of along the **riverbeds**.
- During periods of **higher precipitation or cloudbursts**, the water returns to the river, carrying the dumped muck along with it.
- This **destructive process** is evident in rivers like **Parvati, Beas and Sutlej,** as well as many other **small hydropower dams**.
- Moreover, long tunnels spanning **150 km** have been planned or commissioned on the **Sutlej river** causing significant harm to the entire ecosystem.

How tourism oriented development leads to damage to the environment?

- The **road-widening projects**, often carried out by the **National Highway Authority of India (NHAI)** under the public-private-partnership (PPP) approach.

- This has resulted in **bypassing essential geological studies and mountain engineering skills**.
- Traditionally, **mountainous regions are not cut with vertical slits** but are **terraced**, **minimising the damage to the environment**.
- But in many roads-widening projects the **mountains have been cut vertically**, leading to **massive landslides** and **damage to existing roads**.
- Even during the normal rainfall it leads to **slips** and **slides,** amplifying the magnitude of the destruction during heavy rain or floods.

How have cement plants harmed the environment?

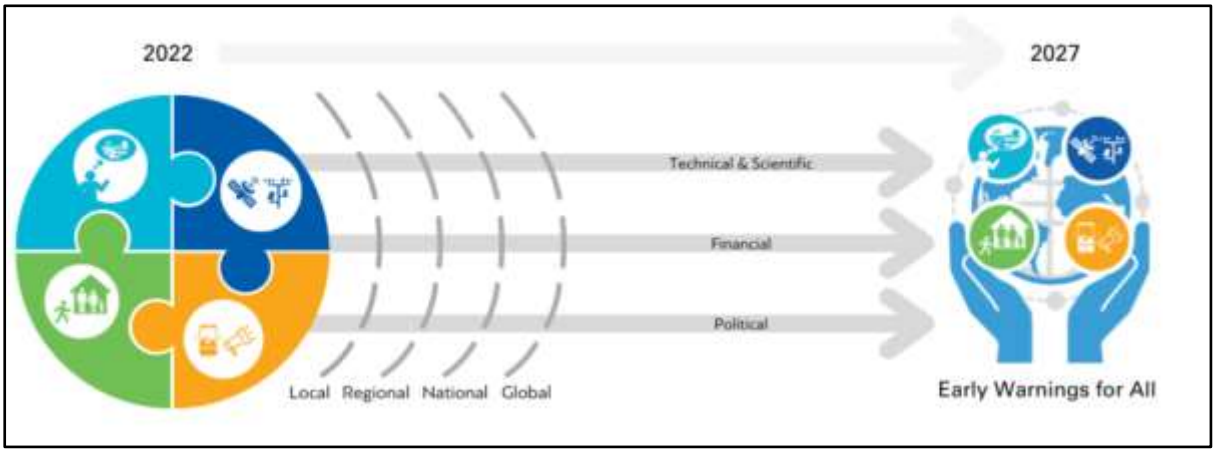
- The establishment of **massive cement plants** and **extensive cutting of mountains** in districts like **Bilaspur, Solan, Chamba** have resulted in **significant land use changes** that contribute to **flash floods during rainfall**.
- The **cement plants alter the natural landscape,** and the **removal of vegetation leads to reduced capacity of land to absorb water**.

How have crop patterns changed?

- There is a significant shift in both **landholdings** and **produce**. **More farmers are now embracing a cash crop economy over traditional cereal farming**. This shift has implications for the **transportation of these crops to markets within a short timeframe owing to their perishable nature**.
- In response to this need, **roads are being constructed hastily without considering essential land cutting and gradient requirements** or without creating **proper drains** or **designated areas for dumping muck.**

Topic 40. EARLY WARNINGS FOR ALL

Important for the subject: Geography



Aim:

The **"Early Warnings for All" initiative** is a groundbreaking effort to ensure that everyone on Earth is protected from hazardous weather, water, or climate events through life-saving

early warning systems by the end of **2027**.

Project partners:

- The **Early Warnings for All initiative** is **co-led** by the **World Meteorological Organization (WMO)** and the **United Nations Office for Disaster Risk Reduction (UNDRR),** with support from the **International Telecommunication Union (ITU)** and the **International Federation of Red Cross and Red Crescent Societies (IFRC)** and other partners.
- The **Early Warnings for All initiative** partners beyond the **UN** with the **Red Cross and Red Crescent movement, civil society, Big Tech companies, donor governments, development banks,** and the **insurance sector**.

The Early Warnings for All initiative is built around four key pillars: Disaster risk knowledge and management

- Systematically gather data and conduct risk evaluations under the supervision of UNDRR.

Detection, observation, monitoring, analysis, and forecasting

- Advancing hazard monitoring and early warning systems under the direction of WMO.

Warning dissemination and communication

- Conveying clear risk information and early warnings under the leadership of ITU.

Preparedness and response capabilities

- Develop national and community response capacities under the guidance of IFRC.

Need for early warning systems:

- These systems are a **cost-effective tool** that saves lives, reduces economic losses, and provides a nearly tenfold return on investment.
- **Early warning systems** have helped **decrease the number of deaths** resulting from hazardous weather, water, or climate events.
- According to the **Global Commission on Adaptation,** giving just **24 hours' notice** of an impending hazardous event can **reduce damage by 30 percent**.
- **Investing** just **US$800 million** in such systems in developing countries would prevent losses of **$3 to $16 billion annually.**
- But major gaps still exist, especially in small islands and developing countries. The **United Nations Secretary-General** ensures that early warning systems protect everyone on Earth within the next five years.
- The **Early Warnings For All initiative** is fully aligned with the **2030 global agenda** and supports key **Sendai Framework for Disaster Risk Reduction provisions** and the **Paris Agreement on climate change** and the **Sustainable Development Goals on poverty,**

hunger, health, water, clean energy, climate action and sustainable cities.

Challenges:

- Only half of the countries worldwide report having adequate multi-hazard early warning systems. And even fewer have regulatory frameworks that connect early warnings to emergency plans.
- Climate, weather, and water-related extremes have led to 15 times more deadly hazards for people in Africa, South Asia, South and Central America, and small island states. Vulnerable, least-developed countries that have not contributed significantly to the problem of climate change are bearing the brunt of this crisis.

Topic 41. EGYPT AND ETHIOPIA ARE FINALLY WORKING ON A WATER DEAL — WHAT THAT MEANS FOR OTHER NILE RIVER STATES

Important for the subject: Geography

Egypt and **Ethiopia** have waged a diplomatic war of words over **Ethiopia's massive new dam** — the **Grand Ethiopian Renaissance Dam** — on the **Blue Nile**, which started filling up in July 2020.

- Now the two countries have finally agreed to conclude **"a mutually acceptable agreement"** within four months.
- Countries in conflict are: **Ethiopia, Egypt** and **Sudan**.

What is the context of the current tussle?

- **Ethiopia,** whose highlands provide **more than 85 per cent of the water that flows into the Nile**, has long argued that it has the **right under international law to manage resources within its own borders for its national development.**
- **Egypt**, which depends on the **Nile** for more than **90 per cent** of its **fresh water,** has argued that the **Ethiopian dam represents a threat to its water security** and its very existence as a people.
- In **February 2022**, the **Ethiopian dam started producing electricity**. **Egyptians** claimed that **Addis Ababa (Capital of Ethiopia)** was **"violating its obligations under the 2015 Declaration of Principles"** and endangering **Egyptian "water interests".**

Rights over Nile river:

- The most important are **Egypt's** and **Sudan's** historically acquired **rights to Nile waters**.
- The rights were granted by the **1929 Anglo-Egyptian Treaty** and the **1959 bilateral agreement between Egypt and Sudan** (1959 Nile Treaty).
- After estimating the **average annual flow of the Nile River** as measured at **Aswan** to be **84 billion cubic metres,** the two treatises granted **66 per cent of Nile waters to Egypt,22 per cent to Sudan** and **12 per cent to account for seepage and evaporation**.
- **Egypt** was also granted **veto power over all construction projects on the Nile and its tributaries**. These rights came to be known as **Egypt's and Sudan's acquired rights**.
- They have been the main sticking point in efforts to conclude a treaty between all **11 Nile riparian states** for the allocation of the waters of the Nile, as well as between **Egypt, Ethiopia** and **Sudan** over the **Ethiopian dam.**
- While **Ethiopia** and other **upstream riparian states** see these **two treaties as colonial anachronisms** that have no relevance to modern Nile governance, **Egypt** and **Sudaninsist that they are binding**.

Other issues include:

- Ethiopia's right to water for agriculture and household consumption is an issue that has not yet been agreed upon by all three countries.

Grand Ethiopian Renaissance Dam

- It is formerly known as the **Millennium Dam** and sometimes referred to as **Hidase Dam**.
- Led by **Ethiopia,** the **145 meter tall hydropower project** will be **Africa's largest dam** after completion.
- It is located in the **Horn of Africa** which is a peninsula and the easternmost extension of the African continent, consisting of the countries namely, **Djibouti, Eritrea, Ethiopia, and Somalia.** The construction was initiated in **2011** on the **upper Blue Nile tributary.**

Nile river:

- The **Nile**, the **longest river in the world**, has been at the centre of a dispute involving several countries that are dependent on the river's waters.

- The main waterways of the Nile run through **Uganda, South Sudan, Sudan** and **Egypt** and its drainage basin runs through several countries in **East Africa,** including **Ethiopia.**

  Blue Nile and **White Nile** are **two tributaries of the Nile.**

- While the **White Nile is the longer tributary,** the **Blue Nile is the main source of water and fertile soil.**
- The **White Nile** is called so because of the **light-coloured clay sediment in the water giving the river a light graycolor**.
- The **Blue Nile** flows for about **1,400 km** to **Khartoum** from **Lake Tana** which is 1,800 meters above sea level in the **Ethiopian mountains.** The **White Nile** and **Blue Nile** merge near **Khartoum,** becoming the proper Nile.

Topic 42. LAND-USE CHANGES PUT ROCKY ADDRESSES OF ANIMALS UNDER STRESS IN MAHARASHTRA'S SAHYADRI PLATEAU

Important for the subject : Geography

A team of five scientists upturned more than 7,000 rocks over a considerable period of time to find out how animals ranging from ants to snakes are responding to landuse changes in rocky habitats.

About the study:

Conducted by:

- The study was conducted by the Nature Conservation Foundation-India (NCF), Bombay Environmental Action Group (BEAG), and the Ahmedabadbased Reliance Foundation.
- The study was supported by the United Kingdom-based On the Edge Conservation, the Habitat Trust (India) and the Maharashtra Forest Department.

The animals the scientists focussed on included:

- The white-striped viper gecko (Hemidactylus albofasciatus) reported only from small parts of the Ratnagiri and Sindhudurg districts of Maharashtra, the Seshachari's caecilian (Gegeneophis seshachari), a unique legless amphibian that mostly lives under soil, the saw-scaled viper (Echis carinatus), ants, spiders, and scorpions.

  Findings:

- The rapid shift from **traditional local grain cultivation** to **monoculture plantations** of mango and cashew in the **Sahyadri plateaus** of Maharashtra is impacting elusive **amphibians, insects, and reptiles** that live under a crop of loose rocks.
- More intensive studies are needed to understand how the socio-ecological impacts traditional paddy abandonment benefits an amphibian, while orchards impact other animals negatively in rock outcrops.

These changes can lead to:

- Widespread impact on ecosystem services
- Ecological biodiversity of the area
- Species richness
- Genetic diversity of the fauna of that region

Sahyadri plateau:

- The **Western Ghats**, also known as the **Sahyadri Hills,** are well known for their rich and unique assemblage of flora and fauna.
- The range is called **Sahyadri in northern Maharashtra** and **Sahya Parvatham in Kerala**.
- The **Maharashtra Plateau** and the **Sahyadris** are made of **volcanic igneous rocks (basalt)**.
- They are thus considered to be **geologically younger** than certain other sections of the mountain range.

Topic 43. MAHARASHTRA CONSIDERS ARTIFICIAL RAINS TO TACKLE DEFICIENT MONSOON

Important for the subject: Geography

The State government is considering **cloud seeding** to tackle **deficient rainfall** in parts of Maharashtra, hoping that **artificial rain could save kharif crops** and also **address depleted water levels in dams**.

- The **government of India** had made it clear that **artificial rain making techniques involving cloud seeding cannot be used for bringing rain clouds to rainfall deficit/drought areas.**
- These techniques **can only induce potential pre-existing clouds,** already passing over a given place, to produce enhanced quantum of rain.

Artificial rains or Cloud seeding:

- Cloud seeding is a type of **weather modification** that **aims** to change the amount or type of precipitation that falls from clouds by dispersing substances into the air that serve as cloud condensation or ice nuclei, which alter the microphysical processes within the cloud.
- Its effectiveness is debated; some studies have suggested that it is difficult to show clearly that cloud seeding has a very large effect.
- The usual **objective** is to **increase precipitation (rain or snow),** either for its own sake or to prevent precipitation from occurring in days afterward.

Mechanism:

- The most common **chemicals** used for **cloud seeding** include **silver iodide, potassium iodide and dry ice (solid carbon dioxide).**
- **Liquid propane,** which expands into a gas, has also been used. This can produce **ice crystals** at **higher temperatures** than **silver iodide.**
- After promising research, the use of **hygroscopic materials,** such as **table salt,** is becoming more popular.
- When **cloud seeding, increased snowfall takes place** when **temperatures** within the clouds are between **−20 and −7 °C.**
- Introduction of a substance such as **silver iodide,** which has a **crystalline structure similar to that of ice,** will induce freezing nucleation.

Electric charges:

- Since 2021, the **United Arab Emirates** has been using a new technology: **drones equipped with a payload of electric-charge emission instruments** and **customised sensors** fly at low altitudes and deliver an electric charge to air molecules.
- This method produced a significant rainstorm in July 2021.

Infrared laser pulses:

- An **electronic mechanism** was tested in **2010**, when **infrared laser pulses** were directed to the air above **Berlin** by researchers from the **University of Geneva.**
- The experimenters posited that the **pulses would encourage atmospheric sulfur dioxide** and **nitrogen dioxide** to form particles that would then act as seeds.

Applications of Cloud Seeding:

- **Creation of Rain:** Cloud seeding is the best way to consider improving rainfall quantity in case of inadequate rainfall. Arid areas usually have conditions that may be harsh in terms of food security and a conducive environment for living.
- Cloud seeding can bring rain, which makes the natural environment flourish and becomes more habitable.
- **Boosting of the Economy:** Agricultural production is important to the local economies of many regions around the world. Rain is important in achieving a proper harvest.
- **Weather Regulation:** Cloud seeding provides an avenue for controlling prevailing weather conditions in different areas.
- **Geographically oriented:** Cloud seeding is primarily done to create certain conditions in specific areas, also termed as microclimates. Places like airports, for instance, often use cloud seeding to create a stable condition for their runway. This is to ensure that planes are not restricted from taking off or landing.

Concerns:

- Some **chemicals are potentially harmful** to the natural environment and the plants which depend on the **contaminated rain to produce food.** Cloud seeding is a **very**

expensive process.

- Cloud seeding could have many **dire consequences to the environment** if not well regulated.
- Dry areas are not usually well-positioned to handle certain weather conditions, and thus, may become easily flooded and cause more harm to the already struggling environment.
- For cloud seeding to be successful, **certain uncontrollable conditions have to be met.**
- for example: Clouds have to be present, not just any cloud but clouds capable of producing rain.
- The atmospheric conditions must also suit the process as certain conditions could lead to an unwarranted result like the rain falling in a different location or not falling at all.

Topic 44. WHAT HAS TO BE DONE TO GET TO ZERO HUNGER?

Important for the subject : International Relations

The Global Report on the Food Crises (GRFC) 2023, prepared by the **Global Network Against Food Crises (GNAFC),** released recently estimated that between 691 million and 783 million people in the world suffered from hunger in 2022.

About Global Network Against Food Crises (GNAFC):

- The **GNAFC was founded by the European Union, Food and Agriculture Organization, and World Food Programme in 2016.**
- It is an alliance of humanitarian and development actors working together to prevent, prepare for and respond to food crises and support the **Sustainable Development Goal to End Hunger (SDG 2).**
- The **Global Report on Food Crises** is the flagship publication of the Global Network and is facilitated by the **Food Security Information Network (FSIN).**
- The Report is the result of a **consensus-based and multi-partner analytical process involving 17 international humanitarian and development partners.**

About FSIN

- A **global initiative** co-sponsored by Food **and Agriculture Organization (FAO), World Food Programme (WFP),** and **International Food Policy Research Institute** (IFPRI) to strengthen food and nutrition security information systems for producing reliable and accurate data to guide analysis and decision-making.

Key Highlights of Global Report on Food Crises 2023:

- The prevalence of moderate or severe food insecurity in the population is based on the **Food Insecurity Experience Scale (FIES**).
- The Global Report starts with a qualified assertion that hunger is no longer on an alarming path upwards at the global level, but still far above pre-COVID pandemic levels.
- It sets the global contexts preceding and during the year under assessment, particularly paying attention to the increasing phenomenon of urbanisation, and its effects on food

security.

- In 2022, an estimated 2.4 billion people did not have access to adequate food. This is still 391 million more people than in 2019.
- Some good news is that stunting, another key metric, defined as the condition of being too short for one's age, among children under five years of age has declined steadily, from 204.2 million in 2000 to 148.1 million in 2022.
- Simultaneously, child wasting, caused by insufficient nutrient intake or absorption, declined from 54.1 million in 2000 to 45 million in 2022.
- In terms of children who are overweight or obese, the study indicated a non significant increase from 5.3% (33 million) in 2000 to 5.6 % (37 million) in 2022.

Food Insecurity Experience Scale (FIES)

- Food Insecurity Experience Scale (FIES) is experience-based measures of household or individual food security.
- The FIES Survey Module (FIES-SM) consists of questions regarding people's access to adequate food, and can be easily integrated into various types of population surveys
- The FIES-SM questions refer to the experiences of the individual respondent or of the respondent's household as a whole. The questions focus on self-reported food related behaviors and experiences associated with increasing difficulties in accessing food due to resource constraints.

Topic 45. WILL G20 AGREE ON A JOINT COMMUNIQUE?

Important for the subject :International relations

What is communique?

It is an official statement by a political group. It is a consensus document.

History of G20 communique?

- Since its inception in 1999, and upgradation to a leader's level summit in 2008, the G20 grouping has always managed to find a consensus within the countries and issue a joint declaration at the end of every summit.

Why controversy?

- Russia and China has opposed the paragraphs on the war in Ukraine.

Topic 46. IMPHAL-BASED COCOMI WRITES TO EUROPEAN PARLIAMENT ON ITS MANIPUR RESOLUTION

Important for the subject: International Relations

An umbrella body of Imphal Valley-based civil society organisations has asked the European Parliament not to let **Manipur become the "new Golden Triangle" of drug trade** by projecting the violence between what it called "immigrant Chin-Kuki narco-terrorists" and

indigenous Meitei people in the State as a religious conflict.

Golden Triangle

- Golden Triangle includes the **area of three countries namely Myanmar, Laos, and Thailand,** where the cultivation and production of drugs such as opium and heroin have been prevalent.
- The area has been a major source of illegal drugs, contributing to the global drug trade, along with Golden Crescent (comprising Afghanistan, Iran, and Pakistan).
- After Afghanistan, Myanmar has been a significant cog of the transnational drug trade as it is the second-largest producer of illicit opium.
- As per the data by the **United Nations Office on Drugs and Crime (UNODC), a specialised United Nations Agency,** it is estimated that there were 430 square kilometres (167 sq m.) of opium cultivation in Myanmar in 2005.
- The opium and heroin base produced in northeastern Myanmar is transported by donkey and horse caravan to refineries along the Thailand-Burma border where they are converted to the final products.
- The finished products are then shipped across the border to towns in Northern Thailand and down to Bangkok for further distribution to international markets.

Topic 47. LEADERS AT UN MEET CALL FOR RENEWED COMMITMENT TO ERADICATE POVERTY

Important for the subject: International Relations

World leaders gathered at the **High-Level Political Forum on Sustainable Development (HLPF)** on July 18, 2023.

- Suggestions evolved from **HLPF** will contribute to the **2023 SDG Summit,** to be held from **September 18-19, 2023**, in **New York.**
- Leaders called for a **renewed commitment to eradicating poverty** — the most fundamental challenge listed in the **United Nations-mandated Sustainable Development Goals (SDG)**.
- As per the latest **UN SDG progress report,** countries are way off track from achieving poverty eradication goals. Nearly **1.1 billion** of the **6.1 billion people** across **110 countries are poor.**
- At least **two regional forums** — **Asia-Pacific Forum for Sustainable Development** and the **Arab Forum for Sustainable Development** — flagged a looming **debt crisis** affecting, especially, the poor and developing countries.
- **Africa Regional Forum on Sustainable Development** too called for intensifying actions on the **Great Green Wall** and the **Battery Minerals Value Chain Initiative**.
- Launched in **2007** by the **African Union,** the **Great Green Wall initiative** aims to restore the continent's degraded landscapes.

HLPF:

- The event was held in **New York** from **July 10-19, 2023** under the auspices of the **Economic and Social Council**.
- **HLPF** (formed on 9 July 2013) is a **subsidiary body** of both the **United Nations General Assembly** and the **United Nations Economic and Social Council** responsible for the **entire organisation's policy on sustainable development.**
- HLPF is the **central global platform** for follow-up and review of the **2030 Agenda for Sustainable Development and SDGs**.

Headquarter: **New York, USA**

- The **theme** of the **HLPF meeting** is **Sustainable and Resilient Recovery from the COVID-19 Pandemic.**
- This year's **HLPF** recognised the unprecedented challenges created by the **global health crisis**, especially those related to poverty.

Asia-Pacific Forum for Sustainable Development:

- The **APFSD** is an **annual, inclusive intergovernmental forum** to support followup and review of **progress on the 2030 Agenda for Sustainable Development** and the **Sustainable Development Goals (SDGs)** at the **regional level**, while serving as a regional preparatory meeting to the **High-Level Political Forum (HLPF)**.
- The Forum provides a regional perspective on the implementation of the **2030 Agenda for Sustainable Development** by identifying regional trends and sharing best practices and lessons learned.
- Since its **inaugural session in 2014**, the **APFSD** has brought governments, civil society, the private sector, and other stakeholders together to prepare for the HLPF and to support regional efforts to accelerate the implementation of the 2030 Agenda.

UN Economic and Social Council (UN-ECOSOC):

- Established by the **UN Charter in 1945,** it is the **principal body for coordination, policy review, policy dialogue and recommendations** on **economic, social and environmental issues,** as well as implementation of internationally agreed development goals.
- It has **54 members, elected by the UN General Assembly** for overlapping **three year terms.**
- It is the **UN's central platform for reflection, debate and innovative thinking** on sustainable development.
- Each year, **ECOSOC** structures its work around an annual theme of global importance to sustainable development.
- It coordinates the work of the **14 UN specialized agencies, ten functional commissions and five regional commissions,** receives reports from **nine UN funds** and programmes and issues policy recommendations to the UN system and to member states.

Few Important Bodies under the Purview of ECOSOC:

- International labour Organization (ILO)
- Food and Agriculture Organization (FAO)
- United Nations Educational, Scientific and Cultural Organization (UNESCO)
- World Health Organization (WHO)
- Bretton Woods Twins (World Bank Group and International Monetary Fund)
- United Nations Children's Fund (UNICEF)
- Apart from these there are various Functional and Regional Commissions, Standing Committees, Ad Hoc and Expert Bodies as well.

Topic 48. GLOBAL SCIENCE FUNDING MUST BE REDESIGNED TO SUCCEED ON SDGS

Important for the subject : International Relations

The current science around sustainability or sustainable science model requires a fundamental revamp to keep up with the pace and intricacy of climate challenges, argued a **high-level Global Commission on Science Missions for Sustainability (GCSMS)**.

Global Commission on Science Missions for Sustainability (GCSMS):

- **GCSMS** was established in **2021** by the **International Science Council (ISC)**, a non-profit.
- The **ISC** was created in **2018** as the result of a **merger** between the **International Council for Science (ICSU)** and the **International Social Science Council (ISSC).**
- It works at the global level to catalyze and convene scientific expertise, advice and

influence on issues of major concern to both science and society.

- Report published by it is **"Flipping the Science Model: A Roadmap to Science Missions for Sustainability"**.
- The commission recommended establishing an ambitious **$1 billion per year mission science network of Regional Sustainability Hubs** across the world to rectify the issue.
- These hubs would address context-specific and complex issues — from climate change and malnutrition to water security and clean energy — through a systematic engagement process.

Slow progress on SDGs:

- Almost halfway to meeting the **2030 deadline,** countries remain far from **achieving poverty eradication goals,** according to the latest **UN SDG progress report.**
- **Nearly 1.1 billion** of the **6.1 billion people across 110 countries are poor,** noted the **UNDP's latest multidimensional poverty** estimates.
- **Global hunger** is back to **2005 levels** and nearly **600 million people** will remain mired in extreme poverty by 2030.

Topic 49. ANCIENT GENOMIC DATA SHED LIGHT ON THE DEMISE OF THE COPPER AGE

Important for the subject :History

Why in news:

An analysis of **ancient human genomic data** suggests that **Copper Age farmers** and **steppe pastoralists** may have interacted **1,000 years earlier than previously thought**.

The findings may aid our understanding of the **demise of the Copper Age** and the expansion of pastoralist groups **around 3,300 BC**.

Backgeound:

- Previous analyses of **ancient genomic data** have suggested that **two major genetic turnover events** occurred in **Western Eurasia;** one associated with the spread of farming around **7,000-6,000 BC** and a second resulting from the expansion of pastoralist groups from the Eurasian steppe starting **around 3,300 BC**.
- The period between these two events, **the Copper Age**, was characterised by a new economy based on **metallurgy, wheel** and **wagon transportation,** and **horse domestication**.

What has the new study found?

- However, what happened between the **demise of Copper Age settlements** (around 4,250 BC) and the **expansion of pastoralists** is not well understood.
- According to the paper, the researchers analysed **genetic data** dating to between **5,400 and 2,400 BC** and they found that while there was **genetic continuity between the**

Neolithic and Copper Age groups, from around **4500 BC** groups from the northwestern Black Sea region carried varying amounts of ancestry from Copper Age and steppe-zone populations.

- This finding shows that **the groups had cultural contact and mixed nearly 1,000 years earlier than previously thought**.
- The **transfer of technology between farmers and transitional hunters** from different geographical zones was integral to the rise, formation and expansion of pastoralist groups **around 3300 BC**.
- According to the authors, the **early admixture during the neolithic appears to be local to the NW Black Sea region of the fourth millennium BC** and did not affect the hinterland in southeastern Europe.
- In fact, the **Early Bronze Age individuals** from **Yunatsite** and **Pietrele** do not show **traces of steppe-like ancestry** but instead a resurgence of hunter-gatherer ancestry observed widely in Europe during the **fourth millennium BC**.

About the Copper Age (or Chalcolithic age):

- **About:** The **end of the Neolithic period** saw the use of metals. Several cultures were based on the use of copper and stone implements.
- Such a culture is called **Chalcolithic** and as the name indicates, during the **Chalcolithic (Chalco = Copper and Lithic = Stone) period,** both **metal** and **stone** were utilised for the manufacture of the equipment in day-to-day life.
- The **Chalcolithic cultures** followed the **Bronze Age Harappa culture**. It spanned around **2500 B**C to **700 BC**.
- **Salient Features:** The **Chalcolithic culture** of a region was defined according to certain salient features seen in ceramics and other cultural equipment like copper artefacts, beads of semi-precious stones, stone tools and terracotta figurines.

Characteristics:

- **Rural Settlements:** The people were mostly rural and lived near hills and rivers.
- The people of Chalcolithic Age survived on hunting, fishing, and farming **Regional Differences:** Regional differences in social structure, cereals and pottery become visible.
- **Migration:** Migration and diffusion of population groups were often cited as causes for the origin of different cultures within the Chalcolithic period.
- **First Metal Age of India:** Since this was the first metal age, copper and its alloy bronze which melt at low temperature were used for the manufacture of various objects during this period.
- **Art and Craft:** The specialty of the Chalcolithic culture was wheel made pottery mostly of red and orange colour.
- Different types of pottery were used by the people of the Chalcolithic phase. The Black-and-Red pottery among them was quite common.
- The **Ochre-Coloured Pottery(OCP)** was also in use.
- **Agriculture:** The major crops cultivated were **barley** and **wheat, lentil, bajra, jowar,**

ragi millets, green pea, green and black gram.

- **Traces of rice cultivation are also found.** This shows that their food included fish and rice. Eastern India produced rice and Western India produced barley.

Topic 50. AHAMADIYYAS

Important for the subject : History

In the southern state of Andhra Pradesh, the **Ahmadiyya community** has approached the Central government to intervene against a case of their exclusion from the larger Muslim community.

This follows a resolution passed by the Andhra Pradesh Waqf Board in February declaring them as 'Non-Muslims' or 'Kafirs'.

Ahamadiyas

- Ahmadiyya Muslims are a **sub-sect of the Sunni Muslims who originated in the 19th century in undivided Punjab, India.** Its founder was **Mirza Ghulam Ahmad**, a reformist who wanted Islam to adapt in tune with modern times and assume a more liberal tone and tenor.
- He stressed on the **role of Islam as a matter of personal faith and took an apologetic stand against 'jihad'** which is using violence to spread Islam or for political motives.
- The Ahmadiyya sect as founded by him became a **key example of the reformist movement in the Indian subcontinent in the late 19th century**, a time when even Hinduism was also witnessing revivalist and reformist movements of its own, including the Arya Samaj and the Brahmo Samaj movements.
- But ironically, unlike the Hindus who received the reformist movements positively, Ahmadiyyas have become a major irritant for orthodox Muslims across the world.

Ahmadiyya Movement

- The **Ahmadiyya forms a sect of Islam which originated from India**. It was founded by **Mirza Ghulam Ahmad in 1889.**
- It was **based on liberal principles**. It described itself as the standard-bearer of Mohammedan Renaissance, and based itself, like the Brahmo Samaj, on the principles of universal religion of all humanity, opposing jihad (sacred war against non-Muslims).
- The movement **spread Western liberal education among the Indian Muslims.**
- The Ahmadiyya community is the **only Islamic sect to believe that the Messiah had come in the person of Mirza Ghulam Ahmad** to end religious wars and bloodshed and to reinstate morality, peace and justice.
- They believed in **separating the mosque from the State as well as in human rights and tolerance.**
- However, the **Ahmadiyya Movement, like Bahaism which flourished in the West Asian countries, suffered from mysticism.**

Topic 51. PRESIDENT OPENS TRIBAL ARTS GALLERY AT RASHTRAPATI BHAVAN AS SHE FINISHES A YEAR IN OFFICE

Important for the subject :History

On a day when India's first President from the tribal community Droupadi Murmu completed one year in office, the Rashtrapati Bhavan on Tuesday got a unique gallery titled **'Janjatiya Darpan'dedicated to tribal arts, culture and heroes.**

- The gallery, which is around 2,200 square feet, has been developed by **the Indira Gandhi National Centre for Arts, an autonomous institution under the Union Culture Ministry.**
- The gallery showcases different themes like **unsung tribal freedom fighters, traditional natural resource management practices** like **Halma, tribal art like Dokra, musical instruments and various scripts like Gunjala Gondi. Janjati heroes** – Gallery consists of different themes such as unsung tribal freedom fighters, traditional natural resource management practices such as Halma, Dokra art, Gunjala Gondi script, and Warli.
- In addition, the contemporary photographs of various Janjatis of Bharat by Satish Lal Andhekar were also displayed at the gallery.
- **Koya Pagide** – The gallery has some of the very rare and unique artefacts such as scroll (Koya Pagide) depicting the life history and genealogy of Koya Janjati community from Bhadrachalam.
- **Gunjala Gondi Script** – The Gunjala Gondi Script along with its detailed history is put on display at the gallery.

Navachara

- An Artificial Intelligence enabled gallery developed by Rashtrapati Bhavan in collaboration with Intel India.
- This gallery exhibits immersive innovations and indigenous AI solutions created by students and AI coaches.
- It is equipped with six interactive exhibits that provide insights into the grandeur of Rashtrapati Bhavan and ignite a sense of inspiration for democratizing AI skills.

Sutra-kala Darpan

- It is a Textile Collection which shows the remarkable collection of antique textiles of the Rashtrapati Bhavan.
- Rashtrapati Bhavan is a repository of distinct textile traditions, ranging from zardozi and gold-embroidered velvets in its carpets, bed and table coverings, to fine muslin and silk drapes.

Indira Gandhi National Centre for the Arts

- The **Indira Gandhi National Centre for the Arts** (IGNCA) was established in 1987 as an autonomous institution under the Ministry of Culture, as a centre for research,

academic pursuit and dissemination in the field of the arts.

- The IGNCA has a trust (i.e. Board of Trustees), which meets regularly to give general direction about the Centre's work. The Executive Committee, drawn from among the Trustees, functions under a Chairman. It is a **research unit under Project Mausam.**
- Project 'Mausam' is a Ministry of Culture project with Archaeological Survey of India (ASI), New Delhi as the nodal agency.
- The central themes that hold Project 'Mausam' together are those of cultural routes and maritime landscapes that not only linked different parts of the Indian Ocean littoral, but also connected the coastal centres to their hinterlands.
- A **project on design and development of a Vedic Heritage Portal** was **initiated at IGNCA, under the aegis of the Ministry of Culture**, Government of India. The portal aims to communicate messages enshrined in the Vedas.

Topic 52. WHEN BHADOHI ROLLED OUT THE RED CARPET FOR NEW PARLIAMENT

Important for the subject: History

It took **900 skilled artisans** in **UP's Bhadohi 10.80 lakh man hours** to **hand-knot 18 shades** from the **Indian agave-green family** to make **158 carpets** bearing motifs inspired by the **peacock** for the **Lok Sabha hall** in the **new Parliament building**.

For the **new Rajya Sabha hall, 156 carpets** bearing a motif inspired by the **lotus** were **woven in shades of kokum red.**

Bhadohi: The carpet city of India:

- Carpets like these have been intricately **hand-knotted** for decades in **Bhadohi** '**the carpet city of India'**.
- In **2009**, these handmade carpets were **awarded** the coveted **Geographical Indications tag**. **Obeetee**, which won the tender to make the carpets, started the **Parliament project in 2020**.
- In the late **1980s**, it made a **hand-knotted carpet** commissioned by **Rashtrapati Bhavan.** The carpet is still laid out in the **Ashoka Hall**.
- While **hand-knotted carpets** are usually made for big manufacturers and exporters, the smaller ones focus on handwoven, hand-tufted and flat-woven (or dhurries) carpets.
- According to **UP, Bhadohi district** alone employs **22 lakh rural artisans** of the **32 lakh employed in the carpet industry in the Mirzapur-Bhadohi region**.

Carpet raw materials:

- It takes the entire country for a carpet to come together.
- **Sheep wool** comes from **Rajasthan** and is processed in **Haryana's Panipat.**
- While **weavers belong to UP, Jharkhand** and **West Bengal,** most **exporters** have offices in **Delhi**.

- For the **Parliament carpets**, however, the **wool** was imported from **New Zealand**.

About the Bhadohi carpet:

Name of GI Registered Product: Hand made Carpet of Bhadohi

Name of State: Uttar Pradesh

- A prominent woven carpet is the **hand-knotted carpet.** This type of carpet is manufactured on a **vertical wooden loom**. **Thick cotton** and **woollen yarns** are used in the warp ends while wool is used in the width direction.
- Designs depicting **flowers, animals, gardens, trees** and **trellises** are used in various hues and ways to liven up these floor coverings.
- The **wool** used in carpets varies according to the **quality, design** and **style** and so do the colours. Usually the best grade of Indian wool is used for medium quality carpets.

Topic 53. NSG TEAM VISITS BLAST-HIT RESTAURANT IN SHIMLA TO ASCERTAIN CAUSE OF INCIDENT

Important for the subject : Polity

A team of the **National Security Guard (NSG)** visited the eatery here on Mall Road where a gas leak apparently led to a blast, killing one person and injuring 13 others.

The blast occurred on July 18 at Himachali Rasoi restaurant, known for serving Himachali cuisines, located in Middle Bazaar in the heart of the city.

National Security Guard (NSG)

- The NSG is a **counter-terrorism unit that formally came into existence in 1986 by an act of Parliament- 'National Security Guard Act, 1986'.**
- The idea behind raising such force came in the aftermath of Operation Blue Star (an Indian military action carried out to remove militant religious leader from the Golden Temple, Amritsar) in 1984, Akshardham Temple attack and the assassination of former PM Indira Gandhi, for 'combating terrorist activities with a view to protect states against internal disturbances.'

It **operates under the Ministry of Home Affairs and is a task-oriented force** that has two complementary elements in the form of:

- **Special Action Group (SAG**) comprising of the Army personnel- is the main offensive or the strike wing of the NSG, and **Special Ranger Groups (SRG**) comprising of personnel drawn from the Central Armed Police Forces/State Police Forces. They generally handle VIP securities.
- The **head of NSG- designated as Director General** (DG), is selected and **appointed by the Minister of Home Affairs.**
- The motto of 'Sarvatra, Sarvottam, Suraksha' has always been upheld by it with a focus

on its basic philosophy of swift and speedy strike and immediate withdrawal from the theatre of action.

- National Security Guard has been given the specific role to handle all facets of terrorism in any part of the country as a Federal Contingency Force.
- The NSG is trained to conduct counter-terrorist task including counter hijacking tasks on land, sea, and air; Bomb disposal (search, detection, and neutralization of IEDs), Post Blast Investigation (PBI), and Hostage Rescue missions.
- The NSG personnel are often referred to in the media as Black Cat Commandos because of the black outfit and black cat insignia worn on their uniform.

Operations undertaken:

- Operation Black Thunder (Golden Temple, Amritsar, 1986 & 1988) Operation Ashwamedh (Indian Airlines Flight-IC427 hijacking, India, 1993) Operation Thunderbolt or Vajra Shakti (Akshardham Temple attack, Gujarat, 2002) Operation Black Tornado (Mumbai Blasts, 2008)
- There is no direct recruitment to the NSG. Personnel from the army/police forces serve in the NSG on deputation. NSG is headed by a Director-General who is generally drawn from the Indian Police Service.

Major functions of the NSG are:

- Counter hijacking tasks on land, air and sea Post blast investigation Bomb disposal (search, detection & neutralisation of IEDs) VIP security Hostage rescue missions

Topic 54. BILL INTRODUCED IN LS TO ADD MAHARA, MAHRA IN CHHATTISGARH SC LIST

Important for the subject : Polity

The Union Social Justice Ministry has introduced a Bill in the Lok Sabha to amend the **Constitution (Scheduled Castes) Order and include two synonyms for the Mahar community in Chhattisgarh to the State's Scheduled Castes list.**

- The Bill will benefit about two lahks more people from these communities by making them eligible for various government schemes and benefits meant for Scheduled Castes (SCs) in the state.
- The Bill **proposes to add "Mahara" and "Mahra" as synonyms for the Mahar community in Chhattisgarh.**
- The Mahar community is **already listed as a Scheduled Caste** in the state, but members of the "**Mahara" and "Mahra" communities, who identify themselves as Mahar,** are **not able to avail themselves of the benefits** available to SCs.
- The Bill seeks to rectify this anomaly and ensure that members of these communities are not deprived of their constitutional rights and entitlements as SCs.

Why are these synonyms being added?

- The inclusion of these two synonyms was initiated by the Chhattisgarh State government, which sent a proposal to the Centre for amending the Constitution (Scheduled Castes) Order.
- The proposal was based on the recommendations of the State-level Scrutiny Committee, which verified the claims of these communities to be Mahar.
- The State government also conducted a socio-economic survey of these communities and found that they were facing similar problems and challenges as other SCs in terms of education, employment, health, and social status.
- The State government argued that adding these synonyms would help in addressing the issues of identity, dignity, and inclusion of these communities and bring them into the mainstream of society.

Scheduled Castes (SCs) list and how it is updated

- Scheduled Castes (SCs) are a group of historically disadvantaged people in India who are recognized by the Constitution of India and given certain rights and protections.
- The term "Scheduled Caste" derives from the fact that they are listed in the
- Schedule (Annexure) of the Constitution. The **list of SCs is not static, but dynamic**. It can be **updated by the President of India, in consultation with the state governor, by issuing an order under Article 341** of the Constitution.
- The order can include or exclude any caste, race or tribe, or part of or group within any caste, race or tribe, from the list of SCs.

Process of Inclusion and Update of the SCs List Constitutional Provision

- Article 341 of the Indian Constitution empowers the President to specify, through a public notification, the castes, races, tribes, or parts of groups within castes and races that are to be considered as Scheduled Castes.

State Government Proposal

- To add or delete any caste or community from the SCs list, the concerned State Government must propose the change to the President.
- The State Government conducts a thorough examination of the social, educational, and economic conditions of the community and submits a detailed proposal to the Union Ministry of Social Justice and Empowerment.

Verification and Recommendations

- The Union Ministry of Social Justice and Empowerment examines the proposal and conducts its investigation to verify the claims made by the State Government.
- It may seek additional information or recommendations from various authorities, including the National Commission for Scheduled Castes (NCSC), State-level

Commissions, and other relevant bodies.

Consultation with NCSC

- The NCSC plays an important role in advising the government on matters related to Scheduled Castes.
- The Ministry may consult the NCSC for its views and recommendations regarding the inclusion or exclusion of a particular caste or community from the SCs list.

Presidential Notification

- After careful examination and considering all the recommendations, the President of India issues a public notification specifying the inclusion or exclusion of a caste or community from the SCs list. This notification is then published in the Official Gazette of India.

Amendment to the Constitution

- Once the President's notification is issued, the SCs list is updated accordingly. The inclusion or deletion of any caste or community in the list becomes part of the Indian Constitution.

Rights and Benefits

- With the inclusion in the SCs list, the identified communities become eligible for various affirmative action programs, reserved seats in legislatures, educational institutions, and other special provisions aimed at their social upliftment.

Topic 55. ARTICLE 370 AND CONSTITUTIONALITY OF CO 272, 273

Important for the subject :Polity

The Supreme Court has heard the arguments challenging the abrogation of **Article 370.**

CO 272 was issued on **August 5, 2019 to** amend **Article 367** of the **Indian Constitution.** This amendment changed the **reference from the "Constituent Assembly" to the "Legislative Assembly" in Article 370(3)**, which played a pivotal role in the subsequent steps leading to the abrogation of Article 370.

- **CO 273** was issued on **August 6, 2019** which **operationalized the recommendation made by the Rajya Sabh**a to **abrogate Article 370.** This proclamation essentially **sealed the abrogation of Article 370** and the **reorganization of the state of Jammu and Kashmir into two union territories.**

What is the Constitutional Principles involved:

- The **core legal arguments** in these challenges revolve around the **principles of constitutional interpretation, separation of powers, and the procedure for amending or altering the Constitution**.

- The petitioners assert that the **use of Article 367 to effect substantive changes to Article 370 goes beyond the scope of interpretative powers** and **violates the constitutional procedure for amending the Constitution.**

What Supreme Court had said:

- The Supreme Court has **enquired center about the restoration of the statehood of Jammu and Kashmir.**
- The Chief Justice had **reminded the Centre** that the **"restoration of democracy is a vital component for our nation".**

What was Article 370 and its features:

- **Article 370** was a provision in the Indian Constitution **that granted** special autonomous status to the state of Jammu and Kashmir.
- It was intended to **provide temporary provisions** for the governance of Jammu and Kashmir following its **accession to India in 1947.**
- The provision allowed Jammu and Kashmir to have **its own constitution, a separate flag, and a high degree of autonomy in matters of governance except defense, communication, and foreign affairs were not under the purview of the state and were controlled by the Indian government**

Topic 56. FREED LABOURERS BONDED TO PAST IN ODISHA

Important for the subject : Polity

335 People rescued by Thiruvallur district administration rescued from the brick kilns, under the **Bonded Labour System (Abolition) Act, 1976 (BLS Act**) on February 12, 2015.

- They should have **received ₹20,000 each from the Odisha and Union governments under the anti-slavery Act**. But the couple has been waiting for the compensation for almost eight years now.
- The rehabilitation assistance was revised in 2016, to ₹2 lakh each to women and ₹1 lakh to men, and ₹3 lakh if the bonded labourers (women, children, transgenders) are rescued from brothels or sexual exploitation.
- The **Central Sector Scheme for Rehabilitation of Bonded Labourer-2021** says that those rescued should be put in skilling programmes and linked with government welfare schemes.

About the Bonded Labour System (Abolition) Act 1976:

- **Bonded Labour System (Abolition) Act, 1976 is an extension to article 23 of the Indian constitution.**
- The Act intends to **free all bonded labourers, cancel their debts, establish rehabilitative measures and punish the offender through imprisonment and fine.**
- The Act is being **implemented by the concerned State Govts./UTs**. The Act provides

for an institutional mechanism at the district level in the form of Vigilance Committees.

- For the purpose of implementing the provisions of this Act, the **State Governments/UTs may confer, on an Executive Magistrate, the powers of a Judicial Magistrate of the first class or second class for trial of offences under this Act.**
- Government of India has introduced a **revamped Central Sector Scheme for Rehabilitation of Bonded Labourers- 2016,** under which financial assistance to the tune of Rs.1.00 (one) lakh, Rs.2.00 (two) lakhs & Rs. 3.00 (three) lakhs are provided to released bonded labourers based on their category and level of exploitation along with other non-cash assistance for their livelihood.

Topic 57. NAVEEN PATNAIK EQUALS JYOTI BASU'S RECORD OF SECOND LONGEST SERVING CM

Important for the subject: Schemes

Odisha Chief Minister Naveen Patnaik on Saturday achieved a remarkable milestone, equaling the record set by former West Bengal CM Jyoti Basu as the second longest-serving Chief Minister in India.

- Patnaik has held the position for an impressive 23 years and 138 days, sharing this rank with the late veteran CPI (M) leader.
- The title of the longest-serving CM, however, belongs to Pawan Kumar Chamling, the former CM of Sikkim, who held the position for an impressive 24 years and 166 days.

Important Developments in Odisha

- **Krushak Assistance for Livelihood and Income Augmentation (KALIA) program** for farmers.
- Revival of millet crops to benefit tribal populations, construction of hostels for tribal students.
- Initiatives like 5T (teamwork, technology, transparency, transformation, and time limit) for a responsive government.
- He has also focused on the development of temples and the ongoing transformation of SCB Medical College Hospital into an AIIMS-plus institution.

KALIA Scheme

- **KALIA or "Krushak Assistance for Livelihood and Income Augmentation" scheme** was launched by the Odisha Government for farmer's welfare.
- The aim of the scheme is to accelerate agricultural prosperity and reduce poverty in the State payments to encourage cultivation and associated activities.
- The scheme is being seen as a viable alternative to farm loan waivers. Under the scheme, around Rs, 10,180 crores will be spent over three years until 2020-21 in providing financial assistance to cultivators and landless agricultural laborers.

Eligibility

- Small and marginal farmers, landless agricultural household, vulnerable agricultural household, landless agricultural laborers and sharecroppers (actual cultivators) are eligible under different components of the scheme.

Provision of the Scheme

- **For Cultivators**: All farmers will be provided Rs 10,000 per family as assistance for cultivation. Each family will get Rs 5,000 separately in the Kharif and Rabi, seasons, for five cropping seasons between 2018-19 and 2021-22. Crop loans up to Rs 50,000 are interest-free.
- **For Landless Agricultural Households**: Financial Assistance of Rs.12500 will be provided to each landless Agricultural Household for Agricultural allied activities like for small goat rearing unit, mini-layer unit, duckery units, fishery kits for fisherman, mushroom cultivation and bee-keeping, etc.
- **For Elderly**: The elderly, sick and differently-abled population who are unable to take up cultivation, will be provided Rs 10,000 per household per year.
- **Insurance for cultivators and landless agricultural household:** The KALIA scheme also includes a life insurance cover of Rs 2 lakh and additional personal accident coverage of the same amount for 57 lakh households.

Topic 58. RUSSIA STRIKES ODESA CATHEDRAL, AS PUTIN SAYS UKRAINE COUNTEROFFENSIVE 'FAILED'

Important for the subject : Art and Culture

Russia's latest strike on Odesa on Sunday killed two people and severely damaged a historic Orthodoxcathedral, drawing a vow of retaliation from Ukraine's leader.

Transfiguration Cathedral

- The **Transfiguration Cathedral in Odesa is the Orthodox Cathedral in Odesa, Ukraine,** dedicated to the Transfiguration of Jesus and belongs to the Ukrainian Orthodox Church (Moscow Patriarchate).
- It was severely damaged by a Russian missile attack on Odesa on July 23, 2023. The first and foremost church in the city of Odesa, the cathedral was founded in 1794 and the cathedral was designated the main church of New Russia in 1808.
- It was continuously expanded throughout the 19th century. The belltower was built between 1825 and 1837, and the refectory connecting it to the main church several years later. The interior was lined with polychrome marble, and the icon screen also was made of marble.
- Several churches in the region, including the Nativity Cathedral in Chișinău, were built in conscious imitation of the Odesa church.
- It was consecrated in 1809, destroyed during the Soviet era in 1936 before being rebuilt

when Ukraine became an independent nation.

- The remains of Prince Vorontsov and his wife were reburied in the cathedral. There is a statue of him on the cathedral square. The cathedral bells are controlled by an electronic device capable of playing 99 melodies.
- The **cathedral lies in Odesa's city center, which UNESCO named a World Heritage Site amid the threat of Russia's invasion.**