

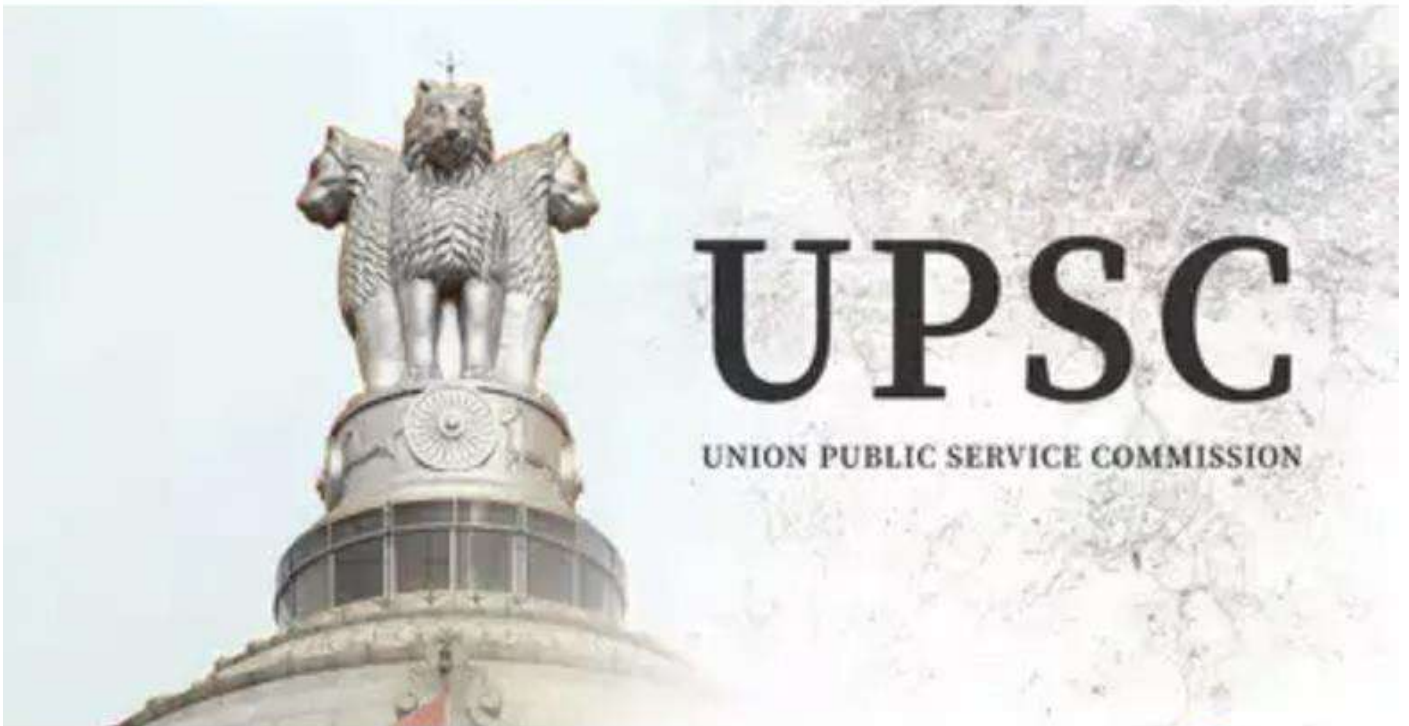


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AUGUST 2025

1. IMPORTANT TOPICS OF THE MONTH

1.1 Round-The-Clock (RTC) Clean Electricity

The recently released Transition Zero report highlighted that India can deliver 70% round-the-clock (RTC) clean electricity by 2030 at lower cost.

What is RTC Energy?

- **RTC (Round-the-Clock) clean energy** – It refers to a system where every hour of electricity use is matched with supply from zero-carbon sources like solar, wind, and battery storage.
- It is also referred to as “**24/7 carbon-free energy (CFE)**” means matching every hour of electricity use with electricity from carbon-free sources.
- It ensures clean power is actually available when it is needed, all day, every day, instead of buying annual clean energy certificates.
- **Power generation** – Solar generates power during the day and wind production is variable, so neither can independently guarantee supply at all hours unless integrated with energy storage or other sources.
- **Need** – Industrial and Commercial Demand i.e. Heavy industries, manufacturing, and data centres require constant, uninterrupted electricity to function effectively.
- RTC enables decarbonization (reducing or eliminating CO₂ emission by human activities) in situations where clean energy delivered in practice, especially during peak demand or nighttime hours.

C. Fossil vs Non-Fossil Energy Share in Installed Capacity as on 30.06.2025

Sector	Capacity (in GW)	Percentage
Thermal	242.04 GW	(49.92%)
Non-Fossil Fuel (RE+ LH+Nuclear)	242.78 GW	(50.08%)
Total	484.82 GW	(100%)

- **Significance** – RTC Supports national renewables goals by enabling India to reach its target of 500 GW of non-fossil fuel capacity by 2030.
 - The report shows RTC clean energy could cut emissions by 2.4% under the 70% matching scenario and when it scaled to 100% RTC matching, the potential emissions reduction rises to 7%.
- RTC approach especially important for heavy industries and data centers, whose electricity demand is typically flat around the clock.

What are the advantages of RTC?

- **Cost efficiency** – The reports analysis indicates that achieving 70% RTC clean energy can save grid operators Rs.9,000 crore (\$1 billion) per year by 2030.
- **Reduction in system cost** – It is estimated that capital and operational savings could lead to net system cost reductions of up to 35% compared to the annual matching model.
- **System flexibility and reliability** – Integrating renewables with energy storage or complementary sources smooths out the variability, providing steady and dependable power.
- **Competitive advantage for industries** – RTC power solutions with fixed pricing help commercial users shield themselves from price volatility.
- **Market and grid transformation** – RTC procurement pushes the energy market towards robust, advanced Power Purchase Agreements and supports the evolution of a resilient, sustainable electricity system.

- **Socio-economic benefits** – Green energy expansion through RTC increases energy access, creates jobs, boosts local economies, and enhances India's energy independence.
- **Carbon abatement** – Carbon reduction under the RTC model is significantly lower.
 - The analysis reveals that achieving carbon reductions through 70% RTC clean electricity costs nearly 3 times less than doing so via annual matching.

What are the challenges in deploying RTC electricity systems?

- **Supply disruption** – Solar and wind are variable and unpredictable, making it tough to provide uninterrupted RTC supply without substantial energy storage or backup sources.
- **Batter storage drawbacks** – Long-duration energy storage (LDES) currently plays a minor role because its high upfront costs make it less economically attractive.
 - In contrast, 4-hour lithium-ion batteries are more competitive, widely available, and rapidly becoming cheaper.
- **Transmission bottlenecks** – Corridor congestion and delays in inter-regional grid upgrades hamper reliable power delivery to load centers, affecting RTC consistency.
- **High project costs** – Integrating storage, oversizing assets, and technical sophistication significantly raise capital and operational expenditures for RTC projects.
- **Regulatory hurdles** – Evolving and often ambiguous regulatory frameworks for RTC tenders can stall implementation and deter private sector confidence.
- **Operational delays** – Lengthy project approval, tender micromanagement, and lack of experience among developers slow the commissioning of RTC systems.

What are the measures can be taken?

- **Regulatory incentives** – Policy support and incentives for procuring RTC power rather than for generic or annual clean energy should be prioritized.
 - This can include targeted subsidies, flexibility credits, and mandates for hourly matching.
- **Integration of infrastructure** – The required 70% RTC energy can be deployed using a combination of solar, onshore wind, and battery storage.
 - Solar and batteries, in particular, show high synergy, with each MW of solar requiring approximately 2 MWh of battery storage to ensure a stable and reliable power supply.
- **Support for battery and storage solution** – Scaling battery manufacture and deployment will be critical.
 - Incentivizing investment in both short-duration (like lithium-ion) and long-duration storage will ensure flexibility.
- **Grid modernization and planning** – Advance grid upgrades to integrate variable renewables, expand transmission infrastructure, and invest in digital solutions to monitor and manage real-time supply-demand.
- **Market mechanisms** – Introduction of flexible, real-time power purchase agreements (PPAs) and demand response programs to encourage customers and suppliers to align consumption.
- **Learning from global examples** – India must avoid pitfalls faced in Europe, where renewable market saturation led to a decline in the financial attractiveness of PPAs.
 - **For example** – In Spain due to cannibalization, the increased supply drives down wholesale electricity prices, impacting the per-unit revenue of renewable energy generators.

Cannibalization refers to the rapid increase in renewable energy sources, particularly solar and wind, has led to an oversupply of electricity, which in turn has reduces the revenue of renewable energy producers.

- **Building awareness** – Engage industries, utilities, and stakeholders through education, pilot projects, and partnerships to demonstrate the practical benefits and economic viability of RTC solutions.

What lies ahead?

- India is poised to set a global precedent with its transition to RTC clean energy. If the current policy momentum, market reforms, and technological adoption are sustained.
- As hourly emissions accounting becomes a global norm, India's early experience with RTC implementation will influence energy transition strategies in other emerging economies.

- Proactive adoption of RTC strategies will propel India to the forefront of the global clean energy movement, making the nation a model for round-the-clock, sustainable growth.

Quick facts

- The report arrives at a critical time, as the **Greenhouse Gas Protocol (GHGP)** the global standard for corporate emissions reporting is reviewing its Scope 2 guidance.
- The Greenhouse Gas Protocol (GHG Protocol) was released by the World Resources Institute (WRI) and the World Business Council for Sustainable Development (WBCSD)
- It is *expected to move toward hourly emissions* accounting, making RTC clean energy procurement increasingly relevant for ESG (Environmental, Social, and Governance) compliant companies.
- While hourly emissions accounting is emerging as the preferred method, the GHGP does not set targets or grade performance.
- A central focus of this review is the update to the Scope 2 guidance the rules governing how companies account for emissions from purchased electricity.

G.S PAPER I

2. HISTORY

2.1 WW-II & its Impact on the Global Order

In a historic move, the UK and Germany signed their first bilateral treaty since the World War II, pledging “mutual assistance” in case of attack remind us the WW-II, in which both states were opposite side.

How WW-I paved way for WW-II?

WW-I lasted from 1914 to 1918, involved major global powers in two alliances, ended with the Allied victory, and led to significant geopolitical changes.

- **Failures of Treaty of Versailles** – In 1919 peace agreement, the resentment felt by Germany about unjust conditions imposed upon it gave rise to the WW-II.
- **Political factors** – After the WW-I, the liberal Weimar Republic replaced the Wilhelmine monarchy in Germany.
- It paved the way for the rise of a politician like Adolf Hitler in Germany.
- **Economic factors** – The Germany experienced hyper-inflation as it struggled to pay the war reparations that were imposed by the Treaty.
- These provisions include payment of war reparations to the victorious Allies.
- **US president’s lofty idealism** – The right to national self-determination faced harsh realities in post-WW Europe.
- US Senate had rejected the Treaty of Versailles due to the unfair treatment eventually.

*US President Woodrow Wilson’s last point among famous fourteen points created the **League of Nations**, which became the predecessor of the **United Nations** came up immediate after WWII in 1945.*

What are the factors that built up to WWII?

*The Wall Street crash shaped post-Second World War international economic order, on the basis of John Maynard Keynes seminal work “The General Theory of Employment, Interest and Money” in 1936. This was done particularly through the setting up of the **Bretton Woods institutions** such as the **International Monetary Fund (IMF)** and the **World Bank**.*

Economic causes – The Great Wall Street Crash of October 1929 was one of the world’s first truly economic crisis adversely affected world especially Europe.

- **Policy of appeasement** – This policy relates to the British Prime Minister, reflects Great Britain's approach to the increasing demands of Germany that unfolded at the Munich Conference of 1938.
 - British PM believed that the policy of appeasement was the best way to avoid war and to buy time for Britain to prepare militarily.
- **Unstable nature of the Weimar Republic** – The Weimar Republic came to an end in 1933 when the Nazi party secured dominance in the German parliament, the Reichstag.
- Hitler was appointed as Chancellor.
- **Violation of treaty** – Hitler decided to remilitarise the Rhineland.
- **Merger of states** – Hitler's Nazi Germany and Benito Mussolini's Italy came together and backed General Francisco Franco's fascist assault against the Republicans in the Spanish Civil War.
- **Germany aggression** - In 1938, Hitler signed the pact with Austria that resulted in the merger of Austria with Germany, this further consolidated his position.
- Hitler kept making the case for the Sudeten Germans in Czechoslovakia, using their minority status to persuade France and Britain that the Sudetenland must be ceded to Germany.
- This was followed the next year in 1939 by Germany's invasion and occupation of the rest of Czechoslovakia.

What is the course of war?

- **Air power and the Blitz** – Germany's Luftwaffe inflicting severe bombings on London and other cities, leading to widespread destruction.
- **Germany's Blitzkrieg tactics** – combined rapid aerial assaults and ground attacks, enabling swift conquests across Europe by spring 1941.
- **Formation of alliances** – The Allies, including Britain, France, the US, and the Soviet Union, opposed the Axis powers of Germany, Italy, and Japan.
- **Entry of USA** – Following the Pearl Harbor attack in December 1941, the US joined the war, bolstering the Allies with military resources.
- **Downfall of Germany** – Germany suffered key defeats at Stalingrad and El Alamein, halting their advances.
- Operation Overlord on June 6, 1944, marked the start of liberating Western Europe as Allies landed in Normandy (France).
- By May 1945, Germany fell as Allied forces advanced, with atomic bombings in August 1945 concluding the Pacific conflict.

WW -II lasted from 1939 to 1945 and caused a staggering loss of between 40 to 50 million lives.

How the WW -II reshaped the global order?

- **Post-war order** – The defeat of the Axis powers established a new global structure **dominated by the United States**.
- **New order** – This was characterized by the development of an international rules-based framework governing relations.
- Landmark proceedings such as the Nuremberg and Tokyo trials introduced critical legal concepts like **war crimes and crimes against humanity**.
- **Genocide convention** – The atrocities of the Holocaust led to the adoption of the Genocide Convention by the UN General Assembly in 1948, reinforcing the commitment to prevent such crimes.

What lies ahead?

- It strengthens European security by including military assistance in case of armed attacks, thereby reinforcing NATO's collective security framework and addressing shared threats like Russian aggression.
- It enhances bilateral cooperation beyond defense in economy, migration control, and technology.
- Showcasing a precedent for deeper strategic partnerships in Europe amid evolving geopolitical landscapes and potentially balancing reduced US engagement in the region.

3. SOCIAL ISSUES

3.1 Slum Clusters in Flood Prone Areas

According to a 2024 Moody's report, more than 158 million slum-dwellers in India live in vulnerable settlements in floodplains, with most of them concentrated in the Ganga River delta.

What is the condition of slum clusters in flood prone areas?

- **Slum clusters** – It refers to a group of informal settlements within cities that have inadequate housing
- This combined with poor hygiene make living conditions miserable.
- **Overcrowded spaces** – Slums are with many people crammed into very small living spaces.
- **Inadequate housing** – Housing in slums is built on land that the occupant does not have a legal claim to and without any urban planning or adherence to zoning regulations.
- **Social conditions** – These areas are often subjected to many social indicators are on a downward slide
 - **For example**, crime and unemployment are on the rise.
- Most also do not have easy access to schools, hospitals or public places for the community to gather.
- **Informal setups** – In such urban areas are typically tin-sheet, tent or tarp housing, with rent paid to owners through land contractors
- **Poor living conditions** – These settlements lack basic municipal services such as water, sanitation, waste collection, storm drainage, street lighting, paved sidewalks and roads for emergency access.
- Many slums have been unserviced and unrecognised for long periods, over 20 years in some cities.

According to **UN-Habitat**, a slum household is characterized by a lack of one or more of the following - durable housing, sufficient living space, access to improved water, access to improved sanitation, and security of tenure.

What are the causes for slum formation?

- **Cheaper settlements** – These flood prone areas are available for migrant workers and informal settlements as they are cheaper.
- These localities are not preferred by large builders for gated communities or IT parks,
- **Inefficient planning systems** – People are coming to cities far faster than the planning process can incorporate them.
- Often, they find their own land and build a shack before the government has a chance to learn of their existence.
- **Urbanization** – The people migrate from rural areas to the cities and natural population growth continues to occur.
- Today, more than half the world's population resides in urban areas.
- **Bad governance** – Governments often fail to recognise the rights of the urban poor and incorporate them into urban planning, thereby contributing to the growth of slums.
- **The attitude of a government** – Government providing urban services to poor people without taking policy measures to restrict slums, will further attract urbanisation and cause the slums to grow.
- **People preference** – People settle in floodplains for various reasons include access to jobs, social vulnerability, and financial constraints.
 - **For instance**, where regions like Europe, subsidised flood insurance premiums in high-risk areas promotes the desirability of floodplain areas like beachfronts and water views.

What are the problems associated?

- **Flood risk** – The people living here often subjected to floods in rainy seasons or cloudburst like disastrous situations.
 - India has the world's largest number of slum dwellers living in floodplains with most of them concentrated in the naturally flood-prone delta of the Ganga river.
- **Indirect consequences** – Inequities in access to resources and loss of jobs and access to services are among the indirect consequences of floods.
- **Social vulnerability** – Exposed populations vulnerability was found to depend on socioeconomic factors like education level and institutional factors like flood insurance.

- **Encroachment risks** – Poor people are forced to live in the most dangerous areas because safer or better-located places are taken by wealthier communities, and the basic services they need are lacking or failing, making them even more at risk.
- **Challenges to mitigate slum formation** – There are various challenges in mitigating slum formations such as
 - **Improper management strategies** – Vulnerable communities often being overlooked merely by looking at the population level instead of vulnerability level in preparing management plans.
 - Informal settlements in such urban areas are typically tin-sheet, tent or tarp housing, with rent paid to owners through land contractors.
 - **Lack of comprehensive data** – Data on vulnerable communities who have flood exposure risk is inadequate to make holistic policy making.

What are the measures can be taken?

- **Bridging data gaps** – It is done by analysing satellite images of informal settlements or slum dwellings in 129 low- and middle-income countries and comparing them with large-scale flood maps.
- **Slum upgrading** – It is an integrated approach that aims to turn around downward trends in an area.
- **Aligning with targets** – Nations to act on flood vulnerability risk for poorer populations as the 2030 deadline for the United Nations' Agenda for Sustainable Development Goals (SDGs) nears.
- **Collaboration efforts** – The government to collaborate with communities instead of banking only on traditional disaster preparedness for better planning.

Slum upgrading is about putting into motion the economic, social, institutional and community activities that are needed to turn an area around.

Quick facts

- **2024 Moody's report** - more than 2.3 billion people are exposed to flooding every year worldwide.
- **In India** - more than 600 million people are at risk of coastal or inland flooding.
- **Global distribution** - The largest concentrations and largest numbers of such people are in **South Asian countries**.
- Where northern India leads in absolute numbers, followed by Indonesia, Bangladesh, and Pakistan.

3.2 A Dedicated Urban Transport Cadre

Recently, an issue has been raised in Lok Sabha regarding urban mobility issues and a proposal was made for the creation of a specialised All India Service Cadre for the urban transport sector.

What is the status urban transport governance India?

- **Jurisdiction** – It does not find explicit mention in any of the three constitutional lists (Union, State, and Concurrent).
- While urban planning is a state subject, and highways and railways fall under the Union, urban transport cuts across both.
- **Nodal ministry** – Ministry of Housing and Urban Affairs (Mo HUA). In 1986, the subject of urban transport was formally transferred to the Ministry of Urban Development.
- **Programmes** – Training and capacity building programmes to train town planners and professionals through projects like the Sustainable Urban Transport Project (GEF-SUTP).
- **Dedicated officers** – The Ministry appointed an Officer on Special Duty (OSD) for Mass Rapid Transit Systems (MRTS) to oversee upcoming metro rail projects.
- These were typically senior railway engineers with deep project execution experience on metro systems.
- This evolved into the OSD for Urban Transport a position occupied by several bureaucrats who played a vital role in piloting policies.
 - National Urban Transport Policy (2006), Metro Policy (2017), and managing centrally funded urban transport projects in several cities.

What are the Needs for integrated planning and management of urban transport?

- **Committee's recommendation** – *The High-Level Committee on Urban Planning Report (2023)*, recommended the creation of an All India Urban and Regional Planning Service.
- **Governance challenges** – Indian cities today face governance issues in the urban transport sector.
- **Separated responsibilities** – Duties are divided across municipal corporations, metro rail corporations, State Transport Undertakings (STUs), Regional Transport Offices (RTOs), and other autonomous agencies.
 - They work with its own logic, data, and priorities, often without a shared vision.
- **Detached workforce** – Professionals trained in urban transport engineering, planning, or policy backgrounds are dispersed across consultancies, academia, civil society organisations, and think tanks.
- **Lack of distinct officers** – While municipal commissioners currently fulfil many of these responsibilities in cities, they have limited tenures and are usually generalist than specialists.
- **Absence of a unified administrative structure** – Cities lack a dedicated corps of officers for long-term strategies, facilitate coordination among stakeholders, and lend continuity to policy frameworks.
- Many states have not setup their own *unified metropolitan transport authorities*.

What is Unified Metropolitan Transport Authorities (UMTAs)?

- **UMTA** – It is a nodal agency that *brings together all the agencies* working in the area of urban transport in Chennai to ensure seamless delivery of mobility.
- **Background** – It was recommended by the *National Urban Transport Policy (2006)*, the *12th Five-Year Plan's Working Group* on Urban Transport and the Metro Rail Policy (2017).
- **Objective** – To act as nodal agencies for coordinated transport governance.
- **Established in** – Tamil Nadu, Karnataka, Kerala, and Assam.
- **Ongoing proposal** – The Delhi government is planning to set up a UMTA to ensure seamless integration and efficient urban mobility.
 - The transport department is working on an Urban Transport Policy under which a unified body and a task force would be set up to coordinate with the Delhi Transport Corporation (DTC), and Delhi Metro Rail Corporation (DMRC), and other transportation-managing authorities.
- **Worldwide examples** – Cities such as London, Vancouver, Singapore, and Paris have lead institutions equipped with professionals to handle the complexities of urban transport.
- **Issues** – There are numerous issues faced by UMTA, such as legal ambiguities, lack of inter-agency coordinating mechanisms, jurisdiction of UMTA, institutional turf protection.

For example, **Transport for London (TfL)** is responsible for the management and coordination of urban transport in the city.

How urban transport cadre could help?

- **Universal practices** – It could draw techniques from other nations and tailor it to address the complexities of Indian cities.
- **Indian administrative model** - It would comprise professionals trained in transport policy, planning, finance, and infrastructure management.
- This lies *Similar in spirit to the Indian Forest Service or the Indian Statistical Service*.
- **Expertise** – Officers from this cadre could provide proficiency on policy, planning, regulation and operation of urban transport at the city or metropolitan levels.
- **Coordination** – They could support city governments, help establish and manage UMTAs, and foster coordination among various agencies.
- **Availability of training** – Administrative training and support could be sought from the Department of Personnel and Training (DoPT).
- **Collaboration** – In addition to technical competencies, focus on building collaborations with local leaders and elected representatives.

What are the Challenges in setting up a dedicated cadre?

- **Existing concerns** – The administrative system already faces challenges that often obstruct good governance.

- Adding a new cadre without addressing existing administrative and capacity constraints could add another layer of difficulty.
- **Complexities of issues** – Moreover, urban transport is not merely an engineering problem *it is a deeply social, political, and environmental one.*
- **Depends on deeper reforms** – The success of such a cadre would depend a lot on enabling the 74th Constitutional Amendment.
- It should empower urban local authorities to set up bodies like UMTAs.
- **Not a magical solution** – All India Urban Transport Service is not a single and simple solution to address urban transport problems in Indian cities.
- It could *only be seen as a first step towards addressing the issues* of capacity and professional expertise in urban transport planning at city or metropolitan level.

What lies ahead?

- India could develop a professional, permanent institutional presence in cities *to address complex and evolving urban challenges* with the necessary expertise and stability.
- Government could *make institutional reform* that need to be responsive to local context, adaptability, and citizen participation.

G. S. PAPER II

4. INDIAN POLITY

4.1 **Suo Moto Cognizance by Supreme Court**

Recently, the Supreme Court (SC) of India initiated suo moto proceedings over the growing menace of stray dog attacks and the resulting fatalities, flagging the situation as alarming and disturbing.

What is suo moto cognizance of SC?

- **The Supreme Court of India** – It is the highest judicial court and the final court of appeal under the Constitution of India, the highest constitutional court, with the power of judicial review.
- **Suo moto cognizance** – It refers to the court's power *to initiate legal proceedings on its own*, without a formal petition being filed.
- This means the court can take up *matters of public interest* or concern.
- **Basis** – It can take action based on Information from media reports, letters, or other sources, even if no one brings a formal case before them.
- **Genesis** – Courts are required to adjudicate adversarial litigation, when one party raises a dispute against the other.
- **After emergency in 1974**, SC took up matters that highlighted *government inactivity and institutional neglect* that denied vulnerable individuals or groups their fundamental rights.

Articles 124 to 147 in Part V of the Constitution deal with the organisation, independence, jurisdiction, powers and procedures of the Supreme Court.

How Supreme Court ensures justice through suo moto cases?

- **Humanitarian support** – The SC intervened during the COVID-19 pandemic to *ensure proper treatment of patients* and dignified handling of dead bodies in the hospitals.
 - **For example**, SC monitored the mode of distribution of essential supplies and services during the pandemic.
- **Environmental protection** – It has ensured effective and timely control of further degradation of the environment.
 - **For example**, SC takes suo moto cognizance of Kancha Gachibowli tree felling.

- **Social justice** – SC took suo motu cognizance of sexual violences.
 - **For example**, During Manipur conflict and RG Kar Hospital rape and murder case.
- **Protection of dignity of the court** – SC took suo motu cognizance and sentenced the sitting judge of the High Courts for contempt of court.
 - **For example**, SC initiated contempt proceedings, for sentencing Supreme court judges for imprisonment.
- **Policy and investigative guidelines** – It gave directions regarding inadequacies and deficiencies in criminal trials dealing with reformation, uniformity.
 - **For example**, it gave clarity of procedure and practices relating to investigation, prosecution, trial, evidence and bail.
- **Societal welfare** – SC imposed the need for regulating stray dog feeding and addressing public safety concerns.

What are the criticism against the suo moto power of SC?

- **Increased burden** – There already number of cases pending before the SC and the suo moto power and jurisdiction puts extra load on judiciary.
- **Judicial over activism** – There is emerging trend of judicial overreach and intrusion by courts in executive actions in the name of public interest.
- **Legitimacy of news** – There can be a lack of validity and legality of the author and contents of news that often forms the basis of suo moto action by courts.
- **Violates separation of power** – There is a departure from the normal operation of the judicial hierarchy, or that such actions are interference into the executive's domain of exercise of power.

What are the arguments in favour of Suo moto jurisdiction?

- **Increased supremacy** – Despite criticism, suo moto action initiated by the Supreme Court has gained power over the years.
- **Sensible use of power** – SC has judiciously and prudently exercised the power of suo moto judicial intervention.
- **Proper solicitation** – It has exercised the utmost caution, ensuring proper verification before initiating action.
- It often refrained from final adjudication until proper investigation and scrutiny.
- **Timely interference** – SC has only intervened where it is required a larger role of protector of constitutional rights and values.
- **Coordination with states** – In many cases, the Government itself has treated the issue as a joint cause with SC.
- They jointly devised solutions to address the issue, rather than treating a suo moto petition as adversarial litigation.
- This is a classic example of all components of a democratic government working as efficient machine.
- **Supervisory role** – The role the SC has played in most of the cases is supervisory and facilitative in nature, rather than that of final adjudication.
- **Assistance from Lower courts** – The SC has taken assistance of the High Courts, amicus curiae, specially constituted panels, or retired judges, as well as the State machinery.
- This helps in identifying solutions and for proper implementation to ensure complete justice.

What lies ahead?

- The SC could strike the right balance between legislative supremacy and adherence to judicial self-restraint, keeping in mind the democratic values of our Constitution.
- SC could look into the validity and legitimacy of the news and its sources.
- The central and state government could also work in coordination with SC in the issues of utmost national importance.

4.2 Chief Election Commissioner of India

Recently, the opposition parties said that they were considering to move a motion of removal of the Chief Election Commissioner (CEC) during the ongoing session of Parliament.

What is constitutional basis of election commissioner?

- **Chief election commissioner**– The chief election commissioner of India (CEC) heads the Election Commission of India.
- **Constitutional source** – *Article 324, part XV* of the Constitution.
- **Statutory backings** – CEC and Other Election Commissioners (Appointment, Conditions of Service and Term of Office) Act, 2023.
- They lay down provisions regarding the appointment, tenure, and removal of the CEC.

How they are appointed?

- **Appointing authority** – The CEC and election commissioners are appointed by the President of India.
- **Recommendation** – Appointment is based on the recommendation from a 3-member selection committee.
- **Selection committee** – The Prime Minister, the Leader of the Opposition (LoP), and 1 member of the Union Cabinet.
- **Qualifications** – No specific qualifications prescribed by the Constitution.
 - But according to the 2023 act those appointed should have previously held secretary-level positions in the Government.
 - They should be persons of integrity, who have knowledge of and experience in management and conduct of elections.
- **Tenure** – The appointments are made for a tenure of 6 years or until the age of 65 years, whichever comes first.
- **Allowances and benefits** – The CEC enjoys the same services and monetary benefits that are extended to justices of the Supreme Court.
- **Reappointment** – The CEC of India is not eligible for reappointment after completing their term, according to a 2023 bill.

How they are removed?

- **Article 324(5) of the Constitution** – It states that the CEC can be removed from office only in like manner and on the *like grounds as a Judge of the Supreme Court*.
- This framing can *also be found in Section 11(2) of the 2023 Act*.
- The article further states that any other Election Commissioner or a Regional Commissioner shall not be removed from office except on the recommendation of the Chief Election Commissioner.
- With the view of shielding the ECI from political pressures, the bar for removing the CEC is purposefully set to be very high.
- **Article 124(4) of the Constitution** – It contains the process for removing a Supreme Court judge, *removal can only be on the ground of proved misbehaviour or incapacity*.
- **Misbehaviour** – It can comprise *any corrupt practices or abuse of office*.
 - Over the years, courts have interpreted this to include actions which are incompatible with the office of the CEC or the CEC's failure to discharge her official duties.
- **Incapacity** – It refers to a situation where the officer is unable to perform his/her duties.
- **Notice of motion** – To initiate the removal of the CEC, *members of both houses must bring a notice of motion* explicitly alleging misbehaviour or incapacity.
- **Enquiry** – After the motion is admitted, an enquiry is conducted to examine the validity of the charges.
- This involves *forming a committee to investigate* evidence of misbehaviour or incapacity.
- **Passing of motion** – The motion for removal then *needs to be passed by a two-thirds majority* present and voting in both the houses of Parliament.
- **Removal of CEC** – Upon successful passage in the House, the President orders the removal of the CEC.

- There is no discretion once the constitutional requirements are met, since the President acts on the advice of Parliament in this context.

Quick facts

Election commission of India

- **Election commission of India** – The Election Commission of India (ECI) is an autonomous constitutional authority responsible for administering election processes in India.
- **Duty** – The ECI is entrusted with the responsibility of conducting free and fair elections in the country.



The infographic features the ECI logo at the top center, which includes the Indian national flag and the text 'भारत निर्वाचन आयोग' and 'ELECTION COMMISSION OF INDIA' with the founding date 'FOUNDED ON 25th JANUARY, 1950'. Below the logo are six informational boxes, each with a colored icon and text:

- Yellow box:** Election Commission of India is a Permanent Autonomous Constitutional Body.
- Blue box:** It holds the Powers and Responsibility of superintendence, direction and control of the entire Election process.
- Green box:** Election Commission is the sole authority for scheduling the elections to Lok Sabha, Rajya Sabha and Offices of President & Vice President.
- Red box:** Election Commission is not just a regulatory but also an Electoral Management body.
- Pink box:** Election Commission of India is also responsible for the deployment of necessary Police and Paramilitary Forces during elections.
- Purple box:** Election Commission also has the right to engage requisite Government Officials during election time.

Orange box: The Present Commission is a three-member body: Sh. O. P. Rawat, Chief Election Commissioner, Sh. Sunil Arora & Sh. Ashok Lavasa, Election Commissioners.

4.3 Validity of an Election

Recently, The Supreme Court overturned the result of sarpanch election of Buana Lakhu village in Haryana's Panipat district after conducting a recounting of votes.

What is the Legal framework for challenging an election?

- **Filing of petition** – The validity of the results of Parliamentary, Assembly, state council or local government elections can be challenged by filing an election petition.
 - **For parliamentary, Assembly, and state council** – It is to be filed before the High Court of the particular state in which the election was conducted.
 - **For local government elections** – It is to be filed at the district-level civil courts.
- **Authorised person** – The petition can only be filed by a candidate or an elector related to the election in question.
- **Time period** – It has to be filed within 45 days from the date of declaration of results.
- **Contents of the petition** – The petition must contain a concise statement of all material facts on which the challenge is based.
- If a petition has allegations of corrupt practices it must provide details such as the names of individuals involved, and the date and place of the alleged act.
- **Dismissal of petitions** – Vague or ambiguous claims are not entertained, and a petition that fails to state material facts can be dismissed at the outset.

- The SC has repeatedly held that allegations of corrupt practices are quasi-criminal and require a high standard of proof.

What are the Grounds for invalidating an election?

- **Corrupt practices** – If candidate failing to disclose their criminal antecedents or promoting enmity among social groups.
- **Qualification disputes** – If the winning candidate was not qualified or was disqualified on the date of their election.
- **Rejection of nomination** – Improper rejection of a nomination paper of an electoral candidate.
 - Improper acceptance of a nomination or the improper reception or rejection of votes (but only when it is proven that these actions materially affected the election's outcome).
- **Defying of law** – Non-compliance with the Constitution or any election laws and rules, if such non-compliance materially affected the result.

What is the basis for recounting of votes?

- **Facts and evidences** – A recount of votes is one of the remedies a court can order, but it is not granted casually.
- Therefore, a court will only order a recount if the petitioner presents specific, material facts and provides sufficient evidence to establish a prima facie case that a mistake in counting is probable and that a recount is necessary.
- **Location for recounting** – Courts usually order vote recounts to take place at the location where the election was held.
- But in the case of the Panipat sarpanch election dispute, the SC recounted the votes at its premises.
- **Issues with recounting** – It is seen as potentially compromising the secrecy of the vote, a cornerstone of free and fair elections.

When courts can declare a new winner?

- **Proof by the petitioner** – He/she must prove that they would have secured a majority of votes if not for the votes obtained by the winning candidate through corrupt practices.
- This requires concrete evidence to quantify the votes tainted by corruption.
- **Satisfaction of the court** – The court must be satisfied that the petitioner or another candidate received a majority of the valid votes.
- **Recent incidents** – In February 2024, the SC declared a new electoral winner in the Chandigarh mayoral election.
 - It is found that the polling station presiding officer had wrongfully marked eight paper ballots as invalid.
 - All the votes had been cast for the losing candidate.
 - The court ordered that these votes be treated as validly cast in the losing candidate's favour, which helped him win the election.

4.4 New Bill to remove PM, CM and Ministers

Recently, The Union government has introduced the 130th Constitutional Amendment Bill, to tackle the increasing criminalization of politics in India.

What does the Bill say?

- **Amendment to constitution** – The Bill seeks to amend Articles 75 and 164 of the Constitution that deal with the Council of Ministers at the Union and State level.
- **Removal of minister** – It provides that a Minister, who has been arrested and detained for 30 consecutive days in relation to an allegation of committing an offence, which is punishable with imprisonment of at least five years, shall be removed from his/her office.
- **Advice from the PM/CM** – They would be removed on the advice tendered by the Prime Minister/Chief Minister (PM/CM).
- If the PM/CM does not tender such advice, the Minister concerned shall automatically cease to hold office from the 31st day.

- **Resignation of PM/CM** – If the PM/CM is arrested and taken into custody for 30 consecutive days, he/she shall tender his/her resignation on the 31st day.
- However, the PM, CM, or Minister can be subsequently appointed on being released from custody.
- **Applicable for union territories** – It also seeks to amend Article 239AA with similar provisions for the National Capital Territory of Delhi.
- These amendments would require a two-thirds majority in both houses of Parliament for its passage.
- Similar amendments have been proposed to parliamentary laws that govern the Union Territories of Jammu & Kashmir and Puducherry.
- These Bills have been referred to a Joint Parliamentary Committee (JPC) for scrutiny.

What are the existing laws?

- **The Representation of the People Act, 1951 (RP Act)** – It provides that any person who is convicted in a criminal case and sentenced to not less than two years in jail, shall be disqualified from being a member of Parliament or State legislature for the period of their sentence and six years thereafter.
- **Section 8(4) of the RP Act** – It provided that with respect to a sitting member of Parliament or State legislature, such disqualification shall not take effect if an appeal is filed against such conviction.
 - **Lily Thomas case (2013)** – The Supreme court struck down this clause as unconstitutional.
- It must be noted that the existing law only provides for disqualification for being a Member of Parliament or State Legislature and not for being a minister.
- **Recommendation of election commission** – In 2016, the Election Commission had recommended that the RP Act be amended to provide that persons against whom charges are framed by a competent court for an offence that is punishable with imprisonment of at least five years be barred from contesting elections.

What are the issues with the bill?

- **Losing of office** – It will result in elected representatives losing their position by mere police action even before the start of a trial.
- **Weakens fundamental principles** – It undermines the principles of parliamentary democracy where the elected PM, CM enjoys the power to choose their cabinet.
- **Power asymmetry** – It gives the Centre disproportionate power to initiate vindictive action against ministers in opposition-ruled States.

Quick facts

Criminalisation of Politics

- **Definition** – It refers to the involvement of individuals with a criminal record in the political sphere.
- This can involve criminals running for and be elected to positions in Parliament and State Legislatures.
- It often occurs due to the close relationship between politicians and criminal elements.
- **Reports** – Association of Democratic Reforms states that 46% of MPs and 45% of MLAs have criminal cases against them.
- **Winnability** – It added that the chances of winning for a candidate with a criminal background was 15.4% as against just 4.4% for a candidate with a clean background.
- An appropriate step then would be to not field candidates who have criminal records.
- **Step to be taken** – Parties should cultivate self-discipline among candidates rather than provide tickets to tainted candidates on the ground of winnability.

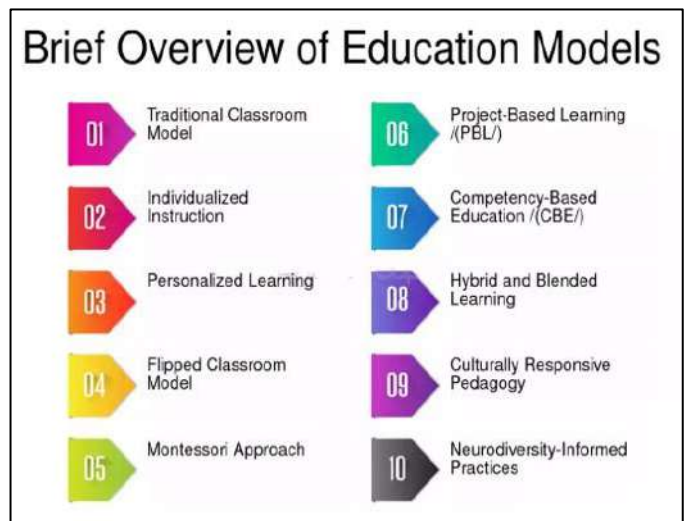
5. GOVERNMENT POLICIES AND INTERVENTIONS

5.1 Education Model and Employment

In the Periodic Labor Force Survey (PLFS) 2022-23, Kerala reports a 42.3% graduate unemployment rate, which challenges the education-employment link, highlighting the need for vocational training and policy reforms.

How educational models and employability are related?

- **Educational model** – The educational model shapes employability by aligning teaching with industry needs.
- **Induces practical learning** – Practical learning approaches equip students with real-world skills valued by employers.
- **Inculcates industrial training** – Industrial training during education bridges the gap between academic knowledge and workplace demands.
- **Bridges demand-supply of labour** – Industry-focused education helps match workforce skills with market demand, reducing the employability gap
- **Improves readiness for employment** – Educational models shape the curriculum and skill development offered to students, impacting their readiness for the job market.
- **Boosts practical learning** – Curricula which get regularly updated to reflect the evolving needs of industries and incorporate practical experiences like internships and apprenticeships.
- **Enhance job security** – The effectiveness of an educational model significantly impacts graduates ability to secure and maintain employment.



What is the paradox in Kerala's educational model?

- **Kerala's education model** – It is often held as a model State in India's educational discourse with near-universal literacy,
 - Strong gender parity in education,
 - Robust public schooling systems.
- **Lack of diversification** – According to the Kerala Economic Review (2023), less than 10% of state-funded higher education institutions offer STEM (Science, Technology, Engineering, and Mathematics)-oriented vocational programs.
- **Misalignment to industry-specific courses** – As per Kerala State Planning Board's Economic Review 2023, about 70% of the courses offered are in humanities and pure sciences that do not match with modern job sectors.
 - **For instance**, Germany, through their dual vocational education system, integrate apprenticeships with formal education, ensuring smooth school-to-work transitions.
- **Failure in job creation** – Kerala has many educated young people moving away helping the economy with remittances, but it also shows that there aren't enough domestic job opportunities.
 - The Centre for Development Studies reports that over 2.1 million Keralites live and work abroad, primarily in the Gulf, many of whom are graduates unable to find appropriate jobs at home.

Literate – A person aged 7 years and above who can both read and write with understanding in any language has been taken as literate. A person who can merely read but cannot write is not classified as literate. Any formal education or minimum educational standard is not necessary to be considered literate.

How other India States fare in education-employment scenario?

- **Tamil Nadu** – The state offers a revealing counter-example by boasting high literacy and educational attainment.
 - It has built a relatively stronger network of polytechnic institutions and vocational training centers.
- As per National Skill Development Corporation's (NSDC) Tamil Nadu Skill Gap Report, the state's industrial linkages and sector-focused skilling have helped reduce the incidence of graduate unemployment to 23.4%.
- **Karnataka** – It has diversified its post-secondary offerings through public-private training collaborations that provide students with both soft and hard skills with its growing tech ecosystem.
- **Northern India** – **Bihar and Uttar Pradesh** continue to struggle with low school completion rates and poor employability indicators, even among graduates.
 - In Bihar, the graduate unemployment rate stands at 33.9% (Periodic Labour Force Survey 2022-23).
 - Only 25.7% of youth aged 18–23 are enrolled in any form of higher education (AISHE, 2021-22).

- Improving access to quality education while ensuring it meets market relevance posing as a dual challenge in this case.

What are the existing issues while linking education and employability?

- **Policy backdrop** – The National Education Policy (NEP) 2020 rightly emphasizes flexibility, multidisciplinary, and skill integration but its rollout on the ground remains uneven.
 - In Kerala, the four-year undergraduate structure has not yet fully addressed the mismatch between degrees and employability.
- **Gaps in vocational training** – This gap reflects both cultural and institutional inertia against vocational pathways, often stigmatized as inferior to mainstream degrees.
 - The NSDC (2022) points out, only 17% of Indian youth receive formal vocational training, compared to 52% in the United States and 75% in Germany.
- **Quality education constraints** – The expanding private higher education sector, which has mushroomed without consistent quality benchmarks.
 - The University Grants Commission (UGC), nearly 60% of private colleges in India operate without NAAC accreditation, raising concerns about faculty quality, infrastructure, and academic outcomes.
- **Lack of guidance** – As per NCERT's National Achievement Survey (NAS) 2021, only 13% of students receive formal career guidance, leaving most to pursue degrees without understanding their employment prospects.

What policy measures can be taken?

- **Integrating education** – Central institutions such as the NSDC and the Ministry of Education must work in tandem to ensure that the skilling ecosystem is not divorced from formal higher education.
- **Mainstreaming vocational education** – States can adopt the Berufsschule model from Germany or the Institute of Technical Education from Singapore, that combine classroom education with practical apprenticeships.
- **Enhancing career guidance** – Secondary schools need to significantly improve their career counseling and academic advising.
- **Adopting placement-based ranking** – The states must establish employment-linked metrics in evaluating higher education institutions.
 - Tamil Nadu's recent move to integrate placement statistics into college rankings could be adapted across States.
- **Tracking outcomes** – National Skills Registry that tracks student outcomes across degree programs, job sectors, and geographies can aid both planning and accountability.

5.2 Breastfeeding – Importance and Challenges

Recently, India continues to see a drop in exclusive breastfeeding by six months, despite high initiation rates.

What is breastfeeding?

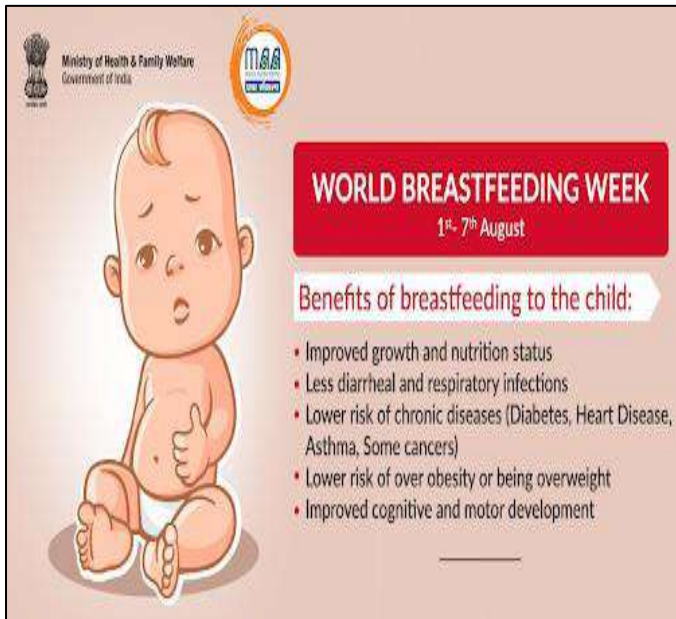
- **Definition** – Breastfeeding, also called nursing
- It is the process of *feeding a mother's breast milk to her infant*.
- It is done either directly from the breast.
- It is also done by pumping out the milk from the breast and bottle-feeding it to the infant.
- **Status in India** – Only 63.7% of infants meeting World Health Organisation (WHO) guidelines, according to the National Family Health Survey (NFHS) -5.
 - India's current systems treat it as optional or supplemental.

World Breastfeeding Week

- **Celebrated on** – Every year in the *first week of August*.
- **Supported by** – WHO, UNICEF, Ministries of Health and civil society partners around the world.
- **Aim** – To recognize breastfeeding as a powerful foundation for lifelong health, development, and equity.

- **Theme for 2025** – Prioritise Breastfeeding: Build Sustainable Support Systems.

What are the benefits of breast feeding?



What are the challenges in breastfeeding?

- **Physiological barriers** – *Latching difficulties, maternal nipple pain and low perceived milk supply* are primary causes for early discontinuation.
- **Hormonal issues** – It can inhibit oxytocin -the hormone essential for milk ejection, further complicating feeding.
 - Stress elevates cortisol, which interferes with prolactin-driven milk production.
- **Poor maternal health** – Marginalised mothers especially from tribal, migrant and urban poor communities face compounded challenges of malnutrition, low literacy and poor access to health information.
- **Lack of Maternity leaves** – Women in informal sectors, *lack maternity leave* which inhibits breastfeeding habit.
- **Absence of safe spaces** – There is a insufficiency of safe and secure spaces to feed milk.
- It causes early *weaning*.
- **Lack of trained staff** – Without trained staff to correct positioning and latch, mothers often stop within weeks.
 - They are not equipped to diagnose a poor latch, assess milk transfer, or identify feeding-related weight faltering.
- **Psychosocial barriers** – It includes lack of support from partner, family and workplace stress.
- **Low compliance** – Although India's Maternity Benefit Act mandates breastfeeding breaks and crèche facilities, compliance is low.

In breastfeeding, latching refers to how a baby attaches their mouth to the mother's breast to feed. A good latch involves the baby's mouth covering not just the nipple, but also a portion of the areola (the dark area around the nipple). This allows for effective milk transfer and minimizes discomfort for the mother.

Weaning, is the process of switching an infant's diet from breast milk or formula to other foods and fluids.

What can be done to promote breastfeeding?

- **Lactation support** – ASHAs (Accredited Social Health Activist) and ANMs (Auxiliary Nurse Midwife) - play a pivotal role in extending lactation support into communities.
- **Competency-based lactation training** – It provides access to visual tools and referral pathways for unresolved cases.
- **Digital aids** – Growth monitoring charts and helpline access can increase field-level efficacy.

- **For example**, Exclusive breastfeeding at 3 and 6 months can be tracked
- **Structural reforms** – Access to clean, private feeding rooms increase breast feeding duration.
 - Public-private partnerships and CSR-backed infrastructure in factories and informal work hubs could address these gaps.
- **Innovative methods** – We need mobile crèches, lactation pods and peer-led support at the community level.
- **Targeted advocacy** – We need multilingual, audio-visual counselling and incentives embedded in schemes like,
 - Pradhan Mantri Matru Vandana Yojana (PMMVY)
 - Mothers' Absolute Affection (MAA) program
 - Indira Gandhi Matritva Sahyog Yojana (IGMSY)
- **Establishing as right** – Treating breastfeeding as a health right could develop a sense of consciousness among people.
- **Social support** – Attaching local leaders in programme planning can enhance trust and cultural fit.

What lies ahead?

- The government and health organisations could encourage people to embed lactation science into everyday healthcare delivery.
- Structured, evidence-based support could be made available at every level hospital, home and workplace.

5.3 India's New Maritime Bills

Recently, the Merchant Shipping Bill, 2025 and the Carriage of Goods Sea Bill, 2025 were passed by the parliament to modernise India's shipping laws.

What is the Merchant Shipping Bill, 2024?

- **Need** – The, Merchant Shipping Act, 1958 had become bulky, fragmented, and outdated.
 - With its 561 Sections it failed to address contemporary maritime challenges.
 - It fell short to fully implement India's obligations under several key International Maritime Organization (IMO) conventions.
- **Structure of the new bill** – 16 Parts and 325 clauses
- India's maritime legal framework by aligning with international conventions
- **Features** – The Bill aims to make India a globally respected maritime jurisdiction and unlock sustainable growth, investment, and innovation in the sector by
 - Enhancing safety at sea, improving emergency response and ensuring environmental protection.
 - Reducing compliance burdens, Promotes Indian tonnage, prioritises seafarer welfare and increasing ship safety.

What is The Carriage of Goods by Sea Bill, 2025?

- **Repealed** – The Indian Carriage of Goods by Sea Act, 1925.
- **Significant principle** – The Hague-Visby Rules
- **Features** – The legislation is expected to
 - Simplify maritime trade, reduce litigation risks, enhance transparency and improve commercial efficiency in cargo movement by sea.

The Hague-Visby Rules is a globally accepted maritime standard also followed by countries like the United Kingdom.

What are the significances of the two bills?

- **International compatibility** – The bills was made to be Well-suited with international trade agreements like *the Comprehensive Economic and Trade Agreement (CETA) with the U.K.*
- **Promoting ease of doing business** – It promotes ease of doing business in the maritime sector by *removing the hardships in litigations and compliances.*

- **Supports maritime security** – It provisions India’s maritime security architecture through better legal and regulatory frameworks.
- **Encourages green initiatives** – It Creates opportunities for green maritime initiatives and sustainable coastal development.
- **Generates employment** – It increases the employment opportunity especially *in coastal regions*.
- **Enhances capability** – It boost India’s capability to compete with global maritime powers such as Singapore, China, and the UAE.

What lies ahead?

- This Bill represents a decisive step that could position *India as a global leader in maritime trade and governance*.
- It is a progressive and advanced legislation, that *could align with international maritime conventions* and informed by the best practices of leading maritime nations.

5.4 Right To Repair as a Consumer right

As India takes steps toward making right to repair a consumer right, we must also treat it as a cultural and intellectual resource a form of knowledge that deserves preservation and support.

What is the right to repair?

- **The right to repair** – It refers to empowerment of consumers to have control over the reparability of a consumer goods.
- It allows end users, consumers as well as businesses, to repair devices they own or service without any manufacturer or technical restrictions.
- **Need** – In an age of cloud backups and algorithmic processing, it is easy to forget the value of knowledge that cannot be codified.
 - **Restoration by skills** – Repairers are experienced technicians or craftspeople restore devices not by strictly following manuals or written instructions.
 - Instead by using their senses (sight, hearing, touch, sometimes even smell) to detect faults, and by creatively adapting solutions based on available parts and unique situations
- **Recent developments** – Indian government recently accepted a report proposing a *Repairability Index* for mobile phones and appliances, ranking products based on ease of repair, spare part access, and software support.
- **Right to Repair movement** – Globally it gained momentum rapidly.
 - **European Union** recently introduced rules requiring manufacturers to provide access to spare parts and repair documentation.
 - **India**, the Department of Consumer Affairs launched a Right to Repair framework in 2022, followed by a national portal in 2023 covering electronics, automobiles, and farm equipment.
 - **United Nations** Sustainable Development Goal 12 promotes repair as part of responsible consumption.
- India now can lead by recognizing repair not just as a service but also as a form of knowledge work.

What is the necessity for the right to repair?

- **Declining product reparability** – Many modern products are made with sealed parts and special tools, making it hard to repair them without help from the manufacturer, limiting what informal repairers can fix.
- **Rise of disposable consumer habits** – Consumers tend to throw away broken items instead of repairing them, influenced by low-cost products and strong marketing.
 - This reduces the need for informal repair services.
- **Exclusion from formal skilling** – Training programs for new technologies focus on formal workers and are hard to access, leaving informal repairers without chances to improve their skills or earn certifications.
- **Neglect in policy and regulation** – Policies on e-waste and consumer rights usually benefit manufacturers and large service centers, ignoring the needs and contributions of informal repairers and minimizing their role in sustainability

- **Neglect of unspoken knowledge** – The risks being lost is not only economic opportunity but also a vast, Unspoken knowledge that has long supported India’s technological resilience.

Unspoken Knowledge

- **Unspoken knowledge** – It refers to forms of skill and intuition that are difficult to formalize.
- **Expertise lives in** – Muscle memory, quiet observation, and years of hands-on improvisation.
- **Expertise shared through** – Mentorship, observation, and repetition not through formal training or certification In India’s repair economy.
- **Significance** – It is inherently adaptive and context-sensitive, qualities that structured digital systems, including AI, often struggle to replicate.

What are the existing initiatives?

- **The E-Waste (Management) Rules, 2022** – This introduced Extended Producer Responsibility (EPR) a principle that makes manufacturers responsible for post-use product management.
- However, while these rules encourage recycling, they make only a passing mention of repair as a preventive strategy.
- **National skilling programmes** – Pradhan Mantri Kaushal Vikas Yojana (PMKVY) focus on short-term certifications for formal industrial roles.
- This includes repair work, which requires improvisation, diagnostic skill and creative reuse does not easily fit this framework.
- **National Education Policy (NEP) 2020** – This celebrates Indian knowledge traditions and experiential learning but offers little guidance on how to support or transmit hands-on repair expertise.
- **Campaigns** – Mission LiFE (LiFESStyle for Environment) promote repair and reuse, but complementary efforts are needed to support the workers who make such sustainability practices possible.

In 2021-22, India generated over 1.6 million tonnes of e-waste, becoming the world’s third-largest producer.

What are the advantages of repair justice?

- **workforce skill recognition** – The policies focus they risk leaving behind the very workforce whose skills make it real.
- **Using feedback loops** – To make use feedback loops and sources of practical insight i.e. a discarded circuit board can become a teaching tool.
- **Safeguarding data** – Repairing through informal repairers enhances security as a salvaged phone part can restore someone’s access to work or school.
- **promoting circular economy** – It is done through including reuse as a design principle.
- The ‘unmaking’ is the process of taking apart, repairing, or repurposing devices after their first use, revealing design flaws and opportunities for reuse.
- **Aligning with repair mechanisms** – Most modern gadgets are built for compactness and control, not repair.
- As the country invests in AI infrastructure and digital public goods, it must align with the ground realities of repair.
- **Inclusive policy making** – Public policy must consider not only how products are manufactured and used but also how they break down, are repaired, and find new life.

*According to a 2023 iFixit global report, **only 23% of smartphones sold in Asia are easily repairable** due to design constraints.*

What steps can be taken?

- **Design developments** – The shift toward designing for “unmaking”, This includes disassembly and repair are anticipated from the start, should inform both hardware standards and AI-integrated systems.
- **Coordinated institutional action** – The Ministry of Electronics and Information Technology can embed reparability criteria into AI and procurement policies.
- **Integrating informal platforms** – It means e-Shram, under the Ministry of Labour and Employment, can formally recognize informal repairers and connect them to social protection and skill-building schemes.

- **Enhancing training programmes** – The Ministry of Skill Development and Entrepreneurship can consider training programmes to account for the unspoken, diagnostic nature of repair work, which does not conform to standardised industrial templates.
- **Usage of AI** – To support this, AI can help codify typical repair pathways, while Large Language Models can capture, summarise, and translate unspoken repair narratives into structured, shareable knowledge.
- **Ensuring broader leaning** – Enabling broader learning without stripping local context or expertise, supporting this ecosystem is not merely a question of intellectual property or technical efficiency.
- It is about valuing the quiet, embodied labour that sustains our digital and material lives is an essential step toward a just, repair-ready technological future.

5.5 Right to Road Safety

Recently, The Supreme Court's judgment in a tragic road accident case from Coimbatore gives an urgent wake-up call for Indian administrators to introduce lane discipline on chaotic roads.

What is the legality of right to road safety in India?

- **Fundamental right** – The Supreme Court (SC) has held that the right to safe, well-maintained and motorable roads is an essential component of the fundamental Right to Life under Article 21 of the Constitution.
- **Constitutional obligation of the State** – The SC said that citizens cannot be deprived of safe public infrastructure, especially roads that are vital for mobility, dignity and economic access
- **Domain of Article 19** – The right to access any part of the country, with certain exceptions and restrictions under certain circumstances, is a fundamental right under Article 19(1) (g).
 - The free movement depends on well-maintained roads.
- **Government's responsibility** – It is the responsibility of the State to develop and maintain well motorable roads under its control.
 - This was held in Umri Pooph Pratappur (Upp) Tollways Pvt. Ltd. v. M.P. Road Development Corporation and Another case.

What is lane discipline?

- **Meaning** – It refers to the practice of driving within designated lanes on a road and adhering to the rules associated with those lanes.
- **Global practise** – In countries like Germany, Japan, or Singapore, lane discipline is drilled into the psyche of motorists.
 - This is achieved through driver education sessions and any violation of road safety rules will lead to penalties.



What are the challenges in following lane discipline?

- **Poor road infrastructure** – Many roads in India are in poor condition, with potholes, uneven surfaces and a lack of clearly marked lanes.
 - This can make it difficult for drivers to stay in their designated lanes.
- **Traffic congestion** – Indian roads are often congested with vehicles, making it challenging for drivers to maintain lane discipline and avoid collisions.
- **Insufficient driver education** – Many drivers in India may not have received adequate training on the importance of lane discipline and how to maintain it on the road.
- **Corruption** – Road Transport Authority conducts namesake tests before issuing driving licences and it is most often riddled with corruption.
- **Implementation issues** – Lack of enforcement of traffic laws in India, which is often negligent.
 - This can lead to a culture of disregard for traffic rules and lack of accountability towards drivers who do not maintain lane discipline.

- **Behavioural problem** – Lane discipline *may not be a priority for some drivers in India*, as there may be cultural or societal pressures that encourage reckless or aggressive driving.
 - They are *overconfident in their abilities* and may not consider the importance of lane discipline to ensure the safety of all road users.

What measures can be taken to ensure driving discipline?

- **Education** – Government needs to ensure people are well educated about traffic rules to end traffic chaos.
- **Stringent enforcement** – A strict method needs to be followed by government for the efficient enforcement of the road safety rules.
- **Insurance policies** – Government may incentivise good road behaviour by offering them discounts in health insurance and motor insurance.
- **Innovative solutions** – Artificial intelligence-driven solutions can be introduced to track people's driving to penalise them for reckless driving.
- **Civic responsibility** – People must understand that a driving licence is not a right but a luxury which comes with responsibility.

Punjab's Road Safety Force – A case study

- **SSF** – Sadak Suraksha Force (SSF) is the road safety force setup by Punjab government.
- **Structure** – SSF teams are stationed every 30 kilometres across 4,100 km of Punjab's highways.
- **Prevention of accidents** – It had prevented accidents and saved more than 35,000 lives.
- **Swift response** – SSF teams reach accident spots within 5 to 7 minutes of receiving an alert.
 - They administer first aid on the spot, and ensure the injured are swiftly transported to hospitals.
- **Women participation** – Women form 28% of its personnel and take part in all activities from accident response, cracking down on drug trafficking, stolen vehicles, and other criminal activities.
- **Zero child mortality** – No child had died in a road accident while commuting to or from school in SSF-patrolled zones during 2024, which was a first in Punjab's history.

5.6 Reform in Civil Aviation in India

Recently, The Department-related Parliamentary Standing Committee on Transport, Tourism and Culture, led by MP Sanjay Kumar Jha, presented its 380th Report on the 'Overall Review of Safety in the Civil Aviation Sector.'

What is the status of civil aviation in India?

- **Civil aviation** - It refers to all non-military and non-governmental aviation activities.
 - It encompasses the operation of aircraft for commercial purposes, such as *passenger and freight transport*.
 - It also includes non-commercial activities like *recreational flying and aerial work like agriculture or search and rescue*.
- **Administration and regulation**
 - **The 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* in India and for enforcement of civil air regulations, air safety, and airworthiness standards.
 - It operates under the **Ministry of Civil Aviation (MoCA)**
- **Airports Authority of India (AAI)** – The AAI is *responsible for managing and maintaining airport and air navigation facilities and infrastructure*.

- This is done in coordination with and under the regulatory purview of the DGCA.
- **Bureau of Civil Aviation Security (BCAS)** – The BCAS focuses specifically on the security aspects of air transport.
- **Growth** – There is 114% increase in establishment of new air ports from 74 in 2014 to 159 in 2024.
- **Future prospects** – Passenger traffic expected to cross 300 million annually by 2030.



What are the issues with the Indian aviation sectors?

- **Absence of autonomy** – Without considerable freedom the DGCA is unable to address critical technical staff shortages—a long-standing issue highlighted by past expert committees but never resolved.
- **Inefficient recruitment model** – The current recruitment model prevents the regulator from attracting top talent and offering salaries commensurate with industry standards.
- This undermines its ability to enforce compliance in a complex and growing sector.
- **Over dependence on foreign companies** – The report addresses the strategic vulnerability caused by India's 85% dependence on foreign Maintenance, Repair, and Overhaul (MRO) facilities.
- **Human fatigue** – The report highlights the much-debated human element of exhaustion amongst Air Traffic Controllers (ATCOs).
- **Infrastructure and technological gaps** – The report underlines an imbalance where aircraft induction is outpacing airport growth.
- It is putting pressure on existing facilities and dangerously straining safety margins.
- **Backlogs of safety complaints** – This is a direct response to a growing backlog of unresolved safety findings that indicates a critical weakness in the post-surveillance rectification process.
- **Critical governance failure** – The most safety-sensitive function, air traffic control, has historically lacked expert representation at the highest decision-making level.
- **Increasing potential for accidents** – Unchecked fleet growth, workforce fatigue, and outdated infrastructure could create conditions ripe for catastrophic accidents.
- **Understaffing** – The Directorate General of Civil Aviation (DGCA) is grossly understaffed only 553 of 1,063 sanctioned posts are filled.
- Nearly 45% of technical staff are on deputation, leading to high attrition and loss of institutional memory.
- **Inefficient audit mechanism** – India's International Civil Aviation Organization (ICAO) audit placed it below the global average in safety oversight.

What are the recommendations of the committee?

- **Reduce safety deficiencies** – On the enforcement front, the committee urges a time-bound mechanism to close all safety deficiencies, especially serious Level I matters.
- **Fatigue management system** – There is a need for immediate development of a Fatigue Risk Management System for ATCOs to ensure their well-being and operational safety.
- **Promotion of health and wellbeing** – It recommended for urging strict compliance with Flight Duty Time Limitation (FDTL) regulations and promoting mental health awareness for both pilots and ATCOs.
- **Imposing penalties** – It proposes stricter penalties, including financial fines, for non-compliance.
- **Capacity alignment plan** – It recommends a National Capacity Alignment Plan to synchronize airport development with airline fleet expansion.
- **Repeal of obsolete systems** – It also calls for a comprehensive restoration of outdated Air Traffic Control (ATC) automation systems.
- **Staffing audit** – A comprehensive staffing audit is needed to combat operational overload and the "long-standing and high-risk practice" of seeking exemptions from mandatory duty time limits.
- **Whistle blowers protection** – In a move to foster a more proactive safety culture, the report calls for the establishment of a "Just Culture" and a robust whistleblower protection framework.

- This aims to counter a punitive environment that currently deters operational personnel from openly reporting errors-an essential practice for proactive safety management and learning.
- **Technological solutions** – It advocates for the integration of modern, AI-driven tools to reduce controller workload.
- **Committed air traffic control (ATC)** – The report recommends the creation of a new, dedicated post-Member (ATC)-on the Airports Authority of India (AAI) Board.
- **Encourage domestic companies** – The committee urges a policy review to provide incentives and rationalise taxation to promote domestic capability.
- **Independent regulatory body** – The central and primary demand of the committee is the need for a stronger, more effective regulatory body.
- **Increased autonomy** – The committee demands full administrative and financial autonomy for DGCA and recruitment independence from UPSC to attract technical experts.

What lies ahead?

- The reforms in the Indian civil aviation could change the overall capabilities of the sector.
- The sector could meet the international standards only if systemic reforms are urgently undertaken.

5.7 India's rural development Progress

Recently, Data shows that India has been witnessing a decline in budget allocation for essential social sectors.

What are the Issues?

- **Cap on MNREGA spending** – The government's decision to cap the spending under the Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS) at 60% for the FY 2025-26.
- But the ministry of Rural Development sought an increased outlay of Rs 5.23 lakh crore for the MGNREGS till 2029-30.
 - For instance, the budget allocations for different programmes under the National Food Security Act (NFSA) have seen a steady decline since before 2019.
- **Decline in MNREGA household workers** – The number of families working under the scheme has come down from 7.25 crore in 2021-22 to 5.79 crore in 2024-25.
- **Increase in rural distress** – Around 65% of the country's population living in rural areas, alongside the ongoing rural distress.
- Such declining welfare allocations have serious implications for rural development.
- **Dilemma in development analysis** – Measuring rural development has two different approaches
 - As a package of policies for socio-economic development in rural areas.
 - In terms of social indicators like access to electricity, drinking water, health, and education.

What is rural development?

- **Definition** – It is a package of policies that aim to foster socio-economic development in rural areas.
- **Genesis** – Rural development as a concept gained traction in the 1970s with renewed emphasis on rural policies and programmes.
- **Background** – This stemmed from the failure of state-led modernisation projects and industrialisation policies that fell short of expectations.
- With growth concentrated in certain areas and widespread rural poverty persisting in the 1970s, it was recognised that the dispersion of basic services is central to equitable distribution of resources and poverty alleviation.
- **Crucial component** – Notably, agriculture is crucial to both rural growth and development.
- According to economic theories on development, agricultural development is a pre-requisite for rural industrial growth.
- These theories further suggest that as agriculture grows, the relative size of farms declines.
- Hence, a high growth agricultural sector along with a declining farm size are seen as markers of agricultural development.

- **Structural transformation** – It is shaped by the movement of both output and labour away from agriculture to the modern industrial sector.
 - In the Indian context, it is often noted that the nature of the structural transformation has been slow and has been linked to premature service-led growth.
 - **Employment in manufacturing** – The employment share of the manufacturing sector has failed to increase.
 - **Growth of employment service sector** – According to the Periodic Labour Force Survey (PLFS) data, this is primarily because of the rapid growth of the service sector, which has restrained the growth of the secondary sector.
 - Another interesting observation about the Indian economy is that most of the service sector is led by self-employment rather than wage employment.

What are the Policies on rural development?

- **The Integrated Rural Development Programme (IRDP)** – It was launched in 1978-79 and implemented from 1980.
- Later it was merged with five other rural development programmes in 1999.
- The core objective of the IRDP was to enable identified rural poor families to increase their incomes and cross the poverty line through the acquisition of credit-based productive assets.
- IRDP was focused on self-employment.
- **Mahatma Gandhi national rural employment guarantee scheme** – The National Rural Employment Programme later became MGNREGS.
- It provides a one-off wage payment to the workers for developing infrastructure such as roads and irrigation works that can generate long-term benefits for the propertied classes.
- MGNREGS emerged as a guarantor of 100 days of wage employment to rural individuals.
- **The Pradhan Mantri Employment Generation Programme (PMEGP)** – It offers subsidies to establish micro-enterprises.
- **The Pradhan Mantri Mudra Yojana (PMMY)** – It facilitates self-employment through loans to micro and small businesses.
- Rural Self-Employment and Training Institutes (RSETIs)
- **Deen Dayal Upadhyaya Grameen Kaushalya Yojana (DDU-GKY)** – The focus is on skill development and entrepreneurship training, etc.
- **State's schemes** – States like Assam have also launched schemes like the Chief Minister's Atmanirbhar Asom Abhijan (CMAAA) to promote self-employment among youth through grants.







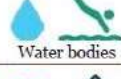












Self-employment is perceived as dynamic and capable of generating further employment in the context of such rural policies.

What are the Socio-economic indicators say about rural development?

- **Indicators** – Rural development can also be understood in terms of social indicators like access to electricity, drinking water, health, and education.
- **Health care access** – National Family Health Survey 2019-21 suggests improvement in these indicators compared to 2015-16, a deeper analysis shows a different picture.
 - **For instance**, rural health care is often marked by informal private doctors or providers, which national-level data sets often fail to capture.
- While numbers suggest that people in rural areas do visit doctors and seek medical care, the quality of this healthcare needs to be discussed.
- **Stunting in children** – Comparative analysis of indicators for rural and urban India shows a higher prevalence of stunting among children (37.3% in rural areas as compared to urban areas (30.1%).)
- Children from Scheduled Tribes and Scheduled Castes are more likely to be seen as disproportionately affected in these indicators.
- **Educational challenges** – The findings of the Annual Status of Education Report (ASER) 2023 reflect serious structural and quality issues in rural education.

- The report shows that many students in rural India are more likely to have progressed through the education system without acquiring foundational learning skills.
- Huge shortage of teachers and human resources further exacerbates the problems.
- **Lack of meaningful employment** – PLFS data suggests that despite the focus on skill-building and training programmes in rural India, meaningful rural employment generation has yet to materialise.
- **Dependence on self-employment** – India’s persistent reliance on self-employment as a sign of distress, not very different from wage-employment, and an alternative in the absence of wage or other gainful employment.

What are the impacts of the rural development schemes?

Capacity Building	Financial Inclusion	Farm Livelihoods	Non-Farm Livelihoods
 Mobilised 10.05 crore rural poor Households into 90.90 lakh SHGs, 5.96 lakh VOs and 32,439 CLFs in 7,143 blocks of 745 districts	 • 1.37 lakh SHG women members positioned as Banking Correspondent Sakhi. • ₹49,284 crore capitalisation support provided to SHGs. • ₹ 9.85 lakh crore of bank credit accessed by SHG.	 • More than 2.64 crore households have agri-nutri gardens • Around 36,205 Custom Hiring Centres established to help small and marginal farmers hire farm tools and services at a nominal cost. • 4.30 crore Mahila Kisan covered	 • Start-Up Village Entrepreneurship Programme (SVEP): nearly 3.13 lakh enterprises in 280 blocks of 31 States/UTs. • Aajeevika Grameen Express Yojana: 2297 vehicles operational in 26 states connecting remote villages.
 Roads Pradhan Mantri Gram Sadak Yojana (PMGSY) (as of 9 January 2025) ¹⁷¹ • 8,34,695 km of road length sanctioned. • 7,70,983 km of road length completed. • 99.6 per cent of the targeted habitations provided connectivity.			
 Housing 2.69 crore houses completed since 2016 under Pradhan Mantri Awaas Yojana-Gramin (PMAY-G). ¹⁷²			
 Water bodies 68,843 Amrit Sarovars (ponds) constructed under Mission Amrit Sarovar. ¹⁷³			
 Health Infrastructure National Health Mission¹⁷⁴ (Figures in '000s.)			
 165.6 Sub-centres (SCs)			
 25.4 Primary Health Centres (PHCs)			
 5.5 Community Health Centres (CHCs)			
 32.9 Doctors at PHCs			
 4.4 Total Specialists at CHCs			
 79.3 Nursing Staff at PHCs & CHCs			
 27.7 Pharmacists at PHCs & CHCs			
 23.2 Lab Technicians at PHCs & CHCs			
 Drinking Water 12.2 crore households provided with tap water connections under Jal Jeevan Mission (as of 27 January 2025). ¹⁷⁵			
 Sanitation 11.8 crore toilets and 2.51 lakh community sanitary complexes were constructed under Swachh Bharat Mission (Gramin) (As of 27 January 2025). ¹⁷⁶			
 Comprehensive transformation Saansad Adarsh Gram Yojana (SAGY) (as of 10 January 2025) ¹⁷⁷ • 3,361 Gram Panchayats (GPs) adopted by MPs. • 3,120 GPs uploaded Village Development Plans. • 2,30,206 projects completed.			

What lies ahead?

- Adequate investment in social sectors such as health, education, and nutrition could deliver full benefits.
- Livelihood generation needs to be aligned with a deeper understanding of the rural economy’s structure.
- Sustainable rural policy must integrate welfare and employment generation by strengthening budgetary support for social infrastructure.
- Investments in rural infrastructure could expand economic opportunities, support human development, and promote more inclusive and equitable growth.

6. EDUCATION

6.1 Income Limit for Scholarships

Recently, union government is considering to revise the parental income limit for eligibility in availing post and pre-matric scholarships administered to students from marginalised castes and tribes.

What are pre and post matric scholarships?

- **Scholarship** – It refers to financial aid awarded to students to support their education, typically based on merit, need, or a combination of both.
- **Scheme** - These scholarships are centrally sponsored scheme

- **Funding ratio** - The Union and State governments in a 60:40 ratio (90:10 for the Northeastern states).
- **Aim** – To provide financial assistance to students from marginalised communities to support their education.
- **Concerned ministry – The scholarships are dealt by**
 - **Ministry of tribal affairs** – For (scheduled tribe) ST students.
 - **Ministry of social justice** – Scheduled Castes (SCs), Other Backward Castes (OBCs), and Denotified Tribes (DNTs).
- **Pre-Matric Scholarships** – Students of Classes IX and X.
 - For SCs, they are available from Classes I to X for children of parents engaged in “*unclean or hazardous*” occupations.
- **Post-Matric Scholarships** – Students of Class beyond X.
- **Current Eligibility** – The annual parental income *must not exceed Rs. 2.5 lakhs*.

What is the proposed revision to income limit?

- **For ST scholarship** – The Ministry of Tribal Affairs is looking to raise parental *income limit to ₹4.5 lakh* for post and pre-matric ST scholarships.
- **For others** – The social Justice Ministry is discussing revising the limits for post and pre-matric scholarships for *Scheduled Castes (SCs), Other Backward Castes (OBCs), and Denotified Tribes (DNTs)*.
- In addition, discussions are also on to raise the parental income limit of college and school scholarships for OBCs, and DNTs.

What are the budgetary allocations?

- **For ST students** – Scholarship schemes for ST students accounted for about *18.6%* of the department's *₹14,925.81 crore allocation for FY 2025-26*.
- **For others** – Scholarships for SCs, OBCs, EBCs, and DNTs account for *66.7%* of the *Social Justice Ministry's Rs. 13,611 crore budgets*.

What are current scenarios in availing scholarships?

- **Declining beneficiaries** – The number of beneficiaries for post and pre-matric scholarships across socio-economic groups has been falling according to government data tabled in parliament.
- From 2020-21 to 2024-25, there was a *30.63% drop in* the number of beneficiaries for pre-matric scholarships for SCs.
- In the same time period, beneficiaries for *SC post-matric scholarships dropped by 4.22%*.
- Pre-matric scholarships for OBCs, EBCs, and DNTs, the beneficiaries dropped from 58.62 lakh in 2021-22 to a little over *20.25 lakh in 2023-24*.
- A similar drop was seen in post-matric scholarships for these sections in the same time period, reducing from *43.34 lakh beneficiaries to 38.42 lakh*.
- For STs, there was a drop of 4.63 lakh beneficiaries in this time period for pre matric scholarships, and *a drop of 3.52 lakh beneficiaries for post-matric scholarships*.

What are the recommendations from Parliamentary Committees?

- **OBC Welfare Committee** – Asked the government *to double the income limit for beneficiaries of pre and post-matric scholarships for OBCs*.
- It has asked for *suitable rise in the income limits* for beneficiaries of top-class scholarships for school and college education.
- Recommended expanding *pre-matric scholarships to OBCs to start from Class V*.
- **Panel on Tribal Affairs and Social Justice** – Recommended revising parental income limits for ST scholarships.
- Emphasised that *current limits exclude many families in need*.
- Both committees stressed that *scholarships are vital tools for social mobility, and overly restrictive criteria undermine their purpose*.

6.2 Vocational Education in India

Recently, there is a huge decrease in skilled workforce in India due our traditional academic and rote-based education system.

What is vocational Education and training?

- **Vocational Education and Training (VET)** – It is a training that provides the specific, hands-on skills and knowledge needed for a particular job or trade, preparing students for direct entry into the workforce or self-employment
- **Examples** – Industrial Training Institutions (ITI), polytechnics, and privately run training institutes are categorized as vocational training.
- High schools under government initiatives such as Skill India, PMKVY, and Samagra Shiksha Abhiyan also do the same.
- **Difference**

Aspect	Vocational Education	Traditional Education
Purpose	Career-specific skill development	Broad-based academic knowledge
Learning Mode	Hands-on, practical training	Theory-based classroom learning
Duration	Short-term (6 months to 3 years)	Long-term (3 to 5 years)
Cost	Affordable or subsidized	Generally more expensive
Job Readiness	Immediate employment opportunities	May require further specialization
Adaptability	Rapidly adjusts to industry trends	Slower curriculum updates
Outcome	Job or entrepreneurship	Degree, higher education, or research

What is the status of VET in India?

- **Skilled workforce in India** – Only 4% of India’s workforce is formally trained.
- **Institutional coverage of VET system** – It is extensive with over 14,000 Industrial Training Institutes (ITIs) and 25 lakh sanctioned seats.
- **Actual enrolment** – It was only around 12 lakh in 2022, implying just 48% seat utilization.
- **Low employment rates** – Our VET system struggles with not only low uptake but also modest employment rates for those who undergo training.
 - **For instance**, in 2018, the employment rate among ITI graduates was 63%, whereas countries with robust VET systems such as Germany, Singapore, and Canada reported employment rates ranging between 80 and 90%.
- **Schemes** – Indian government has introduced many schemes that reflect an increased focus on employment outcomes.
- **Employment Linked Incentive (ELI) scheme** – ELI Part A offers up to Rs 15,000 for first-time EPFO-registered workers,
 - Revised ELI, Part B gives employers Rs 3,000 a month for every new hire.
 - Both ELI schemes push formalisation of jobs but have no skilling components.
- **The Prime Minister Internship Scheme** – It aims to provide one-year placements to youth in top companies, but lacks pathways to permanent jobs.
- **The ITI Upgradation Scheme** – It focuses on modernising 1,000 government ITIs in partnership with industry, but not necessarily the quality of training.

What are the challenges faced by India's VET system?

- **Stage of integration of VET** – In India, VET is a late addition offered after high-school education.
- This shortens the period available for hands-on training before the youth enter the job market, and also does not allow for orientation towards employable skills.
- Countries that introduce VET earlier in the schooling system show a stronger association with better labour market outcomes.
 - **For example**, In Germany, VET is integrated at the upper secondary level through a dual system, combining school education with paid apprenticeships.
- **Absence of a defined pathway** – India offers no formal academic progression from VET to mainstream higher education, nor does our education system offer credit transfers between systems.
 - **For instance**, Singapore offers VET either as technical education at the post-secondary level or via polytechnics at the tertiary level through dual vocational tracks, but has defined pathways from VET to traditional university education.
- This reduces the uptake of VET by many who wish to keep the option of traditional, academic education viable.
- **Perception and quality of VET in India** – In India, many courses are outdated and misaligned with industry needs.
- Singapore has industry led curriculum design, high instructor quality, regular audits and a mechanism that seeks constant feedback from employers and trainees.
 - **For example**, Singapore also has a Skill Future Programme, where the government offers subsidies to upskill throughout one's career.
- **Staff vacancy** – Over one-third of ITI instructor posts are vacant due to limited training capacity at National Skill Training Institutes.
- **Weak monitoring** – Quality monitoring is weak, with irregular ITI grading and no feedback systems.
- **Less private sector involvement** – In India, the engagement of employers in the private sector is limited, if not absent.
 - **For example**, In Germany, Singapore, and Canada, governments fund VET institutions, while employers pay for apprenticeships, share training costs, and also help design curricula.
- Medium and Small Scale Enterprises drive local job creation, but have low engagement with ITIs due to capacity constraints.
- **Lack of funds** – ITIs depend heavily on government funding, with minimal private sector investment in infrastructure and training apparatus.
 - **For instance**, India allocates around 3 per cent of total education expenditure to VET, compared to 10-13 per cent in countries like Germany, Singapore, and Canada.
- **Inefficient Sector Skill Councils** – Sector skill council play a key role in integrating training with industry needs, but lack state-level presence.

What can be done to overhaul India's VET programme?

- **Integrate VET into early schooling** – The National Education Policy (NEP), 2020 recommends such integration, but progress has been slow.
- **Fast track reforms** – Implementing the National Credit Framework that defines clear progression pathways and aims to have a board for nationally recognised certifications.
- **Improve training quality** – Align VET courses with local industry demand through regular market assessments.
- **Expand recruitment** – Enlarge the NSTIs and fast-track instructor recruitment to address capacity gaps, and strengthen ITI grading by incorporating trainee feedback.
- **Partnerships** – Scale models like the Private Training Partner approach by leveraging public infrastructure and private expertise.
- **Utilize CSR** – Involve MSMEs, and strategically use CSR funding to boost industry relevance.
- **Increase public spending** – Ensure the financial viability of institutions by linking public funding to their performance and granting them autonomy to generate their own revenue.

What lies ahead?

- Overhauling of the skill development system could transform the level of productivity and employability of our workforce.
- Such a renovation is crucial for making vocational training a pathway to jobs an essential step towards a Viksit Bharat.

7. HEALTH

7.1 Medical Tourism in India

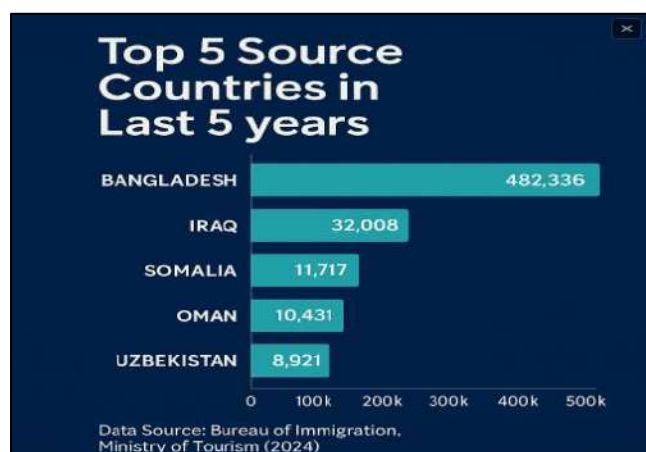
Recently, India witnessed an increase in foreign tourist arrivals (FTAs) for medical purposes between January and April 2025, highlighting a sharp surge in medical tourism as per data from the Ministry of Tourism.

What is medical tourism?

- **Definition** – It refers to the practice of traveling to another country to receive medical, dental, or other healthcare services.

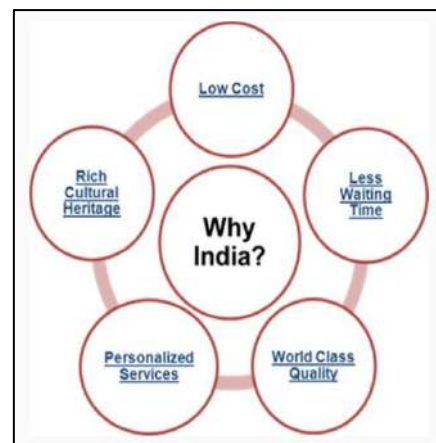
What is the status of medical tourism in India?

- **Increasing influxes** – India recorded 1, 31,856 foreign tourist arrivals (FTAs) for medical purposes from January to April 2025, accounting for approximately 4.1% of global total.
- **Top source countries & Future prospects**



What are the reasons for choosing India as a medical tourism destination?

- **Cost-Effectiveness** – India offers significantly lower costs for medical procedures compared to Western countries.
 - **For example**, heart bypass surgery can be 5-10 times cheaper in India than in the US or UK.
- **High-Quality Healthcare** – India has a well-established and growing healthcare infrastructure with internationally accredited hospitals and skilled medical professionals.
 - **For example**, Tamilnadu emerges as the top state in medical tourism due to best quality medical services.
- **Government Support** – The Indian government has implemented policies to promote and facilitate medical tourism.
 - **For example**, the Government of India has extended e-medical visa and e-medical attendant visa facilities to nationals of 171 countries.
- **Programmes and schemes** – The Ministry of Health and Family Welfare is also actively promoting the 'Heal in India' campaign.



- It fosters public-private partnerships to enhance the medical tourism ecosystem, which includes hospitals, facilitators, hotels, airlines, and regulatory agencies.
- **International certifications** – Many hospitals in India has recognitions from international institutions.
- **State government initiatives** – In Gujarat, the state government is promoting medical tourism by
 - Registering wellness retreats on the official Tourism Department website, supporting participation in wellness-focused events,
 - Organizing familiarization trips for industry stakeholders,
 - Promoting wellness centres through social media platforms.
 - Showcasing its healthcare infrastructure globally
 - Training paramedical staff to improve service quality
 - Participating in international health and wellness events, exhibitions, and conferences.

What are the challenges?

- **Lack of promotion** – India is lacking in promoting and creating awareness about the state-of-the art facilities in India.
- **International competition** – India is witnessing strong competition from destinations like Thailand, Malaysia, Singapore, Turkey, and South Korea with low-cost options.
- **Lack of coordination** – There is a lack of cohesiveness amongst the major players in the industry to come together and represent India on a world platform to acquire newer geographies.
- **Unpredictable fees** – The inconsistent fee structure confuses the international patients in choosing India.
- **Lack of transparency** – In many hospitals there is a lack of transparency in billing to foreign patients.
- **Poor hygiene** – Certain hospitals in India has poor hygiene awareness in medical attendants, unhygienic food handling, and lack of proper hospitality services.

7.2 Community Engagement in Health Governance

Recently, some states in India began to bring health care directly to doorsteps, to improve community engagement in healthcare.

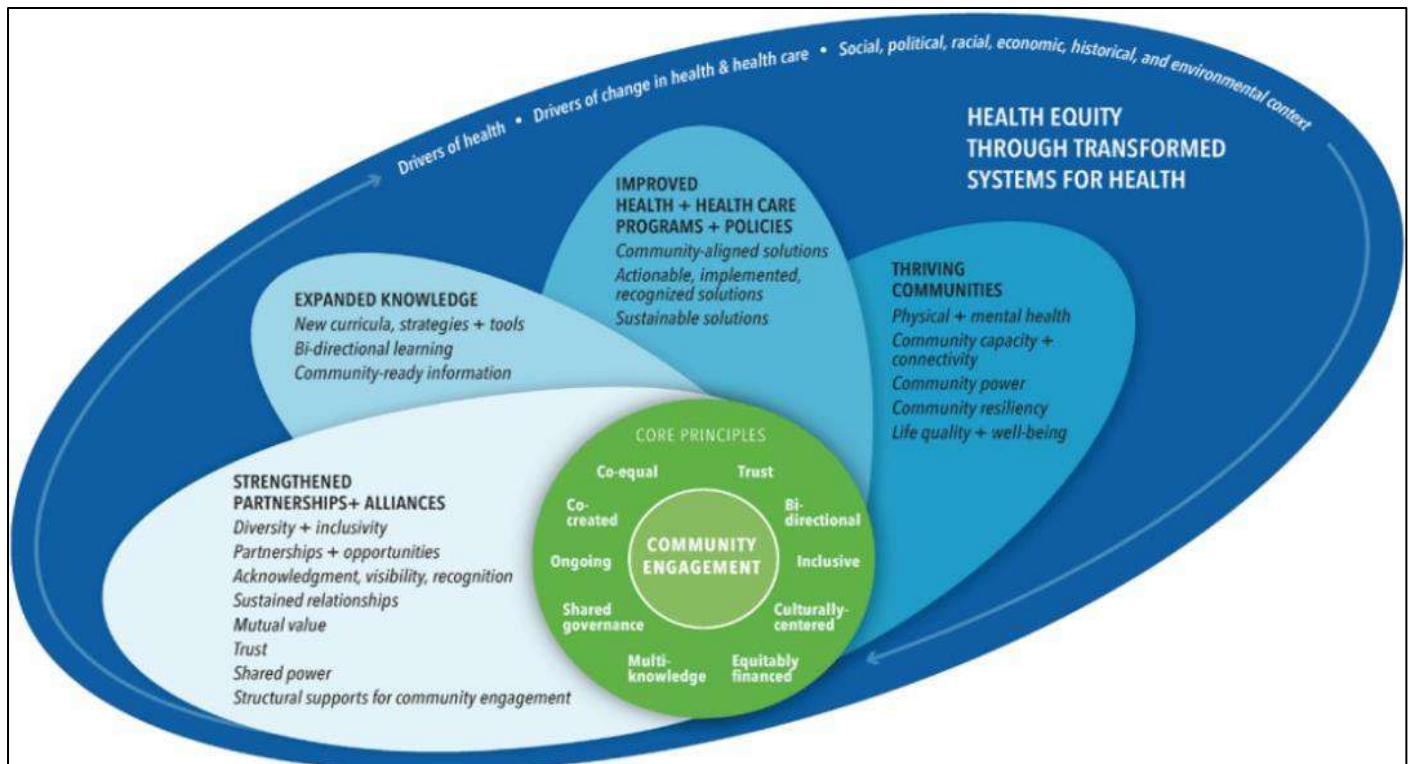
What is community engagement in healthcare?

- **Community engagement** – It refers to the process of actively involving people in decisions and activities that affect their lives and well-being.
- **Community engagement in healthcare** – It involves building relationships, fostering communication, and collaborating with various stakeholders to achieve positive change in the health governance of the country.

Recent Examples from the States

- **Makkalai Thedi Maruthuvam**
 - **Launched by** – Government of Tamilnadu
 - **Launched in** – August 2021.
 - **Aim** – To deliver essential healthcare at the doorstep of the people
- **Gruha Arogya scheme**
 - **Launched by** – Government of Karnataka
 - **Launched in** – October 2024
 - **Expanded** – To all districts in June 2025
 - **Aim** – to deliver health care at doorsteps for persons with non-communicable diseases.
- **Stakeholder inclusion** – It promotes inclusion of diverse actors such as civil society, professional bodies, hospital associations and trade unions.

- **Influences participation** – It operates through formal and informal social processes, with power dynamics shaping participation and influence.
- **Improves decision making** – It affirms self-respect, counters epistemic injustice and upholds democratic values by enabling people to shape decisions affecting their health and health-care services.
- **Strengthens governance** – Inclusive participation strengthens accountability, challenges elite dominance and reduces corruption.



- Without it, health governance risks becoming oppressive and unjust.
- **Increases trust** – It also builds mutual understanding and trust between communities and providers.
- **Improves collaboration** –It fosters collaboration with frontline workers, improves service uptake, and supports better health outcomes.
- The national rural health mission has a public engagement as the important component of the scheme

National Rural Health Mission (NRHM)

- **Launched in** – 2005
- Institutionalised public engagement in India’s health governance through various platforms.
- **Rural area platforms**
 - Village Health Sanitation and Nutrition Committees (VHSNCs)
 - Rogi Kalyan Samitis.
- **Urban area platforms**
 - Mahila Arogya Samitis, Ward Committees and Non-governmental organisation-led committees.
- **Aim** – To be inclusive, particularly of women and marginalised groups, and supported by untied funds for local initiatives.
- **Challenges** – In some areas these committees have not been established, while in others where they do exist,
- **Other issues** – These include
 - Ambiguous roles, infrequent meetings and underutilisation of funds.
 - Poor inter-sectoral coordination and deeply rooted social hierarchies.

What are the challenges in community engagement?

- **Defective mind-set** – Policymakers, health administrators and providers often view communities as passive recipients of care rather than as active participants in shaping health systems.
- **Less focus on implementation** – Programme performance is typically measured through target-based metrics, such as the number of beneficiaries reached.
- It has little reflection on how programmes are implemented or experienced on the ground.
- **Problem with the term** – The use of the term beneficiaries itself signals a deeper issue, it frames citizens as objects of intervention, not as rights-holders or co-creators of health systems.
- **Lack of commitment** – Although the National Health Mission promotes bottom-up planning, including community participation in Programme Implementation Plans, such engagement is rare in practice.
- **Dominance of western model** – Health governance spaces remain dominated by medical professionals, predominantly trained in western biomedical models.
- **Lack of effective leadership** – Health administrative leadership, is typically held by doctors who are expected to learn public health administration on the job.
- **Issues with promotion policy** – Promotions are often based on seniority rather than public health expertise.
- This reinforces a medicalised and hierarchical system that remains disconnected from community realities.
- **Other issues** – Scholarly work on health policy suggests concerns over
 - Increased workload
 - Greater accountability pressures
 - Regulatory capture by dominant medical and capitalist interests
 - Absence of a level playing field in governance processes

What could be done?

- **Change of mind-set** –Community engagement must no longer be seen as merely to achieve programme targets.
- **Treating people as ends in themselves** – Treating people as instrumental to health outcomes is not only reductive but also deeply disrespectful to their agency and dignity.
- **Improve participatory processes** – To enable meaningful community engagement in health governance, we must adopt following approaches
- **Empowering people** – Communities should be actively empowered.
- **Spreading of information** – Disseminating information about health rights and governance platforms.
- **Timely awareness** – Fostering civic awareness early will make people to engage in the process at the initial stages.
- **Reducing inequalities** – Making intentional efforts to reach marginalised groups and vulnerable sections.
- **Utilization of resources** – Equipping citizens with knowledge, tools, and resources needed to participate effectively in health care decision-making processes.
- **Sensitising health system actors** – Players of health system should move beyond blaming poor awareness as the sole reason for low health-seeking behaviour and health-care utilisation among people.

8. GOVERNANCE

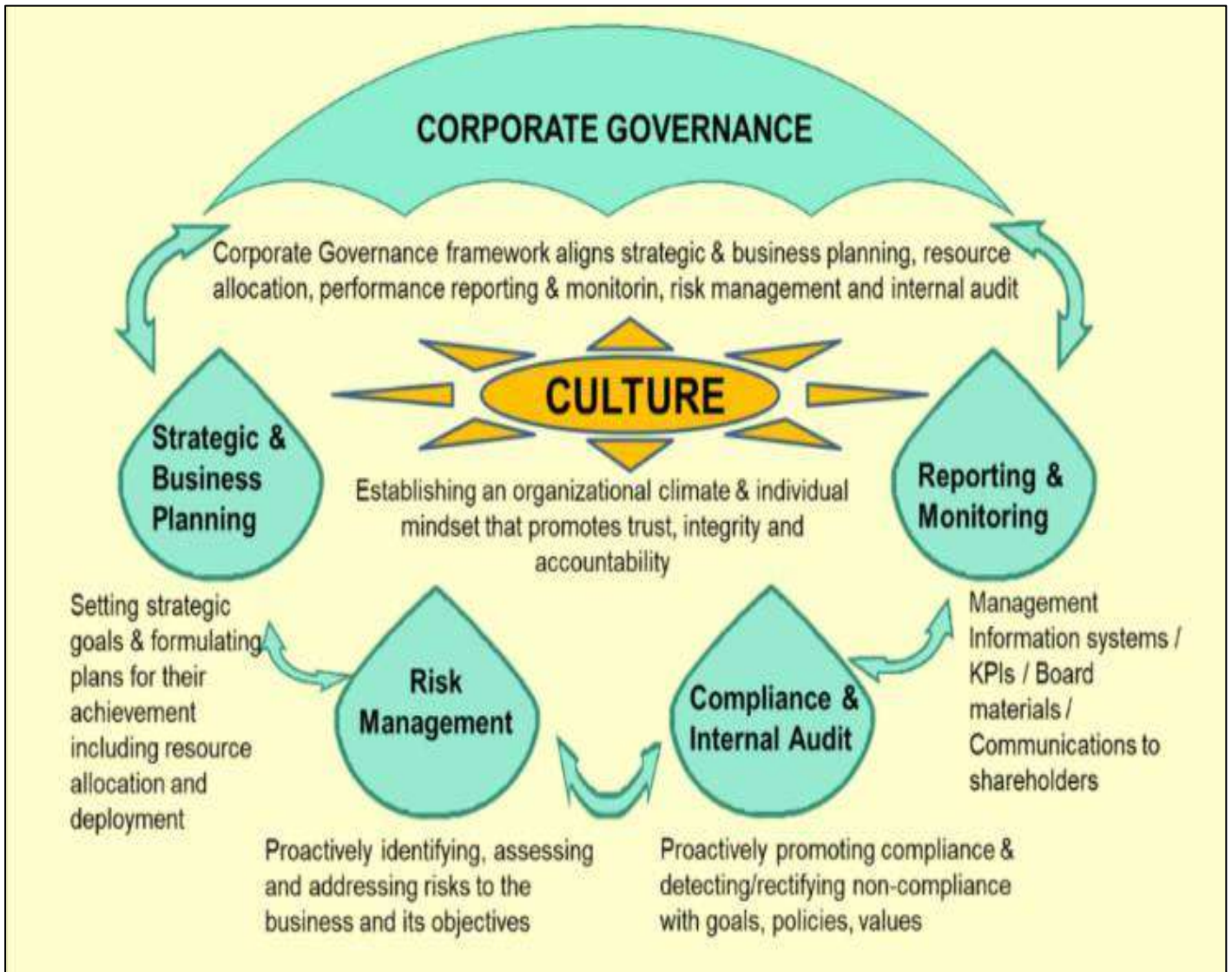
8.1 Trust Building in a Management

Recently, The Confederation of Indian Industry (CII) has come up with 15 action points that can induce regulators to reduce compliance burdens and move towards a trust-based corporate governance.

What is corporate governance?

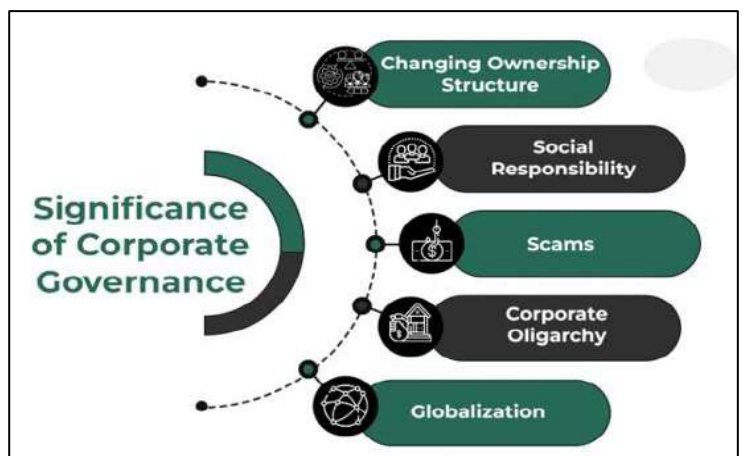
- **Definition** – It refers to the system of rules, practices, and processes by which a company is directed and controlled.

• Principles



What are the importance of trust in corporate governance?

- **Serves as a valuable asset** – Building trust is a powerful asset for Indian industry, enabling companies to thrive in a competitive and globalised environment.
- **Builds collective goals** – In the current geo-economics and geopolitical environment, the responsibility of building trust needs to be ideally shared between businesses, the government and various stakeholders.
- This enables them to work in coordination and shared values.
- **Enable stakeholders engagement** – On the governance side, this will enhance stakeholder engagement, build brand value, deepen customer loyalty, inspire employees and strengthen resilience during crises.



- As stakeholders increasingly seek transparency and accountability, businesses that invest in trust can meet these expectations more effectively.
- **Leads to efficient policy making** – Building trust can encourage regulators to adopt more supportive and streamlined policies, reducing compliance burdens and fostering a more business-friendly environment.
- **Promotes business** – Companies known for integrity and good governance gain a competitive edge by attracting talent, investors and global partnerships—fuelling innovation and long-term success.

- This involves taking actionable steps towards conservation and sustainability, digital transformation and responsible use of AI.
- Equity, inclusivity and welfare, community engagement, education and upskilling, R&D and innovation, leadership commitment and financial integrity among others.

What are the 15 action points to improve corporate governance?

- **Establish a clearly defined purpose** – A clear corporate purpose grounded in ethics, sustainability and long-term value creation should be established.
- This must reflect both the organisation's vision and stakeholder aspirations.
- It should act as a reference point for strategic decisions, fostering alignment, accountability, and transparency across the enterprise.
- Develop a robust risk and crisis management framework - Trust is tested during uncertainty.
- **Identify areas of vulnerability** – Indian businesses must identify challenges of geopolitical, financial, operational, or technological and implement comprehensive risk mitigation plans.
- Companies can reinforce stakeholders' confidence by demonstrating preparedness and responsiveness during crises
- **Ensure regulatory compliance and financial integrity** – Clear policies, internal controls, and early corrective mechanisms should be institutionalised.
- Transparent financial reporting and timely statutory disclosures affirm the company's integrity and commitment to ethical governance, which in turn fosters regulatory trust and investor confidence.
- **Embrace technology and innovation responsibly** – Adopting AI, block chain and automation tools can enhance transparency, efficiency and data protection.
- Companies must be explicit about technological integration, train employees accordingly, prevent misuse and ensure that innovation aligns with ethical standards.
- **Optimise supply chain management** – A reliable and ethical supply chain enhances both operational efficiency and stakeholder trust.
- Businesses should use technology for transparency, predictive analytics to foresee disruptions and ensure fair and timely payments to suppliers.
 - Strong relationships across the value chain promote resilience and shared accountability.
- **Assign clear roles for trust stewardship** – Titular designation or appointing an existing senior executive to lead trust-building initiatives highlights the strategic priority.
- This executive shall coordinate efforts across compliance, risk, stakeholder engagement, and data security, working collaboratively with other all executives.
- **Manage conflict constructively** – Proactive conflict resolution helps maintain internal cohesion and external credibility.
- Companies should foster two-way communication to resolve disagreements swiftly.
 - Institutionalising mechanisms for redressed minimises escalation and promotes a culture of openness and fairness.
- **Maintain transparent stakeholder communication** – Consistent, honest communication reinforces credibility.
- Creating feedback loops and listening actively to stakeholders' concerns builds deeper engagement and reduces misinformation.
- **Deliver consistently on promises** – Companies should meet or exceed the set expectations on Reliability.
- By setting realistic goals and consistently delivering, businesses establish trustworthiness.
- **Uphold ethical practices and integrity** – A clear code of conduct, regular ethics training and strict enforcement of behavioural standards are crucial for maintaining trust.
- Ethical leadership must be demonstrated across all levels of the organisation.
- **Empower and engage with employees** – Investing in professional development, recognise achievements and encourage collaboration.

- Open communication, psychological security and inclusive policies enhance internal trust and employee loyalty.
- **Adopt a customer-oriented approach** – Providing seamless service, quick issue resolution, and multiple communication channels.
- It includes respecting data privacy which strengthens customer relationships and enhances brand credibility over time.
- **Nurture collaborative and transparent partnerships** – Regular communication, fair negotiations and mutual goal-setting help establish dependable, long-term partnerships built on trust and mutual respect.
- **Commit to the environmental, social and governance responsibility** – Businesses should prioritise environmental stewardship and community development demonstrate a broader commitment to the common good.
- Investment in sustainability initiatives help earn public goodwill and societal trust.
- **Champion the trust agenda** – Transparent decision-making, openness to accountability and ethical role modelling by senior executives shape organisational culture.
 - When trust is channelled from the top, it embeds throughout the company.

What lies ahead?

- By working on these 15 points, Indian industry could meet the rising expectations of stakeholders and also be future-resilient.
- A trust-centred approach and global competitiveness could lead to collective progress, policy vitality and enhanced trade and investment.

8.2 Social Justice and Regulation of Secular Practices

Recently, a political controversy erupted in Tamil Nadu on the issue of diverting temple funds for building colleges which has thrown light on a unique social justice model around the regulation of secular practices.

What is the issue?

- **Diversion of temple funds** – A political controversy has emerged in Tamil Nadu concerning the diversion of temple funds for the establishment of colleges.
- **Regulation of secular practices** – This debate not only highlights substantive legal implications but also underscores a critical model of social justice related to the regulation of secular practices tangled with religion.

***Social justice** refers to ensuring equal social opportunities for all citizens, regardless of caste, religion, gender, or other social distinctions, and promoting the welfare of marginalized and vulnerable groups. It aims to create a society where everyone has the chance to develop their potential without facing discrimination or disadvantage.*

- **Background** - Rooted in a legislative framework that dates back to the erstwhile Madras Presidency, this social justice model boasts over 200 years of evolution and has garnered substantial support across South India.
- **Importance** – As elections in Kerala and Tamil Nadu approach, gaining clarity on this issue is vital to prevent the manipulation of voters through division.
- A clear, informed perspective on this topic will be crucial in countering attempts to polarize communities during the election season.

What is the historical background of Religious Endowment Law ?

***Religious endowment** refers to property or assets dedicated to religious or charitable purposes, typically managed by religious institutions, and intended to support their activities.*

- **Ancient philanthropy** – The tradition of temples receiving generous donations dates back to 970 AD in the Chola Empire.
- Influential figures like Queen Sembiyan Mahadevi played a key role by strategically donating lands and resources to temples.
- **Cultural hubs** – Temples served not only as places of worship but also as vibrant socio-cultural centers where education flourished.
- This dual role lends credence to the argument for channeling temple resources toward educational institutions.

- **Legislative framework evolution**

- **Religious Endowment Regulation (1817)** – It instituted by the British East India Company, this law created the foundational framework for the regulation of religious endowments.
- **Royal Proclamation (1858)** – In the aftermath of the Sepoy Mutiny, Queen Victoria's declaration limited the Crown's interference in religious affairs.
- This was instrumental in maintaining local governance and control over revenue.

- **A realistic approach** – The British government adopted a position that balanced non-interference in purely religious practices with the necessity of managing secular aspects of religious endowments.

- The role of government oversight over religious institutions became crystallized following the Justice Party's election in 1920, reflecting a growing consensus on the need for transparency.

- **Key Legislative Milestones**

- **Hindu Religious Endowments Act (1922)** – It is introduced by the Justice Party, this legislation faced considerable opposition, primarily due to provisions permitting the diversion of surplus temple funds for other purposes.

- **Tamil Nadu Hindu Religious and Charitable Endowments Act, 1959** – The Section 36 of the act empowers trustees of religious institutions to allocate surplus funds for a variety of purposes, contingent upon prior consent from the Commissioner.

"Surplus" is defined as any remaining funds after ensuring adequate maintenance of the temple and training of its officials.

- The Act also grants authority to allocate funds when the original purposes become impracticable.

- **The legal basis for fund diversion** – The 1959 Act been thoroughly tested and validated by constitutional courts, affirming its legitimacy.

- Among the permissible uses of surplus funds is the establishment and maintenance of universities and colleges (Section 66).
- It is mandated that educational institutions funded through temple surplus must provide education related to Hindu religion or temple architecture.

- Therefore, repurposing temple funds for higher education is not only legal but also a logical progression consistent with existing legislative provisions.

What is the legacy of social justice?

- **Scope** – The discussions surrounding the use of temple funds extend beyond legality, capturing thoughtful ideological and sociopolitical dimensions.
- **Historical Context** – In pre-colonial times, rulers recognized temples as mechanisms for allocating state resources to advance welfare initiatives.
- **Colonial governance** – The British East India Company and later the Crown deemed the regulation of temple affairs essential, both for revenue generation and the stabilization of local governance.
- **The power of social movements** – The **Self-Respect Movement**, which emerged from the Madras Presidency, posited the regulation of temples as a cornerstone of anti-caste reform.
- Without this movement, critical advancements such as temple entry legislation in 1936 and 1947 would likely not have been realized.
- **Contemporary developments** – Today, Tamil Nadu and Kerala stand as beacons of progress, having appointed priests from backward classes after a long struggle for equity.

What lies ahead?

- Contesting government oversight of temple activities strikes at the essence of social justice and equity.
- The governance of temple fund allocation is firmly entrenched within a robust legal framework, promoting accountability and fairness.
- Any attempts to dismantle this system would undermine the monumental strides in social justice and religious reform that South India has championed.

8.3 Internal Complaints Committee (ICC)

Recently, a student in Balasore, Odisha, died by self-immolation after her sexual harassment complaints against the head of her department were dismissed by the college's Internal Complaints Committee (ICC).

What is the ICC?

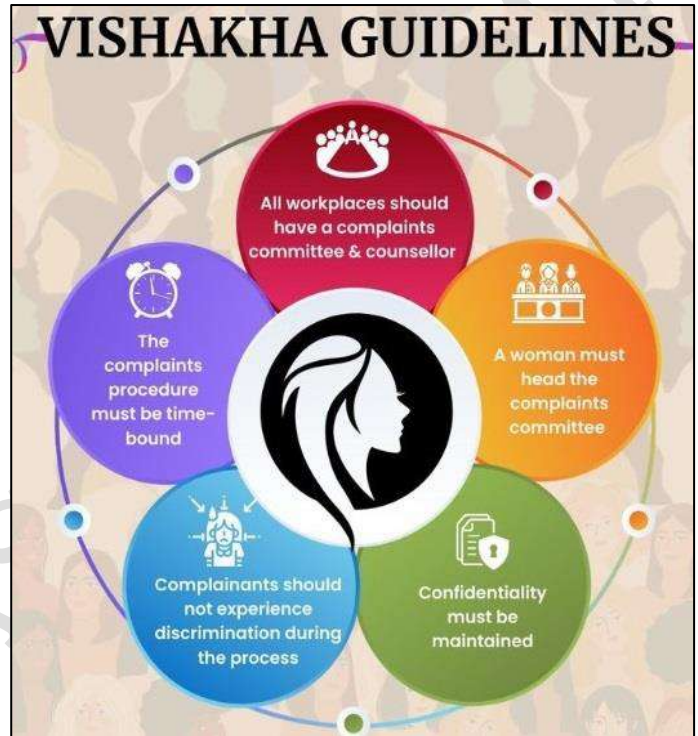
- **ICC** – An Internal Complaints Committee (ICC) is a mandatory institutional redressal mechanism to address complaints of sexual harassment at the workplace.
- **Created under** – The Sexual Harassment of Women at Workplace (Prevention, Prohibition and Redressal) Act, 2013 (POSH Act).
- **Background** – Evolved from *Vishaka Guidelines (1997)* by the Supreme Court, after a petition by Bhanwari Devi.

Bhanwari Devi, a social worker in Rajasthan, was gang-raped when she tried to stop a child marriage in 1992.

- **Legal basis** – After Nirbhaya killing in Delhi in December 2012 the provisions were actually written into law.
- **Establishment** – Mandatory at all workplaces which employed more than 10 people.
- Women working in smaller enterprises in the informal sector could complain to Local Committees to be set up by district authorities.

What is the composition of ICC?

- **Headed by** – Presiding Officer, who is to be a woman employed at a senior level at the workplace.
- **Members** – At least 2 members should be employees preferably committed to the cause of women or who have had experience in social work or have legal knowledge.
- Another member should be from an NGO devoted to women's rights or a person familiar with sexual harassment issues.
- **Women's ratio** – At least half of the members should be women.
- **Complaint** – Any aggrieved woman can complain in writing within 3 months of the date of the harassment incident or series of incidents.



What are the powers and functions of ICC?

- **Powers** – ICC has the same powers as are vested in a civil court under the Code of Civil Procedure.
- **Time limit for inquiry** – To be completed within 90 days.
- **Actions** – The committee can help to settle the matter at the request of the woman or begin an inquiry into the complaint.
 - If the complaint is proved, the ICC must recommend the action to be taken against the accused.
 - The employer is also required to aid the victim if she wishes to file a criminal complaint.
- **Concealment clause** – The law mandates confidentiality regarding
 - The contents of the complaint
 - The identity and addresses of the aggrieved woman
 - The respondent and witnesses
 - Any information relating to conciliation
 - Inquiry proceedings
 - The recommendations of the ICC.

What are the challenges faced by ICC?

- **Irregular execution** – The implementation of Internal Complaints Committees (ICCs) remains patchy and inadequate across institutions.
- **Ineffective functioning** – They *often lack training*, maintain no confidentiality, and fail to address workplace power imbalances.
- **Lack of coordination** – Women and Child Development Ministry oversees the Act, but actual employers fall under the Labour and Industries Ministries.
- This *gap between ministries* creates a responsibility crisis.
- **Lack of monitoring** – Absence of analysis of the law’s functioning, leaves a black hole in accountability and data.
- **Supreme Court’s Apprehension** – The Supreme Court expressed concern over the *serious lapses in enforcement*.
- It called the state of affairs disquieting and *ordered immediate compliance across both public and private sectors*.

What lies ahead?

- The government could push for *quicker setting up of ICC* in every public and private organisations.
- The actions taken by the ICC could be *periodically monitored and analysed*.

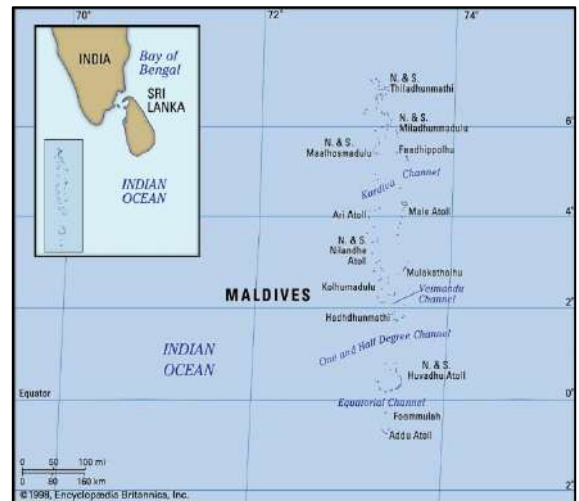
9. INTERNATIONAL RELATIONS

9.1 India – Maldives Bilateral Relation

Recently, Indian Prime Minister participated in the 60th Independence Day celebrations of the Maldives, as the Guest of Honor.

What are the pillars of Indo-Maldives relations?

- India and the Maldives are bound by deep-rooted ethnic, linguistic, cultural, religious, and trade ties that date back centuries, forming a strong and multifaceted relationship.
- **Geographical proximity** – Maldives is a tropical island nation located about *700 km southwest of the Indian mainland*, southwest of Sri Lanka and India in the Indian Ocean.
- Its position near major sea routes makes it strategically significant for maritime security and international trade.
- **Historical relations** – It is widely believed that Sri Soorudasaruna Adeettiya, an Indian prince, established the earliest organized form of government in the Maldives.
- India was one of the earliest country to *recognise Maldives after its independence in 1965*.
- **Political ties** - India’s prompt *assistance during the 1988 coup attempt*, led to development of trust and long-term and friendly bilateral relations with the Maldives.
- Maldives is covered under India’s *‘Neighbourhood First’ policy*, which guides the management of India’s relations with countries in its immediate neighbourhood.
- **Diplomatic ties** - India diplomatic mission began in 1972 and appointed high commissioner in 1980 and Maldives established their High commission in New Delhi in 2004.
- India and Maldives are members of SAARC grouping.



India’s Neighbourhood First’ policy focuses on creating mutually beneficial, people-oriented, regional frameworks for stability and prosperity, including through the building of physical, digital and people to people connectivity.

- **Economic ties** – *Addu Development Project* involves improving water and sanitation systems on 34 islands, along with road development and land reclamation efforts.
 - **Other initiatives** - A port development project, 2 airport expansion projects, and Greater Male Connectivity Project.
- **Cultural relations** – Indian expatriates constitute a major part of the Maldivian workforce, especially in the fields of healthcare and education
- **Security ties** – India-Maldives military exercise *Ekuverin* strengthens defence ties between the 2 nations.
- Both are part of the Colombo security conclave.

Colombo Security Conclave is regional maritime security grouping formed in 2011 with India, Sri Lanka, Maldives, Mauritius and Bangladesh as members while Seychelles is an observer nation. It aims to make maritime security, marine pollution response and maritime search & rescue priorities for the region.

- **Humanitarian relations** - India was the 1st to assist Maldives during the 2004 Tsunami and water crisis in Male in Dec 2014.
- India's rapid and comprehensive assistance to the Maldives during COVID- 19 pandemic further reinforced India's credentials of being the "first responder".

Challenges in India-Maldives Relations

- **India out campaign** – Beginning in 2020, it started as protests in the Maldives that spread widely across social media, expressing public concerns about India's influence in the country.
- **Lack of transparency** – Some critics have pointed to a lack of openness regarding certain bilateral agreements signed between India and the Maldives during President Solih's tenure.
- **Indian Military Presence** – Allegations have surfaced about Indian military personnel operating in the Maldives, leading to unease among sections of the Maldivian population.

What are recent agreements in Indo-Maldives ties?

- **Trade pacts** – India launched talks on a Free trade talks with Maldives after sealing the FTA with United Kingdom.
- **Capital support** – India announced a new *line of Credit of 4850 crore rupees* to support the development.
- **Fisheries development** – A joint efforts in sustainable tuna fishing, deep-sea fisheries, aquaculture, and eco-tourism.
- **Digitalising initiatives** – It involves sharing India's successful large-scale digital platforms with the Maldives.
 - **For example**, enabling digital transactions in the Maldives through *India's UPI system*.
- **Pharma collaborations** – *Facilitating access to Indian medicines* and integrating Indian pharmacopoeia standards within Maldivian healthcare.
- **Connectivity** – India has introduced direct air connectivity to strengthen cooperation and boost tourism.
- **Defence** – India will also *provide 72 heavy vehicles* to the Maldivian Ministry of Defence.
- **Social initiatives** - India handed *over 3,300 social housing units in Hulhumale* and have inaugurated a roads and drainage system project in Addu city.

What are key outcomes of recent agreements?

- **Maritime security** – It will help to curb the piracy, smuggling, terrorism in Indian Ocean region.
- **Promotes tourism** – Improved connectivity through direct flights and infrastructure projects enhances tourism flows between them thereby benefiting both countries' economies.
- **Enables digitalisation** – By sharing India's proven digital solutions like UPI, the Maldives advances its digital payment systems and overall technological infrastructure.
- **Counters Chinese aggression** – Strengthening bilateral relations helps India mitigate China's expanding presence in the Indian Ocean like China's "String of Pearls" strategy that aimed at securing strategic ports and assets.

- **Boosts trade** - Free trade agreement encourage greater economic collaboration and investment.

What lies ahead?

- India can take steps to pursue soft diplomacy to ensure continued relationship with Maldives.
- India's economic ties with Maldives can be bolstered by finalizing free trade agreements benefitting both nations.

9.2 ICJ urges States to be Held Accountable for Emissions

Recently, the International Court of Justice (ICJ) stated that government actions driving climate change are illegal and states should be held legally responsible for their emissions.

What is International Court of Justice (ICJ)?

- **Established in – 1945** by the **United Nations Charter**, began work in April 1946.
- **Location** - The Hague, Netherlands, Only principal UN organ not based in New York.
- **Official Languages** - English and French.
- **Composition** - 15 judges serving nine-year terms, whom were elected by the UN General Assembly and Security Council.
- No two judges can be from the same country.
- **Jurisdiction** - Settling legal disputes between states and giving advisory opinions to authorized UN organs/agencies.
- Only states may be parties in contentious cases, jurisdiction is based on consent by concerned states.
- **Binding status** - They are final and are ***binding only on the parties involved***.
- It has ***no formal enforcement power*** and implementation may require action by the UN Security Council.
- **Significance** - Principal judicial organ of the UN, often called the "**World Court**".
- It is crucial in maintaining international law, peaceful dispute resolution, and providing advisory opinions.
- Judges act impartially independent of national governments

How ICJ makes states responsible for their executive actions?

- **ICJ observation** - The climate change treaties set forth binding obligations for states parties to ensure the protection of the climate system and other parts of the environment from anthropogenic greenhouse gas emissions.
- **Reminded responsibilities** - It directed nations to adopt measures with a view to contributing to the mitigation of greenhouse gas emissions and adapting to climate change.
- States parties listed in Annex I to the UNFCCC have additional obligations to take the lead in combating climate change.

Annex 1 countries (both *developed and with economic transition countries*) of UNFCCC are obligated to reduce their greenhouse gas emissions, aiming to return to 1990 levels, as outlined in the UNFCCC.

- Historical responsibility of developed countries to the fore, which was almost put on the backburner when all countries agreed to the Paris Agreement that diluted the responsibility of the Annex 1 countries.
- It is also noted that "... A breach by a State of any obligations ... constitutes an internationally wrongful act entailing the responsibility of that State".
- **Wrongful acts** - The legal consequences resulting from the commission of an internationally wrongful act may include the obligations of
 - cessation of the wrongful actions or omissions, if they are continuing
 - providing assurances and guarantees of non-repetition of wrongful actions or omissions, if circumstances so require
 - full reparation to injured States in the form of restitution, compensation and satisfaction, provided that the general conditions of the law of State responsibility are met, including that a sufficiently direct and certain causal nexus can be shown between the wrongful act and injury.

- **Legal impact** – Despite this judgement does not have a binding force, the court’s advisory opinions has a legal impact and moral authority on the state parties.
- The court’s conclusions will allow the law to inform and guide social and political action to solve the ongoing climate crisis.

- **Determinants of the ruling** - The first-ever ruling of the highest global judicial forum on climate change, has been passed in an advisory capacity as requested by the Secretary-General of the United Nations.
- UN decision, to refer the matter to the ICJ, was driven by a demand from Pacific youth and island nations supported by a coalition of civil society, indigenous peoples and states.

What are future implications?

- **Rejuvenate global climate talks** – It Promotes active engagement in the global allied efforts to address collective climate goals and financial commitments.
- Particularly after the recent Bonn negotiations subdued apparently due to US president Donald Trump’s strong anti-climate change rhetoric and a spate of wars across the world.
- **Relief to climate vulnerable countries** - It Provide lot of negotiation ammunition to climate vulnerable countries including India, which is one of the biggest sufferers due to climatic impacts.
- **Future prospects** – This order would play a key role in the upcoming COP30 negotiations to be held at Belem, Brazil and It would also rejuvenate global climate talks.

Quick facts

Some Global Climate Conservation Initiatives

- **Paris Agreement (2015):** Limits global warming to below 2°C, with countries submitting updated climate action plans every five years to reduce emissions and support vulnerable nations.
- **Vienna Convention (1985) & Montreal Protocol (1987):** Framework and binding treaty to protect the ozone layer by phasing out ozone-depleting substances, leading to significant ozone recovery.
- **Convention on Biological Diversity (1992):** Conserves biodiversity, promotes sustainable use, and ensures fair benefit-sharing from genetic resources globally.
- **United Nations Convention to Combat Desertification (1994):** Addresses land degradation in drylands through sustainable land management, crucial for food security and climate resilience.

9.3 US Tariff on India and its Effects

Recently, US president has announced a 25% additional penalty on Indian goods, for continuing to purchase oil from Russia, taking the total baseline tariff to 50%.

What are reciprocal tariffs?

- **Definition** – It is a tax or trade restriction that one country places on another in response to similar actions taken by that country.
- **Implementation** – If one country raises tariffs on goods from another, the affected country might respond by imposing its own tariffs on imports from the first country.
- **Purpose** – This response is meant to protect local businesses, preserve jobs, and fix trade imbalances.
- **Impacts** – It can lead to a back-and-forth increase in trade barriers, potentially resulting in a trade war that negatively impacts both economies.
- It can disrupt supply chains, raise prices for consumers, and slow down economic growth.

How US imposes reciprocal tariffs?

- **Section 232** – It allows the US department of Commerce to investigate and impose additional tariffs if the import of the goods threaten national security.

• **Tariffed goods**

Product Category	Tariff Rate (August 7, 2025)	Tariff Rate (August 27, 2025)
Textiles & Apparel	25%	50%
Gems & Jewelry	25%	50%
Leather & Footwear	25% (20.8–29.51% for footwear)	50% (45.8–54.51% for footwear)
Marine Products	33.26% (25% + 2.49% anti-dumping + 5.77% countervailing)	58.26% (50% + 2.49% + 5.77%)
Chemicals (Organic)	25%	50%
Automobiles & Auto Parts	25%	50%
Iron, Steel, Aluminium	25% (5–12.5% for industrial goods)	50% (30–37.5% for industrial goods)
Agricultural Products	25% (e.g., onions at 25.54%)	50% (e.g., onions at 50.54%)
Machinery & Engineering Goods	25%	50%
Ceramic, Glass, Stone	25%	50%
Rubber Items	25%	50%
Paper & Wood Products	25%	50%
Furniture	25%	50%

- **Exempted items** – Pharmaceuticals, Electronics & Semiconductors, Energy Products and Critical Minerals.
- These exempt items account for approximately 30% of India's exports.

How it will impact India?

- **Reduction in exports** – Exporters in the textiles, chemicals and gems and jewellery segments will face reduction of 50 to 70% in their exports to the US.
- All the tariffed goods from India will be extremely expensive in US.
- **Decreases consumers for Indian goods** – With India's competitors such as Vietnam, Indonesia, Malaysia and Philippines facing reciprocal tariffs of less than 20%, Indian goods are going to find fewer takers in the US market.
- **Makes exports expensive** – The 50% tariff can reduce overall Indian exports to the US by 40 to 50 %.
- **Sectoral impacts** – The following sectors are going to face severe impacts



Sector	Total Share in Exports in 2025
Textiles and apparels	37%
Chemicals	15%
Electrical machinery	32%
Jewellery	30%

Average Share in Exports for the last 3 Years



- **Downfall of stock market** - The stocks like *Gokaldas textiles, Kitex, Camlin, Aarti industries, Atul, Bharat forge, Suprajit Engineering, Sona BLW* etc will see a sharp reduction in revenue and profitability.
- **Reduction in external demand** – There will be weakening of external demand for the companies due to the ongoing chaos, which can diminish the outlook for all companies.
- **Diminishes GDP** – Exports to the US accounting for approximately 2.2 % of our GDP in 2025, per commerce ministry data.
- A 50% reduction in the US exports can lead to a decline of at least 30 to 40 basis points in our GDP for FY26.

What lies ahead?

- India could look for ways to help the affected exporters *through subsidies or other schemes.*
- *Reduction of crude oil imports from Russia* could be an option too, given that \$87 billion of exports is at stake.

9.4 Necessity of Nuclear Weapons Non-Use norm

Marking 80 years on from Hiroshima, the recent developments including hostilities involving nuclear possessors, nuclear modernization are putting the norm of non-use under immense strain.

What was the Hibakusha's role in shaping global views on nuclear weapons?

- **Advocating moral and ethical needs** – It provided powerful testimony about the human consequences of nuclear attacks.
- It creates a strong moral and ethical case against nuclear weapons use.
- **Overcoming suppression** – Initially, U.S. occupation authorities suppressed information about the bombings' effects.
- Survivors fought to have their stories heard and respected, a recognition that took decades to achieve.
- **Educating and rising global awareness** – The survivors formed the Nihon Hidankyo, a group that traveled globally to educate people about the horror and prolonged suffering caused by nuclear weapons.
- **Linking radiation sickness to nuclear weapons** – Public understanding of radiation sickness in Japan only followed the 1954 Fukuryu Maru incident.
- This connected acute radiation illness to nuclear fallout and amplified the survivors' voices.
- **Disarming efforts** – It contributed to international awareness, culminating in their recognition with the Nobel Peace Prize in 2024 for disarmament efforts.

*The people exposed to the radiation from the bombs are known as the **Hibakusha**, which literally translates to "explosion-affected people."*

What are the factors supporting the "norm of non-use"?

- **Fear of mutual destruction** – The idea that the fear of destruction has been a greater factor in preventing nuclear weapon use than just legal or moral reasons alone.

- **Nuclear weapons unacceptability** – The use of nuclear weapons in conflicts is fundamentally intolerable, largely due to humanitarian issues and the pursuit of political stability.
- **Global political consensus** – As the memories of past nuclear conflicts fade, there's a risk that the international community may become satisfied that could increase the chances of dangerous nuclear miscalculations.
- **International treaties** – Treaties such as the Nuclear Non-Proliferation Treaty (NPT) and the Comprehensive Nuclear Test Ban Treaty are in place to discourage the use of nuclear weapons.
- **Long-term risks** – Decision-makers are cautious about the potential for uncontrollable escalation and the long-term geopolitical consequences that deters them from using nuclear weapons.

What are the challenges for the “norm of non-use”?

- **Absence of legal prohibition** – There is no binding international law prohibiting the use of nuclear weapons.
- The existing treaties like the NPT and Comprehensive Test Ban Treaty do not ban their use, only their proliferation and testing.
- **Evolving threats** – Recent developments, such as Russia's threats over Ukraine, India's nuclear posturing during *Operation Sindoor*, have introduced nuclear rhetoric into regional conflicts.
- **Modernization of nuclear arsenals** – Advances in nuclear weapon technology, including development of more “useable” tactical weapons, raise concerns that the threshold for nuclear use could be lowered in future conflicts.
- **Legitimizing nuclear use** – Nations strategically challenge the norm of nuclear non-use by deploying other norms that legitimize nuclear use, leading to debates of acceptable nuclear behavior.
- **Weakening of disarmament efforts** – Failures and fractures in nuclear treaties such as the Nuclear Non-Proliferation Treaty (NPT) i.e. the neglect of disarmament obligations by nuclear states weakens non-use norm.

What measures can be taken?

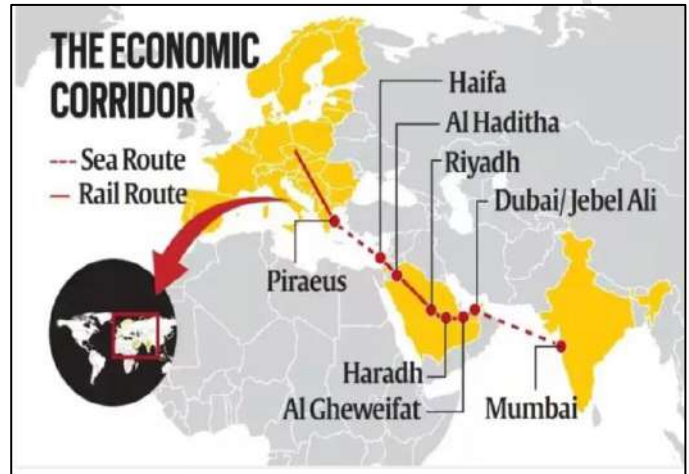
- **Strengthening international norms** – It is needed to reinforce the unique status of nuclear weapons as unacceptable tools of war through sustained diplomatic efforts and international declarations.
- **Promoting universal adherence to non-use** – This emphasizing humanitarian and ethical imperatives can be established by the experiences of the Hibakusha.
- **Encouraging negotiations** – New legal instruments that unambiguously prohibit the use of nuclear weapons, closing existing legal loopholes can leverage global cooperation.
- **Fostering trust among nuclear-armed states** – It can be done by establishing crisis communication mechanisms and confidence-building measures will help to prevent misunderstandings.
- **Investing in education and awareness** – Integrate the historical lessons of Hiroshima, Nagasaki, and incidents like Fukuryu Maru into global educational curricula
 - This will help prevent complacency about nuclear dangers.
- Support the testimony and outreach of survivors (Hibakusha) and organizations advocating for disarmament, ensuring their message remains relevant.
- **Modernizing deterrence without escalation** – Urge states to review and revise nuclear postures to avoid developing or deploying more “useable” tactical nuclear weapons.
- Advocate for security policies that prioritize non-nuclear deterrence and conflict resolution.
- **Enhancing global collective action** – Encourage major powers and nuclear possessors to lead by example by reducing their nuclear arsenals and upholding non-use norms.
- **Mobilize the international community** – This including civil society, NGOs, and non-nuclear states to campaign for complete nuclear disarmament.
- **Preventing nuclear miscalculation** – Stress the importance of robust verification and early-warning systems to avert missteps.
- Develop crisis management frameworks for de-escalation in case of rising tensions involving nuclear-capable states.

9.5 IMEC – Challenges and future

Recently, India's National Security Council Secretariat hosted envoys and officials to discuss progress on the India-Middle East-Europe Economic Corridor (IMEC).

What is IMEC?

- **IMEC** – The India-Middle East-Europe Economic Corridor (IMEC) is a proposed infrastructure project.
- **Announced during** – *The G20 Summit* held in New Delhi in 2023.
- **Members** – United States, UAE, Saudi Arabia, France, Italy, Germany, Israel, Jordan and the European Union.
- **Aim** – To stimulate economic development through enhanced connectivity and economic integration between Asia, the Arabian Gulf, and Europe.
- **Two corridors** – India-Gulf and Gulf-Europe
- **India-Gulf** – It will carry container traffic from India's western ports to the UAE.
 - From where high-speed freight railway will carry goods across the Arabian Peninsula (UAE, Saudi Arabia, Jordan) until the port of Haifa in Israel.
- **Gulf-Europe** – It will see cargo being shipped from Haifa to ports in Greece and Italy.
 - From where Europe's well-established train networks will take goods to their final destinations across the continent.



What are the ambitions of IMEC?

- **Reduce travel time** – IMEC is expected to cut shipping time from India to Europe by about 40% when compared to the Red Sea route.
- **Establishment of agreements** – IMEC gave way to normalisation agreements and rapprochements that prioritised regional economic growth.
- **Conflict resolution** – It may solve years of conflict along ideological and geopolitical lines between
 - Qatar-GCC
 - Iran-Saudi Arabia
 - Arab states-Israel
- **Potential for minilateral agreements** – The Arab normalisation with Israel, which Saudi Arabia was set to join, was yielding enough geo-economic gains for Arab states.
- It can overlook the Palestine question and explore minilateral arrangements with Israel like the I2U2 with India.
- **Envisage new route** – IMEC allowed India and its Middle Eastern, American, and European partners to envision a new corridor between India and Europe.
- **Increase in trade** – The EU is India's largest trading partner with bilateral trade in FY 2023-24 at \$137.41 billion.
- The non-oil trade between India, the UAE and Saudi Arabia has increased significantly in recent years.
- **Trade facilitation and accessibility** – The IMEC will address several issues that continue to persist till date, including
 - No corridor-wide tariff standardisation
 - Low financial integration among corridor partners
 - Lack of corridor-wide insurance
 - Widely differing port capacities.
- **Future prospects** – Its implementing partners would lay cables for electricity and digital connectivity, pipes for clean hydrogen export.

- It would increase efficiencies, reduce costs, enhance economic unity, generate jobs, and lower greenhouse gas emissions.

What are some key challenges faced by IMEC?

- **Israel – Palestine conflict** – The single most important issue is Israel’s increasingly unpopular war on Gaza, which has killed at least 61,000 people.
- The IMEC’s cornerstone is the Middle East-Europe connection, between Jordan and Israel.
- **Jordan-Israel issues** – The relations are presently at a significant low, and are worsening due to the Israeli-American push for Jordan to absorb more of the Palestinian population
- **Saudi-Israel tussle** – The potential for Saudi-Israel normalisation is much lower today than in 2023.
 - **For Instance**, Riyadh has doubled down on the need for Israeli concessions towards Palestine while Israel’s desire to accept a Palestinian state is at a historic low.
- **Israel’s domination** – Israel is presently focused on formally re-occupying and potentially re-settling the Gaza Strip, despite intensifying global opposition.
- The direct impact of Israel’s endless war is the worsening of even those challenges which could be mitigated through reconciled trade practices between stakeholders.
 - **For instance**, while the Houthi attacks on Red Sea shipping justified the need for the IMEC as a more secure alternative, the expansion of Israel’s war demands high insurance premiums for any trade transiting the region.

What could be done to make IMEC stronger?

- **Trade development** – India is Saudi Arabia’s second largest trading partner and both states have had a strategic partnership since 2010.
- These partnerships have should be developed to yield several instruments to bolster connectivity.
- **Improving India’s presence** – Progress on the IMEC corridor is very much possible for India.
 - **For instance**, Riyadh and Abu Dhabi both allow the use of UPI for fund transfers and remittance payments, improving the potential for digital connectivity along the IMEC route.
- **Reducing the Saudi domination** – The Saudi need to undercut the Emirati economic dominance of the region continues.
 - **For example**, in 2021, Riyadh imposed new tariffs specifically on those GCC states that have “free zones” offering preferential tax and customs treatments.
- **Improving regional stability** – In the long term, for the IMEC to be realised in its originally envisioned form, a secure and stable Middle East is an imperative.
 - **For instance**, as long as principal issues such as that of Palestinian statehood are not addressed, any regional connectivity plan will inevitably be susceptible to renewed conflict.
- **Addressing sustainability challenges** – It could be mitigated through commitment and investment from all stakeholders.
 - **For instance**, in September 2023, participants explicitly agreed to meet within sixty days to develop and commit to an action plan with relevant timetables.

G.S PAPER III

10. ECONOMY

10.1 Rural Economy and Emerging Distress

Recently, The Government has imposed a cap of 60% on the spending under the Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS).

What is the role of Agriculture in rural economy?

- **Agriculture** – The science, art, or practice of cultivating the soil, producing crops, and raising livestock and in varying degrees the preparation and marketing of the resulting products

- **Employment** - It remains India's largest sector for employment, accounting for 46% in 2023-24.
- **GDP** – Contributing only 16% to the country's GDP.
- **Gross value added (GVA)** - During the last eight years, the real GVA of agriculture has increased by 4.9 %.
- **Projected growth** - The projected growth rate of agriculture in FY 2025 is 4.6% compared to 2.7% in FY 2024.
- **Dependent on climate** - The projections for growth are based on a good Kharif (summer) harvest.
- It also depends on an equally positive Rabi (winter) harvest, which is largely dependent on climatic conditions.
- **Real wages** – It have largely remained stagnant.
- **Workforce** – It consists of cultivators and agricultural labourers.
- **Acts as a buffer** – Rural households went back to agriculture in the absence of other alternatives during the lockdown.
- **Alternative opportunity** – Migrant workers returning to their respective areas also took up agricultural work as a “fall-back” option.
- **Reliant on investment** – Sustained agricultural growth and rise in farmers' income are dependent on public investment and structural reforms in the sector.

Cultivators, own land or operate land through lease or contracts.

Agricultural labourers work on land owned by others in return of wages, paid in cash or kind.

How rural economy evolved post-Green Revolution?

- **Income** – According to NABARD's All India Rural Financial Inclusion Survey (2021-22).
- The average monthly income of agricultural households was Rs 13,661 compared to Rs 11,438 of non-agricultural households.
- For agricultural households, income from cultivation forms one-third of the total income and is the primary source.
- **Diversification of income** – Agricultural households have also shown more diversification into other income sources as compared to non-agricultural households.
- Rising input costs and uneven distribution of the benefits of the Green Revolution, pushed many rural households to opt for alternative non-farm sources of income.
- **Hindu rate of growth** – India's economic growth between the 1960 and 1980 has been termed by economist Raj Krishna as the Hindu rate of growth.
- **Slow progress** – During the 1960s, the growth rate of agriculture was around 1% annually, which increased slightly to 2.2% between 1968-69 and 1975-76.
- **Self-sufficiency** - The Green Revolution helped the country achieve food sufficiency in food grains like rice and wheat.

Hindu rate of growth refers to the low economic growth that averaged around 4 %.

Negative impacts

- Rising regional disparities
- Neglect of rain fed areas
- Neglect of nutritional crops, like millets
- Exclusion of resource-poor farmers
- Ecological degradation
- Long-term environmental unsustainability
- Present in smart art

Why MGNREGA fails to alleviate rural economy?

MNREGA

- **MNREGA** – Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGA).
- **Introduced in** – 2005
- **Aim** – It aims to provide atleast 100 days of guaranteed wage employment to one member of every Indian rural household.
- **Operation** – It is operated as a Demand-driven programme with no spending limit till now.
- **Background** – It was implemented against the backdrop of declining real agricultural wages, poverty reduction and capital formation, after the 1991 economic liberalization.
- **Insufficient funds** – In recent years, the scheme faced issues such as inadequate budget allocation and

- **Delayed wage disbursement** – There has been significant delay in the wages of the workers.
- **Reduced working days** – As of 2018-19, only 7.4% of rural households, on average, availed of 100 days of work.
- In 2023-24, an average MGNREGS household worked only for 52 days.
- **Increase in rural distress** – Since the pandemic, there has been a rise in the number of people demanding MGNREGS work.
- However, the growing gap between the demand for work and its availability underlines a larger rural distress.
- Finding employment since the lockdown has become difficult which further elevates the problem.
- Data from the Centre for Monitoring Indian Economy (CMIE) highlights many distress

What causes for a rise in rural non-farm employment?

- **Impact of green revolution** – The technologies introduced to boost agricultural productivity and farmers' income resulted in less labour intensive agricultural practices.
- **Creation of linkages** – The surplus production created forward linkages that generate demand for goods and services produced by small-scale, labour-intensive rural entities.
- They also created backward linkages and spurs demand for agro-processing goods.

Key indicators of the distress

- Rural wage contraction
- High rural inflation
- High demand for employment under MGNREGA
- Sluggish rural consumption.
- These issues are closely linked to the developments in the agriculture sector

Forward linkage is created when the output of one industry becomes the input for another industry, essentially moving "forward" along the production chain.

Backward linkage occurs when the production of one industry creates demand for inputs from other industries, essentially moving "backward" along the production chain.

- **Regional inequality** – Largely benefitted the states of Punjab, Haryana, and West Bengal
- **Depend on borrowings** – Large number of farmers are increasingly relying on borrowing to manage their agricultural activities.
- Hence they shifted to other sort of employments.
- **Rise in expenditure** – Increasing costs of cultivation, including the cost of labour, fertilizers, and machinery dragged people out of agriculture.
- **Lack of adequate employment** – Despite growth in the agricultural sector, rural workers struggle to find adequate employment.
- **Inadequate policies** – Easing credit access, reducing direct taxes (like corporate taxes), and promoting the ease of doing business are insufficient in addressing the basic concerns of job creation and the quality of employment in rural areas.

What lies ahead?

- The fund allocation and implementation of MGNREGA could be strengthened in future policy decisions.
- Public investment in agriculture could be scaled up, particularly in areas like irrigation, storage, and climate-resilient farming practices.

10.2 Microfinance

What is microfinance?

- **Microfinance** – It is a form of financial service which *provides small loans and other financial services* to poor and low-income households.
- **Enhance access to financial services** – Microfinance represents banking services for low-income individuals or groups who otherwise would not have access to financial services.

- **Working** – Like conventional lenders, microfinanciers charge interest on loans and institute specific repayment plans
- **Safe lending practices** – Microfinance allows people to take on reasonable small business loans safely and consistent with ethical lending practices.
- **Data management** – Microfinance client disbursement and recovery data is updated daily with Credit Information Companies (CIC), ahead of the 15-day regulatory requirement.
- **Financial operations** – Microfinance Institutions (MFIs) operate with thin profit margins.
- These institutions offer loans without collateral with small interest rate increases (e.g., 0.15%) attract significant attention.
- **Globally influential** – Most microfinancing operations occur in developing nations, such as Bangladesh, Cambodia, India, Afghanistan, the Democratic Republic of Congo, Indonesia, and Ecuador.
- **In India** – all *loans that are below Rs. 1 lakh* are considered as microloans.
- Based on the recommendations of **Malegam Committee**, RBI introduced a comprehensive regulatory framework for NBFC-MFIs in 2011.

What are its contributions?

- **Increases banking penetration** – Serves 75 million low-income clients across 720 districts including 112 aspirational districts.
- **Last-mile financial service** – Microfinance institutions frequently deliver loans and related financial services directly to borrowers' homes or villages, especially in rural and remote areas.
- This "last-mile" servicing involves substantial expenses such as travel costs, field staff salaries, logistics, and time.
- **Generates employment** – Contributes 2.03% to India's Gross Value Added (GVA) and generates employment for 13 million people (based on 2021 NCAER study with 2018-19 data).
- **Empowers women** – Promotes women's empowerment, builds digital capabilities, and helps curb urban migration.
- **Enhances accountability** – The sector maintains transparency by publicly disclosing minimum, maximum, and average interest rates.

How they are regulated in India?

- **Lending limits** – The microfinance Industry Network (MFIN) restricts lending so that a borrower can have loans from no more than three regulated entities.
 - Additionally, the combined loan amount from all lenders cannot exceed ₹2 lakh, protecting borrowers from excessive debt.
- **Repayment limits** – The Reserve Bank of India (RBI) mandates that microfinance borrowers' total repayment obligations must not exceed 50% of their household income.
- This rule ensures borrowers retain enough income for daily expenses, preventing financial distress and promoting sustainable borrowing.
- **Periodical monitoring** – To enforce these protections, MFIN conducts quarterly reviews of Credit Information Company (CIC) data.
 - This ongoing monitoring helps ensure responsible lending practices and reduces risks of over-indebtedness among low-income borrowers.

Current Status of Microfinance Progress

- Portfolio at Risk (1-90 days) is now improving, currently at 4%.
- Only 4% of the total loan amount disbursed by microfinance institutions is currently overdue by between 1 and 90 days.
- This relatively low PAR suggests that the majority (96%) of loans are being repaid on time or within an acceptable margin.
- Out of total credit outstanding is ₹3.55 lakh crore, *representing 2% of India's total banking sector credit flow.*

- **Borrower profile** – The majority of borrowers (95.6%) maintain relationships with fewer than three lenders, ensuring controlled debt exposure.
- Additionally, 84% of these borrowers have outstanding loans below ₹1.2 lakh, indicating moderate borrowing levels and reduced risk of over-indebtedness.

Portfolio at Risk (1-90 days) is a key metric used in microfinance to assess the quality of loan portfolios. It represents the percentage of a microfinance institution's outstanding loan portfolio that is overdue or at risk of default by 1 to 90 days. A lower PAR percentage indicates better portfolio health and effective recovery of loans.

What are the issues?

- **Gaps in KYC process** – After the 2017 Supreme Court ruling, regulated entities (such as microfinance institutions) were prohibited from storing or reporting Aadhaar numbers to Credit Information Companies (CICs).
- This limits effective customer identification and verification in microfinance.
- To comply, institutions use alternative IDs like voter ID as these are less reliable and prone to inaccuracies.
- Increasing risks of duplicate or fraudulent borrower records.
- The inability to fully use Aadhaar undermines the potential for seamless and accurate borrower verification in the sector.
- **Funding crunch** – Despite abundant liquidity in the banking system, bank funding to Non-Banking Financial Company-Microfinance Institutions (NBFC-MFIs) fell by 54%.
- **Lending restrictions** – This has restricted NBFC-MFIs' ability to lend, resulting in nearly 7 million low-income clients losing access to formal microfinance services.
- **Pricing perception** – Public discussions often ignore key factors like interest rate benchmarks, the costs of offering doorstep services, and the risks of unsecured loans.
 - Comparing a single institution's rates in isolation can be misleading; rates must be viewed relative to overall sector benchmarks to understand if they are reasonable or excessive.
 - This incomplete understanding muddies perceptions about fair loan pricing.
- Informal finance still accounts for 31% of rural loans, indicating the ongoing need for well-regulated microfinance.

What lies ahead?

- To keep helping low-income communities, it's important to make regulations clearer, improve Know Your Customer (KYC) processes, and tackle funding issues.
- Pricing talks may be more responsible and take into account the challenges and risks faced by microfinance providers, which are essential for financial inclusion.

10.3 Downfall of Indian Rupee

Recently, The Indian rupee has been in the news recently for its sharp depreciation against the dollar.

What is the strength of Indian rupee globally?

- **Indian rupee** – The Indian currency is called the Indian Rupee (INR).
- One Rupee consists of 100 Paise.
- The symbol of the Indian Rupee is ₹.
- The design resembles both the Devanagari letter "₹" (ra) and the Latin capital letter "R".
- **Exchange rate** – An exchange rate is a relative price of one currency expressed in terms of another currency or group of currencies.
 - **For example**, if the US Dollar is stronger than the Indian Rupee, it implies that value of the US Dollar is higher w.r.t. the Indian Rupee.
- **Determinants of exchange rate** – It is influenced by a wide range of factors, including

- Interest rates
- Inflation rates
- Trade balances
- Economic growth prospects
- Geopolitical events, and government policies.

current status		
Indian Rupee	1.00 INR	inv. 1.00 INR
US Dollar	0.011418	87.582318
Euro	0.009788	102.161862
British Pound	0.008478	117.951750
Australian Dollar	0.017502	57.137906

What are factors for downfall of rupee?

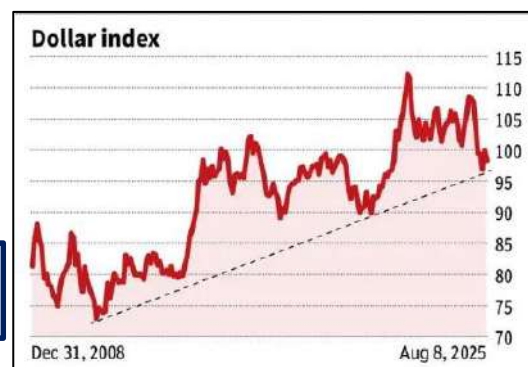
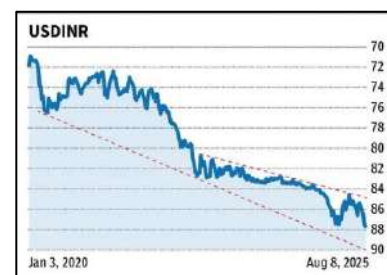
- **Indo-Pakistan conflict** – Operation Sindoor, carried out by India in the first week of May, dragged the rupee below 85.
- **Iran-Israel war** – It triggered a sudden spike in the Crude Oil price.
- **Brent Crude oil** spiked about 15% from around \$68 to \$78 in just one week.

Brent crude is a specific type of light, sweet crude oil, and it's also a major global benchmark for oil prices. It's primarily sourced from the North Sea oilfields and is widely traded because it's easy to refine into gasoline and diesel.

- The foreign portfolio investors (FPIs) drew out \$2.05 billion from the equity segment in July.

Foreign portfolio investors are those who are holding financial assets, such as stocks and bonds, in another country to diversify their portfolios.

- This pulled down the Nifty 50, the benchmark equity index, by 3%.
- It dragged the rupee below 87 again and the currency was down 2% for the month.
- **Tariff imposition by US** – A 25% tariff on Indian imports dragged the rupee to a low of 87.80 in the final trading day of the month.
- **Possible dollar strength by US** – The dollar index (98.18) touched a low of 96.38 in July and has risen back well from there.
- On the charts, the region around 96 is a very strong long-term trend line support.
- So, there are good chances that the dollar index has found its bottom already.
- From a long-term perspective, if the dollar index sustains above 96, a rise to 106-108 cannot be ruled out.



U.S. Dollar Index (USDX), is a tool for assessing the strength or weakness of the US dollar in relation to a basket of major currencies.

What lies ahead?

- Promoting the consumption of locally made products over imported ones, Could reduce the demand for foreign currency.
- Cutting down on non-essential imports could help reduce the trade deficit which in turn strengthen the rupee.
- Government policies that aim to boost exports and reduce imports could have a positive impact on the rupee.

AGRICULTURE

10.4 FPO and Circular Economy

Recently, as climate change tightens its grip on Indian agriculture, Farmer Producer Organisations (FPOs) have become key to building resilient food systems by embracing circular economies rooted in local knowledge and regenerative practices.

What is Farmers' Producer Organisation (FPO)?

- **FPO** – A Farmers' Producer Organisation (FPO) is a **legal entity** formed by primary producers such as farmers, milk producers, fishermen, weavers, rural artisans, and craftsmen.
- It is also known as a Farmers' Producer Company (FPC).
- **Forms** – It can be a producer company, a cooperative society or any other legal form.
- It has combined feature of both co-operative and private companies.
- **Role** – It aims to help small landholder farmers achieve economies of scale and strengthening their bargaining power through collective action.
- **Working** – The participation, organisation and membership pattern of these companies are more or less similar to the cooperatives.
- Their daily operations and business models follow the approach of professionally managed private companies.

FPO's in India

- **Introduced** – The concept of FPOs launched in the early 2000s
- **Measures** – The Government Launched a scheme to formation and promotion of 10,000 FPOs with allocating budget of 6865 crore.
- 8,875 FPOs have been registered under this initiative.
- **Regulation** – FPO incorporated/ registered under Part IXA of Companies Act or under Co-operative Societies Act of the concerned States.

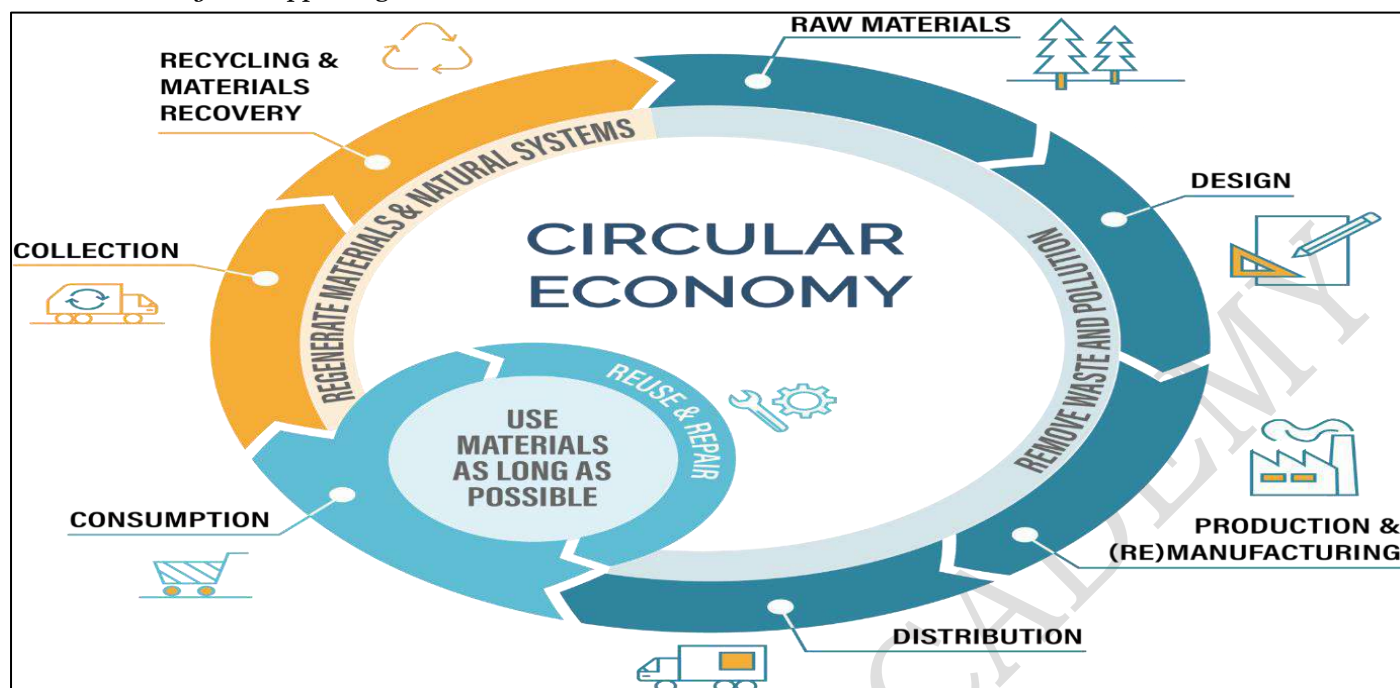
What are the issues with FPO?

- **Limited capacity** – Lack of Cold storage, and packaging facilities leads to rapid spoilage of produce, limits storage options, reduces profitability, and results in loss of potential value-added income.
- **Financial constraints** – FPO's operate with limited budgets
- **Lack of expertise** – Limited expertise in branding, digital marketing, and consumer outreach.
- It making difficult for their products to compete with established brands—ultimately restricting sales and growth.
- **Prioritising exports** – FPO focus on producing crops for distant urban or export markets rather than local consumption.
- It leads farmers become more prone to market instability and sudden price changes. Indigenous, sustainable crops are often overlooked in the process.
- **Policy issues** – FPOs are fixated on penetrating urban markets, attempting to sell their products far from their point of origin.
- This leads to challenges related to trust, branding, unfulfilled promises, poor marketing strategies and governance issues.

How circular economy can help FPO?

- **Circular economy** – According to the *World Economic Forum*, a circular economy is "an industrial system that is restorative or regenerative by intention and design."
- **Redefine FPOs** – It operates, balancing profitability with environmental stewardship and community well-being.
- **Promotes ecological health** – It emphasises production systems that cater to local consumption.
- It reducing reliance on external inputs and markets, instead focusing on locally appropriate crops that conserve water, improve soil health and are resilient to climate variability.
- **Builds resilient business** – Local circular economies build viable and resilient enterprises.
- **Reduce waste generation** – It promotes waste reduction and resource reuse in agriculture.
- Initiatives such as composting, resource-sharing among farmers and creating value-added products from surplus produce can greatly lower environmental impact.

- The promotion of indigenous crops can bolster biodiversity and strengthen resilience to climate change. Enabling policy measures such as the *Paramparagat Krishi Vikas Yojana* and the *National Mission for Natural Farming* are supporting these efforts.



- It significantly reduces the environmental footprint of food production, distribution and carbon emissions associated with long-distance food travel.
- Focus on local markets** – It minimise the need for long-haul transport, thereby reducing emissions, packaging waste & spoilage.
- It leveraged to target local markets, shorten supply chains and promote direct farmer-consumer connections.
- It helps to reduces carbon footprints and regenerative agricultural practices.

The National Mission on Natural Farming (NMNF) launched as a shift to strengthen agriculture practices with scientifically backed approaches towards sustainability, climate resilience and safe food.

The Paramparagat Krishi Vikas Yojana (PKVY), launched in 2015 to supporting and promoting organic farming, in turn resulting in improvement of soil health.

What lies ahead?

- FPOs can use circular economy practices by bringing together small farmers, helping reduce waste and improve efficiency through collective production.
- They could facilitate access to regional markets and promote recycling and reuse waste.
- FPOs may strengthen local economies and reduce reliance on global supply chains that are affected by climate change.
- They can also raise awareness among consumers about the importance of local and sustainable food.

INDUSTRIES, INFRASTRUCTURE & INVESTMENTS

10.5 Reforms to Toll Collection Practices

Recently, The Public Accounts Committee (PAC) of Parliament has recommended significant reforms to toll collection practices on national highways.

What is toll?

- Toll** – It is a *fee charged* for the use of a road, bridge, or other infrastructure.

- **Collected at** – Designated toll plazas or booths.
- **Collected by** – In India, *the National Highway Authority of India (NHAI)* and, in some cases, *private concessionaires*, are responsible for collecting toll on national highways.
- **Collected for** – Funding the *construction, maintenance, and operation* of that infrastructure.

How is toll determined in India?

- **Section 7 of the National Highways Act, 1956** – It empowers the *Government to levy fees for services* or benefits rendered on national highways.
- **Section 9** – It empowers the *Union government to make rules* in this regard.
- Accordingly, the policy for the collection of user fee is formulated and governed by the *National Highways Fee (Determination of Rates and Collection) Rules, 2008*.
- **Fixation of user fee** – The levy of user fee is based on the base rates *fixed under the NH Fee Rules across the country* and is not related to the cost of construction or its recovery.
- The rates of *fees have been increasing by 3% each year from April 1, 2008*.
- **Normalisation of cost variations** – In order to cover the impact of variable cost of operation and maintenance, *40% of annual increase of WPI is provided*.
- **Collection of fee** – The fee is to be collected by the Union government if a highway is publicly funded or by the concessionaire if it follows any of these models
 - Build Operate Transfer (BoT)
 - Toll-Operate-Transfer (ToT)
 - Developed under Infrastructure Investment Trust.
- **Amendment in 2008** – It allowed user fees to be collected in perpetuity.
- So, if the concession period is over, the highway is handed over to NHAI, and the toll collected will go directly to the Consolidated Fund of India.
- **Total collection** – The toll collection has gone up from ₹1,046 crore in 2005-06 to *₹55,000 crore in the financial year 2023-24*.
- Of this ₹25,000 crore will go to the Consolidated Fund of India, and the remaining to the concessionaire toll plaza.
- **Discounts** – These are available to users *residing within 20 kilometres of the toll plaza* based on their Aadhar card or any other proof following which they get a monthly pass of ₹340.
- **Exemption from toll payment** – It is granted *to 23 different categories* that include President of India, Vice President, Prime Minister, Governors, Chief Justice of India, Ministry of Defence personnel, Central and State armed forces in uniform including para military forces and police as well as ambulances, funeral vans and vehicles modified for differently abled people.

What are the issue with current practices?

- **Unfair collection** – The committee expressed concern that current toll practices allow for *indefinite collection* regardless of road quality, traffic volume, or user affordability, creating what it termed a *“regime of perpetual tolling”*.
- **Increase in toll rates** - The PAC noted that while toll rates currently *increase annually by a fixed 3% increment* plus partial indexation to the Wholesale Price Index.
- **Issues with FASTags** – Despite their extensive implementation, traffic bottlenecks persist on NHs due to *malfunctioning scanner readings at collection points*.
- **Absence of regulatory body** – There is no institutional mechanism *to independently evaluate whether these charges are justified relative to actual operational* and maintenance costs or future service requirements.

What are the key recommendations?

- **Suspending toll collection** – Advocated for *discontinuing or significantly reducing toll charges* on national highways once the capital expenditure and maintenance expenses have been fully recovered.
- **Validation of toll collection** – The panel emphasised that any continuation of toll collection beyond cost recovery *should only be permitted with clear justification and approval* from a proposed independent oversight authority.

- **Setting up regulatory body** – It proposed establishing a specialised regulatory authority *to ensure transparency and fairness in toll determination, collection, and regulation.*
- **Compensatory clause** – The panel has also insisted that highway users should receive toll reimbursements *when construction is in progress and commuters cannot properly utilise the roadways.*
- **Intensive use of technology** – The government should create a *technology-based and transparent system for automated toll reimbursement* or exemption in such circumstances.
- **Updating FASTags** – It suggested *establishing on-location services for motorists* to top up, buy, or exchange FASTags.
- **Effective scrutiny** – It states that efficient toll administration must encompass *continuous surveillance and evidence-based decision-making.*
- **Efficient follow-up mechanisms** – NHAI should create a *live toll plaza monitoring system* that combines real-time traffic movement, waiting line lengths, individual lane utilisation, and projected delay periods.

How has the Ministry responded?

- **Recognised the recommendations** – The Ministry of Road Transport and Highways acknowledged the Committee's concerns.
- **Started a complete study** – It has initiated a comprehensive study with NITI Aayog to revise the user fee determination framework.
 - **Scope of the study** – It will cover parameters such as vehicle operating cost, damage to the highway due to vehicle use as well as user's willingness to pay.
- **Introduction of annual pass** – To address affordability concerns, the government introduced an annual FASTag pass effective from August 15.
- It was, priced at ₹3,000 for non-commercial vehicles.
- It enables access to 200 toll crossings over 12 months, effectively reducing the cost to ₹15 per toll booth.
- **Development of comprehensive system** – To ensure smooth traffic flow at toll booths, the Ministry is developing a barrier less free flow tolling system.
- It combines high-quality FASTag readers with Automatic Number Plate Recognition (ANPR) cameras, allowing vehicles to pass through toll plazas without stopping.

What lies ahead?

- Reforming the toll collection process could ensure smooth flow of traffic and reduce commuting time for the vehicles.
- Access to modern infrastructure in toll plazas could ensure India meet global standards in traffic management.

DISASTER MANAGEMENT

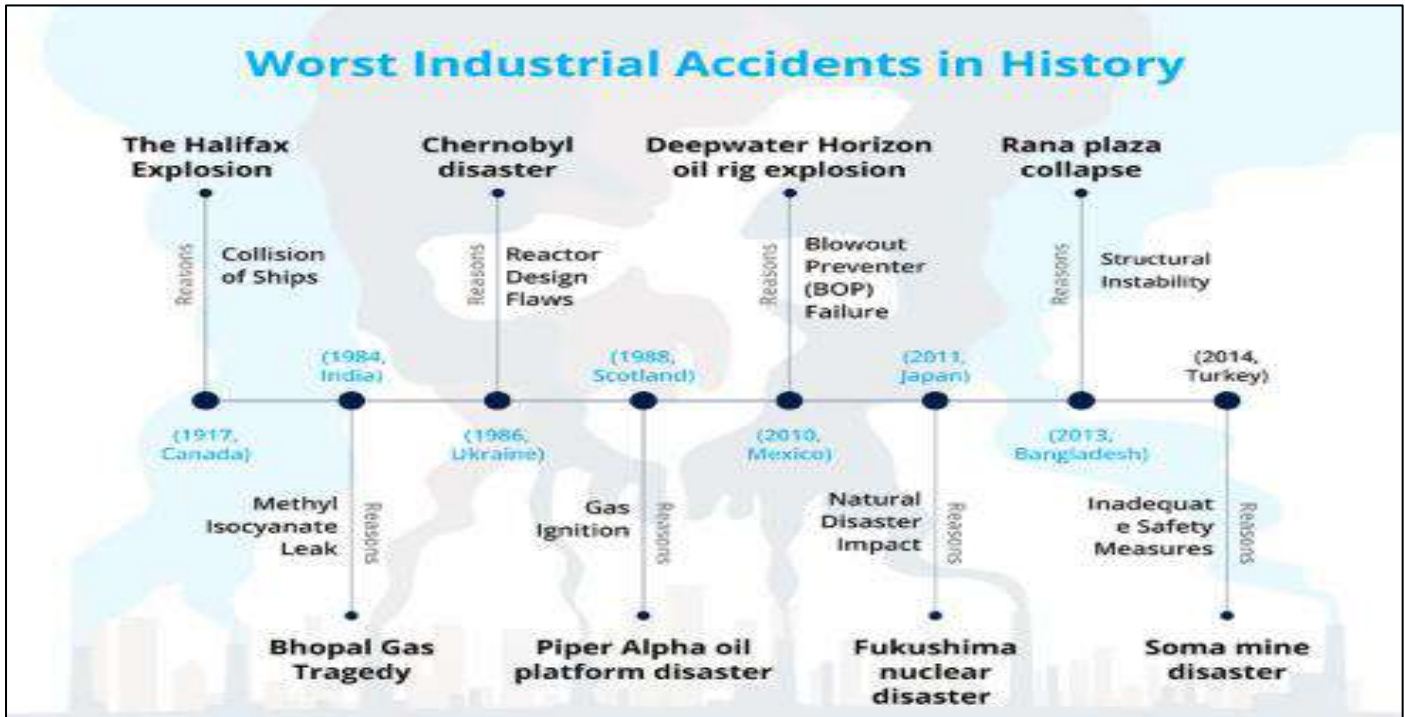
10.6 Industrial Accidents in India

Recently, the explosions at Sigachi Industries in Telangana, and a firecracker unit disaster in Tamil Nadu raised deeper insights on ongoing national crisis of industrial accidents.

What are industrial accidents?

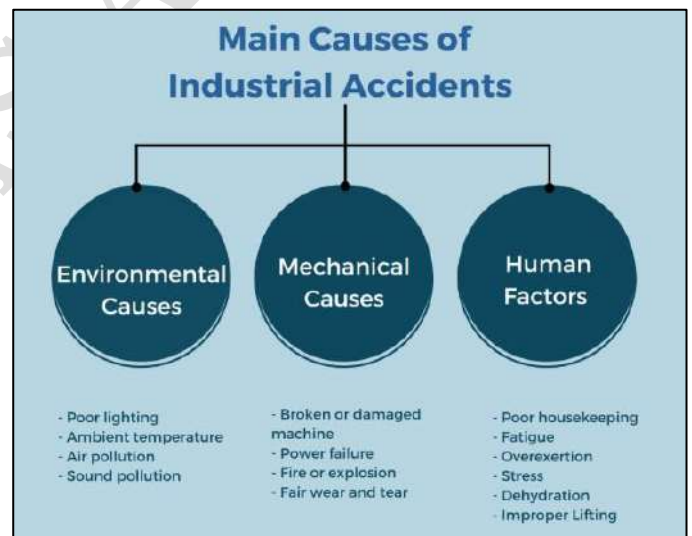
- **Definition** – They are unforeseen, work-related incidents that result in harm, injury, or even death to workers, visitors, or the public.
- **Places of occurrence** – These events typically occur in industrial settings like factories, construction sites, and warehouses.
- **Potential causes** – It is caused by a variety of factors including equipment malfunctions, human error, unsafe conditions, or a failure to follow safety protocols.

• **Notable industrial accidents**



What is the status of India in industrial accidents?

- **Death toll** –According to labour ministry data and Right to information applications, at least 6,500 workers have lost their lives.
- This means that nearly three fatalities occur every day in Indian industries, construction sites, and mines.
- **Recent case surge** – In Andhra Pradesh and Tamil Nadu alone, over 200 fatalities have occurred in major industrial mishaps over the past decade.
- **Most affected states** – Gujarat, Maharashtra, Chhattisgarh, and Uttar Pradesh have their own grim records.
 - **For example**, Gujarat witnessed over 60 major industrial fires and gas leaks in just a single year (2021), according to media and State records.



- **The hidden toll** – Data from unregistered or informal sector units may be much higher and rarely makes news.
 - A study in 2022 by the Centre for Science and Environment (CSE) found that India had had over 130 major chemical accidents in just a 30-month window post-2020, with 218 fatalities and 300-plus injuries.
- Most of these occurred in small and medium-sized enterprises (SMEs), which often operate under regulatory radar.
- According to the Directorate General Factory Advice Service and Labour Institutes (DGFASLI), India records one serious industrial accident every two days in registered factories.

What are the reasons for increasing industrial accidents?

- **The silence of the public** – There is a large muteness among the general public on the industrial unsafety.
- **Less penalty and conviction** – Convictions for safety lapses are rare, and penalties are often small or even absent.

- **The inactivity of regulators** – The regulators are largely inoperative which decreases the accountability of the industrial management.
 - **For example**, in no permit-to-work system, high-risk jobs are undertaken casually, with no formal hazard identification or job safety analysis.
- **Negligence of factories** – Many Factories running without even the basic No-Objection Certificate from the Fire Department.
 - **For example**, many industries work with no firefighting systems, alarms, sensors, extinguishers, and fire exists.
- A National Geographic documentary explored how industrial accidents across the world stem from negligence and failed systems.
- **Lack of training** – There is no training, especially for migrant and contract workers who often speak different languages and oblivious to the signage or safety protocols.
- **Cost-cutting compulsion** – Many companies are reducing their expenditure on proper infrastructure and workers safety.
- **Class bias** – The safety lapse in largely occur in the establishment where the migrant workers, contract labourers, and the economically voiceless are employed.

What are the existing laws and provisions regarding industrial safety in India?

- **Factories act, 1948** – It provides safety provisions for hazardous processes.
- **Plantations labour act, 1951** – It focuses on the safety and welfare of workers in plantations.
- **Mines Act, 1952** – It Governs safety and health in mines, including regulations for mining operations and worker welfare.
- **Contract labour (Regulation and Abolition) act, 1970** – It addresses the working conditions and welfare of contract labours, including safety aspects.
- **Environment protection act, 1986** – This act governs usage of chemicals in industries and other establishments.
- **Explosives rules, 2008** – It regulates the storage and handling of fireworks and chemicals.
- **NDMA guidelines on chemical accidents, 2015** – It Provide risk mitigation framework in chemical related disasters.

What needs to be done?

- **Make companies accountable** – Every industrial management should be held responsible for the safety and security arrangements.
 - **For example**, countries such as South Korea and Singapore now have corporate manslaughter laws, holding senior executives criminally accountable for gross safety failures.
- **Strengthening labour safety boards** – The regulatory bodies on labour safety should be strengthened to take legal and act without any political influences.
- **Digitise risk reporting** – The reports are to be digitized and periodically reviewed.
- **Embed safety as essential value** – Globally, countries such as Germany and Japan have embedded safety deeply into industrial design and workplace culture.
- **Ensure whistle-blower protection** – The people who expose the safety and other regulatory lapses must be protected.
- **Making industrial safety a right** – Industrial safety should be explicitly made as a fundamental right.

What lies ahead?

- There could be regulatory and better safety audit mechanism in every industrial establishments irrespective of their location, size and ownership.
- There is a need for collective conscience which could solve the crisis in the future.
- As citizens, as industry leaders, as media, as policymakers we need to care.

11. ENVIRONMENT

11.1 Ecological Carrying Capacity

The Joshimath disaster in 2023 highlights the urgent need to address carrying capacity in fragile ecosystems and increased awareness of the consequences of unplanned development in mountain regions.

Why carrying capacity is important than sustainability?

- **Sustainability** – It is a process that begins with subsistence, leads to surplus, and results in sharing resources.
- **Issues with sustainability** - It is defined based on convenience rather than true ecological balance or resource repayment.
- Projects labeled as sustainable may not genuinely adhere to ecological principles and often misunderstood.
- **Carrying capacity** – This term was introduced by the Western world, especially in the 1970s, when American ecologists began to use it.
- It refers to the maximum level of resource exploitation an environment can sustain without negative consequences.
- **Environmental thresholds** refer to critical points in an ecosystem where slight changes can trigger significant negative impacts.
- Ignoring these can lead to consequences like habitat destruction and increased vulnerability to natural disasters.
- **Importance of carrying capacity** – It gained mainstream attention due to systemic breakdowns in human settlements, particularly following the Joshimath disaster.
 - **For example**, Joshimath is a small village on top of a fragile mountain whose unplanned development led to severe consequences.

How developments are related to disasters?

- **Causes** – Unplanned and hasty infrastructure projects are often undertaken without thorough environmental assessments.
- When ecological debt is not repaid, it results in diminished natural buffers against disasters, making communities more susceptible to catastrophic events, such as landslides or flash floods.
 - **For example**, development projects in Uttarakhand contributed to over-extraction of resources like timber, water, & minerals that led to the degradation of forests & water bodies.
- Utilizing construction techniques that do not align with local climatic and soil conditions can destabilize foundations and infrastructure, increasing the likelihood of structural failures during adverse weather.
- Rapid urbanization without adequate planning can lead to over-concentration of populations in vulnerable areas, thereby increasing disaster risk.
 - **For example**, unregulated tourism and urban sprawl in areas like Shimla and Mussoorie are closely linked to increased landslide incidents.
- **Induce natural disasters** – These developments leads to soil destabilization, increased runoff, and reduced natural drainage, increasing the risk of landslides and flooding during heavy rains.
- It is showcasing the link between construction practices and ecological vulnerability.
 - Himachal Pradesh frequently faces landslides and flash floods due to the combination of deforestation, soil erosion, and the alteration of natural watercourses.

Ecological debt refers to the cumulative impact of resource exploitation exceeding the planet's regenerative capacity.

Impacts of Unplanned Infrastructure in Delhi's Neighborhood

- Delhi city is collapsing under the pressure of heavy traffic and overpopulation.

- Life in the city is increasingly difficult, with basic services and health under constant threat.
- Studies reveal that air pollution is a leading cause of child mortality in Delhi.
- Groundwater is heavily contaminated with harmful chemicals.
- The Yamuna River, once a lifeline, is now one of the dirtiest rivers.

Why carrying capacity is relevant in Western Himalayan States?

- **Western Himalayan states** – In India, it includes Himachal Pradesh, Uttarakhand and Union Territory of Jammu & Kashmir and Union Territory of Ladakh.
- **Fragility** – The mountainous terrain of the Western Himalayas is inherently fragile, with ecosystems that are *sensitive to changes*.
 - **For instance**, landslides, soil erosion, and deforestation are prevalent issues, emphasizing the vulnerability of these regions to human impact.
- **Marginality** – Inaccessibility in mountain regions limits development and access to essential services, reinforcing fragile ecosystems' low carrying capacity and amplifying the risk of resource overexploitation and ecological degradation
- **Policy issues** – Governments prioritized connectivity and economic growth *without sufficient regard for sustainable practices*, leading to ecological degradation and social inequities.
- Historically, infrastructure development in these regions has taken precedence over ecological considerations.

Himachal Pradesh	It has encountered numerous natural disasters due to reckless development.
Jammu & Kashmir	It has been stunted by socio-political issues.
Uttarakhand	It has experienced repeated catastrophes due to a combination of environmental negligence and rapid urbanization.

What lies ahead?

- Reassess carrying capacity in ecologically sensitive areas can be done.
- Future policies prioritizing ecological balance and community are needed to prevent further disasters.
- Recommendations from expert committees could be acted upon to guide sustainable development.

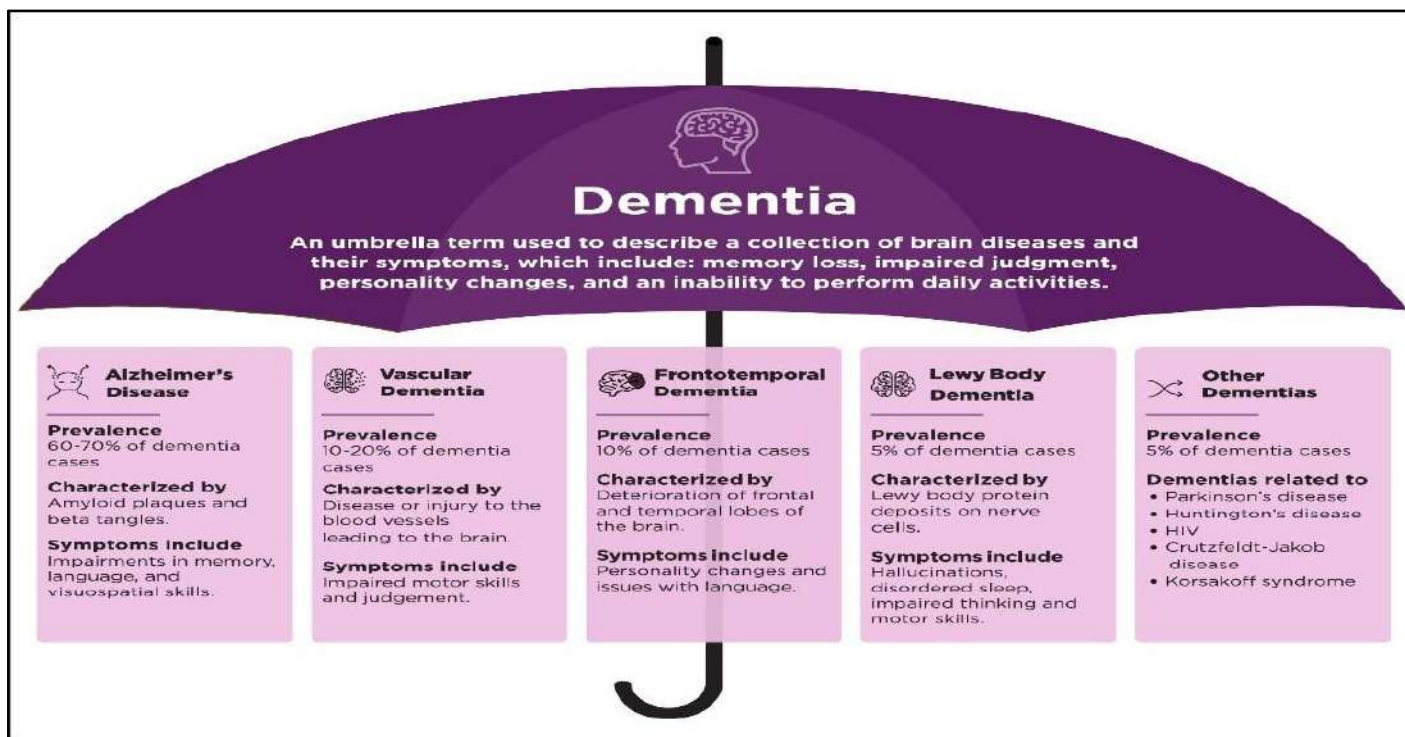
11.2 Air Pollution Causes Dementia

Recently, Cambridge University researchers have found that long-term exposure to air pollution is linked to an increased risk of developing dementia.

What is Dementia?

- **Dementia** – It is a term for several diseases that affect memory, thinking and the ability to perform daily activities.
- **Vulnerable** – It mainly affects older people.
- **Symptoms** – Forgetting recent events and having difficult to recalling familiar persons, names.
- **Conversation** – Difficult to communicate with others.
- **Decision making** – Struggling to make quick decision.
- **Spread** – Around 57 million people had dementia worldwide in 2021, with the number expected to increase to at least 150 million by 2050.
- **Vulnerable** – It mainly *affects older people*.
- **Symptoms** – Forgetting recent events and having difficult to recalling familiar persons, names.
 - **Conversation** – Difficult to communicate with others.
 - **Decision making** – Struggling to make quick decision.

- **Spread** – Around 57 million people had dementia worldwide in 2021, with the number expected to increase to at least 150 million by 2050.



Which air pollutants are related to dementia?

- **Air pollutants** – They are substances present in the air at higher-than-normal levels that may harm living organisms, materials, or the environment.
- They can take the form of solid particles, liquid droplets or gases, and come from both natural and human-made sources.

Primary pollutants	<ul style="list-style-type: none"> • They directly cause air pollution. • Ex: Carbon monoxide (CO), CO₂, Nitrogen dioxide, Sulphur oxides (SO₂), volatile organic compounds & suspended particles.
Secondary pollutants	<ul style="list-style-type: none"> • They are formed due to mixing and reacting with primary pollutants. • Ex: Smog, Ground level Ozone, Acid rains.

- **PM_{2.5} (Fine Particulate Matter)** – PM_{2.5} is extremely fine particulate matter with a diameter of 2.5 micrometers or less.
- They are predominantly produced by vehicle emissions and thermal power plants.
 - **Risks** - Each 10 µg/m³ increase in long-term exposure to PM_{2.5} may raise the risk of dementia by 17%.
- **Nitrogen dioxide (NO₂)** - Produced primarily due to the burning of fossil fuels by vehicles, thermal power plants, and various industrial processes.
 - **Risks** - For Every 10 µg/m³ of long-term exposure to nitrogen dioxide, the relative risk of dementia increased by 3%.
- **Soot or Black Carbon** – Origin from vehicle exhaust emissions and burning wood.
 - **Risks** - 13% increase in dementia risk per 1 µg/m³ of long-term exposure

How air pollutants increase risks of dementia?

- **Neural damage** – It causes *inflammation in the brain* which leads to neural damage.
- **Oxidative stress** – It results in an *imbalance between reactive oxygen species (ROS) and the body's defence* systems.

- **Cell damage** – Excessive ROS can harm brain cells, contributing to the development of neurodegenerative conditions like dementia.
- **Direct Brain damage** – Air pollutants may directly enter the brain, bypass protective barriers and initiating harmful processes.
- **Indirect effects** – Air pollution can also affect brain health through systemic inflammation and pathways shared with heart and lung diseases.

What lies ahead?

- Individual actions and policy changes may reduce exposure to air pollutants.
- An interdisciplinary approach can support better prevention of dementia.
- Urban planning, transport policy, and environmental regulation can play a key role in promoting public health and preventing dementia.

11.3 Groundwater Pollution in India

Recently, the 2024 Annual Groundwater Quality Report by the Central Ground Water Board (CGWB) reveals more than 20% of samples from 440 districts were contaminated with nitrates and identified groundwater death zones.

What is groundwater pollution?

- **Groundwater** – It exists beneath the Earth's surface, filling the spaces within soil and rocks in a saturated zone.
- It's a vital source of freshwater, often accessed through wells and springs.
- **Groundwater pollution** – It is also known as groundwater contamination, occurs when harmful substances contaminate underground water sources.
- **Causes** – This can happen due to natural occurrences or human activities.
- Pollutants can enter groundwater through various pathways, including surface contamination, industrial waste, and agricultural runoff.
- It is largely due to the overuse of chemical fertilisers and leaching from septic systems.
- **Groundwater death zones** – These are areas in groundwater systems where dissolved oxygen levels are significantly depleted, making it difficult or impossible for life to survive.
 - **For example**, In Budhpur, Baghpat (Uttar Pradesh), 13 people died within a fortnight this year, from kidney failure and related complications.
 - It is allegedly linked to toxic discharges from nearby paper and sugar mills contaminating local borewells.

What are the major contaminants and associated diseases?

- **Fluoride** – The 2024 CGWB report found that 9.04% of 15,259 groundwater samples exceeded the WHO's 1.5 mg/L fluoride limit.
- Around 66 million people suffer from skeletal fluorosis caused by fluoride contamination.
 - In Rajasthan, over 11,000 villages have reported cases.
 - In Jhabua (Madhya Pradesh), fluoride levels exceed 5 mg/L, with 40% of tribal children affected.
- **Arsenic** – Its exposure is concentrated in the Gangetic belt—including West Bengal, Bihar, Uttar Pradesh, Jharkhand, and Assam.
- It leads to skin lesions, gangrene, respiratory problems, and various internal cancers.
- Elevated blood arsenic levels make 1 in 100 individuals highly vulnerable to cancer, including cancers of the skin, kidney, liver, bladder, and lungs, as well as other secondary cancer types.
 - In Ballia (U.P.), arsenic concentrations reached 200 µg/L—20 times the WHO limit— linked to over 10,000 cases of cancer and other diseases.

Skeletal fluorosis is a debilitating condition that causes joint pain, bone deformities, and stunted growth, particularly in children.

Gangrene is a serious medical condition where body tissues die due to a lack of blood supply.

- In Bihar's Bhojpur and Buxar districts, similar impacts have been observed.
- While arsenic is geogenic, its mobilisation is worsened by groundwater over-extraction, mining, and irrigation.

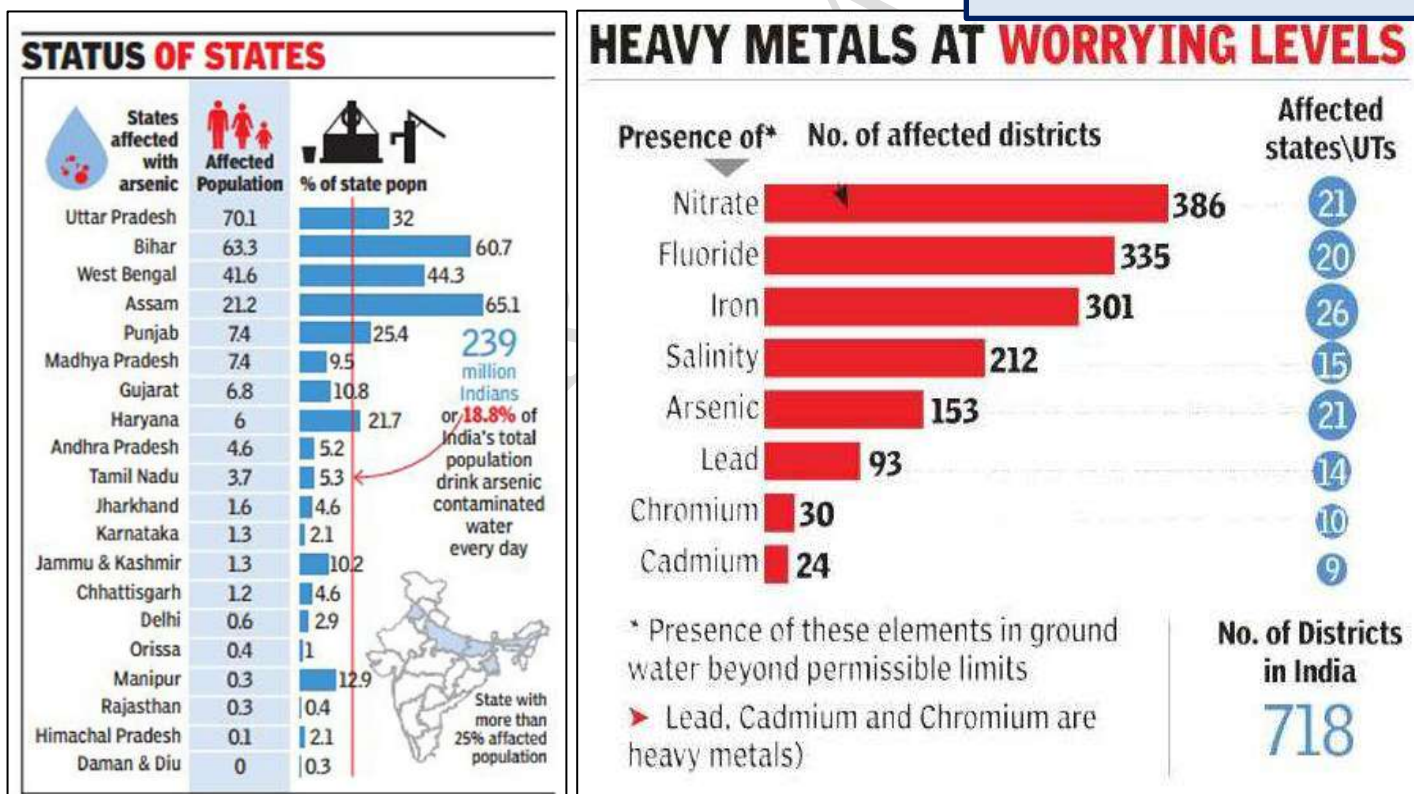
Geogenic refers to something originating in or caused by geological processes, especially those occurring naturally within the Earth.

Nitrate contamination – It is rampant in northern India and poses a severe threat to infants.

Blue baby syndrome, also known as cyanosis or infant methemoglobinemia, is a condition where a new born baby's skin appears bluish due to low oxygen levels in the blood.

- When baby formula is mixed with nitrate-laced water, it can cause blue baby syndrome.
- The 2023 National Health Profile recorded a 28% rise in hospital admissions from acute nitrate toxicity over five years, particularly in Punjab, Haryana, and Karnataka.
- Today, 56% of Indian districts exceed safe nitrate levels.
- **Uranium contamination** – It is increasingly detected due to excessive groundwater extraction and fertiliser use.
- A study by the Central University of Punjab in the Malwa region found increased uranium levels in groundwater.
- It is exceeding the WHO threshold of 30 µg/L, posing serious risks of chronic organ damage and nephrotoxicity.
- The results showed that 66% of samples posed health risks for children and 44% for adults.

Nephrotoxicity refers to kidney damage caused by exposure to toxic substances, including certain medications and chemicals.



- **Heavy metals** – Lead, cadmium, chromium, mercury enter groundwater from unchecked industrial discharges.
- They cause developmental delays, anaemia, immune system issues, and neurological damage.
 - The ICMR-National Institute for Research in Environmental Health (NIREH) found dangerously high blood lead levels among children near industrial clusters in Kanpur (U.P.) and Vapi (Gujarat).
- Contamination from leaking septic systems and sewage infiltration has triggered repeated outbreaks of cholera, dysentery, and hepatitis A and E.

- In Paikarapur, Bhubaneswar, over 500 residents were recently affected by a waterborne disease outbreak tied to sewage-contaminated groundwater.

Why the crisis persists?

- **Ineffective policies** – The Water (Prevention and Control of Pollution) Act, 1974, scarcely addresses groundwater pollution.
- The CGWB lacks statutory authority, and State Pollution Control Boards (SPCBs) are under-resourced and technically constrained.
- **Inadequate industrial regulation** – Industries operate with minimal oversight, and sanitation infrastructure, especially in rural and peri-urban India, remains deficient.
- **Institutional fragmentation** – Agencies such as CGWB, CPCB, SPCBs, and the Ministry of Jal Shakti operate in silos, often duplicating efforts and lacking coordination for integrated, science-based interventions.
- **Weak legal enforcement** – While the Water Act exists, its enforcement on groundwater discharge is inadequate.
- Regulatory loopholes and negligent compliance encourage polluters.
- **Lack of real-time data** – Monitoring is infrequent and poorly disseminated.
- Without early warning systems or integration with public health surveillance, contamination often goes undetected until after serious health outcomes emerge.
- **Over extraction** – Excessive pumping lowers water tables and concentrates pollutants, making aquifers more vulnerable to geogenic toxins and salinity intrusion.

CPCP – Central pollution control board.
SPCB – State pollution control board.

What are the acceptable limits of contaminants?

Indian Bureau of Standards guidelines for contaminants levels in drinking water				
Analyte	Unit	Limits		Health effects
		Acceptable	Permissible*	
Chloride (Cl)	mg/L	250	1000	Eye/nose irritation; stomach discomfort
Fluoride (F)	mg/L	1	1.5	Bone disease; children may get mottled teeth
Iron (Fe)	mg/L	1	None	Anesthetic effect; promotes iron bacteria
Nitrate (NO ₃)	mg/L	45	None	Blue baby syndrome
Arsenic (As)	µg/L	10	No relaxation	Skin damage; increased risk of cancer
Uranium (U)	µg/L	30	No relaxation	Increased risk of cancer; kidney toxicity
Electrical Conductivity (EC)	µS/cm at 25°C	750	3000	Anesthetic effect; cardiovascular complications

What changes to be done?

- **Unified framework** – A National Groundwater Pollution Control Framework can clearly define responsibilities across agencies and empower the CGWB with regulatory authority.
- **Modernized monitoring infrastructure** – Use of real-time sensors, remote sensing, and open-access platforms.
- Integrating water quality data with health surveillance systems like Health Management Information System (HMIS) for early detection.
- **Targeted remediation and health interventions** – Installing community-level arsenic and fluoride removal systems, especially in high-risk regions.
- Expand piped water access and awareness campaigns in water stressed areas.
- **Urban and industrial waste reforms** – Mandating Zero Liquid Discharge (ZLD), regulate landfills strictly, and enforce penalties for illegal discharges.
- **Agrochemical reform** – Promoting organic farming, regulate fertiliser and pesticide use, and encourage balanced nutrient management.

- **Citizen-Centric groundwater governance** – *Strengthening the role of panchayats, water user groups, and school programmes* in water testing, monitoring, and advocacy.

What lies ahead?

- *Effective interventions* could be taken including defluoridation, improved nutrition, and provision of safe drinking water.
- India's groundwater crisis calls for a *bold, coordinated, and multi-dimensional strategy* that integrates regulation, technology, health, and public participation.

11.4 New Rules on Chemically Contaminated Sites

Recently, The Environment Ministry has notified The Environment Protection (Management of Contaminated Sites) Rules, 2025, under the Environment Protection Act that lays out a process for addressing sites with chemical contamination.

What are contaminated sites?

- **Definition** – According to the Central Pollution Control Board, these sites are *where hazardous and other wastes were dumped historically*.
- **Effects** – It has most likely resulted in *contamination of soil, groundwater and surface water that pose a risk to human health* and the environment.
- **Origin and causes** – Some of the sites were developed when there was no regulation on management of hazardous wastes.
- In some instances, polluters responsible for contamination have *either closed down their operations or the cost of remediation is beyond their capacity*.
- **Types** – These may include landfills, dumps, waste storage and treatment sites, spill-sites, and chemical waste handling and storage sites.
- **Number of sites** – There are 103 such sites identified across the country.
- Only in seven sites has remedial operation commenced, which involves cleaning the contaminated soil, groundwater, surface water and sediments by adopting appropriate technologies.

Why were these rules necessary?

- **Background** – The Environment Ministry had, in 2010, initiated a *Capacity Building Program for Industrial Pollution Management Project* to formulate the National Program for Remediation of Polluted Sites.
- This consisted of three broad tasks
 - **Creating an inventory** – Forming a registry of probable contaminated sites.
 - **Evolving a guidance document** – Developing a guidance document for assessment and remediation of contaminated sites.
 - **Development of framework** – To build a legal, institutional and financial framework for the remediation of contaminated sites.
- While the first two steps have been in place, the last step, regarding a legal codification, remained unfulfilled.
- The rules that were made public on July 25 were part of this legal codification process.

What are the process under the new rules?

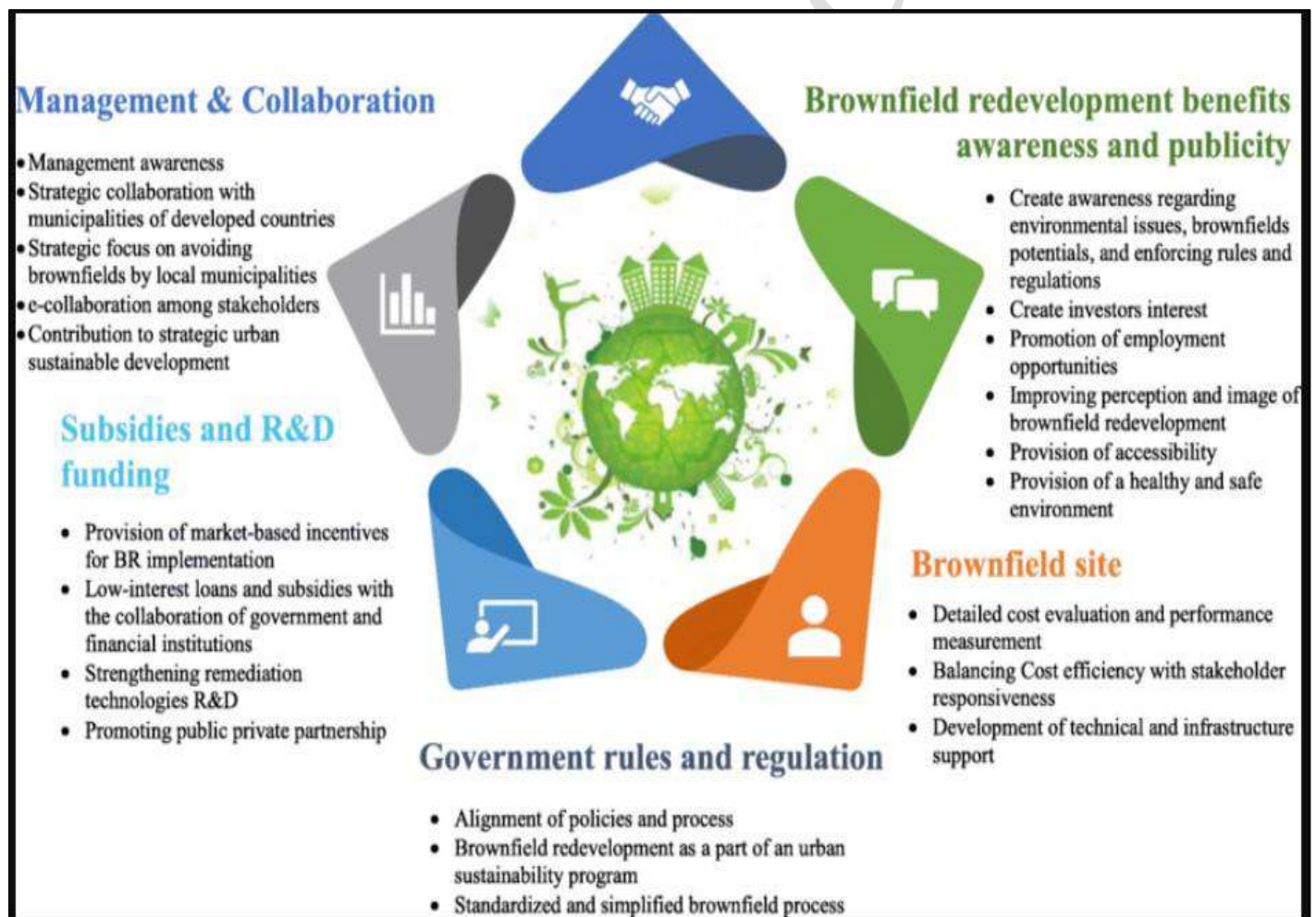
- **Reports** – Under these rules, the district administration would prepare half-yearly reports on suspected contaminated sites.
- **Preliminary assessment** – A State board, or a reference organisation would examine these sites and provide a preliminary assessment within 90 days of being thus informed.
- **Survey** – Following these, it would have another three months to make a detailed survey and finalise if these sites were indeed contaminated.
- This would involve establishing the levels of suspected hazardous chemicals.
 - There are currently *189 marked chemicals* under the provisions of the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016.

- **Restriction** – If these sites exceed safe levels, the location of these sites would be publicised and restrictions placed on accessing it.
- **Remediation plan** – Then, the reference organisation which would basically be a body of experts, would be tasked with specifying a remediation plan.
- **Identification of violators** – The State board would also have 90 days to identify the person(s) responsible for the contamination.
- **Liability for cleaning** – Those deemed responsible would have to pay for the cost of remediation of the site, else the Centre and the State would arrange for the costs of clean-up.
- **Legal action** – Any criminal liability, if it is proved that such contamination caused loss of life or damage would be under the provisions of the Bharatiya Nyaya Sanhita (2023).

What are the exemptions?

- **Exempted sites** - The new rules does not deal with contamination resulting from
 - Radioactive waste
 - Mining operations
 - Pollution of the sea by oil
 - Solid waste from dump sites
- **Lack of timeline** – Another major omission from the rules is the lack of a defined timeline whereby once a contaminated site is identified, a deadline is set by which it must be returned to safe levels.

What could be done to address the chemically contaminated sites?



Brownfield sites are previously developed land that are abandoned or underutilized, often with known or potential contamination from past industrial or commercial use.

11.5 Agricultural Plastic Pollution

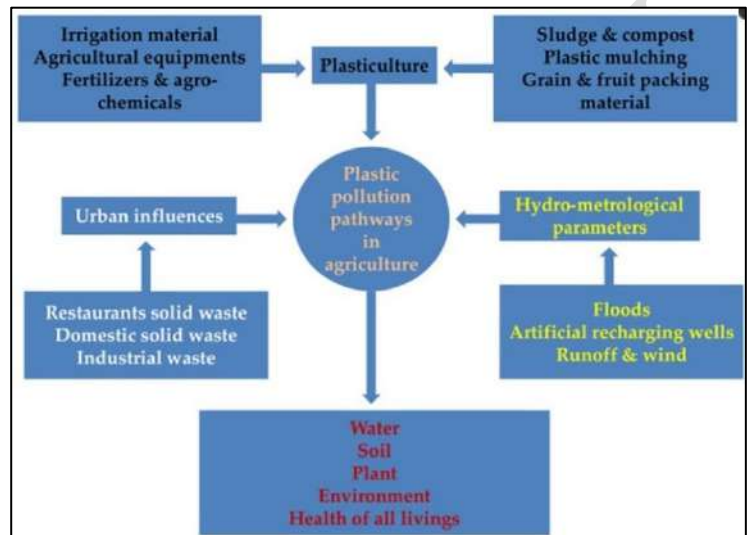
Recently, there has been a considerable increase of plastic sediments in the agricultural soil across Asia.

What is Agricultural plastic pollution?

- **Definition** – Agricultural plastic pollution refers to the accumulation of plastic materials in the environment as a result of agricultural practices.
- **Plastic materials** – This includes plastic waste from various sources like mulch films, irrigation pipes, packaging, and other farming-related items.
- Asia is estimated to be the largest user of Agri-plastics, constituting almost half of global usage, according to the FAO assessment.

How plastic is used in agriculture?

- **Modern agriculture** – Plastic has become an integral component of agriculture and this use is increasing with the intensity of modern commercial agriculture.
- **Diverse applications** – Plastic is now used in mulching, seedling trays, micro-irrigation, pond liners, polyhouses, food storage, packaging, and transportation.
- **Polyethene film** – It could successfully moderate soil temperature, limit weed growth and prevent moisture loss.
- This method was found to increase cotton, maize and wheat yields by an average of 30% at a relatively low cost.
- Polyethene residue is now increasingly prevalent in treated soils at levels of up to 300 kilograms per hectare.
- Just 1 kg of thin mulching sheets is enough to cover and contaminate as much as 700 square feet of agricultural land.
- **FAO report** – In 2021, the Food and Agriculture Organization (FAO) released a landmark report assessing the use of plastics in agriculture.
- The report calculated that, in 2019, agricultural value chains used 12 MT of plastic products in plant and animal products and 37.3 MT in food packaging.



What are the impacts of plastic pollution in agriculture?

- **Harms soil health** – The accumulation of plastic waste in agricultural lands harms soil health, leads to reduced soil fertility.
- **Disrupts ecosystems** – It poses a growing challenge to sustainable farming practices.
- **Hinders air circulation** – Plastic fragments can reduce air circulation and negatively impact microbial communities crucial for soil health.
 - **For example**, Research in Karnataka and Maharashtra on microplastics found evidence of the highest microplastic contamination in soil – 87.57 pieces per kg of soil at a dumpsite in Maharashtra.
- **Adversely affect root biomass** – It affects overall plant growth and can harm soil organisms like earthworms, affecting their feeding and excretion.
- **Inflow into food chain** – Microplastics can be absorbed by plants, potentially entering the food chain and human bodies.

What are the challenges in tackling in plastic pollution?

- **Lack of consideration** – Plastic pollution in agriculture unfortunately lacks the required attention at policy and practice levels and is jeopardising the overall sustainability of farming and ecosystems.
- **Absence of holistic plans** – Farm decisions are dominated by economic productivity of a particular crop season.
- It lacks sufficient holistic, environmental, and long-term perspectives.

- Plastics' increased intensity and spread and lack of systematic disposal and management pose disastrous consequences.
- **Uninformed farmers** – Farming communities are ignorant and uninformed about these consequences.
- **Inadequate attention** – The issue of plastic pollution is overshadowed by urban garbage and pollution of water bodies with no serious action on Agri-plastic.
 - **For example**, some of the recent strategic initiatives like the Maharashtra Plastic Action Roadmap too do not adequately recognise the Agri-plastic issue.
- **Lack of information** – Knowledge and understanding about the damage caused by Agri-plastic pollution is very recent.
- **Lack of recycle facilities** – There is evidence that most plastics are burned, buried, or landfilled, although record keeping is generally non-existent.
- For instance, only nine 9% of plastics produced worldwide are successfully recycled.
- **Absence of waste management system** – A recent sample study reveals that 90% of Indian villages have no waste management systems while 67% of households prefer to burn plastic waste.

How to tackle agriculture plastic pollution?

- **Informed farm decisions** – There is a need to make the farming community understand the disastrous consequences.
- **Research and development** – Science-based guiding frameworks should be provided for the sustainable use and management of plastics in agriculture.
- **Alternative cost-effective solution** – The Indian Council of Agricultural Research and research centres should engage to develop alternate bio-plastic materials and then incentivise those alternative solutions at the farm level to cope with this transition.
- **Ban on single use plastic** – Putting an immediate stop on the use of single use plastics should be carried out.
- **Promoting circular approach** – It is essential to reduce plastic waste generation through prevention, reduction, reuse, and recycling.



- **Enforcing policy framework** - Policy should check production, use and management of Agri-plastic waste.
- **Appropriate strategy** – A time-bound target-oriented strategy backed by a legally binding framework needs to be in place.
- **Legal enforcement** – The legal framework should hold plastic manufacturers responsible for the end-of-life management of their products.
- **Village level climate action plan** – The village climate action plan should be integrated with Agri-plastic waste management, adoption of suitable alternatives, and should also be a part of climate-resilient agriculture.
- **Stringent monitoring** – There should be stronger monitoring to penalise irresponsible dangerous practices like burning, burying, or open dumping of plastic waste.
- **Involvement of public** – Community-led initiative for waste management should be incorporated with the village ADP.
- **Adoption of regenerative farming practices** – Practices like conservation agriculture (e.g., cover cropping) that reduce the need for plastic-intensive methods should be adopted.

- **Promotion of sustainable farming practices** – Practices include vermin-composting, bio-mulching, bio-fertilisers, bio-pesticides and soil and moisture conservation should be encouraged.
- These improve soil health, protect soil carbon and regenerate local biodiversity.
- **Guidelines of FAO** - The FAO carried out studies in 2019 and released the Voluntary Code of Conduct on the Sustainable Use and Management of Plastic in Agriculture in October 2024.

Quick facts

Plastic Production and Pollution

- **First produced** – The first synthetic plastic was produced in 1907.
- By 1950, the world was producing two million tonnes (MT).
- **Yearly production** – It now produces over 450 MT annually.
- **Plastic pollution** – Every year, 19-23 MT of plastic waste leaks into aquatic ecosystems, polluting lakes, rivers, and seas and 13 MT of plastics accumulate in soil.
- Plastic waste is now everywhere, damaging our forests, soil, water, and air.
- Microplastics have entered animals, plants, fruits, and even human bodies.
- A recent study found a litre of bottled water included about 240,000 tiny pieces of plastics.

11.6 GM Crops Adaption and Innovation

Recently US negotiators are turning up the heat, urging India to open its agriculture market to genetically modified (GM) crops.

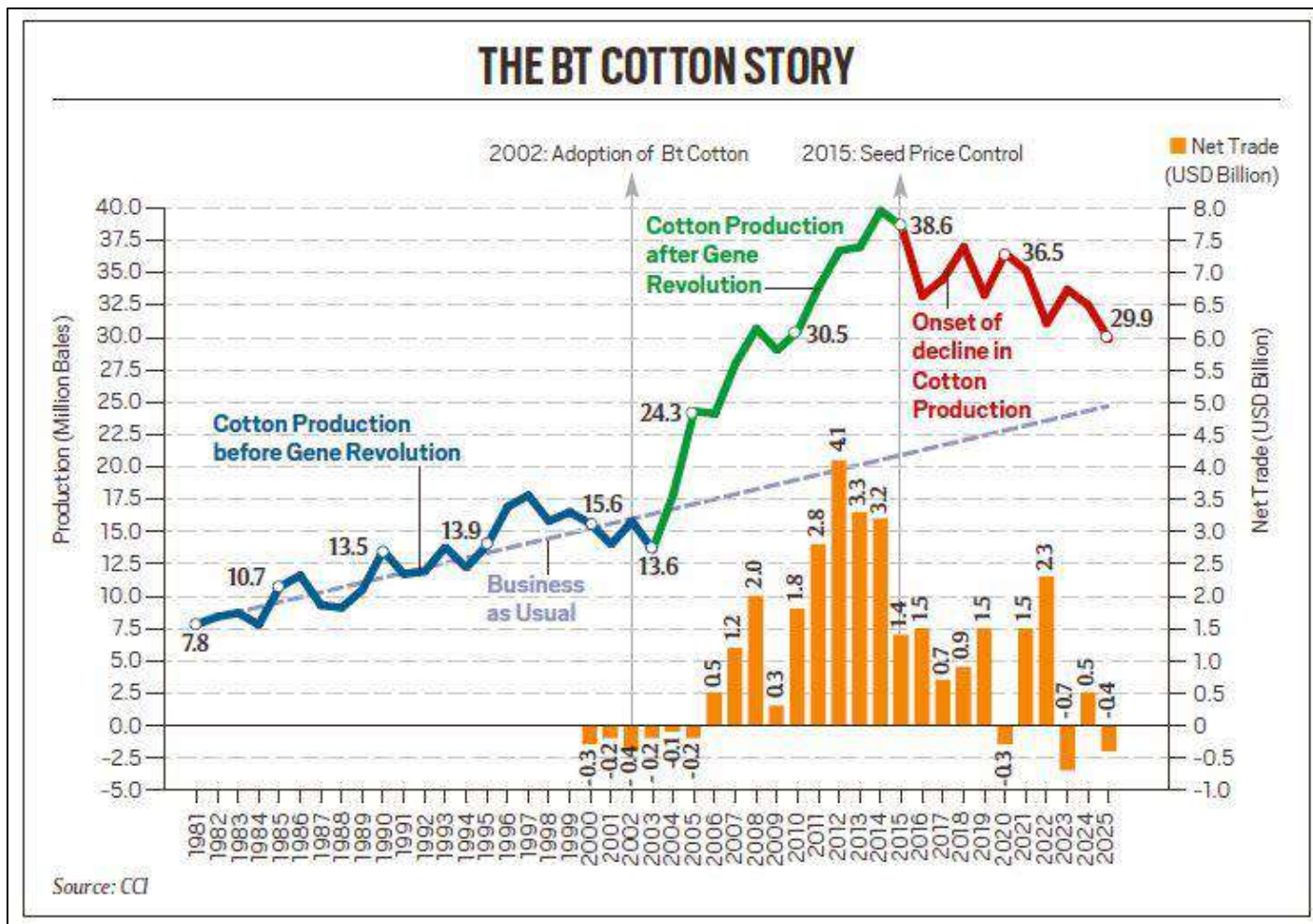
What are GM crops?

- **GM crops** – It means Genetically Modified (GM) crops are plants whose DNA has been altered using genetic engineering techniques for desired traits such as pest resistance or higher yield.
- GM crops very different from traditional crops showcasing significant traits tolerating environment stress.
- **Traits** – GM crops are engineered to withstand harsh environmental conditions such as drought, salinity, and extreme temperatures, enabling them to thrive where traditional crops may fail.
 - **Water Efficiency** – Traits like drought tolerance allow GM crops to use less water, making them ideal for cultivation in water– scarce regions and promoting sustainable agriculture.
 - **Pest Resistance** – GM crops possess built– in resistance to pests, reducing the need for chemical pesticides and minimizing crop losses due to pest attacks.
 - **Herbicide Tolerance** – These crops are designed for herbicide tolerance, enabling farmers to control weeds more effectively and improve overall crop productivity.
- **Need** – Food security is the major concern to be addressed for the sustainability of the growing population in coming future.
- According to the United Nations, the world population is expected to reach the 9th billion mark by 2050.
- **Global usage** – Introduction of GM crops in 1995 also known as the “Gene Revolution” for the improvement of agricultural productivity to effectively address food security issues.
- Globally, GM crops are widely cultivated, with the area planted increasing to a record 209.8 million hectares in 2024.
- The most widely planted GM crops are soybean, maize, and cotton, with herbicide tolerance and insect resistance being the primary traits.
- The USA, Brazil, Argentina, Canada, and India account for the majority of global soybean, maize, and cotton GM crop cultivation.

What is the status of GM crops in India?

- **GM Cotton** – The only GM crop officially approved for commercial cultivation since 2002; widely adopted across India.

- **Trade** – India’s cotton exports increased fivefold, reaching 15.3 lakh tons by 2007 and peaking at 23.7 lakh tons in 2013, making India the world’s largest cotton exporter at the time.
- For the 2024–25 season, exports are estimated at 15–17 lakh bales, a significant decline from 28.36 lakh bales the previous year.



- **Cotton production** – It surged from 13.6 million bales in 2002–03 to 39.8 million bales in 2013–14 – a phenomenal 193 per cent growth.
- **Productivity improvement** – Bt cotton in India have reduced chemical insecticide use by 37%, increased crop yields by 22%, and increased farmer profits by 68%.
- More than 90 per cent of India’s cotton area is under Bt cotton, and its seed is fed to cattle.

*GEAC is a statutory body under the Environment (Protection) Act, 1986, constituted by the Ministry of Environment, Forest, and Climate Change. It is the **apex regulator** for approving the use, release, import, and export of **genetically modified organisms (GMOs)** and products, including GM crops, in India.*

- **GM Mustard** – Approved for "environmental release" by GEAC in 2022 but awaits final clearance for commercial cultivation; faces legal and public resistance.
- **GM Brinjal** – Cleared by GEAC in 2009 but commercial rollout was blocked due to public and scientific concerns; cultivation is on hold.
- **Key challenges** – this include Regulatory delays, India faces lengthy and complex approval processes for GM crops with no new GM cotton hybrids commercialized since 2006.
- **Reliance on outdated technology** – Multi- stage trials, state- level permissions, and frequent court interventions have created a regulatory deadlock, stalled scientific progress and kept farmers reliant on outdated technology.
- **Biosafety concerns** – Persistent environmental and health risk worries often amplified by activist groups have led to moratoriums (e.g., on Bt brinjal) and stricter scrutiny of field trials.
 - These concerns, sometimes lacking scientific consensus, slow the adoption of new GM varieties.

- **Awareness gap** – There is a lack of public understanding and trust in GM technology.
 - Misinformation and insufficient outreach have fueled skepticism among consumers and policymakers, undermining science-based decision making and stalling innovation.
- **Farmer opposition** – Some farmers' groups and affiliated organizations oppose GM crops due to fears of seed dependency, market control by multinationals, and uncertain economic returns.
 - Their lobbying has influenced policy, contributing to delays and resistance at both state and national levels.

How GM Cotton fared in India?

- **Initial success** – Bt cotton was introduced in 2002 to combat bollworm infestations and quickly gained popularity among Indian farmers due to its pest-resistant properties.
- **Positive impact** – The adoption led to higher yields, reduced pesticide use, and increased farmer incomes.
 - Cotton production rose from 13.6 million bales in 2002–03 to 39 million bales in 2013–14, and yields nearly doubled during this period.
- **Negative effects** – Over time, pest resistance developed, with secondary pests emerging and some target pests adapting.
 - Farmers also faced rising seed costs, ecological concerns, and fluctuating profitability.
- **Regulatory hurdles** – Recent years have seen disputes over seed licensing, price controls, and the spread of unapproved HT Bt cotton varieties.
 - These regulatory and legal challenges have slowed innovation and complicated the cotton sector's progress.

How India can reap benefits of GM crops?

- **Robust regulation** – Strengthen biosafety evaluation and monitoring to ensure only safe GM crops are approved.
- **Awareness campaigns** – Promote scientific awareness and education to counter misinformation among farmers and the public.
- **R&D investment** – Increase funding for public-sector research to develop GM crops suited to Indian needs.
- **Transparency measures** – Ensure open data access and involve stakeholders in decisions to build public trust.
- **Controlled rollout** – Implement phased introduction and monitoring with contingency plans to minimize potential risks.

What lies ahead?

- The need of the hour is a strong, science-led political leadership and the future of agriculture belongs to technology adopters and innovators.
- Real progress needs commercial deployment of advanced biotech i.e. Ht Bt cotton, Bt brinjal, GM mustard, and even GM soy and corn.

12. SCIENCE & TECHNOLOGY

12.1 Challenges for Solar Energy Production

Recently, India made a remarkable progress in its clean energy transition by achieving 50% of its installed electricity capacity from non-fossil fuel sources five years ahead of its 2030 target under the Paris Agreement.

What is solar energy?

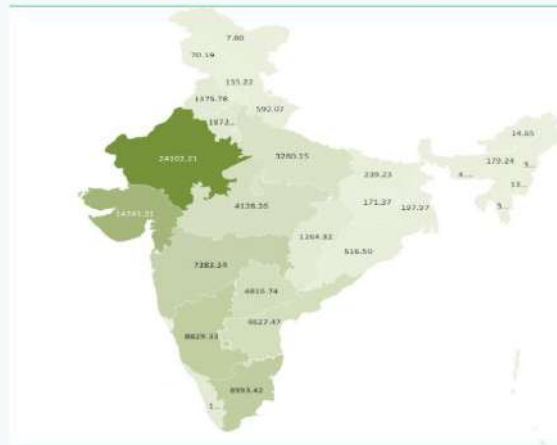
- **Definition** – Solar energy is a renewable and sustainable form of power derived from the radiant energy of the sun.
- **Technology used** – Photovoltaic cells and solar thermal systems.
- **Photovoltaic (pv) cells** – It convert sunlight directly into electricity by utilizing the photoelectric effect.

Solar Power in India

Cumulative : 100.32 GW

- **Ground Mounted Solar Plant** : 76.95GW
- **Grid Connected Solar Rooftop**: 16.28 GW
- **Hybrid Projects(Solar Component)** : 2.85 GW
- **Off-Grid Solar**: 4.25 GW

Map of Indian states with solar capacity.



Source: MINISTRY OF NEW AND RENEWABLE ENERGY

Top states with highest solar power capacity

1	Rajasthan	27,343 MW
2	Gujrat	17,579 MW
3	Tamil Nadu	9,541 MW
4	Maharashtra	9,337 MW
5	Karnataka	9,282 MW

As on Jan 2025.

Western states like Rajasthan, Gujrat and Maharashtra are leading the way in terms of installed solar power capacity.

What are the challenges for India?

- **Dependent on imports** – India depends on imports for nearly 80% of its solar equipment.
- **China's dominance** – India still relies on China for over 50% of its solar cells and modules,
- India also sources from Southeast Asian partners such as Vietnam and Malaysia which also often rely on Chinese raw materials like polysilicon and wafers.
- **Lack of capacity** – It lacks manufacturing strength in components like polysilicon and ingots, and efforts to build local capacity.
- **Insufficient policies** – The Production Linked Incentive (PLI) scheme still heavily rely on Chinese equipment suppliers.
 - One Indian solar company lists all seventeen of its supply chain partners as Chinese firms.
- **Outdated technology** – Indian manufacturers had the capacity to produce only 3 GW of solar cells and 9-10 GW of solar panels, far below the country's needs.
- **High production cost** – India's higher energy costs and lower labour productivity makes solar module manufacturing more expensive in the country.
- **Unintentional consequences** – National Solar Mission accidentally incentivised reliance on cheaper imports over supporting domestic manufacturing.
- **Lack of global support** – Government support manufacturers through the Domestic Content Requirement and safeguard duties.
- But it has faced challenges including World Trade Organization disputes and practical implementation issues, leading to inconsistent support.

How India can diversify its supply chains?

- **Strengthening domestic manufacturing** – India needs to develop an integrated manufacturing supply chain from silica mining to module assembly to achieve true self-reliance.

- **Robust policy support & investment** – Government-assisted projects to source India-made modules, is another vital step.
- These efforts require consistent, long-term planning and sufficient funding, especially for capital-intensive upstream production.
- **Diversifying international cooperation** – India should actively seek collaborations with a variety of partners, such as the United States, European Union, and Japan.
 - **For instance**, the US Development Finance Corporation has already lent nearly \$1 billion for solar cell and module production in India but diplomatic tensions delayed it.
- These partnerships can offer concessional financing, advanced technologies and expertise moving beyond simple reliance on a single source.
 - **For example**, green hydrogen, offshore wind technology can be applied from other nations.
- **Research and development** – Investment in domestic R&D is also vital for technological self-reliance and global competitiveness.
- **Strategic balancing** – The non-aligned foreign policy of India can be leveraged to strategically engage with both the US and China.

What lies ahead?

- Balancing affordability with innovation could be done to serve national interests without succumbing to external pressures.
- More strategic approach could allow India to capitalise on the competitive aspects of US-China climate policies to negotiate mutually beneficial terms.

12.2 Satellite-Based Internet

Recently, Starlink Company has decided to launch the satellite based internet services in India.

What is Internet?

- **Internet** – Sometimes simply called the net, is a worldwide system of interconnected computer networks and electronic devices.
- It is used to communicate with each other using an established set of protocols.
- **Types** – Internet networks can be classified into
 - Ground based network
 - Satellite based network

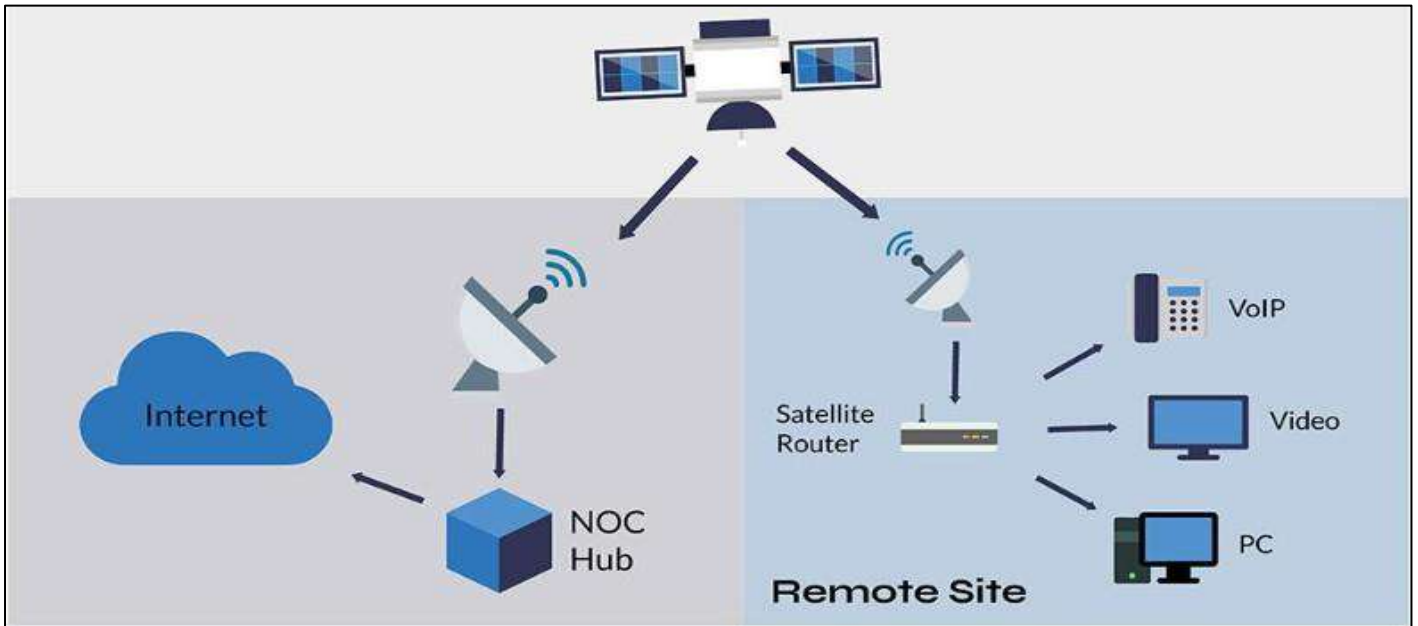


What are Ground-based networks?

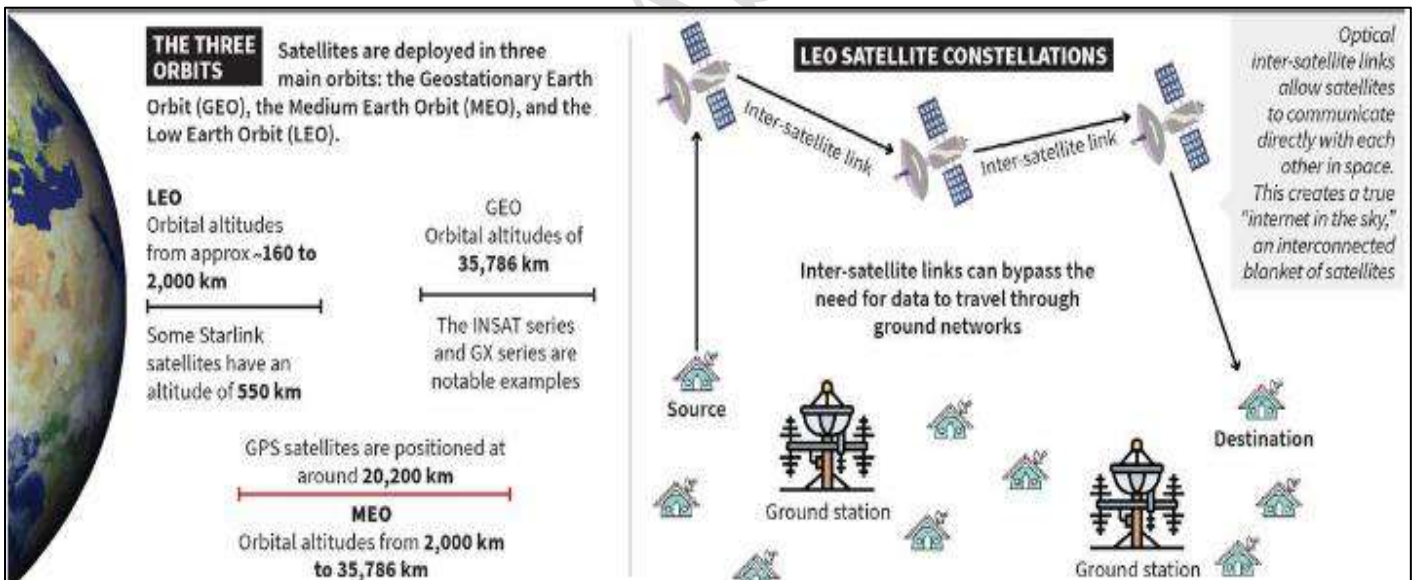
- **Ground-based networks** – They refer to terrestrial communication system that relies on infrastructure like cell towers, fiber optic cables, and other ground-based technologies.
- **Limitations** – They are
 - **Economically unfeasible** – Their reliance on physical infrastructure makes them economically unviable in sparsely populated regions.
 - **Susceptible to disasters** – They are also vulnerable to disruptions from natural disasters such as floods and earthquakes.
 - **For example**, when Hurricane Harvey struck the Texas coast in 2017, it knocked out 70% of cell towers in affected regions.
- **Cannot meet demand** – They often cannot meet the demand for on-the-go connectivity in remote locations or for temporary operations.

What are Satellite based networks?

- **Satellite based networks** – These are communication systems that use satellites orbiting the Earth to transmit and receive data.
- **Working**



- **Two segments** – It is composed of a space segment and a ground segment.
 - The *space segment* consists of the satellites in orbit.
 - *Ground segment* includes all equipment on Earth that communicates with them.
- **Life time** – Service life of 5 to 20 years.
- **Orbits** – Satellites are deployed in three main orbits:
 - The Geostationary Earth Orbit (GEO)
 - The Medium Earth Orbit (MEO)
 - The Low Earth Orbit (LEO).



What are the advantages of satellite based internet over ground based internet?

- **Reduction of user terminals** – This innovation could eliminate the need for separate user terminals altogether.
- **Hardware integration** – As the technology becomes mainstream, specialised hardware may be integrated directly into devices like smartphones and laptops.
- **Wide coverage** – It provides extensive and resilient coverage regardless of terrain or the presence of terrestrial infrastructure.
- **Resilient to disaster** – It can work during extreme weather and other natural disasters.

***User terminal** is the device that is used by an end user to access the services provided by the wireless networks.*

- **For example**, when mobile towers fell during Hurricane Harvey in Texas coast in 2017, Viasat's satellite internet became a lifeline for coordinating rescue operations.
- **Can track multiple users** – It has steerable antennas that can track multiple users and ground stations simultaneously, much like moving spotlights on a stage.
- **Can meet demands** – It can be deployed rapidly to manage sudden demand surges.
- **Can provide temporary connections** – It also provides connectivity within moving platforms like airplanes and remote sites such as offshore oil rigs.
- **Operational readiness** – It also enhances operational readiness in isolated conflict zones.
 - **For example**, the Indian Army's used it on the Siachen Glacier.
- **Future prospects** – Companies like AST SpaceMobile and Starlink are testing direct-to-smartphone services for greater accessibility in future.

What are the applications of satellite-based internet?

- **Communications** – It provides network access to remote areas and enables the Internet of Everything (IoE).
- **Transportation** – It will enhance navigation systems, support self-driving cars, and improve logistics.
- **Disaster management** – In public administration and disaster management, it can power smart cities, provide early warnings, and coordinate rescue efforts.
- **Healthcare** – The healthcare sector can benefit from telemedicine and remote patient monitoring.
- **Farming** – Agriculture can leverage it for precision farming and crop health analysis.
- **Military applications** – It can serve the defence forces in variety of purposes
 - **For example**, In the Russia-Ukraine war, SpaceX's Starlink has been pivotal for Ukrainian defence forces.
- **Other applications** – It also has significant applications in environmental monitoring, energy exploration, tourism, and defence.

Starlink Internet Project

- **Starlink** – It is satellite internet constellation operated by SpaceX.
- It provides high-speed internet to users worldwide, including remote locations, by utilizing a network of low Earth orbit (LEO) satellites.
- **Mega constellation** – These are networks of hundreds or thousands of satellites working in unity.
 - *For example, Starlink has over 7,000 satellites in orbit, with plans for up to 42,000.*
- **Key innovation** – The use of optical inter-satellite links.
- These allow satellites to communicate directly with each other in space.
- This creates a true “internet in the sky,” an interconnected blanket of satellites.
- **Advantages** – The smaller satellites are *capable of on-board signal processing*.
- This on-board intelligence *simplifies the user terminals* on the ground.
- Terminals become *smaller, cheaper, and more accessible* to individual households.
- This network *can route data globally with minimal reliance on ground stations*, reducing latency and increasing efficiency.
- This enhances data *transmission efficiency, improves signal quality*, and allows for greater flexibility.

What are the challenges?

- **Expensive** – The service is still more expensive than terrestrial broadband.
 - **For example**, the terminals cost around \$500, and monthly services start at about \$50.
- **Connectivity challenges** – Maintaining continuous connectivity is a challenge.
 - **For example**, LEO satellites move at nearly 27,000 km per hour. They stay within a user's line of sight for only a few minutes.

- To ensure uninterrupted service, the network must seamlessly “hand-off” the connection from one satellite to the next.
- **Potential for misuse** – Borderless nature facilitates illicit use.
 - **For example**, Security forces in India have confiscated smuggled Starlink devices from insurgent groups and drug rackets.

What lies ahead?

- India could develop comprehensive strategies to integrate the technology into national resilience plans.
- India could also leverage it to bridge the digital divide and foster economic development.

Quick facts

Geostationary Earth Orbit (GEO)

- **Altitude** – They orbit at 35,786 km above the equator.
- They match the Earth’s rotation, allowing them to remain stationary relative to a point on the ground.
- **Advantages** – The high altitude allows a single GEO satellite to cover nearly one-third of the Earth’s surface, except the Polar Regions.
 - For example, *Viasat’s Global Xpress (GX) system*.
- GEO satellites are also typically large.
- They act as “bent-pipes,” simply relaying signals back to Earth without processing them.
- **Drawback** – They have high propagation latency.
- This makes GEO systems unsuitable for time-sensitive applications like video conferencing or real-time transactions.

Viasat, is a global communications company specializing in satellite-based internet and networking systems for both commercial and government sectors.

Latency refers to the delay, or time it takes, for data to travel from one point to another on a network.

The Medium Earth Orbit (MEO)

- **Altitude** – MEO satellites operate at altitudes between 2,000 km and 35,786 km.
- **Advantages** – They offer a compromise between GEO and LEO systems
- Their latency is lower than that of GEO satellites,
- **Drawbacks** – They still require a constellation for global coverage
 - For example, O3b MEO constellation, consists of 20 satellites.
- Their latency is often insufficient for many real-time applications.
- The satellites remain large and costly to launch.

The Low Earth Orbit (LEO)

- **Altitude** – They orbit at altitudes below 2,000 km
- **Advantages** – Their proximity to Earth results in very low latency
- They are also smaller, often table-sized, making them cheaper and quicker to deploy.
- **Drawbacks** – Smaller coverage area.

12.3 Critical Thinking and AI

In the recent trends AI is becoming a common tool in the workplace, but critical thinking remains essential for navigating its impact effectively.

What is an artificial intelligence (AI)?

- **Artificial intelligence** – It refers to the creation of computer systems capable of performing tasks that normally require human intelligence.

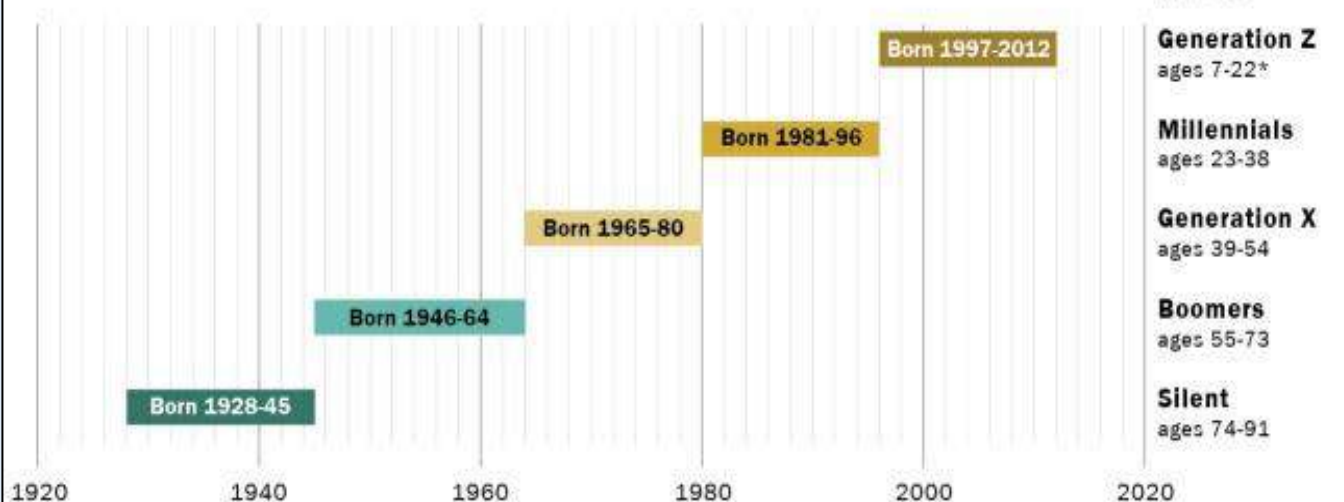
- These tasks include learning, problem-solving, and decision-making.
- AI includes various technologies, such as machine learning and deep learning, which allow machines to analyze data, recognize patterns, and make predictions.
- **AI usage trends** – AI is becoming the quiet companion in everyday business, whether it's summarizing reports, coming up with new content, or automating those dull data entry.
- **Older generation's adaption** – Gen X and Boomers are also starting to utilize AI technologies, although not as quickly.
 - Only approximately 28% of Gen X and 17–22% of Boomers use them every week.
- **Gap between generations** – Young professionals are not just okay with AI, but are also pushing it into the workplace.
 - **Attitudes and purpose** – Younger generations use AI creatively (learning, hobbies, emotional support), while older adults use it mainly for work tasks and are less trusting of AI overall.

Microsoft's 2024 Work Trend Index says that a whopping 75% of Gen Z workers and 68% of Millennials utilize generative AI tools like ChatGPT or Copilot for work every week.

Generational Divisions

- **Generational Divisions** – These allow researchers to examine how today's older adults felt about a given issue when they themselves were young
 - To describe how the trajectory of views might differ across generations.
- Different generational divisions based on time of birth are as follows
 - **Boomers** (1946-1964) characterized by a post-war, economic boom era.
 - **Gen X** (1965-1980) being an "in-between" generation shaped by economic shifts and the rise of technology.
 - **Millennials (Generation Y)** - (1981 and 1996)
 - **Generation Z (Gen Z)** - (mid-1990s to the early 2010s).

The generations defined



To know more about AI, click [here](#)

What is the need of critical thinking in using AI?

- **To do right things** – AI can write emails and do complex math, but it can't check to see whether the data is skewed or the advice is fair.
 - Emphasizing the need of people who can do the right things in a world when AI can do practically everything properly.
- **To develop problem solving skills** – Critical thinking gives people the abilities they need to solve hard issues, make moral choices, and come up with new ideas.

*The World Economic Forum's Future of Jobs Report 2025 says it clearly - **critical thinking** is now one of the three most important talents for the future.*

- **For example**, a supply chain manager who is dealing with a worldwide crisis can use dashboards and AI forecasts to aid, but it's her judgment that analyses options and takes the hard choices.
- Or picture a data scientist that doesn't only praise how accurate an AI model is, but also looks for hidden biases before they make the news.
- **Enhance skill for survival** – It gives people the capacity to tell the difference between what hype is and what's useful.
 - It helps individuals think critically about digital technologies, find areas where they need to learn more, and plan flexible, long-term career trajectories.
- **To combine AI's speed with human judgment** – The IT executive who picks a cloud vendor doesn't only look at performance data, she also looks at hidden expenses and long-term dangers.
 - When a communications officer has to deal with a data breach, they don't merely follow what an algorithm says would "optimize sentiment", but do think about their legal obligation and the public's confidence.
- **To uphold Purpose** – By taking into account legal requirements, brand reputation, and social trust, the experts don't just "use AI" but they guide it with thought and purpose.

What is the role of critical thinking along with AI?

- **Analytical decision making** – A computer could mark a transaction as fake, but a good analyst will question why and figure out what to do next.
 - **For instance**, a diagnostic AI may suggest an illness, but a **doctor must compare the algorithm's** results with the patient's history and the situation in which they live.

Sector	AI Output	Critical Thinking Adds Value
Financial Services	Market Predictions	Identifies overlooked risks and externalities
Healthcare	Diagnostic Suggestions	Balances output with patient context and ethics
Cybersecurity	Threat Alerts	Filters false positives and anticipates hidden vulnerabilities
Product Design	Design Prototypes	Validates usability and social impact
Policy	Regulatory Recommendations	Ensures legal compliance and democratic fairness

- **Keeps creative** – In a society that may become efficient but shallow, it's what keeps creativity alive with new improvements and progress.
 - When AI takes care of the regular tasks, critical thinking gives back the details, the morals, and the excitement of true invention.
- **Making moral choices** – Critical thinking makes sure that judgments are in line with human values, not simply how well they work.
 - This is true whether we are trying to figure out what to do after a data breach or how to balance privacy and surveillance in public policy.

- **Advancing innovation** – Machines can make things better, but only people with inquiry and doubt can challenge the rules themselves.
 - **For example**, a team that questions its go-to-market assumptions might find whole new groups of customers.
 - A data scientist who looks into the training set of an AI model might be able to find and fix a bias before it goes public. Creativity like this grows amid discomfort, and critical thought is its guide.
- **Produce leaders** – A critical thinker doesn't simply learn how to use it, they also study why it important, what dangers it poses, and how it fits into bigger processes.
 - This orientation makes them quick learners, strong leaders, and intelligent team players. It also makes them essential in jobs where nothing is definite.

What lies ahead?

- It's true that too much automated creativity may be scary. When everything works well, it might lose its depth. But critical thinking brings back the depth, richness, and moral imagination that robots can't copy.
 - It tells us that progress needs to be both quick and careful.
- In a future where AI comes first, those who can think critically will be in charge.
 - Not because they know the answer, but because they are brave enough to ask the right question.
- For Gen Z and Millennials, **critical thinking isn't just a talent for their resumes, it's a way to stay alive in their jobs.**

12.4 Need for National Space Law

Recently, The Indian Space Research Organization (ISRO) with the Indian Navy successfully carry out the Well Deck trials of the Gaganyaan missions's crew module at Eastern Naval Command using welldeck ship off the coast of Visakhapatnam.

What is Space law?

- **Definition** – According to United Nations office for outer space affairs (UNOOSA) Space law is a body of law governing activities in outer space.
- This includes the exploration, use, and liability for space objects.
- **Components** – This includes collection of international agreements, treaties, and national laws that aim to ensure responsible and peaceful space activities while fostering international cooperation.
- **UN treaties** – The five primary United Nations treaties on outer space are
 - The Outer Space Treaty (1967)
 - The Rescue Agreement (1968)
 - The Liability Convention (1972)
 - The Registration Convention (1974)
 - The Moon Agreement (1979).
- The core United Nations treaties on outer space provide the foundational principles for all space activities, from the peaceful use of outer space to the responsibility and liability of states.
- **The Outer Space Treaty of 1967** – It establishes that space is the province of all humankind, prohibits national appropriation.
- It places responsibility on states for national activities in space, whether conducted by government or private entities.
- Its companion agreements create binding frameworks of rights, responsibilities, and liability rules.

What is the need for national space law?

- **Provides thrust to space activities** – In the race to explore, innovate, and commercialise outer space, the law is the Launchpad for sustainable, equitable, and safe space activities.

- **Creates an enforceable structure** – Space policy may signal intent but law is what creates an enforceable structure.
- **Ensures compliance** – Policies can guide and inspire but only statutory law can mandate compliance and provide legal certainty.
- **Offers stability** – National space legislation offers predictability, legal clarity, and a stable regulatory environment for both government and private actors.
- **Implements international treaties** – It operationalizes international commitments, enables effective oversight, and embeds sustainability into everyday practice.
- National legislation is the means by which nations can give effect to the international principles domestically.
- **Promotes accountability** – It ensures that the growing space sectors develop in a safe, sustainable, and internationally responsible way.
- **Attracts investments** – The legal clarity fosters investment and innovation for industry.
- **Provides tools** – It offers tools to manage activities responsibly in line with the applicable global framework for regulators
- **Global examples** – Japan, Luxembourg, and the US have enacted frameworks to facilitate licensing, liability coverage, and commercial rights over space activities and resources.
- **Indian scenario** – India has ratified the key UN space treaties but it is still in the process of enacting comprehensive national space legislation that fully operationalises these international commitments.

“A nation with a strong base in science and technology is a nation with a strong backbone” – these words of A.P.J. Abdul Kalam.

What are components of India’s regulatory evolution?

- **India’s approach** – India’s approach to space legislation reflects a methodical, incremental strategy.
- **Two components** – The national space legislation includes two cardinal interdependent aspects
 - Technical regulations
 - Regulatory framework
- **Technical regulations** – It governs space operations in orbit by commercial entities.
- This is the first aspect of authorisation process under Article VI of the Outer Space Treaty.
- The Department of Space is proceeding meticulously in this matter.
- This methodical approach has yielded concrete regulatory developments, including
 - The Catalogue of Standards for the Space Industry which is critical for ensuring the safety of space operations.
 - The Indian Space Policy, providing details of activities that non-governmental entities are encouraged to undertake in 2023.
 - The IN-SPACE Norms Procedure Guidelines (NPG) for Authorisation to implement the Space Policy in 2024.
- NPG for launch vehicles and other aspects will undoubtedly be issued in due course.
- **Regulatory framework (textual part)** – This is the space activities law that will contain provisions of the OST that are meticulously, carefully, appropriately drafted.

IN-SPACE has addressed certain ground segment activities and establishing satellites in orbit.

What are the challenges?

- **Operational challenges** – From the industry’s standpoint, the current regulatory transition creates significant operational challenges.
- **Delay in clearances** – The dual-use nature of space technologies creates particular complications, with companies facing delays from multiple ministry clearances even after provisional approvals.
- **Lack of formal background** – IN-SPACE, which currently operates without formal legal backing, requires clear statutory authority to strengthen its role as the central regulatory body.
- **Absence of political consent** – The risk to the Outer Space Treaty is the absence of political consensus consequent to big power contestations among the three military space super powers.
- **Geopolitical issues** – The greater threats to space governance emerge from international geopolitical tensions rather than national legislative delays.

What are the priorities for the national space law?

- **Statutory authority** – The fundamental priority of the national space law is the setting up of a statutory authority to give a legal backing.
- **Strong regulations** – The national space law should clearly set out licensing rules, qualifications, application processes, timelines, fees, and reasons for acceptance or denial, to avoid unnecessary delays and confusion from multiple ministry approvals.
- **Clear FDI rules** – It includes allowing 100% FDI in satellite component manufacturing under automatic routes, would attract critical capital for startups to scale operations.
- **Vibrant liability frameworks** – While India is ultimately responsible internationally, private companies must hold proper third-party insurance to cover any damages.
- It should create affordable insurance frameworks for startups managing high-value space assets.
- **Transparency** – The law should lay out transparent steps for reporting incidents and handling claims.
- **Protection of innovation** – Legislation should secure intellectual property rights without excessive government control.
- This balanced approach would prevent migration of talent and technologies to more IP-friendly jurisdictions.
- **Encourage partnerships** – It should encourage collaborations among industry, academia, and government, and foster investor trust.
- **Binding safety standards** – There should be a mandatory accident investigation procedures, enforceable space debris management laws.
- It also includes unified frameworks for space-related data and satellite communications, and an independent appellate body to prevent conflicts of interest.

What lies ahead?

- Without statutory backing, IN-SPACE's regulatory decisions remain vulnerable to procedural challenges, creating uncertainty for private players navigating India's growing commercial space ecosystem.
- With the International Astronautical Congress meeting in Sydney this year and potentially in India in the near future, the timing is significant for India.

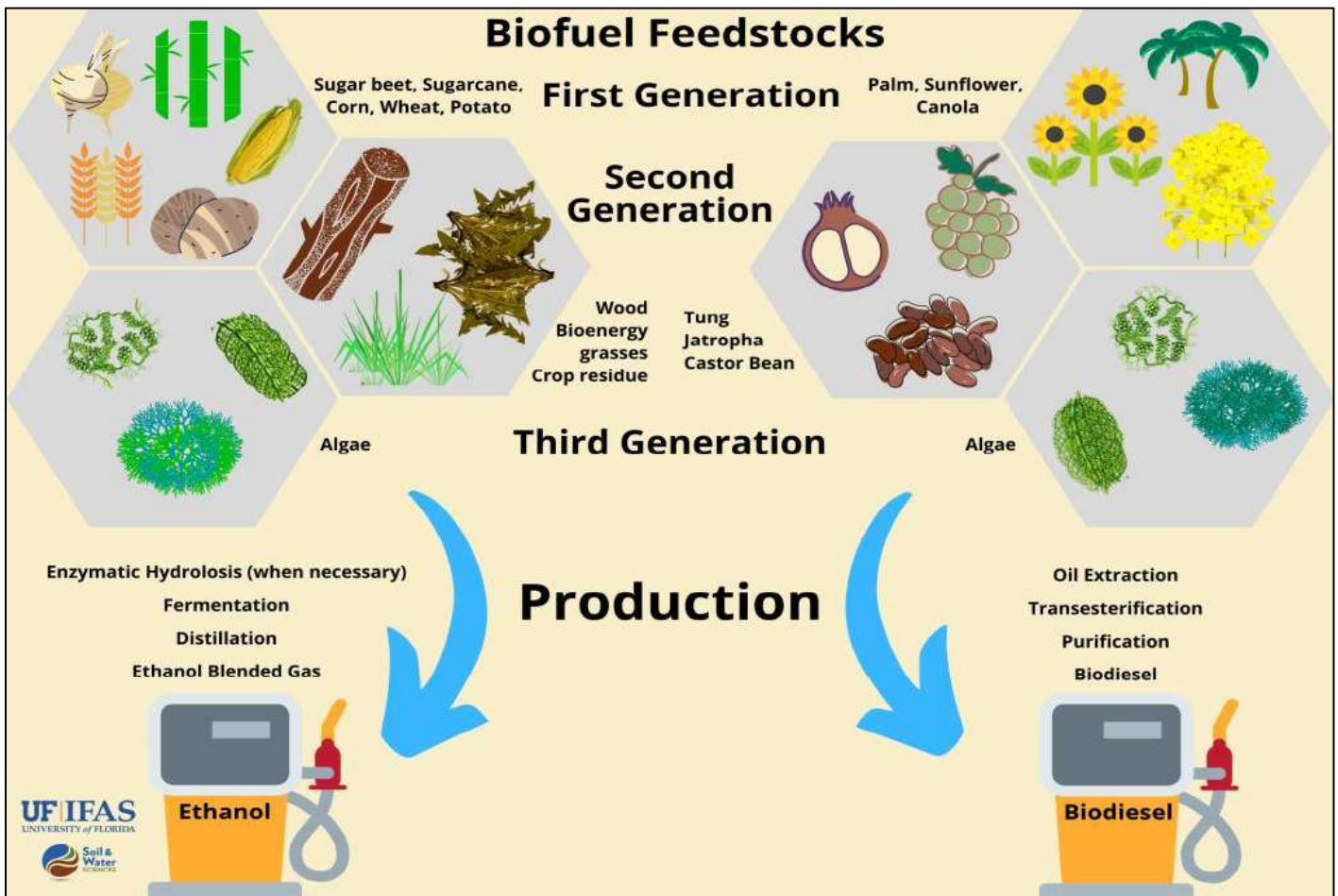
12.5 Biofuels

The recent global shift towards renewable energy sources, Biofuels have emerged as a promising alternative to fossil fuels, leaving the questions about its efficiency in net energy consumption.

What are biofuels?

- **Biofuels** – Fuel produced from organic matter, or biomass which can be used as a replacement for fossil fuels like gasoline and diesel.
- They can be **solid, liquid, or gaseous**, with liquid biofuels like ethanol and biodiesel being the most common.
- They are considered renewable because the biomass used to produce them can be replenished.
- **Types of Biofuels**

Generation	Source	Example
First generation (1G)	Food sources - corn, sugarcane, and vegetable oils.	Bioethanol, biodiesel, biogas
Second generation (2G)	Non-food sources and the waste left from the food resources - Municipal solid waste, wood chips etc.,	Cellulose ethanol, biodiesel
Third generation (3G)	Algae - It consists of 40% of lipids which can be converted to biodiesel or synthetic petroleum.	Butanol, Gasoline, Jet fuel
Fourth generation (4G)	Produced from genetically engineered bio algae.	



- **Ethanol** – A liquid biofuel made by fermenting sugars from crops like corn and sugarcane.
- **Biodiesel** – Another liquid biofuel made from vegetable oils, animal fats, or recycled greases.
- **Production process**
 - *Thermochemical methods* like pyrolysis and gasification, producing fuel materials with low moisture content.
 - *Biochemical method utilize microorganisms* to break down high-moisture organic matter, generating biogas or bioethanol through processes of anaerobic digestion or fermentation.
 - *Agrochemical method* involves conversion of biomass using chemical processes i.e. transesterification to produce fuels like biodiesel from plant oils or animal fats.

How plant waste are turned into fuel?

- **Enzymatic cellulose breakdown** – Cellulase enzymes can break down plant waste into glucose, but slow reactions, instability, and cellulose variability hinder efficiency.
- **Fermentation process** – *Yeast and bacteria ferment sugars* to ethanol, but ethanol above 10% inhibits these microbes, demanding extra purification,
 - Moreover, different microbes leave some sugars unfermented.
- **Process optimization** – *Co-fermentation and immobilized enzymes* optimize sugar conversion, the full process includes biomass selection, pretreatment, saccharification, fermentation, distillation, and by-product recovery.
- **Biochemical engineering** – It now uses immobilized enzymes instead of live microbes, allowing continuous reactions without cell growth.
- This reduces sugar loss and improves biofuel efficiency.

What is the role of biomass in the carbon cycle?

- **Carbon cycle** – The carbon is managed via vital processes like photosynthesis, respiration, feeding, and consumption.

- Each year, about 250 gigatonnes (Gt) of dry organic material circulate through the biosphere, with 100 Gt of this being carbon.
- **Role of photosynthesis** – The carbon fixed during photosynthesis, which annually captures roughly 2×10^{21} Joules of solar energy across the planet, crucial in maintaining the natural carbon cycle.
- **Carbon released from energy** – For over 10 % of the world's energy needs, especially in developing regions, biomass remains the primary energy source, much of which is used directly for heating.
 - This in turn release carbon into the atmosphere
- **Carbon cycle and sustainability** – Biomass energy keeps the carbon cycle balanced, the carbon taken in during photosynthesis is equal to what is released through respiration and decay.
- **Climate impact** – Biofuels recycle existing carbon, fossil fuels add new carbon which increases warming and threatening biodiversity.

Humans directly manage around 0.5 % of global biomass, mostly as food crops.

What are the concerns of the biofuel usage?

- **Food security** – First Generation Biofuels raising concerns about food shortages, particularly for poorer populations.
- **Production constraints** – Ethanol production by microbes requires acidic conditions through either aerobic respiration or anaerobic respiration.

Aerobic Respiration uses oxygen to fully extract energy from glucose, releasing CO₂ and water for cellular work. **Anaerobic Respiration** is faster but less efficient, producing energy-rich byproducts like ethanol and lactic acid.

- **High treatment costs** – Second generation biofuels aim to convert waste biomass into fermentable sugars.
 - Extracting sugar from complex biofibers incurs high costs due to pretreatment processes.
- **Biofuel environmental impact** – Expansion of biofuel requires large quantity of biomass, which in turn changes land use patterns and fertilizer use.
- This excess usage release potent greenhouse gases like nitrous oxide and methane

Sugarcane ethanol reduces greenhouse gas emissions, but most biofuels do not.

- **Societal impacts** – The proposals to clear large swathes of Amazon rainforest for energy crop cultivation requires displacement of indigenous populations
- **Ecological risks** – Worsening of erratic weather and climate patterns due to large scale soil disturbance and deforestation.
- Monoculture farming reduces biodiversity and depletes scarce freshwater resources, posing long-term ecological risks.

Quick Facts

Biofuel-Ethanol

- **Properties** – Azeotropic ethanol contains ~4.4% water and remains liquid from -114°C to 78°C.
- Flash point (lowest temperature at which the vapor above the oil will ignite momentarily when exposed to an ignition source) is 9°C, self-ignites at ~423°C.
- Lower energy density than petrol (24 GJ/m³ vs 39 GJ/m³), but better combustion compensates.
- **Engine compatibility** – 5% ethanol blend works in standard vehicles without tuning (modification).
- E10 and E15 can be used with minor or no engine modifications.
- Ethanol's anti-knock properties improve engine smoothness.
- **Limitations** – Water in ethanol blends dissolves in petrol, causing sludge buildup in tanks and harm to unmodified engines.
- **Ethanol market** – The US leads ethanol production followed by Brazil.
 - US - Mainly corn-based
 - Brazil - Sugarcane-based

- **India** – It had produced over 1 billion gallons in 2022, now *contributing about 5% to global output*.
- The *use of maize for biofuel* has turned India from exporter to net importer of the feed grains.
- Production now allowed from sugarcane, B-molasses, C-molasses, and surplus rice (up to 2.3 million tonnes from FCI).
- It targets 20% ethanol blending, like US, Brazil, and EU.

13. SECURITY

13.1 Assam - Eviction of Illegal Migrants

Recently, Assam government's move to evict encroachers from its forestlands has made other States bordering Assam to take measures to ensure that those evicted from Assam do not cross over.

What is the Physio-geography of Assam?

- It is situated in the northeast of India and largest northeastern states in terms population.

National Borders	International Borders
<ul style="list-style-type: none"> • North - Arunachal Pradesh • East - Nagaland and Manipur • West - West Bengal • South - Tripura, Meghalaya & Mizoram 	<ul style="list-style-type: none"> • North – Bhutan • South - Bangladesh

- **Physiographic division** – Northern Himalayas (Eastern hills), Brahmaputra plains, Deccan plateau (Karbi anglong).
- **Climate** – Tropical monsoon Rainforest climate with high levels of humidity and high rainfall.
- **Major rivers** – Brahmaputra and its tributaries
- **National parks** – Kaziranga, Manas, Dibru - Saikhowa, Nameri, Dehing, Raimona Orang National Park and Tiger Reserve
- **Indigenous tribe** – Bodos, Mishing, Karbhis, Rabhas

What are the reasons for evictions?

- **Background** – It stems from the *encroachment by the 'Bangladeshi', 'Miya', or 'illegal infiltrators'* who are Muslims with roots in present-day Bangladesh.
- They were alleged to have polarized electoral politics in Assam during and after the anti-foreigners Assam Agitation (1979-'85).

The Assam Accord, signed on 15 August 1985 in New Delhi, was a Memorandum of Settlement between the Government of India and leaders of the Assam Movement. A key provision was that foreigners who entered Assam between 1951 and 1961 would be granted full citizenship, including voting rights.

- It led to the signing of an accord prescribing a cut-off date with midnight of March 24, 1971 for the detection, deletion (from electoral rolls), and deportation of "illegal immigrants".
- **Encroachment of religious places** – It is said that 15,288.52 *bighas of satra (Vaishnav monastery)* lands remain illegally occupied by people of doubtful citizenship across 29 districts.
- **Encroachments of forestlands** – Union Environment Ministry's report to the National Green Tribunal stated that 3,620.9 *square kilometers of forest area* in Assam were under encroachment as of March 2024.
- **Encroachment of wetlands** – Houses of 130 families were bulldozed to clear the **Silsako Beel, a major wetland in Guwahati** which was alleged to be encroached in 2022.

How the eviction process is followed?

- Evicting encroachers from forestlands, wetlands, and government revenue lands is not a new phenomenon in Assam.
- **Eviction basis** - The Assam government which came to power in 2016 promised to secure jaati (race), maati (land), and bheti (home).
- Gauhati high Court ordered to reclaim encroached forestlands.
- **Eviction** – The 1st eviction drive was carried out in 3 fringe villages of eastern Assam's Kaziranga National Park in 2016.
- Between 2016 and July 2025, 1,080 families were evicted from 135 hectares of the Paikan Reserve Forest in Assam's Goalpara district.
- The Assam government has vowed to continue the eviction drive until Assam is encroachment-free in “at least 10 years” from 2025.
- **Target sections** – The eviction drives, allegedly targeted at Bengali Muslims, resumed again recently in June 2025.
- The eviction drives have impacted non-Muslims as well.
- **Exception** – Tribal people living in forest areas from before 2005 and covered by the Forest Rights Act would not be touched.
- They also made fast-track resettlement of at least 12 Ahom families who were evicted along with migrant Muslims from village grazing reserves across 4 locations in northeastern Assam's Lakhimpur district.

What are the challenges for neighboring states?

- **Entry of Illegal migrants** – The Assam government eviction drive in Golaghat district's Uriamghat, which borders Nagaland, was seen as an attempt to push illegal Bangladeshi immigrants into ancestral Naga land.
- Before the drive commenced, the police in Nagaland's Niuland district intercepted and turned 200 vehicles carrying illegal migrants
- A coalition of extremist groups announced a task force to guard the Assam-Nagaland border against infiltrators.
- Increase vigilance in bordering Assam to prevent the evicted people from coming in and make the issuance of the inner-line permit.

Inner line permit (ILP) is a concept drawn by colonial rulers it separated the tribal-populated hill areas in the Northeast from the plains. ILP is required for Indian citizens from outside these regions to enter and reside there, regardless of the duration.

- **Cultural clash** – Nagaland, Mizoram, Arunachal Pradesh, and Meghalaya have mostly tribal populations, and the arrival of migrants like Bengali-speaking Muslims or Hindus from Bangladesh is seen as a threat to their identity and population balance.
- **Interstate disputes** – Encroachment is the core of the State's boundary disputes with Arunachal Pradesh, Meghalaya, Mizoram, and Nagaland.
- Four States have been occupying 83,000 hectares of land belonging to the State.
- These States were carved out of Assam between 1963 and 1972.
- **Legal interventions** – Gauhati High Court directed Assam, Arunachal Pradesh, Meghalaya, Mizoram and Nagaland states to constitute a high-level committee to facilitate a coordinated action to clear illegal settlements from forestlands.

What lies ahead?

- Coordinated action among northeastern states can facilitate peaceful resolution of boundary disputes.
- Compliance with environmental and legal norms in eviction drives may reduce judicial intervention and help conserve sensitive ecosystems.
- Transparent and inclusive process can promote social harmony and protect the rights of all affected communities.

13.2 Tackling of Money Laundering

Recently, a report submitted by the Finance Minister in the Rajya Sabha states that Enforcement Case Information Reports (ECIRs) have been issued to initiate proceedings under the Prevention of money laundering act (PMLA) 2002.

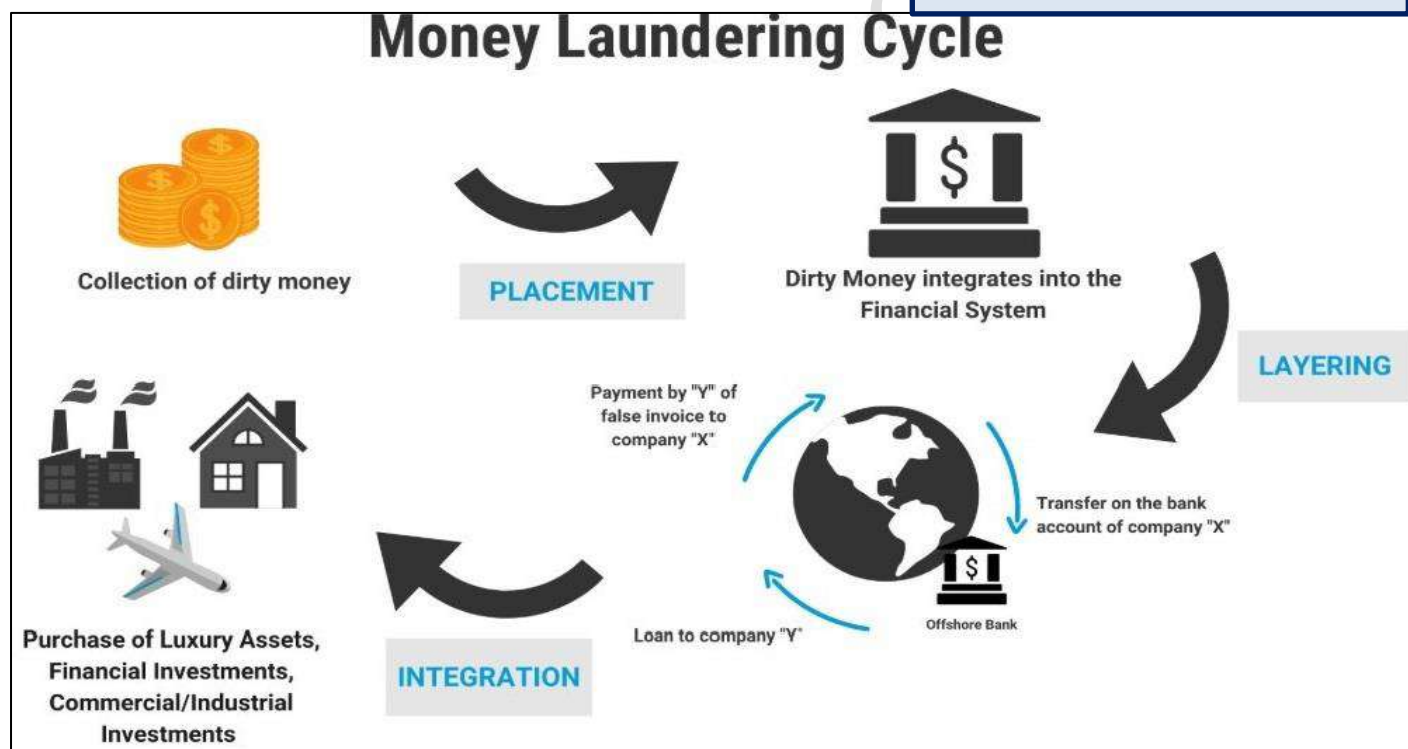
What is Money laundering?

- **Definition** – It is defined under *Section 3 of PMLA*, as an action through which processes or activities connected to the *proceeds of crime are concealed, possessed, acquired, or used and projected as untainted property or claiming to be untainted property.*
- **Origin** – The term money laundering is said to have its origins from the mafia's ownership of *Laundromats in the US* in the 1920's and 1930's for their crimes and under-the-table dealings.
- **Laundromats** – A laundromat is an all-purpose financial vehicle.
- It may be *set up by a bank or any other company* engaged in providing financial services.
- However, it can also help clients launder the proceeds of crime, hide ownership of assets, *embezzle funds from companies, evade taxes or currency restrictions and move money offshore.*
- The term is said to have originated from the use of laundromats by organised crime syndicates in the U.S. as cover

How is money laundered?

- **Placement** – It is the first stage where the launderer introduces money into the financial system which might be done by smurfing.

Smurfing is a process which involves breaking up large amounts of cash into smaller sums.



- **Layering** – Money is shifted to other locations through investments and transactions.
- **Integration** – The laundered money is brought into the financial system through real estate, business or asset formation etc.

What are the effects of money laundering?

- **Affects the sovereignty** – The Supreme Court in *P. Chidambaram versus Enforcement Directorate (2019)* held that money laundering affects the financial system and also the sovereignty and integrity of the nation.
- **Promotes terrorism** – Money laundering is a serious offence as it has a direct linkage with terror activities and is a major source of terror financing.
- **Expands money supply** – This might prove detrimental to monetary stability of the country ultimately impacting inflation.

- **Affects trading** – According to the Financial Action Task Force (FATF), money laundering severely affects both the domestic and international trade.



What are the steps taken by India?

- **Double Taxation Avoidance Agreement (DTAA)** – India has signed this with about 85 countries, which helps to check money laundering.
- These agreements *promote the exchange of financial and tax-related information* between tax authorities of participating countries.
- This facilitates the enforcement of tax regulations and helps prevent illegal activities like tax evasion and money laundering.
- **PMLA, 2002** – The act was enacted to prevent money laundering and to confiscate the property involved or obtained.
- It was enacted in line with the UN Political Declaration and Global Programme of Action (adopted by the UN General Assembly in February 1990).
- The most significant part of the statute is that the burden of proof is on the accused.
- Under the act *Enforcement Case Information Reports (ECIRs)* will be issued to initiate proceedings.

The **burden of proof** in law refers to the responsibility of a party in a legal case to prove their claims.

Enforcement Case Information Reports (ECIRs)

- **ECIR** – It is a document created by the Enforcement Directorate (ED)
- It is similar to a First Information Report (FIR).
- It is considered an internal document and is not mandatorily shared with the accused
- **Aim** – To initiate investigations into suspected money laundering
- **Issues under** – The Prevention of Money Laundering Act (PMLA).
- **Features** – It is sufficient to initiate proceedings
- It has also been reiterated by the Supreme Court in *Vir Bhadra Singh versus ED (2017)*, that no FIR is required to initiate proceedings under the Act.
- The only requirement as per the top court was that a scheduled offence (offence against the state) be essential for the offence of money laundering.

What are the Challenges in tackling money laundering?

- **Increasing cases** – The number of money laundering cases is seriously increasing, questioning the efficacy of the implementation of the law.
- **Abuse of law** – On many occasions, the law has been abused by authority which has been seen and referred to by the Supreme Court as well.
 - **For Instance**, In *Vijay Madanlal Chaudhury versus Union of India (2022)* the Court held that to initiate prosecution under Section 3 of the PMLA, registration as scheduled offence is a pre requisite but for initiating attachment of property under Section 5, there need not be a pre-registered criminal case.
- This view has been very often misused by authorities with politically motivated intentions.
- **Less conviction rate** – The number of convictions vis-a-vis total cases is far from satisfactory.
 - About 5,892 cases were taken up by the Enforcement Directorate (ED) since 2015, only 15 convictions have yet been ordered by special courts.

What lies ahead?

- Authorities *could follow the recommendations of the FATF* and ensure that money laundering cases are handled with care and caution.

- The misuse of law could be checked, and genuine cases reported and investigated properly to enhance the rate of conviction.
- Instead of political motives, the law could be used to address the issues and concerns involved in a sincere manner.

13.3 Illegal Migration & Associated Issues

Recently, The Union Home Ministry in a counter-terror sweep, had directed states to identify and deport illegal migrants, especially those from Bangladesh and Myanmar.

What are the causes for the illegal migration?

- **Illegal migration** – It is cross-border movement without legal authorization, such as entering, residing, or overstaying in a country without valid documents or permits.
- **Compulsion & requirements** – Migrants may be compelled by urgent needs, such as escaping conflict, persecution, disaster, poverty, or family separation, but lack access to legal channels or required documents.
- **Causes** – Economic hardship (poverty, joblessness)
 - Conflict or violence
 - Political instability or persecution
 - Restrictive migration policies
 - Desire for better living conditions or reunification with family.
- **Facilitating factors** – Porous borders and weak enforcement
 - Human smuggling networks or traffickers
 - Lack of legal migration pathways.
- **Risks & challenges** – Exposure to exploitation,
 - unsafe journeys,
 - criminalization and denial of rights or services in host countries.

Illegal migrants are individuals who have entered or remained in a country without the legal authorization or documentation required by that country's immigration laws.

Migration is a natural and necessary phenomenon in a country as diverse and dynamic as India. Article 19 of the Constitution guarantees all citizens the right to move and reside freely within the country.

What are the issues arising with enforcing guidelines?

- **Bypassing fair process** – Language, religion, and citizenship merged and considered as a mere mechanism of exclusion.
 - In this drive across several states such as Haryana, Maharashtra, Chhattisgarh and Delhi, the security imperative has often resulted in forceful deportations of Bengali-speaking Muslims, who are Indian citizens.
- **Targeting of vulnerable communities** – In Gurgaon, blue-collar (manual labour like in construction) workers were rounded up and many allegedly despite official identity documents, and detained.
 - In Delhi's Jai Hind Camp, essential services were cut off to facilitate evictions.
 - In Odisha, over 400 Bengali migrants were detained on suspicion of being illegal Bangladeshis.
- **Weaponization of identity** - The repeated abuse and arbitrary detention of Bengali-speaking citizens undermines the Constitution's promise of equality, dignity, and due process.
- It still reflects a rising impulse toward majoritarian governance is more concerning.

Operation Push back in the early 1990s aimed to deport suspected Bangladeshi migrants. It was disorganized and many were sent back without proper procedures, often ignoring valid ID.

What are the regional responses associated to deportations in India?

- **Assam** – The state has its own history of exclusion is steeped in post-colonial anxieties.

- **Anti-Bengali sentiment** – Assam has roots in the mass migrations following Partition and the formation of Bangladesh in 1971.
- **Bongal Kheda movement** – In the 1960s solidified in the Assam Agitation (1979–1985) and the subsequent Assam Accord sought to protect indigenous identity
 - but it came often at the expense of long-settled Bengali-speaking communities.
- **The 2019 National Register of Citizens (NRC)** – This process is opaque, inconsistent, and flawed by bureaucratic hurdles, exclusion from welfare schemes, and a constant threat of statelessness.
 - Over 19 lakh people were excluded from the final list, most of them Bengali-speaking, and Muslim.
- **Recent move** – Invoking the Immigrants (Expulsion from Assam) Act, 1950 is allowing district collectors to deport individuals labelled as “foreigners” without the oversight of Foreigners Tribunals
- It raised pressing concerns about the erosion of institutional safeguards and the risk of communal profiling that could wrongfully implicate lawful residents alongside the undocumented.
- **West Bengal responses – Politicization issues** Referring to the Election Commission’s plan to implement the Special Intensive Revision (SIR) nationwide, the Cm of West Bengal described the action as discriminatory.
 - West Bengal CM has accused the BJP-led Centre and the EC of attempting to introduce the NRC “through the backdoor” of linguistic profiling and discrimination against minorities from the state.
- **Targeted assaults** – The Chief Minister has described the current spate of detentions in various parts of the country as targeted assault against vulnerable Bengali speakers.
- **Protest** – CM has launched a ***Bhasha Andolan*** (language movement) campaign an emotive issue among the community from Bolpur, the site of Rabindranath Tagore’s Visva Bharati university, this week.
- **Political Landscape Ahead of Elections** – With critical Assembly elections due in both Bengal and Assam next year, the thickening of identity politics can turn into a flashpoint.
 - In 2021, the TMC’s campaign slogan *Bangla nijer meyekei chay* (Bengal wants its own daughter) channeled regional pride in response to the BJP’s aggressive Hindutva push.
- **Rising questions on governance** – Now, amid corruption scandals and a spate of incidents of sexual violence raising questions over governance, the migrant issue has evidently given TMC a new platform.
- It has reoriented its campaign to focus on the rights of Bengali-speaking migrants an estimated 22.5 lakh Bengalis work outside West Bengal.
- **Rising security concerns** – In Pune a mob of around 60-odd people, several of them allegedly belonging to the Bajrang Dal barged into the home of a Kargil War veteran’s relative in Pune
 - They demanded identity proofs from the family, calling them Bangladeshis.
 - The police on site apparently acceded to the demands of the mob, carting the family off to the police station in the dead of the night.

What lies ahead?

- The rhetoric of “infiltrators” and “outsiders” may reap electoral dividends in the short term, but in the long run, it foments division, distrust, and a breakdown of order.
- When a system focuses on citizen vs infiltrator, us vs them i.e. then it erodes the nuanced, layered understanding of what it means to be Indian.
- The warning bells are loud and clear if identity continues to be weaponized, India risks further shrinking its civic space into something narrow, brittle, and unjust.
