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**NOVEMBER 2024**

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News Analysis



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## November 2024

### 1. IMPORTANT TOPICS OF THE MONTH

#### 1.1 Indo-Pacific Economic Framework for Prosperity

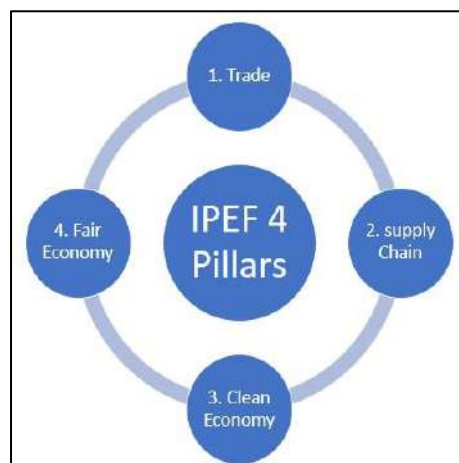
##### Why in News?

Recently India signed the US-led 14-member Indo-Pacific Economic Framework for Prosperity (IPEF) bloc's agreements on a clean and fair economy.

##### What is IPEF?

- **IPEF** - Indo-Pacific Economic Framework for Prosperity was launched jointly by the USA and other partner countries of the Indo-Pacific region on May 23, 2022 at Tokyo.
- **Goal** - It seeks to strengthen economic engagement and cooperation among partner countries for advancing growth, economic stability and prosperity in the region.
- **14 Member Countries** – USA, Australia, Brunei, Fiji, India, Indonesia, Japan, Republic of Korea, Malaysia, New Zealand, Philippines, Singapore, Thailand, Vietnam.
- India had **joined Pillars II, III & IV** of IPEF while it has an **observer status in Pillar-I**.

*IPEF with its 14 partner countries represents 40% of global GDP and 28% of global goods and services trade.*



- **Ministerial-level council and a commission** - Agreement on the Indo-Pacific Economic Framework for Prosperity established a ministerial-level council and a commission.
- **Overarching Agreement** – It is an administrative agreement establishing an oversight Ministerial-level mechanism over the various individual IPEF agreements.
- **Objective** - To facilitate the effective implementation of subject agreements (Pillars II-IV).
- **Funds under IPEF** - IPEF also provides platforms for technical assistance, concessional funding, and viability gap funding.
  - **IPEF Catalytic Capital Fund** - To pool resources and expand the pipeline of bankable climate projects.
  - With an initial grant of USD 33 million from Australia, Japan, Korea, and the United States, it aims to

IPEF Agreements	Date of Entry into Force
Supply Chain Agreement	February 24, 2024
Clean Economy Agreement	October 11, 2024
Fair Economy Agreement	October 12, 2024
Overarching Agreement on IPEF	October 11, 2024

catalyse private investments totalling USD 3.3 billion.

- **PGI Investment Accelerator** - To increase private investment in the Indo-Pacific.
- It has received initial funding of USD 300 million from the United States International Development Finance Corporation
- **Significance of the IPEF** - Inclusive growth, Environmental sustainability, Fair economic competitiveness.
- **Reshape Economic Relations** - The pillars of supply chains, a clean economy, and a fair economy will reshape economic relations in the region.
- **Counter BRI** - At a time when China's Belt and Road Initiative (BRI) is leading to debt traps, the IPEF seeks transparency and open dialogue.

*India's merchandise exports to the U.S. have risen by over 50% (54.4%) from USD 54.3 billion in 2018 to USD 83.8 billion, as reported in 2023.*

Initiatives under IPEF	
<b>IPEF Upskilling Initiative</b>	Providing digital skills training to primarily women and girls in IPEF emerging and middle-income partner countries.
<b>Critical Mineral Dialogue</b>	Strengthening the critical mineral supply chain and ensuring sustainable mining practices in the region.
<b>Tech Council</b>	Coordination and cooperation on key technologies like Cyber Security, Undersea Cables and Artificial Intelligence.
<b>Cooperative Work Program</b>	Facilitate collaborative and cooperative efforts among the interested participating IPEF countries to advance the objectives of the Clean Economy Agreement.

### What is the Pillar II - Supply Chain?

- **Aim of Supply Chain Pillar**
  - Deepening cooperation to build more competitive and resilient supply chains.
  - Better prepare for, prevent, and respond to supply chain disruptions when they happen.
  - Ensure that regional supply chains raise up workers and respect labour rights.
- **Supply Chain Agreement's three bodies**
  - Supply Chain Council
  - Crisis Response Network
  - Labour Rights Advisory Board(LRAB)
- **Benefits** – This pillar helps in supply chain diversification among the member countries.
- **Boosts Domestic Manufacturing** - It supports India's Aatmanirbhar Bharat and Production Linked Incentive (PLI) schemes by mobilizing investments in production, logistics services, and infrastructure.
- **Shift of Production Centers** - The agreement is expected to attract production centers in key goods and critical sectors to India, boosting domestic manufacturing.
- **Global Supply Chain Integration** - The agreement facilitates deeper integration of Indian MSMEs (Micro, Small, and Medium Enterprises) into global supply and value chains.
- **Economic Resilience** - It helps mitigate risks of economic disruptions from supply chain shocks and adverse events, creating a more resilient economic environment.
- **India's Tech Advancement** - Initiative on Critical and Emerging Technologies (iCET)-related sectors such as cyber security & AI, will ensure that India remains at the forefront of technological advances.
- **Workforce Development** - It includes provisions for upskilling and reskilling the workforce, ensuring that Indian workers are well-prepared for the demands of modern supply chains.

*India was elected as **Vice Chair** of the Supply Chain Council with US as Chair.*

### What is the Pillar III – Clean Economy?

- **Aim** - To advance cooperation on research, development, commercialization, availability, accessibility, and deployment of clean energy and climate friendly technologies.

- **Objectives of Agreement on Clean Economy** - Accelerate efforts of IPEF partners towards energy security and transition, climate resilience and adaptation, GHG emissions mitigation.
- **Benefits** - U.S.-India clean energy partnership is vital in helping India achieving net zero carbon emissions by the year 2070.
- **Technical Cooperation** - Collaborate to facilitate development, access, and deployment of clean energy and climate-friendly technologies
- **Capacity Building** - Promote technical cooperation, workforce development, capacity building, and research collaborations.
- **Energy Security** - Find/develop innovative ways of reducing dependence on fossil fuel energy.
- **Financial Opportunities** - Facilitate investments through climate financing and green bonds towards climate-related projects in the region.
- **Domestic Industrial Development** - Investments in renewable energy projects and technology transfers will allow India's industries to integrate more deeply into global value chains.

#### What is the Pillar IV – Fair Economy?

- **Aim** - To create a more transparent and predictable trade and investment environment across the Indo-Pacific.
- **Benefits** - Expand trade, investment ties and ensure the benefits of trade are broadly shared throughout their economies.
- **Mitigate Trade Hurdles** – Reducing trade complexities & barriers, opaque regulatory requirements and tax policies that encourage corrupt behaviour in certain emerging markets.
- **International Financial Cooperation** - It enhances information sharing among partners, facilitating asset recovery and strengthening cross-border investigations and prosecutions.
- **National Security and Economic Integrity** - It helps in addressing issues such as cross-border money laundering and terror financing.
- **Generate Investor Confidence** – Implementation of the agreement creates a reliable trade environment and attracts investments.
- **Strengthening Anti-Corruption Measures** - The agreement focuses on preventing and combating corruption, including bribery and money laundering.
- **Efficient Tax Administration** - The agreement supports initiatives to improve tax transparency and enhance cooperation in tax administration among member countries.

#### What lies ahead?

- IPEF represents more than a series of trade and investment agreements and is a strategic effort to cement partnerships in the region.
- Revival of Generalized System of Preferences (GSP) of US will boost trade with US.
- Generalized System of Preferences (GSP) facilitated duty-free access to more mature markets and it was withdrawn in 2019.
- Building consensus along the lines of QUAD to address geopolitical turbulence, and global economic uncertainty.
- Enhancing information sharing among partners, facilitating asset recovery and strengthening cross-border investigations and prosecutions.
- Utilize member' strengths like technological advancements, investment capacity, market potential, requisite resources including skilled workforce.
- Develop domestic standards quickly to avoid being at a disadvantage in international negotiations on standards.

## 1.2 Taking Stock of International Solar Alliance

### Why in News?

The 7th Session of the International Solar Alliance (ISA) was held in New Delhi from November 3 to 6, 2024.

### What are the initiatives launched in the 7th Session?

- **International Solar Alliance** – It is a global initiative launched in 2015 by India and France at the COP21 summit in Paris.



- The founding conference ISA was held on March 11, 2018, in India marked a significant step in mobilizing international efforts toward solar deployment.
- **Objective** - To promote solar energy as a sustainable solution for energy access and climate change.
  - **Towards 1000 strategy** - To unlock **US\$1 trillion** in solar investments by 2030.
  - To provide energy access to 1 billion people and install **1,000 GW** of solar energy capacity.

Achieving these targets would significantly mitigate global carbon emissions, **reducing 1,000 million tonnes of CO<sub>2</sub> annually.**

Initially focused on developing countries, the **ISA's Framework Agreement** was amended in 2020 to allow all United Nations member states to join.

- **Members** - **120 signatories**, including **102 fully ratified member countries.**

- **Approach**

- Analytics & Advocacy Capacity Building
- Programmatic Support

- **Headquarters** – New Delhi, India.

- ISA is the first international organization established in the country.

- **Four Regional Groups**

- Africa
- Asia and the Pacific
- Europe and Others
- Latin America and the Caribbean

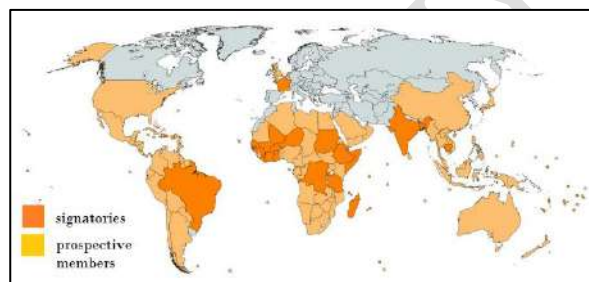
- **Annual Meet** - The Assembly meets annually at the ISA's headquarters to assess the impact of programs and activities.

- **ISA & SDG** - The ISA aims to achieve the Sustainable Development Goals, especially in the areas of affordable and clean energy (**SDG 7**) and climate action (**SDG 13**).

- **Focus of 7th Session** - Accelerating solar energy deployment across its Member Countries, particularly in regions with limited energy access.

- **Elections**

- **Presidency** - India
- **Co Presidency** – France
- **Vice Presidents**
  - Africa region: Ghana and Seychelles
  - Asia and the Pacific region: Australia and Sri Lanka
  - Europe and Others region: Germany and Italy
  - Latin America and the Caribbean region: Grenada and Suriname



- The seventh session of the ISA Assembly elected Mr. Ashish Khanna from India as its third Director General.

- **3<sup>rd</sup> edition of the World Solar Report series**

- World Solar Market Report
- World Investment Report
- World Technology Report
- Green Hydrogen Readiness Assessment for African Countries.

### What are the significances of ISA?

- India plays a pivotal role in shaping ISA's initiatives and fostering international cooperation.
- **Multilateralism** - ISA reflects India's commitment to multilateralism.

- **Solar Facilitator** - ISA help countries overcome financial, technological, regulatory, or other barriers in harnessing solar energy.
- **Carbon-neutral future** – By reducing carbon emissions and promote sustainable development, it helps India achieve its Panchamrit targets.
- **Advancing global solar cooperation** - ISA provides policy support, technology capacity building, investment facilitation to smaller countries.
- **Enhancing energy security** - By leveraging international cooperation and innovative solutions, the ISA is set to make significant strides toward achieving global climate goals and ensuring energy for all.
- **Clean energy transition** - Promoting solar energy across sectors such as agriculture, health, transport, and power generation.
- **Strategic Tool** - It is an important part of India’s outreach to the Global South, particularly to countries in Africa.

### What are the challenges with ISA?

ISA Initiatives	
<b>SolarX Start-up Challenge</b>	It was introduced at COP27 (2022) to support innovative solar businesses in ISA Member Countries.
<b>STAR-C Initiative</b>	To strengthen solar technology skills in developing economies.
<b>Global Solar Facility</b>	To catalyse investment in underserved regions, particularly Africa.
<b>Viability Gap Funding Scheme</b>	To provide grants to solar projects in Least Developed Countries and Small Island Developing States, easing financial barriers.
<b>Solar Data Portal</b>	It offers real- time data to inform investment decisions.
<b>International Solar Festival</b>	To foster global collaboration on solar solutions.
<b>Green Hydrogen Innovation Centre</b>	To explore synergies between solar energy and hydrogen.
<b>ISA Knowledge Series and World Solar Reports</b>	To promote research, insights, and market trends, positioning ISA as a leading advocate for solar energy worldwide.

- **Slow deployment of solar energy** - Despite 9 years of existence, no ISA-facilitated solar power project has been started operations.
- The first ISA project is expected to be in Cuba where auctions have taken place and a developer has been selected to set up a 60 MW plant.
- **Entry Barriers** - Smaller developing countries, particularly in Africa do not have prior experience of executing large power projects.
- **Dominance of China in Solar Products** - Over 80% of the solar products manufacturing is concentrated in China, which is seen as another barrier to quick spread of solar energy in smaller markets
- **Less investments in Africa** - Less than 2 per cent of new additions are happening in Africa, a region that houses about 80% of the nearly 745 million people who still do not have access to electricity.
- **Inadequate global participation** - ISA is still largely viewed as an Indian initiative and it is almost entirely funded by India.
- **Underutilization** - ISA offices have been under-staffed and under-funded, and conflict with Ministry of New and Renewable Energy.
- **Inadequate Inspiration** – Failure to create excitement about solar energy in countries that are in desperate need of access to cheap and reliable energy source.

### What lies ahead?

- Rotate the presidency of ISA among other countries to encourage their participation and contribution.



- Expedite the operation of ISA funded projects to inspire members to take actively participate.

### India's Solar Sector

- India **ranks 5<sup>th</sup>** globally in solar power capacity.
- **India's installed solar capacity** - 90.76 GW (As of September 2024)
- It has been increased 30-fold over the past 9 years.
- **India's solar potential** - 748 GW (National Institute of Solar Energy estimate).
- **Five Panchamrit targets**
  - India will reach its non-fossil energy capacity to 500 GW by 2030.
  - India will meet 50 percent of its energy requirements from renewable energy by 2030.
  - India will reduce the total projected carbon emissions by one billion tonnes from now onwards till 2030.
  - By 2030, India will reduce the carbon intensity of its economy by less than 45 percent.
  - By the year 2070, India will achieve the target of Net Zero.
- **India's Progress**
  - 46.3% of the country's total energy capacity now comes from non-fossil sources.

**Government Initiatives**

**PM Surya Ghar Muft Bijlee Yojana**

This scheme offers free electricity (up to 300 units/month) to 1 crore households in India that install rooftop solar units. It promotes renewable energy and reduces electricity costs.

Free Electricity:	Up to 300 units/month for eligible households
Financing:	Low-interest loans for installation.
Annual Savings:	₹15,000 for 300 units/month.
Outlay:	₹75,021 Crore.

**PM-KUSUM**

Aimed at boosting solar power in agriculture, this scheme targets 34.8 GW capacity by 2026. It focuses on reducing diesel use, increasing farmer income, and reducing pollution.

**Components:**

- A: 10,000 MW solar plants.
- B: 1.4 million stand-alone solar pumps.
- C: 3.5 million grid-connected pumps.

Subsidy:	30% (50% in select areas).
Target:	34.8 GW by March 2026.

**Solar Parks**

Launched in 2014, this scheme establishes large solar parks (500 MW+) to streamline solar power generation by providing necessary infrastructure.

Capacity Target:	40,000 MW by 2025-26.
Infrastructure:	Transmission lines, water access, etc.
Collaboration:	State and private sector partnerships.

### 1.3 Groundwater Depletion

#### Why in news?

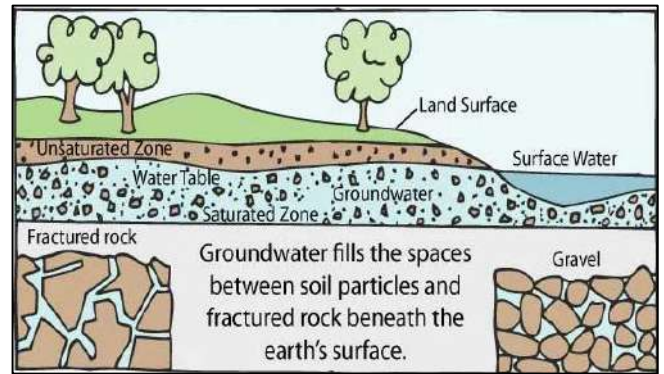
A recent study shows significant groundwater depletion in five Indian states.

#### What is groundwater?

- **Groundwater** – It is the water found underground in the cracks and spaces in soil, sand and rock.
- It is stored in and moves slowly through geologic formations of soil, sand and rocks called aquifers.
- **Aquifers** – They are typically made up of gravel, sand, sandstone, or fractured rock, like limestone.
- Water can move through these materials because they have large connected spaces that make them permeable.
- **Saturation zone** – The area where water fills the aquifer is called the saturated zone (or saturation zone).
- **Water table** - The top of the saturation zone is called the water table.
- It may be located only a foot below the ground's surface or it can sit hundreds of feet down.
- It may be deep or shallow that may rise or fall on basis of many factors.
- **Speed of groundwater flows** – It depends on the size of the spaces in the soil or rock and how well the spaces are connected.



- **Groundwater recharge** – They are recharged by rain and snow melt that seeps down into the cracks and crevices beneath the land's surface.
- 'Groundwater' is often referred to as the hidden lifeblood of our planet, essential for sustaining agriculture, industry, and communities.
- **Groundwater depletion** – It occurs when groundwater is extracted faster than it can be replenished.
  - Groundwater, constituting 62% of irrigation and 85% of rural water supply.



### What are the key drivers of groundwater depletion?

- **Agricultural exploitation** – It dominates groundwater consumption, especially with high water-demand crops like paddy & sugarcane.
- Farmers continue to favour these crops for financial returns, even in arid regions, leading to excessive extraction.
  - In regions like Punjab and Haryana, traditional agricultural practices remain highly dependent on groundwater.
- **Energy subsidies** - Power subsidies in agriculture have *incentivized unregulated pumping*, adding to groundwater depletion.
- **Green revolution legacy** – *High-yield crops* introduced during the green revolution remain prevalent, adding pressure to already vulnerable regions.
- **Unregulated industrial use** – Rapid industrialization has led to unmonitored groundwater extraction across all affected states.
- Industries often have high water demands, especially those involved in manufacturing, textile processing, and other water-intensive sectors.
- **Population growth** – As population grows, they require substantial amounts of water for drinking, sanitation, and other domestic uses.
- **Rapid urbanization** – The rapid pace of urbanization has also strained groundwater resources.
  - The level of urbanization between 2001 and 2011 increased by 10 per cent, from 10 to 20%.
- **Encroachments over natural recharge zones** – It seals off areas where rainwater could previously seep into the ground and replenish aquifers.
- **Widespread use of bore wells** – Contributes to rapid extraction, often outpacing natural recharge rates.
- **Groundwater contamination** – Contaminants such as arsenic, nitrate, fluoride, and salinity compromise groundwater quality.
  - Pollution from fertilizers, industrial waste, and poor waste management has impacted nearly 60% of Indian districts.
- **Weak regulation** - With insufficient policies governing groundwater usage, both urban and rural areas face unchecked extraction.
- The lack of stringent regulations on private groundwater ownership has further deepened the crisis.

### Status of Groundwater Depletion in India

- India, home to 16% of the global population but with just 4% of the world's freshwater.
- According to the Central Groundwater Board, **17% of India's groundwater blocks are classified as over-exploited**, with extraction far exceeding natural recharge rates- a situation worsened by climate change and pollution.
- A drop in net annual groundwater availability between 2004-05 and 2018-19 by 4%.
- **Hotspot categorization** – The study raises serious concerns for five hotspots with the northern and northwestern hotspots have suffered a staggering loss of approximately 64.6 billion cubic meters of water over the past two decades.

Hotspot	State	Decline in net annual groundwater availability (2004- 2018)
I	Punjab & Haryana	4 %
II	Uttar Pradesh	4 %
III	West Bengal	3 %
IV	Chhattisgarh	4 %
V	Kerala	17 %

### What are its impacts?

- **Water scarcity** – It reduces water availability thereby impacting sustenance of living organisms.
- **Public health issues** - People may turn to unsafe sources, risking exposure to contaminants like arsenic.
- **Food insecurity** - Overexploitation of groundwater resources has led to large-scale depletion in key food producing countries, cascading impacts for global food security.
- **Impact on livelihood** - Marginalized section of people who cannot afford alternative water sources will have impact on their incomes.
- **Ecosystem damage** – It affects vegetation, wildlife, and wetland habitats that depend on consistent water levels.
- **Biodiversity crisis** – It leads to reduction in biodiversity, impacting flora and fauna and threatening overall ecological balance.

Social Impacts	Ecological Impacts
<ul style="list-style-type: none"> <li>• Water Scarcity</li> <li>• Food Insecurity</li> <li>• Public Health Crisis</li> <li>• Livelihood Challenges</li> </ul>	<ul style="list-style-type: none"> <li>• Damages Habitat</li> <li>• Reduced Productivity</li> <li>• Reduced Biodiversity</li> <li>• Ecosystem Damages</li> </ul>

### Groundwater Contaminants and their Impacts

- **Nitrates from fertilizers and sewage** – They contribute to health risks like methemoglobinemia.
- **Pathogens from poor sanitation** – They lead to waterborne diseases.
- **Trace Metals from industrial activities** – They pose carcinogenic risks.
- **Inorganic Compounds** – They degrade water quality, affecting human health and water hardness.
- **Organic Compounds from pesticides and industrial discharges** – They harm ecosystems and health.

### What are the government measures?

- **Statutory measures** – The *Water (Prevention and Control of Pollution) Act 1974* aims to provide for the prevention and control of water pollution, and for the maintaining or restoring of wholesomeness of water in the country.
- **Policy measures** - *National Water Policy (2012)* promotes efficient water use across all sectors.
- **Institutional measures** - *Bureau of Water Use Efficiency (BWUE)* formed under the National Water Mission develops standards for water-efficient products and practices.
- *Central Ground Water Authority (CGWA)* regulates large-scale groundwater extraction.
- **Water management initiatives** - *Jal Shakti Abhiyan (JSA)* focuses on rainwater harvesting and groundwater recharge under [Catch the Rain initiative](#).
- [Amrit Sarovar Mission](#) aims to rejuvenate and develop 75 water bodies in each district of the countries.
- Mahatma Gandhi National Rural Employment Guarantee Scheme (*MGNREGS*) focuses on building water conservation and water harvesting structures.
- Atal Mission for Rejuvenation and Urban Transformation ([AMRUT](#)) 2.0 uses ‘Aquifer Management Plan’ harvesting the rainwater through storm water drains into water body.

- [Atal Bhujal Yojana](#), a community-led scheme focuses on sustainable groundwater management in 80 water-stressed districts of 7 States, viz., Haryana, Gujarat, Karnataka, Madhya Pradesh, Maharashtra, Rajasthan and Uttar Pradesh.
  - The scheme incentivizes states to adopt water-efficient agricultural practices.
- *National Aquifer Mapping and Management (NAQUIM)* to delineate the aquifers, characterize them and prepare management plans.
- Watershed Development Component under Pradhan Mantri Krishi Sinchai Yojana (WDC-PMKSY) for the development of rain fed and degraded lands in the country.

#### What lies ahead?

- Strengthen groundwater regulations.
- Promote sustainable agricultural practices.
- Promote less water-intensive crops.
- Implement efficient irrigation techniques, such as drip and sprinkler systems.
- Invest in water infrastructure.
- Decentralize groundwater management.
- Encouraging Blue Credit schemes for encouraging water conservation efforts in both domestic and industrial sectors.
- Encourage community-based water management initiatives to promote sustainable water usage at the local level.
- Restore wetlands and urban recharge zones in urban areas.

### 1.4 Gender Mainstreaming

#### Why in news?

Recently, a two-day National Consultation on Revisiting and Re-envisioning the Beijing Declaration was organized by National Alliance for Women's Organization to review and revive the struggle.

#### What is gender mainstreaming?

- **Gender mainstreaming** – It means integrating a gender equality perspective when designing, implementing and evaluating policies, programmes and projects.
- **Origin** – The concept of gender mainstreaming was first introduced at the [1985 Nairobi World Conference on Women](#).
- **Strategy for gender equality** – Gender mainstreaming was established as a strategy in international gender equality policy through the Beijing Platform for Action.
- **Key principles of gender mainstreaming**
  - **Inclusive analysis** - Understanding how policies and programs impact women and men differently, and incorporating these insights into decision-making processes.
  - **Equal participation** - Ensuring that both women and men have equal opportunities to participate in and benefit from development efforts and policymaking.
  - **Eliminating gender bias** - Identifying and addressing systemic gender biases and inequalities in institutions, practices, and norms.
  - **Empowerment** - Promoting women's empowerment and leadership in all spheres of life, including social, economic, and political domains.
  - **Accountability** - Holding institutions and stakeholders accountable for achieving gender equality goals.

*Beijing Platform for Action was adopted at the 1995 Fourth United Nations World Conference on Women in Beijing.*

*SDG goal 5 aims to achieve gender equality and empower all women and girls.*

#### How has women rights and gender mainstreaming evolved?

- **Seneca Falls Convention** - The **1848** Seneca Falls Convention was a historic women's rights meeting in New York where the "[Declaration of Sentiments](#)" was adopted.



- The declaration held “that all men and women are created equal”.
- **Suffrage movement** - The Suffragette movement of the 19th and 20th century was a long-drawn fight by women globally to gain their right to vote.
- **The Second sex (1949)** - French existentialist philosopher Simone de Beauvoir put forth the idea of Gender as a social construct and gender identities are not biologically determined but socially constructed.
- Societal norms and constraints shape women’s choices and behaviour, often restricting their freedom and opportunities.
- This perspective laid the theoretical foundation for future feminist activism.
- **The Feminine mystique (1963)** - Betty Friedan brought the private “problem that has no name” till then into the public domain.
- Friedman initiated discussion around devalued domestic work and critiqued the way it was romanticised through the portrayal of housewives as the ideal of femininity.
- **National Organization for Women (NOW)** – It was established in 1966 as a result of collective feminist consciousness on Betty Friedan’s *The Feminine Mystique* (1963) that initiated discussion around domestic work.
- It criticized the portrayal of housewives as the ideal of femininity.
- **Women’s strike for equality** - In 1970 over 50,000 women marched with slogans like “Don’t Iron While the Strike is Hot” and “Don’t Cook Dinner—Starve a Rat Today”.
- The strike was part of the second wave of feminism in the 1960s and 1970s and furthered the demand for equality in both public and private spheres.
- **Declaration on the Elimination of Discrimination against Women (1967)** – Appropriate measures to abolish existing laws, customs, regulations and practices which are discriminatory against women,
- **International Women's Year (1975)** - It was organized by United Nations in Mexico City to emphasize importance of women rights.
  - The UN further designated the decade from 1976-1985 as the United Nations Decade for Women.
- **Convention on the Elimination of All Forms of Discrimination against (CEDAW)** – It was adopted in 1979 by the UN General Assembly, is often described as an international bill of rights for women.
- It was ratified in second world conference.
- **Discrimination** - It redefined that ‘discrimination’ is not only legal inequalities but also social and cultural barriers, and compelled nations to take steps to dismantle systemic inequalities.

United Nations World Conference on Women	Significances
<b>First world conference on women (1975) – Mexico City</b>	<ul style="list-style-type: none"> <li>• Unified global framework on women’s rights.</li> <li>• Plan of action for the implementation of the objectives of the International Women’s Year.</li> </ul>
<b>Second world conference on women (1980) - Copenhagen</b>	<ul style="list-style-type: none"> <li>• Focus on employment, health and education.</li> <li>• To review progress in implementing the goals of the first world conference.</li> </ul>
<b>Third world conference on women (1985) - Nairobi</b>	<ul style="list-style-type: none"> <li>• Nairobi Forward-Looking Strategies.</li> <li>• Measures for achieving gender equality at the national level.</li> <li>• Promote women’s participation in peace and development efforts.</li> <li>• Convention on the Elimination of All Forms of Discrimination against (CEDAW)</li> </ul>
<b>Fourth world conference on women (1995) - Beijing</b>	<ul style="list-style-type: none"> <li>• The Beijing Declaration and the Platform for Action.</li> <li>• Recognized women’s rights as human rights.</li> <li>• Formulated key global policy framework on gender equality.</li> </ul>

- Emphasized shared societal responsibility.
- Recognized 12 areas of concern in achieving women equality.

### What are the challenges in achieving women's rights?

- **Lack of women in leadership** – It hinders comprehensive policy formulation on women development.
  - 27% of parliamentary seats
  - 36% of local government seats
  - 28% of management positions
- **Lack of equal grounds** – The conferences failed to address intersectional inequalities faced by women of color, indigenous women, and those from economically disadvantaged or conflict-affected.
- **Non-binding nature** – Governments endorsed gender equality but failed to implement laws or policies that would lead to substantial changes for women on the ground.
  - The absence of binding nature diluted the effectiveness of the conference outcomes.
- **Absence of accountability** – The effectiveness of these international conferences was often undermined by a lack of sustained political will and accountability.
- **Imbalance in unpaid care work** – Persistent gender inequality in house hold chores limits women's participation in education, employment, and other opportunities.
- By 2050, women globally will spend 9.5% more time (2.3 more hours per day) on unpaid care work than men.
- **Legal barriers** – At least 28 countries do not have laws granting women equal rights to enter marriage and initiate divorce.
- **Inadequate funding** - Women's rights cannot be fully realized without addressing the financial constraints.
- The additional investment needed to achieve gender equality by 2030 is estimated at USD 360 billion per year.
- **Social norms and cultural practices** – The prevalence of child marriage highlights the need for attitudinal shifts and the promotion of legal frameworks that safeguard women and girls' rights.
  - Globally, one in five young women is ***married before age 18***.
- **Women and armed conflict** – Wars and armed conflict destroy families and societies and leave women and girls particularly vulnerable.
  - Sexual violence is widespread and often used as a war tactic which affects women right.

### Beijing Platform for Action 12 critical Area of Concern

- Women and Poverty
- Education and training of women
- Women and Health
- Violence against women
- Women and Armed Conflict
- Women and the Economy
- Women in Power and Decision-Making
- Institutional mechanisms for the Advancement of Women
- Human Rights of Women
- Women and the Media
- Women and the Environment
- The Girl Child

### What lies ahead?

- Focus on Education and awareness
- Promote women's participation in the workforce by providing equal pay and career development opportunities.
- Data collection to identify areas of inequality and monitor progress.
- Promote gender equality in the workplace, improve working conditions

## 1.5 India-Italy Joint Strategic Action Plan

### Why in news?

India and Italy announced an ambitious five-year joint strategic action plan 2025-2029 to widen the ambit of economic cooperation during their meeting at the G20 Summit in Rio de Janeiro, Brazil.

## What is the history of India-Italy bilateral relationship?



- India and Italy are ancient civilizations with rich cultural heritage.
- **Ancient connection** - Italian port cities were important trading posts on the ancient spice route.
- **Medieval connection** - The Venetian merchant Marco Polo, during his travels to the east, travelled to India in the 13th century and wrote about his experiences.
- Diplomatic relations between India and Italy were established in **1947**.
- **People to People connect** - The two countries enjoy strong people-to-people connect propelled by a large Indian diaspora and long standing Indological Studies tradition in Italy.
- **Political relations** – In October 2021, Prime Minister visited Italy to attend the G20 Summit in Rome.
- Both sides announced a Strategic Partnership on Energy Transition and a Statement of Intent on Textiles Cooperation.
- **Strategic Partnership** – India Italy relations were elevated to a Strategic Partnership in 2023.
- **G20 2023** - PM Meloni participated in the G20 Leaders' Summit in New Delhi in September, 2023 and both sides agreed to enhance cooperation in defense & new and emerging technologies.
- **Energy transition and IPR** - A Letter of Intent for cooperation in Energy Transition as well as a MoU on Industrial Property Rights were signed in 2024.
- **Plurilateral initiatives** - Italy joined several India-led several India led plurilateral initiatives such as
  - International Solar Alliance (ISA)
  - Coalition for Disaster Resilient Infrastructure (CDRI)
  - India-Middle East-Europe Economic Corridor (IMEEC)
  - Global Biofuels Alliance (GBA)
  - Indo-Pacific Oceans Initiative (IPOI)
- **Economic Relations** – Italy is India's 4<sup>th</sup> largest trading partners in the EU after Germany, Belgium and Netherlands.
- **Bilateral trade** – In 2023-24 it reached USD 14.56 billion with our exports at USD 8.76 billion.
- India accounts for 1.2% of Italian imports with the balance of trade remains in India's favour with Euro 3.98 billion.
- **Services trade**- In 2023 Italy imported services from India for a total value of Euro 489.14 mn and Italy exported to India services for a total value of Euro 654.98 million.
- **FDI investment** - Italy ranks 18th in FDI inflows in India during April 2000 to December 2023 with FDI inflow of USD 3.53 billion during this period.
- Major FDI sectors – Automobile (29.8%), Trading (17.1%), Industrial Machinery (5.6%), Services (5.1%), Electrical Equipment (4.6%)
- **Defence** – Indian Army has a unique historical connect with Italy.
- **WWII** – It played a significant role in advances of the allied forces for the liberation of Italy in the Second World War.
- **Defence relationship** - Initially focused on import of defence equipment to India, now expanded to include training sharing of information, maritime Exercises, maritime security etc.
  - Italy has a well-established defence industry.

*In 2023, both countries celebrated the 75th anniversary of establishment of diplomatic relations.*

**Bilateral Trade (Values in USD million)**

Year	2020-21	2021-22	2022-23	2023-24
<b>India's exports to Italy</b>	4,735.74	8,180.76	8,691	8,765
<b>India's imports from Italy</b>	3,862.05	5,048.47	5,562	5,795
<b>Total Trade</b>	8,597.79	13,229.22	14,253	14,560
<b>Trade Balance</b>	873.69	3,132.29	3,129	2,970



- **Milan** – It is biennial naval exercise between India and Italy held annually.
- **India – Italy Military Cooperation Group (MCG)** - It is a forum established to boost defence cooperation between India and Italy.
- **Recent developments**
  - Our Raksha Mantri (RM) visited Italy in October, 2023 and held bilateral discussions with his Italian counterpart H.E. Mr. Guido Crosetto.
  - Both sides signed a MoU on defence cooperation.
  - The Italian Navy Ship (ITS Morosini) made a port call in Mumbai in August, 2023.
  - Indian Navy Ship INS Sumedha held Maritime PASSEX Exercise along with ITS Morosini off the coast of Sardinia in April, 2023.
  - Italian Navy also participated in MILAN 2024 Naval Exercises, Vishakapatnam in February, 2024.
- **Science and Technology** – An Agreement on S&T Co-operation was signed in 1978.
- **ITPAR** - A significant bilateral initiative under the S&T Cooperation Agreement is the India-Trento Programme for Advanced Research (ITPAR).
- **DST-ICTP Ramanujan prize in mathematics** – It was instituted by Department for Science and Technology (DST) in collaboration with International Centre for Theoretical Physics (ICTP) in Trieste for developing countries annually.
- **Counter Terrorism, Cyberspace and Space Cooperation**
- India participated in the 20th anniversary of the adoption of UN Convention on Transnational Organized Crimes (UNTOC) in Palermo in September, 2023.
- Three MoUs were signed between Indian and Italian space companies in the areas of satellite services and ground station solutions in 2024.
- **Cyber dialogue** – It was inaugurated between India and Italy in 2024 in New Delhi.
- **Cultural cooperation** – The agreement for cultural cooperation was signed in 1976.
- **Indian diaspora** - The Indian community in Italy (estimated at 2.5 lakhs including PIOs) is the third largest community of Indians in Europe after UK and the Netherlands.
- Indian community is the 5th largest foreign community in Italy.
- Executive Programme on Cultural Cooperation for the term 2023-27 was signed in 2023.
- **Migration and Mobility Agreement (MMA)** - It was signed during in 2023 to facilitate safe and legal migration of seasonal and non-seasonal workers, researchers, professionals and academicians.
- **Education** - Currently, more than 6,709 Indian students are pursuing higher education in Italy.
- There are around 10 Universities/higher education institutions in Italy which conduct courses in Indian art, history and languages.
- **Indology** - There is a long-standing tradition of Indology in Italy with several scholars taking keen interest in studying Indian languages like Hindi, Tamil, Sanskrit, etc.

### What are the highlights of India-Italy Joint Strategic Action Plan?

- **Political dialogue** – Regular meetings between ministry of Foreign Affairs, Trade and Defence.
- Hold yearly bilateral consultations between the two Foreign Ministries to deepen cooperation in all sectors of common interest.
- **Economic cooperation** – Increase bilateral trade and investment, in with high potential sectors by joint ventures between large companies and SMEs.
- Promote the participation in trade fairs and periodic business fora.
- Promote industrial partnerships, technological centres and mutual investment, in automotive, semiconductors, infrastructure and advanced manufacturing.
- **Connectivity** – Enhance collaboration in maritime and land infrastructure in the framework of India - Middle East - Europe Economic Corridor (IMEEC).
- Finalize the Agreement on cooperation in the maritime and port sector.

- **Science & Technology** – Cooperation to boost Industry 4.0, advanced manufacturing, clean energy, critical minerals extraction and refining, by involving academia and industries, SMEs and start-ups.
- Enhance innovation and research collaborations, within the context of the Indo-Pacific Oceans Initiative (IPOI).
- Launch the Indo-Italian Innovation and Incubation Exchange.
- Implement the Executive Programme for scientific and technological cooperation.
- **Space sector** – Collaboration of ASI – ISRO in projects of common interest in Earth observation, heliophysics and space exploration with emphasis on lunar science.
  - Organize Italian delegation visit to India on research, space exploration and commercial collaboration.
- **Energy transition** – Organise "Tech Summits" to share best practices and technology advancements.
- Impetus to the Joint Working Group on Renewable Energy to facilitate cooperation in green hydrogen, biofuels, renewables and energy efficiency.
- Strengthen the Global Biofuels Alliance and International Solar Alliance.

**"India-Middle East-Europe Economic Corridor" (IMEC)** is a proposed economic route aiming to enhance connectivity and economic integration between Asia, the Persian Gulf, and Europe, primarily by connecting India to Europe.

*The Indo-Pacific Oceans Initiative (IPOI) was launched by India in 2019 at East Asia Summit (EAS) is a non-treaty-based initiative for countries to work together for cooperative and collaborative solutions to common challenges in the region.*

- **Defence cooperation** – Hold yearly Joint Defence Consultative (JDC) meeting and Joint Staff Talks (JST).
- Increase interoperability and cooperation, in Indo- pacific region
- Enhance partnerships and dialogue among public and private stakeholders, on defense research.
- Enhance maritime cooperation, including in the field of maritime pollution response and maritime search and rescue.
- Negotiate a Defence Industrial Roadmap, between the two Ministries of Defence.
- **Security cooperation** – Enhance security cooperation and capacity building activities in cybersecurity and cybercrimes.
- Hold yearly bilateral meetings of the Joint Working Group on Combating International Terrorism and Transnational Crime.
- Share information and best practices in the fight against terrorism
- Strengthen cooperation in judicial and security matters through capacity building programmes.
- Finalize an agreement for the mutual protection and exchange of classified information.
- **Migration and Mobility** – Promote safe and legal migration channels, fair and transparent labour training and recruitment procedures.
- A pilot project to train the health professionals in India for employment in Italy.
- Enhance cooperation to counter the facilitation of irregular migration.
- Increase mobility of students, researchers and academics in higher education.
- **Culture and Tourism** – Promote exhibitions and cultural initiatives through partnerships between museums.
- Increasing film co-productions and filmmaking.
- Preservation and restoration of old and heritage sites and buildings.
- Foster connections and tourist flows in both directions.

## G.S PAPER I

### 2. HISTORY

## 2.1 Conservation of Monuments in India

### Why in News?

The approach of conservation of monuments in India requires a renewed relook.

### How Monuments in India are conserved?

- **Monuments** – They are remains of our prestigious past, representing culture, art architecture and structural technology of bygone days.
- **Types** - Prehistoric sites, stone age rock-shelters, Neolithic sites, Megalithic burial sites, rock-cut caves, stupas, temples, churches, synagogues, mosques, tombs, palaces, forts, bathing ghats, tanks, water reservoirs, bridges, pillars, inscriptions, mounds, kos minars, excavated sites, etc.
- **Number of Monuments in India** - Central Government has declared **3696 monuments and sites** as of **national importance** under the provisions of the **Ancient Monuments and Archaeological Sites and Remains Act, 1958**.
- **State Monuments** - State Government and Union Territories have also declared the monuments/ sites as of State importance under their respective Acts.
- **ASI** - Archaeological Survey of India is responsible for protecting and maintaining these 3679 monuments and archaeological sites declared as of national importance.
- **Conservation Regulation** - An area up to the limit of **100 meter** from monument or site has been declared as **prohibited area** and an area up to the distance of **200 meter** further beyond prohibited limit has been declared as **regulated area**.

*The Ancient Monuments and Archaeological Sites and Remains Act, 1958 provides provision for **declaring a monument** or sites as of national importance, provided it should fulfil the criterion specified.*

**Adopt a Heritage: Apni Dharohar, Apni Pehchaan'**

### What is the Adopt a Heritage - program?

- **Adopt a Heritage Program** – It is an initiative of the Ministry of Tourism, launched in 2017, in collaboration with the Ministry of Culture and the Archaeological Survey of India.
- 66 monuments across India have come under the adoption scheme.
- **Feature** - Government invites entities, including public sector companies, private sector firms as well as individuals, to develop selected monuments and heritage and tourist sites across India.
- **Development** - Provision and maintaining of basic amenities, including drinking water, ease of access along with advanced amenities such as surveillance systems and tourism facilitation centres.
- **Monument Mitras** - Public sector companies and select private business houses that engage in the conservation of monuments.
- **Use of CSR** - There is no financial bid involved and the corporate sector is expected to use corporate social responsibility (CSR) funds for the upkeep of the site.
- **Benefits** - Adopted landmark would be both scrupulously maintained and appropriately highlighted for tourism
- **Adopt a Heritage 2.0** - ASI launched the programme on in 2023 to foster collaboration with corporate stakeholders to preserve monuments.

### What are the issues in managing heritages in India?

- **Isolation of Monuments** – Not absorbing the monuments in to townscape and the daily lives and part of residents.
- **Non Usage** – Not opening the monuments to public and keeping them closed deteriorates the structures of the building.
- **Inconsiderate Usage** – Use of monuments to private functions, such as conferences and fashion shows and using it without the concern for conservation.
- **Reuse issue** – Use of monuments as office or institutional buildings.
  - Converting Kerala's Padmanabhapuram Palace into a dental collage, or Delhi's Red Fort into a film city.
- **Rigid Preservation** – Monuments are kept highly inaccessible to public and it creates a sense of otherness.



- **Threat of polarisation** - Religious polarisation of cultural and heritage sites and spreading hatred among the public towards the monuments.
- **Lack of Interest** - Inadequate concern by the trusts and big corporations.

#### What can be done?

- Change the perspective and relationship of cities with the monuments.
- Bring together the frame of history and contemporary life in ways that make them easily compatible.
- Utilization of monuments in productive manner and make it more accessible to the public.
- Renovation with fresh landscape and Constructive upgradation of monuments with modern art without damaging the structure.
- Careful consideration of local requirements and national ideals to create policy on reuse.

The **Kashi Vishwanath Temple Corridor project in Varanasi** is aimed at transforming pilgrims' experience of the temple town.

### 3. GEOGRAPHY

#### 3.1 Challenges in cyclone forecasting

##### Why in news?

Though meteorologists had forecast a historic hurricane season for 2024 based on the expectation that a strong La Niña would emerge this winter, 2024 has evolved to be a year with a summer with no major hurricanes.

##### What was the 2024 hurricane projection?

- **2023 Hurricane season** - It was history's fourth-most active despite the strong El Niño that year.
- **2024 Hurricane Forecast** - Meteorologists had forecast a historic hurricane season for 2024 based on the expectation that a strong La Niña would emerge this winter.
- **Failure of projection** - 2024 has evolved to be a year with a summer with no major hurricanes.
- **Truant La Nina** - One important reason for the failure of forecast was the weakness of La Niña.

Usually, subdued hurricane season emerge during an **El Niño** and an earnest one during a **La Niña**.

#### Cyclone

- **Cyclone** – As per National Disaster Management Authority (NDMA), cyclones result from atmospheric disturbances surrounding a low-pressure area characterized by rapid and often destructive air circulation.
- **Air circulation**- The air circulates inward in an anticlockwise direction in the Northern Hemisphere and clockwise in the Southern Hemisphere.
- **Occurrence**- Cyclonic winds move across nearly all regions of the Earth except the equatorial belt.
- **Warm ocean waters** - Cyclones require sea surface temperatures of at least 26.5°C to form.
- **Low-pressure system** - As warm, moist air rises from the ocean, it creates a low-pressure area.
  - The rising air cools and condenses, forming clouds and thunderstorms.
- **Coriolis Effect** - The rotation of the Earth causes the air to spiral, contributing to the cyclone's circular motion.
  - Cyclones rotate counterclockwise in the Northern Hemisphere, and they rotate clockwise in the Southern Hemisphere.
- **Intensification of cyclone** - As the storm gathers strength, it draws more warm air from the ocean.
  - The **cyclone's eye** forms at the center, surrounded by a ring of thunderstorms called the eyewall, which houses the strongest winds.

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

#### What are the components of forecasting cyclones?

- **Satellites** - By monitoring sea surface temperatures, cloud formations and wind patterns to detect the early formation of cyclones.
- **Doppler radar** - It provides detailed information about wind speeds and precipitation patterns.
- **Weather buoys** - These floating devices give real-time data of atmospheric pressure and sea surface temperatures.
- **Climate models** - They estimate the likelihood and intensity of cyclonic activity by using broader atmospheric and oceanic metrics.
- **Numerical weather prediction model** - Post-processing techniques to improve forecasts of tropical cyclone track, intensity, and wind structure.
- Statistical and machine learning methods for predicting tropical cyclone intensity change.

### What are the challenges in cyclone forecasting?

- **Limitation of climate models** – They forecast cyclones not explicitly but indirectly, based on metrics that indicate cyclonic activity and its potential intensity
- **Global warming** - Rising Ocean temperatures are increasing the frequency of stronger cyclones, making it harder for traditional forecasting methods to keep pace.
- **Link between hurricanes and ENSO** - Climate change is starting to affect the traditional relationship between ENSO and hurricane intensity.
- **Rapid intensification** - Warming of upper oceans in all cyclone-producing regions of the planet led to many instances of rapid intensification that affects cyclone forecast.
- Rapid intensification is when the maximum cyclone wind speed increases by 55 km/hr or more within a 24-hour period.
- **Post landfall behavior** - Predicting the storm's behavior after landfall, such as rainfall, flooding, and wind damage, is also complex.
  - The terrain, local weather patterns, and storm structure can significantly influence the cyclone's impact after it hits land.
- **Impacting preparedness** - These challenges are critical, as it directly affects how governments and communities prepare for and respond to cyclones

### What are factors influencing cyclone in Indian Ocean?

- **Ocean stretch** – The typical stretch of ocean limits cyclone intensification, over both the Arabian Sea and the Bay of Bengal, thus limiting the size and strength of the cyclones.
- **Movement of cyclone** - Most cyclones over the Arabian Sea tend to be steered northwestward, away from India.
- **Chronic stressors** – India is vulnerable to chronic stressors such as ocean warming, rising sea levels, and the increasing incidence of rainfall extremes and dry spells.
- **Acute stressors** - These acute stressors exacerbate the chronic ones, leading to more damaging events like heavy rainfall events, flooding, and flash drought.
- **Combination of acute and chronic stressor** - Cyclone induced flooding worsens as sea levels rise or heatwaves during droughts devastate crops and reduce water availability.
- **Monsoon Change** - Warming in the Indian Ocean, especially the Bay of Bengal, has been extending the southwest monsoon into the northeast monsoon and delivering both excess and extreme rainfall.

### What are the needs of effective forecasting?

- **Disaster management** – Accurate forecasting is essential to plan for cyclone mitigation and adaptation measures.
- **Resource management** - India remains an economically developing country, and any increments in its ability to manage its financial and human resources will be critical for the foreseeable future.
- **Sustainability** - India's dream of sustained economic development need the resilience of entire subcontinent.
- **Security** - India's vulnerabilities to chronic and acute climate stressors aren't only India's socio-economic vulnerabilities, but also India's national security issues.

### What India needs to do?

- **Hyperlocal risk projections** - India must focus on local predictions for cyclones that will help allocate resources more efficiently and enhance disaster preparedness.
- **Infrastructure enhancement** - Infrastructure upgradation is required in the installation of ocean observation systems and in high-resolution earth observation satellites.
- **Developing India-specific weather models** - That are able to understand and simulate Indian conditions more accurately.
- **Mitigation and adaptation** - By investing in renewable energy, weather forecasting, early warning systems, and disaster management.
- **Regional cooperation** – Establishing subcontinent-wide weather and climate networks and improving forecasts and projections for all parts of India's wider neighbourhood.
- **Gathering more weather data** - To make accurate forecasts of cyclones and generate useful early warnings in a particular region.

## 4. SOCIAL ISSUES

### 4.1 Revitalizing STEM Education

#### Why in News?

Recent studies show that a vast majority of students graduating from private engineering colleges, the newer Indian Institutes of Technology (IIT) and universities colleges lack the basic skills that are required by industry.

#### What is the importance of STEM research in India?

- **STEM** – It is the umbrella term used to group together the distinct but related technical disciplines of science, technology, engineering, and mathematics.
- **STEM Graduates** - India contributes 31.7 per cent of the total STEM graduates in the world, and has one of the world's largest STEM job markets.
- **Skill Development** - STEM equips students with all of the knowledge, skills, and abilities required for success in industries like engineering, computing, computer science, and biotech.
- **Tech Contribution** - India has made strides in STEM research, becoming an influential player in areas like space technology, biotechnology, and pharmaceuticals.
- **Increase in Women Participation** – Women account for over **43% of all (STEM) graduates in India**, one of the highest in the world.
- 40% women enrolment in STEM field a world record for India.
- **Start-ups and Unicorn** – Most of the start-ups are from the STEM sector.
- **Ideas Innovator** - Innovation in the field of education goes through a radical change with more Indians becoming innovators rather than consumers.
- **Provides Employment** – STEM provides new jobs in science and technology field in various sectors.

India is the **third largest unicorn hub** and ranks 39<sup>th</sup> in the Global Innovation Index.

#### What are the issues in STEM education and research in India?

- **Shortage of Skilled Faculty** - Teaching institutions often grapple with faculty shortages, which impacts the quality of STEM education and limits opportunities for student mentorship.
- **Deficiency in Teaching** - Many faculty members are products of their own institutions and are often pressured to chase papers and patents for their colleges to maintain their rankings, often at the expense of scholarship and pedagogy.
- **Inadequate Capacity of Graduates** - A significant portion of India's STEM graduates are not industry-ready.
- **Dwindling Students** - Number of students pursuing higher education has been dwindling.
- The number of STEM jobs are outstripping the number of STEM graduates in the country with 2020 witnessing a 44 % increase in STEM job postings.

According to the **National Science Foundation**, it is estimated that 80% of the jobs created in the next decade will require some form of math and science skills, and India's young need to equip them to attain desired skill.

- **Inequities in Educational Access** - It allows only a small number of people access to quality STEM education.
- **Less Enrollment in Premier Institutes** - Only about *5% of STEM students* come from premier institutions like the Indian Institutes of Technology (IITs), the National Institutes of Technology (NITs), and the Indian Institute of Science (IISc).
- **Ill Method of Ranking Institutions** - Ranking teaching institutions and their faculty members based heavily on research output, such as papers and patents.
- **Lack Of Research Culture** - Limited resources get redirected from teaching quality to maintaining a research facade, affecting both education quality and STEM research output.
- **Lack Of Collaboration** - Most institutions work in isolation, with minimal engagement with research organizations.
- It limits exposure to cutting-edge research for students diminishing the quality of research output from these institutions.

### What are the government measures?

- **National Education Policy (NEP) 2020** - It emphasizes interdisciplinary studies, critical thinking, and a focus on research.
- **Anusandhan National Research Foundation (ANRF)** - The ANRF's Partnerships for Accelerated Innovation and Research (PAIR) program is designed to foster collaboration between research and teaching institutions.
- This initiative encourages joint research projects and faculty exchange programs to enhance research quality.
- **Government Funding in Key STEM Areas** - Investment in initiatives such as quantum computing, cybersecurity, and artificial intelligence reflects the country's ambition to strengthen its STEM capabilities.
- **Vigyan Jyoti Scheme for Schoolgirls** – Schools to conduct lectures at regular intervals and science camps to develop scientific temper among female students between 9th to 12th standard.
- **WISE-KIRAN** – Enhances women participation in the field of Science and Technology to bring gender parity.
- **Gender Advancement for Transforming Institutions (GATI)** – To bring gender parity in higher education and research centers.
- **Consolidation of University Research for Innovation and Excellence (CURIE)** - It aims at assisting the research and development facilities at women's universities.
- **SERB-POWER** - The Science and Engineering Research Board provides financial aid in the form of grants and fellowships.
- **Biotechnology Career Advancement and Re-orientation Programme (BioCARE)** – Aims to increase women participation biotech research.
- **Women in Engineering, Science, and Technology (WEST)** -It was launched in 2022 to provide a platform for scientifically inclined women researchers and scientists.
- **I-STEM** - (Indian Science, Technology, and Engineering facilities Map) is an initiative by Office of Principal Scientific Advisor to link Researchers and Resources.

### What needs to be done?

- **4A** – Accessibility, Affordability, Availability, Adaptability are keys to STEM success.
- **Focus On Pedagogical Training** - Teaching institutions should prioritize pedagogical skills over research output for faculty promotions.
- **Capacity Building of Faculties** - Faculty development programs, mentorship, and continuous evaluation should become integral to STEM education.
- **Separate rankings for teaching and research institutions** – Ranking teach institutions majorly based on teaching quality.
- This approach can alleviate the pressure on faculty to produce low-quality research and shift focus toward effective teaching methods.
- **Collaborative Degree Programs** - Establishing joint degree programs between research and teaching institutions can enhance student quality and foster meaningful collaboration.



- **Creation of Teaching Tracks** - Establishing a dedicated teaching track within institutions to focus on pedagogy without pressure to publish research.
- **Leveraging Technology for Education and Research** - Online platforms and virtual laboratories can enhance access to quality education, allowing students from under-resourced institutions to participate in advanced learning.

## 4.2 CSR in Agriculture

### Why in News?

A decade ago, India became the first country to legally mandate Corporate Social Responsibility (CSR).

### What is corporate responsibility?

- **Corporate Social Responsibility (CSR)** – It is a means of corporates contributing directly for the welfare of the society through socio, economic, environmental contributions.
- It involves taking responsibility for the company's impact on society and the environment, going beyond profit-making to contribute positively to the broader community.
- **Legal mandate** – Section 135 of Companies Act 2013, mandates the eligible companies to **spend 2%** of the average net profits of the immediately preceding 3 years on CSR activities.
- **Applicability** - The provisions of CSR applies to every company, its holding company, its subsidiary company and foreign company having in the preceding financial year.
  - Net worth > 500 crore
  - Turnover > 1000 crore
  - Net profit > 5 crore



India was the **first country** to have statutorily mandated CSR for specified companies.

2007	2009	2010	2011	2012	2014
Adoption Of Inclusive Growth-11th Five Year Plan	Voluntary Guidelines On Corporate Social Responsibility, 2009	Parliamentary Standing Committee On Finance-21st Report On Companies Bill, 2009	National Voluntary Guidelines(NVGs) On Social, Environmental & Economic Responsibilities Of Business, 2011	Business Responsibilities Reporting	Mandatory Provision Of CSR Under Section 135 Of The Companies Act, 2013 Coming Into Effect From 01/04/2014

### List of proposed CSR activities

- Schedule VII (Sections 13) mentions activities that can be taken by companies in their Corporate Social Responsibility Policies.
- Eradicating extreme hunger and poverty.
- Promotion of education.
- Promoting gender equality and empowering women.
- Reducing child mortality and improving maternal health.
- Combating human immunodeficiency virus, acquired immune deficiency syndrome, malaria and other diseases.
- Ensuring environmental sustainability.
- Employment enhancing vocational skills.

- Social business projects.
- Slum area development.
- Contribution to the Swachh Bharat Kosh set up by the Central Government for the promotion of sanitation.
- Contribution to the Clean Ganga Fund set up by the Central Government for rejuvenation of river Ganga.
- Contribution to the Prime Minister's National Relief Fund or any other fund set up by the Central Government or the State Governments for socio-economic development.

### Activities Not Falling in the Ambit of CSR

- The CSR projects that benefit only the employees of the company and their families.
- One-off events such as marathons / awards / charitable contribution / advertisement / sponsorships of TV programs etc.
- Activities which are not taken up in project mode.
- Expenses incurred by companies for the fulfillment of any Act / Statute of regulations (such as Labour Laws, Land Acquisition Act etc.)
- Contribution of any amount directly or indirectly to any political party.
- Activities undertaken by the company in pursuance of its normal course of business.

### What are the needs for CSR in Agriculture?

- **Role of Agriculture** - Agriculture as a sector has a pivotal role in shaping the country's socio-economic landscape.
- **High Human Resource in Agriculture** - 47% of the India's population depends on agriculture for employment and is significantly higher than the global average of 25%.
- **Low Economic Contribution** - Agriculture accounts for 16.73% of India's GDP.
- **New Concerns** - Degradation of the natural resource base, stagnant farmer incomes, and threats caused by climate change are current focus of Indian Agriculture system.
- **Shift in Agri Focus** - Shift in agriculture towards sustainability and modern agriculture makes a good case for CSR funds from the private sector.
- **Inadequate Public Funding** - Indian agriculture needs more support as government funds often fall short.

**23% of companies** had "environment and sustainability" as their CSR priority area.

### How CSR contributions can be used for Agricultural Sustainability?

- **Climate Action and Sustainability** - Contribution to climate action and sustainability in the agricultural sector.
- **Infrastructural Development** – Development of grain banks, farmer schools, water conservation projects, and energy-efficient irrigation.
- **Promoting Organic Farming** - Corporations can support organic farming practices by providing resources, training, and certification assistance to farmers.
- **Farmer Livelihoods** - CSR programs can directly improve farmer livelihoods by providing training, resources, and access to markets.
- **Energy-Efficient Irrigation** – CSR funds are supporting the development of energy-efficient irrigation systems, which reduce both water and energy consumption.
- **Precision Farming** - Providing farmers with access to advanced technology and tools like GPS, drones, and IoT devices to enhance productivity and efficiency.

### Common Areas of CSR and Agriculture

- Gender equality
- Agroforestry
- Poverty
- Eradicating hunger and malnutrition
- Technology incubators
- Animal welfare
- Environmental sustainability
- Livelihood enhancement projects
- Conservation of natural resources
- Rural development projects
- Socio-economic inequalities
- Women's empowerment.

- **Supply Chain Sustainability** - CSR can enhance sustainability throughout the agricultural supply chain by promoting ethical sourcing practices.

### What are the challenges?

- **Inadequate Monitoring** – Lack of method to determine the extent of funding going into Agri projects and to categorize them based on targeted sectors of CSR activities.
- **Insufficient Reporting** - Current reporting mechanisms have little to no emphasis on agriculture-related CSR initiatives.
- **Tracking Funds** - Little chance of tracking the funds spent for agriculture-related initiatives alone.
- **Limiting Sectoral Impact Assessments** – Most of the listed activities contribute to other sectors and non Agri activities.
- **Lack of Clear Regulation of Fund Allocation** - The listed activities currently emphasize companies understanding if they are eligible rather than explicitly delineating the sector to which their CSR funds can be flowed.

### What lies ahead?

- Specify agriculture as a distinct sector in CSR activities is crucial to engender more sustainable growth and effect a just transition.
- Transition the reporting framework based on sectors receiving funds to help streamline and better target the available funds.
- Identify the prevailing sustainability issues vis-à-vis agroecosystems and direct funds according to requirements to help drive tractable changes.

## 4.3 Concerns in labour employment of women

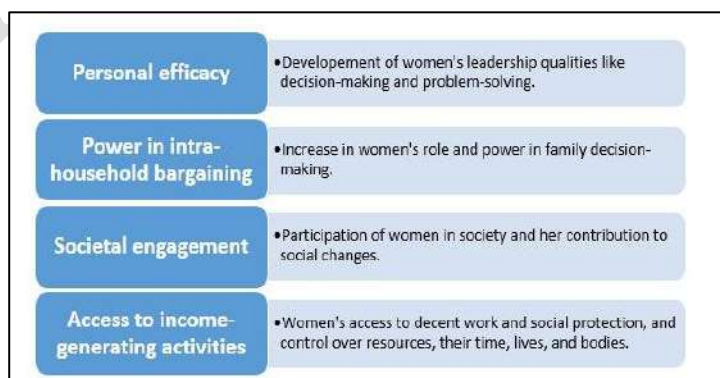
### Why in news?

A recent report of The India Human Development Survey (IHDS) shows that despite advancements in education and societal engagement, women's wage labour participation has stagnated.

India ranks **129<sup>th</sup>** out of 146 countries in the **Global Gender Gap Index**.

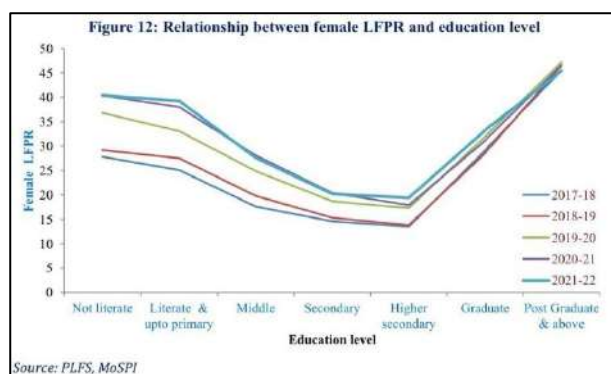
### What is women empowerment?

- **Women's empowerment** – It is the process of women gaining the power and control to make their own choices, and to influence social change. It includes four areas of development,
  1. Personal efficacy
  2. Power in intra-household bargaining
  3. Societal engagement
  4. Access to income-generating activities



### What are the concerns in women employment?

- **Stagnated waged employment** – Among the four key areas there is an improvements in the first three domains and the fourth, access to waged employment has stagnated.
  - The IHDS recorded a drop from 18% in 2012 to 14% in 2022 among women aged 20-29.
  - For women in their 30s, participation levels have also plateaued.
- **Unpaid contribution** – Women continue to contribute to the economy by working on family farms, and it reflects the increase in women's participation in work as per the Periodic Labour Force Survey.
- **Skewed employment growth** – U-shaped relationship between education and FLFP rate where the **FLFP rate is generally higher among women with little or no education**.



- As the level of education increases, the FLFP rate declines, before eventually rising for highly educated women.

### Findings of the IHDS survey

- **Advancements in education** – The India Human Development Survey (IHDS) highlights a dramatic rise in women's educational attainment.
- College degree attainment among women has more than doubled, from 12% to 26%, achieving parity with men.
- **Delayed marriages** – The delay in marriage aligns with increased educational opportunities and changing aspirations.
- In 2011-12, 76% of the women in their 20s were married, by 2022-24 the proportion had dropped to 66%.
- **Expanding horizons** – Women's autonomy and societal engagement are gradually improving.
- Comfort with solo travel rose from 42% to 54%.
- Membership in Self Help Groups doubled from 10% to 18%.
- Participation in gram Sabha meetings also showed modest growth.
- **Increased self-employment** – The share of self-employed women in the labor force increased from 51.9% in 2017-18 to 67.4% in 2023-24.

### What are the underlying factors?

- **Lack of suitable opportunities** – Surveys reveal that most women and families are open to wage work, provided suitable opportunities exist.
- **Job scarcity** – Due to growing unemployment the roles for women with higher qualifications got reduced.
- **Conservative social norms** – It emphasizes the duty, traditional values, and social institutions.
  - Preservation of *traditional family structures and gender roles*.
- **Patriarchal mindset** – Which causes intolerance towards women in society has created the largest obstacle for women to succeed.
- **Socio-cultural misconceptions** – Women empowerment is often seen as opposing Indian culture, especially when women challenge traditional norms.
- **Work place hurdles** – Women in the workplace face other challenges such as sexual harassment, pregnancy discrimination, imposter syndrome.
- Infrastructure limitations, such as inadequate childcare and work commutes, exacerbate the issue.
- **Unhealthy practices** – Unequal opportunities and distribution of work in private sector.
- Issues related to privacy such as asking personal questions to female candidates discourage women from entering the workspace.
- Lack in proper execution of **gender-friendly policies** fuel the increasing gender gap in employment.
- **Unequal wages** – For the same work and designation in demand driven jobs is discouraging women's from participating in waged employment.
- **Sectoral dynamics** – While women continue to contribute significantly to family farms and government schemes like MGNREGA, these avenues do not translate into formal wage employment.

*According to the World Bank data, the employment to population ratio is **72.2% for males and 25 % for females**. It is a paradox where India have more female graduates but less working women and researchers*

### What lies ahead?

- Access to income-generating activities lags behind.
- Expand skill development programs tailored to emerging industries.
- Enhance support systems like transportation and childcare.
- Promote equitable hiring practices in the private sector.
- Gender-inclusive employment guarantee scheme to help women to avail job opportunities on a greater level.

*India's GDP growth rate can climb above **9%** if women were given an equitable share of jobs according to a World Bank.*

## 4.4 Challenges of Rapid Urbanization

### Why in news?

World Cities Day is celebrated on 31st October every year by the United Nations General Assembly.



## What is urbanization?

- **Urbanization** – Urbanization the process of people moving from rural to urban areas, and the corresponding growth in the number of people living in cities.
- **Significance** – Urbanization, along with industrialization and sectoral change, hold key to the nature of socio-economic transformation in country.
- **Global trend** – The world’s urban population has reached an estimated 57.5% of the world’s total population, with projections to double by 2050.
- **Urbanization in India** – As per 2011 census, urban population in India was about 31.2% of the total population.
- By 2036, towns and cities will be home to 40% of the population, with urban areas contributing almost 70 % to GDP.
- South India is one of the most urbanized regions of the country with Tamil Nadu and Kerala reaching 50% urbanization.
- **Rapid urbanization** – When urbanization happens at a rate that puts pressure on infrastructure, healthcare, and other services.
- India experiencing rapid urbanization with an annual growth rate of 2.3%.

*October 31 is observed every year as World Cities Day. The theme for this year’s World Cities Day is ‘Youth Climate Change - makers: Catalyzing Local Action for Urban Sustainability’.*

## What are the concerns in rapid urbanization in India?

- **Groundwater depletion** – Due to rapid urbanization and industrial expansion ground water is depleted at a faster rate than its recharge capacity.
- **Climate change** – Rapid urbanization intensifies pollution and contributes to urban flooding.
  - Cities in the NCR region rank among the most polluted.
- **Urban planning issues** – Outdated spatial plans fail to address population growth has led to overcrowding.
  - 40% of urban residents in India are living in slums.
- **Urban heat islands** – Urbanization replaces natural land cover with dense built environments like buildings and pavement that absorb and retain heat, creating a heat island effect within the city limits.
- **De-industrialization** – Leads to declining share of employment in manufacturing which deprives the jobs for growing population in cities.
  - It has led to job losses in cities like Ahmedabad, Delhi, Surat, and Mumbai.
- **Governance issues** – Despite the 74<sup>th</sup> Constitutional Amendment, most urban planning remains centralized, with minimal powers to local urban bodies.
- This limits effective local governance, as key functions outlined in the 12th Schedule remain under centralized or state control.
- **Lack of funding** – Cities receive just 0.5% of GDP in intergovernmental transfers, limiting their capacity to address local issues.

## What are the Impacts of rapid urbanization?

- **Growing inequality** – Wealthy developments contrast sharply with slum conditions.
- **Socio-economic segregation** – As city development increasingly caters to the wealthy while ignoring the needs of the broader population.
- **Poverty growth** – Many people remain below the poverty line due to the prevalence of low-paying, high living costs, and insufficient social support.
- **Water scarcity** – Over use and consumption in urban areas leads to acute water crisis in cities.
- **Lack of infrastructural development** – Cities here often suffer from housing shortages, poor access to clean water and sanitation.
- **Poor living conditions** – Without adequate infrastructure in urban areas leading to poor living conditions.
- **Informal sector jobs** – Street vending, rickshaw driving, and informal construction work, often become the primary livelihood for migrant and low-skilled workers.

- These roles typically fall outside labor regulations, leaving workers without social security.
- **Poor working conditions** – Informal workers in urban areas often face hazardous work environments, including unregulated construction sites and polluted spaces.
- **Environmental degradation** – Urbanization leads to the destruction of natural habitats, deforestation, and a reduction in green spaces to make way for housing, industry, and infrastructure.
- **Pollution crisis** – Cities face severe pollution and 10 most polluted cities in India, eight are in the NCR region around Delhi.

#### What lies ahead?

- Increase investments in eco-friendly housing, improved public transit, and infrastructure to withstand climate events.
- Enhanced community engagement and urban governance.
- Promote sustainable building materials, water conservation, and emergency preparedness to withstand climate disruptions.
- Smart city solutions can improve the quality of life by using Artificial intelligence, the Internet of Things (IoT), and data analytics to manage resources efficiently.
- Focus on upskilling the urban workforce, especially in the informal sector.

## G. S. PAPER II

### 5. INDIAN POLITY

#### 5.1 Aligarh Muslim University Judgement

##### Why in news?

The recent judgement by the 7-judge bench of Supreme Court on AMU case redefined minority rights and laid down a holistic test to determine the 'minority character' of an educational institution.

##### What is Minority Educational Institution?

- **Minority Institution** – An institution established and administered for the educational development, religious or secular education, of the community by the minorities.
- **Minority** – Though "Minority" is not defined in the Indian Constitution, it recognizes religious and linguistic minorities.
- The Central Government has notified six religious minority communities viz. Muslim, Christian, Sikh, Buddhist, Parsi and Jain.
- **Fundamental right** - All minorities, whether based on religion or language, shall have the fundamental right under **Article 30(1) to establish** and administer educational institutions of their choice.
- **NMCEI** - National Commission for Minority Educational Institutions (NCMEI) grants minority status to educational institutions.
- State governments also grant minority educational status to institutions within the state.
- **Benefits of minority status**- Greater control over their day-to-day administration from student admission to the hiring of teaching and non-teaching staff.
- **Student admissions** - A minority institution can admit non-minority students without losing its minority character.
- **No SC/ST reservation** - Article 15(5) introduced in 2006, exempted minority educational institutions **from reserving seats** for Scheduled Castes and Scheduled Tribes.
- **Minority reservation** - It can reserve up to **50%** of seats for minority students, providing flexibility while still prioritizing minority representation.

### What is the background of the case?

- **Mohammedan Anglo-Oriental College** – In 1875, Sir Syed Ahmad Khan founded the Muhammadan Anglo-Oriental (MAO) College in Aligarh, Uttar Pradesh.
- The college was designed after the British educational system, with the goal of integrating Western science and literature with Islamic subjects.
- **University status** – The Aligarh Muslim University Act, 1920 by the Indian Parliament, elevated the MAO College to the status of an Aligarh Muslim University (AMU).
- **The 1951 amendment** – It took away compulsory religious instructions for Muslim students at the AMU.
- **S. Azeez Basha v Union of India case (1967)** – The judgement took away the minority status of the AMU in 1967 stating that AMU was neither established nor administered by the Muslim minority.
- It came into existence through an Act of the central legislature and did not, therefore, qualify as a minority institution under Article 30 of the Constitution.
- **AMU amendment act (1981)** – It Conferred complete minority character to the AMU.
- **50% reservation for muslim** – AMU introduced the reservation for Muslim students in 2005.
- **Removal of minority status** - Allahabad High Court judgement (2006) struck down both 50% reservation for Muslim and the AMU Amendment Act (1981).
- **Appeal** - Government filed the appeal before the Supreme Court against the 2006 verdict of the Allahabad High Court.
- **Constitution bench** – Following this, the Supreme Court constituted a seven-member Bench to deal with a reference arising out of the 2006 order passed by the Allahabad High Court.

*In the T.M.A Pai Foundation (2002) case, the SC clarified that a 'minority' is to be determined by the concerned State's demography, not the national population.*

### What are the constitutional tests to determine the minority status?

- **Genesis** - Trace the origin of the idea for the establishment of the institution to determine the brain behind the establishment.
- For proof, a variety of sources could be considered – letters, correspondence with other community members or government officials, etc.
- The link must point towards one member of the minority or a group from the community.
- **Purpose** – It must "predominantly" be for the benefit of the minority community, even if it is not the sole purpose.
- **Implementation** – Examining the source of funding, land donations and constructors of the infrastructure.

### What are the significances of the Supreme Court judgement?

- **Overturns Azeez Basha case judgment** – New Judgement held that Statutory recognition to a minority institution doesn't remove its minority status.
- **Purpose** - While the purpose of establishing a minority institution should be the conservation of language and culture, it need not be the only purpose.
- **Admission** - Minority institutions won't lose its minority character by admitting non-minorities students.
- **Administration** - The administration of a minority educational institution does not need to be handled by the minority community.
- Its administration must reflect a commitment to protecting and promoting minority interests.
- **Education** - Secular education can be imparted at a minority institution without affecting its minority character.
- **Government aid** - If a minority institution has received aid from the government, no student can be forced to participate in religious instruction.
- If the institution is fully maintained out of state funds, it cannot provide religious instruction.
- However, these institutions must still be considered minority institutions.
- **AMU status** – Supreme Court further constituted three-member bench in its recent judgement to decide minority character of AMU.

## 5.2 President rule in Manipur

### Why in news?

Recently, large scale violence has erupted again in Manipur.

### What are the needs of president rule provisions in Indian context?

- **President's Rule** –It is a provision under Article 356 of the Indian Constitution that allows the central government to assume direct control over a state's governance.
- It also known as State emergency or Constitutional emergency.
- **Origin** - Emergency power of President in present Constitution can be traced from section 93 of the Government of India Act, 1935.
- Government of India Act, 1935 empowered both the Governor General (at the Federal level) and the Governor (at the provincial level) to deal with the failure of the Constitutional machinery.
- **Need of president rule**
- **Protect unity and integrity of the nation** - Parliamentary democracy is vulnerable to diverse and complex society of India.
- **Address governance breakdown** - Union intervention might be needed to ensure that states adhere to constitutional norms and maintain law and order when required.
- **Strengthen federalism** – To prevent federal units of the union resisting the central government and ensure cooperation among the states.
- **Protect individual's liberty** – when a state's machinery fails, depriving citizens of basic liberties, Union intervention becomes essential to safeguard their rights and restore peace.
- **Uphold constitution** – To ensure values and principle of the constitution is respected and obeyed by the states.
- **Protect states** – To protect states against external aggression and internal disturbance.

*Article 365 empowers the union government to impose president rule when states fail to comply with, or to give effect to, directions given by the Union.*

*B.R.Ambedkar, Alladi Krishnaswami Ayyar, K. Santhanam, Thakur Das Bhargava stressed the necessity of president's rule provisions.*

*Article 355 provides that it is the duty of the Union to protect States against external aggression and internal disturbance.*

### Article 356

- **President's Proclamation (1)** - If the President, by the report from the Governor of the State or otherwise, is satisfied that a situation has arisen in which the government of the State cannot be carried on in accordance with the provisions of this Constitution, the President may, by Proclamation.
  - (a) Assume to himself all or any of the functions of state
  - (b) Allow Parliament to exercise the powers of the State Legislature.
  - (c) Make provisions necessary to enforce the Proclamation, including suspension of certain Constitutional provisions relating to State authorities.
- **Revocation (2)** – Any such Proclamation may be revoked or varied by a subsequent Proclamation.
- **Parliamentary Approval (3)** – Must be presented to both Houses of Parliament and will cease to operate after two months unless approved.
- If issued during Lok Sabha dissolution, it remains *valid for 30 days* after the new Lok Sabha's first session, pending its approval.
- **Duration (4)** – Proclamation so approved shall, be operate six months from the date of issue of the Proclamation.
- **Extension beyond one year (5)** – The Proclamation can be extended beyond **one year** only when:
  - (a) A National Emergency in effect.
  - (b) Election Commission certification that elections to the State Assembly cannot be held due to difficulties.



### Why is Manipur violence unique?

- **Continuous violence** – No State in India has seen such continuing violence among the common people.
- **Common man violence** – Unlike other violence in north eastern states common man is involved in Manipur violence.
- Ordinary people have become the victims of violence and also forced to indulge in violence to protect themselves.
- **Involvement of police force** – State police force began to divide based on ethnicity which increased the hostility between Meitei and Kukis.

### What are the necessities of president rule in Manipur?

- **Breakdown of constitutional machinery** – The government has failed to protect its citizen's basic liberties and maintain law and order.
- **Deprivation of fundamental rights** - 3 million people of Manipur are deprived of fundamental rights and their lives, liberty, dignity, and peace.
- **Judiciary failure** – In spite of various judicial orders and directives the violence have not been controlled depriving.
- **Failure of governance** – Inability of the state government to control the violence in the state.
- **Internal disturbance** – The violence caused killing of more than 250 people and displacement of over a lakh of people.
- Hundreds of temples, churches, homes and other places have been destroyed.
- Article 355 imposed in 2023 which empowers the Union government to protect the state under any internal and external threat.

### Manipur Issue

- Meiteis are the valley people, constituting 65% of state population and Kuki are tribes living in hills constituting 35% of Manipur population.
- 90% of the state's geographical area comprises hills.
- **Sectarian violence** – Conflict between the dominant Meitei and Kuki communities is majorly due to the imbalance in development across and protecting the ethnic rights of their community on the state.
- **Meitei demands** – They demand for ST status to preserve their ancestral land, tradition, culture, and language.
- They argue that they were scheduled tribes before 1949 and lost the status after the merger with India.
- The reduction their population invokes fear of marginalization among the community.
- **Refugee intrusion** – Influx of Kuki refugees from Myanmar have heightened tensions over demographic shifts and resource competition.
- Manipur shares nearly 400-km border with Myanmar.
- **The sudden trigger** – In April 2023 the Manipur High Court recommended the state government should consider the demand of Meitei communities.
- **Kuki's objection** – As Meitei account for half of Manipur's population and extending ST status to them would mean they would get a share of education and government jobs reserved for Kukis and Nagas.
- The conflict began after a peaceful protest march organized by the All Tribal Student Union of Manipur (ATSUM) against the Manipur High Court's recommendation to recognize the Meitei as a Scheduled Tribe (ST).

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

### What lies ahead?

- Restore governance and protect citizens' rights in the state by curbing the violence.
- The government should act decisively to bring back peace, harmony, justice, relief and rehabilitation.
- Engage both parties to peace talks to stop the violence.

### 5.3 Multiparty System in India's Political Landscape

#### Why in news?

The recently Jammu and Kashmir Assembly passed a resolution urging the Union government to initiate dialogue with its elected representatives for the restoration of special status.

#### What is a political party?

- **Political party** – A political party is an organized group of individuals who come together to contest elections, secure political power, and implement policies aligned with their ideology or agenda.
- Political parties serve as intermediaries between citizens and the government, articulating public demands and shaping governance.
- **Recognition of political parties** – In India, the Election Commission of India (ECI) recognizes political parties based on their electoral performance.

*In the 1980s, state assembly elections **elevated the electoral presence and influence of regional parties.***

Criteria for National party recognition	Criteria for State party recognition
<ul style="list-style-type: none"> <li>• 6 %of the votes cast in <u>four or more states</u> and 4 seats in Lok Sabha or state assemblies.</li> <li>• 2% of the Lok Sabha seats from 3 states.</li> <li>• Recognized as state party in 4 states.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>6% of the valid votes polled</b> in the assembly election and <b>2 seats</b> in the assembly of the state.</li> <li>• 6% of the valid votes polled in Lok Sabha election and win 1 seat.</li> <li>• 3% of seats or 3 seats in the assembly in the legislative assembly whichever is more.</li> <li>• Winning 1 seat for every 25 seats in the Lok Sabha from the state concerned.</li> <li>• 8% of the total valid votes polled in the state at Lok Sabha or state assembly general election. <b>This condition was added in 2011.</b></li> </ul>

- **National parties in India** – As on 2024, **6 parties** are recognized as national parties.
  - Bharatiya Janata Party (BJP)
  - Indian National Congress (INC)
  - Communist Party of India (Marxist) (CPI-M)
  - Bahujan Samaj Party (BSP)
  - National People's Party (NPP)
  - Aam Aadmi Party (AAP)
- **State parties in India** – As on 2024 there are **58 parties** recognized as state parties.

#### What are the factors contributed for rise of regional parties?

- **Linguistic reorganization of states** – The creation of states based on language in 1956 fueled regional identities, providing fertile ground for regional parties to thrive.
- **Growth of regional consciousness** – Regional identity has grown due to historical, cultural, and linguistic differences which fueled demands for autonomy, recognition, and greater resource allocation.
- **Uneven development** – Disparities in economic and social development among states have led to emergence of regional parties.

#### Evolution of multiparty system in India

##### 1952-1964

- One-party system under Congress rule.
- The Congress Party was like a big umbrella that accommodated various ideologies and interests.
- Regional parties were weak and acted more like pressure groups.

##### 1964-1977

- The death of Nehru and the 1967 elections challenged Congress dominance.
- Regional parties grew stronger, and Congress faced internal power struggles.
- Indira Gandhi declared a state of emergency in 1975.

##### 1977-1980

- A coalition government led by the Janata Party came to power, but internal ideological differences led to its fall.
- Congress regained power in 1980.

##### 1980-1989

- Center-state tussle.
- Congress faced off against newly emerged regional parties at the state level.
- Regional parties became more assertive in national politics.

##### 1989-2024

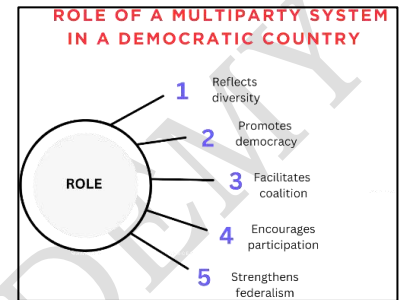
- Multi-party system and coalition politics.
- The rise of regional parties and decline of Congress led to an era of coalition governments.
- This period had both advantages and disadvantages.

- **Caste-based political mobilization** – The mobilization of caste groups to cater the specific needs of the communities.
- **The “sons of the soil” movement** – It demanded local employment and resources for native people of the state, especially in states with significant migration.
- **Ethnic differences** – Ethnic diversity, particularly in the northeastern states, has led to the rise of regional parties addressing local ethnic and cultural aspirations.

Political scientist **Paul Brass** argued that most of the national parties are regional parties spread over a few states. Hence, he called the party system in India an ‘unstable fragmented multiparty system’.

### What is the role of regional parties in reshaping India's political landscape?

- **Emergence of multiparty system** – Rise of regional parties in the states led to a multiparty system in India's political landscape.
- **Coalition politics** – Regional parties play vital role in shaping national policies by negotiating their regional demands.
- The recent Lok Sabha election also proved that no single party can secure a majority without the support of regional parties.
- **Balance of power** – The rise of regional parties reduced strong center by balancing the power between the center and states.
- **Decentralization** – Regional parties work towards decentralization of power in national politics.
- **Strengthened federalism** – Regional parties have ensured that state-specific issues are prioritized, balancing central policies with local needs.
- **Cooperative federalism** – The multi-party system has strengthened cooperative federalism, as the center must negotiate with regional parties to pass legislation.
  - Institutions like the NITI Aayog have become platforms for collaborative policy-making.
- **Political inclusiveness** – Coalition politics facilitated political inclusiveness, allowing regional parties to represent their constituencies effectively at the national level.
- **Policy innovation** – Successful welfare programs like Tamil Nadu's mid-day meal scheme and Odisha's KALIA scheme highlight the impact of regional parties on governance.
- **Strained central-state relations** – The rise of regional parties has decentralized power, enabling states to assert their autonomy.
- Conflicts on resource allocation, legislative matters, and role of governors strained centre-state relations.
- **Unequal economic growth** – The witnessed competition among states for attracting foreign direct investments, which widened the existing income and consumption gap between states.



### Centre state relation commissions

- **Sarkaria Commission (1983)** - Chaired by Justice R S Sarkaria (B Sivaraman and S R Sen were other members).
  - The commission submitted its report in 1988 and made 247 recommendations.
  - **Reccomendation**
    - Foster cooperative federalism
    - Non-partisan governors.
    - Establishment of Inter-State Council under Article 263 of the Constitution to facilitate coordination of relations between the centre and states.
  - **Punchhi Commission (2007)** – Chaired by Madan Mohan Punchhi, along with 4 members.
    - Submitted its report in 2010 and made 273 recommendations.
    - **Recommendations**
      - Creation of a national integration council
      - Amendments to state emergency provisions (Articles 355 and 356)
      - Non-partisan appointment of governors
      - Consultation with states before legislating on matters in the Concurrent List

### What lies ahead?

- Balance between autonomy and unity by negotiation and cooperation.
- Transparent and equitable allocation of financial resources to maintain harmony between the center and states.
- Inclusion of Regional Aspirations to ensure that diverse communities are represented, fostering inclusive democracy.

## 5.4 Urban Financing in India

### Why in news?

A recent report by World Bank says that India needs approximately 70 lakh crore rupees by 2036 to meet its urban infrastructure needs.

### What is urban financing?

- **Urban financing** – It is the process of securing the funds needed to improve and expand a city's physical infrastructure.
- **Source of urban revenues in India:**

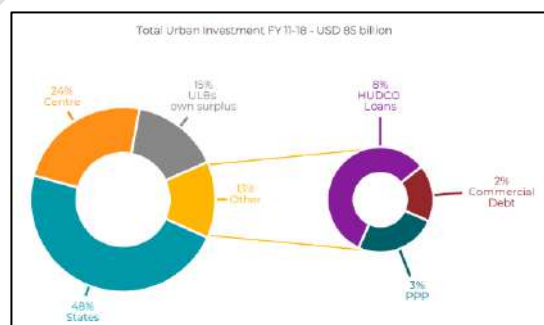
**Urbanization** is the process of people moving from rural to urban areas, and the corresponding growth in the number of people living in cities.

Revenue Head	Sources of Revenue
Tax Revenue	Property tax, advertisement tax, tax on animals, vacant land tax, entertainment tax, surcharge on stamp duty, profession tax, Motor vehicles tax.
Non-tax Revenue	User charges, municipal fee, sale & hire charges, lease amount.
Assigned/shared revenue	ULBs receive a percentage of taxes levied and collected by the state government.
Grants-in-aid	Grants from central government and state government under various projects and schemes.
Loans	Loans borrowed by the local authorities for capital works from HUDCO, LIC, State and Central Governments, Banks and Municipal Bonds.

- **Shortfall in financing** – Current annual investment of 1.3 lakh crore rupees falls short of the required 4.6 lakh crore rupees.
- To meet the demands of its fast-growing urban population, the government would need to invest 84,000 crores rupees over the next 15 years, an average of 5,500 crores rupees each year.

### What are the current issues in urban financing?

- **Stagnant municipal finances** – Municipal tax revenues have risen by 8% in past decade which shows only modest growth.
  - Municipal revenue stuck at 1% of GDP since 2002.
- **Inefficient tax collection** – Low service charges for municipal services undermine financial sustainability and viability.
  - Property tax contributes only 0.15% of GDP.
- **Low cost recovery** – The cost recovered on implemented projects in urban utilities is very low compared to other large middle-income countries.
- **Weak absorptive and implementation capacity** – It limits overall infrastructure delivery due to institutional weaknesses like weak strategic planning to develop pipeline of viable projects, low capacity to design and structure complex projects.
- **Low fund utilization** – As per 15<sup>th</sup> finance commission report, 23% of municipal revenue remains unspent.
- **Underutilization of central schemes** – Urban local bodies were able to spend only 2/3<sup>rd</sup> of funds under schemes like Smart Cities Mission and AMRUT schemes.
- **Dependency on transfer payment** – ULBs are highly dependent on central and state grants which reduced their ability to funds.
- **Declining public-private partnerships** – Private debt financing has primarily been raised by a few large ULBs across the country, with cities from only 7 states accounting for all municipal bond issuances in India.
- Private investments dropped from 8,353 crore rupees in 2012 to 467 crore rupees in 2018.



Due to rapid urbanization, urban local bodies will be home to **40% of the population by 2036**, and urban areas contribute almost 70% to GDP.



- **Restrictive inter-governmental framework** – It reduces accountability and incentives for city agencies to invest more ambitiously in infrastructure.
- **Highly centralized** – States control over ULB financing which is opposite of international best practice, is not conducive to create environment for private financing.
- **Weak fiduciary capacity** – The quality and data of city agencies undermines investor confidence and creditworthiness.

#### What are the reforms suggested by the World Bank?

- **To strengthen municipal governance** – By revising state municipal legislation to give them more authority.
- **Structural reforms** - The fiscal transfer system (at both national and state levels) should move to a more stable, formula-based, and unconditional fiscal transfer regime.
- **Improve creditworthiness** – By addressing revenue constraints through increasing property taxes, user fees and service charges from the current low bases substantially in real terms.
- **Diversify funding sources** – Use of municipal bonds, land-value capture, and attract private investment through better PPP models.
- **Decoupling project preparation** – Project preparation must prioritize financial, social, and environmental sustainability to ensure long-term success.
- **Improving cities absorptive capacity** – Supporting cities with strategic multi-year capital investment, financial planning and building a pipeline of investment projects.
- **Adopt digital public infrastructure (DPI)** – To streamline services like transport and utilities using digital technologies.
- **Increase decentralization** – Empowering local governments and communities is essential for sustainable urban development.
- **Capacity building** – Through facilitation, technical assistance, and removing market frictions
- **Establish a dedicated Support Unit** – Such as Cities Investment unit within an appropriate Ministry to focus on infrastructure finance to assist specific cities.
  - This Unit can nurture partnerships between stakeholders.
- **Integrated urban development** – Urban transport projects, such as metro rail systems, should be integrated with land-use planning to optimize resource utilization and reduce commuting distances.

#### What lies ahead?

- Allocate minimum 10% of income tax collected from cities for urban infrastructure development.
- Engage citizens in identifying needs and designing solutions.
- Coordinate between government, private sector, and citizens for innovative solutions.
- Ensure regular elections and accountability in urban local bodies.

### 5.5 Strengthening election commission of India

#### Why in news?

Recently, calls have been made to strengthen the ECI's role and independence in order to increase voter trust.

#### What are the Constitutional provisions related to the election commission?

- **Constitutional body** – The Election Commission of India (ECI) is established on January 25, 1950 to ensure free and fair elections.
- **All-India jurisdiction** – The ECI is common to both the Central and State governments.
- **Powers and functions** – Superintendence, direction and control of elections to:
  - Parliament, State Legislatures, President and Vice-President.
- **Composition of the election commission of India** – Chief Election Commissioner (CEC) is the head of the Election Commission and is the senior-most official.
- The commission may have up to two other Election Commissioners and this provision was added in 1989.

- Together with the CEC, the ECI they form a multi-member body.
- The CEC and Election Commissioners have equal powers and responsibilities.
- **Procedure for appointment** – The President makes the appointments based on the recommendations of the panel consisting of:
  - Prime Minister,
  - Leader of the opposition in Lok Sabha,
  - A member of the union council of ministers to be nominated by the prime Minister.
- **Tenure and conditions** – Six years or until reaching the age of 65, whichever is earlier
- **Removal** – The CEC can be removed from office in the same manner as a Supreme Court judge (on grounds of proved misbehavior or incapacity).
- Other Election Commissioners can be removed on the recommendation of the CEC.
- **Articles related to election commission:**
  - **Article 324** – Grants the Election Commission of India (ECI) powers of superintendence, direction, and control of elections.
  - **Article 325** – Prohibits discrimination based on religion, race, caste, or sex in electoral rolls.
  - **Article 326** – Provides for adult suffrage for elections to the Lok Sabha and state legislatures.
  - **Article 329** – Bars courts from interfering in electoral matters except through election petitions.

#### What are the issues in India's election system?

- **Declining Voter Turnout** – Lack of awareness, logistical hurdles, and political disillusionment contribute to declining voter turnout.
- **Electoral Violence** – Violence and threats during elections disrupt the voting process, especially in rural and conflict-affected regions.
- **Exploitation of Media for Misinformation** – The manipulation of media, including social platforms, skews public opinion and divides the electorate.
- **Deep fake videos** were used to influence the voter decisions.
- **Gender Disparity in Political Representation** – The political system remains biased against women, resulting in their significant underrepresentation in legislative bodies.
- As of 2024, women represent just **13.6% of the Lok Sabha**, reflecting the gender disparity in political participation and leadership.
- **Use of black money** – Unregulated funding channels increase the influence of black money in elections.
- Lack of transparency in political donations undermines accountability.
- **Increasing criminalization in politics** – In the 2024 elections, **46% of elected members** faced criminal cases.
- Voters often lack adequate information to make informed choices.
- **Political defections** – Despite the Anti-Defection Law, political defections remain rampant.
- Horse trading and destabilization of governments compromise the democratic values.
- **Increase in wealthy candidates** – Which make difficult for other candidates to compete in terms of money.
- In 2024 Lok Sabha elections **93% of elected** members were crorepatis.

#### What are the key reforms needed?

- **Improving election funding transparency** – Introduce state funding for political parties with independent audits.
- Establish a **National Election Fund** for all donations to ensure equitable distribution.
- **Impartial appointment procedures** – To ensure independence of Election Commissioners for free and fair elections.
- **Addressing criminalization** – Ban candidates with serious criminal charges from contesting elections.

- Enhance voter education and transparency in candidate disclosures.
- **Capping wealth disparities** – Impose stricter ceilings on candidate expenditure.
- Audit political party expenditures to curb financial malpractice.
- **Reforming anti-defection law** – Amend the Tenth Schedule to make it more effective to uphold democratic principles and trust of the people.
- Enforce stricter penalties for political defections and horse trading.
- **Improve voter turnout** – By increasing the awareness among the public through campaigns.

#### What lies ahead?

- Develop comprehensive laws to address funding, criminalization, and defection issues.
- Encourage voter participation and education on clean politics.
- Enhance coordination among the executive, legislature, judiciary, and ECI to uphold democratic values.

## 6. GOVERNMENT POLICIES AND INTERVENTIONS

### 6.1 Use of Aadhaar Biometric in Forensics

#### Why in news?

Recent discussions about using Aadhaar biometrics data to identify unknown dead bodies.

#### What are the challenges in finding identity with the current system?

- **Limited Records** - Fingerprint databases for police investigations are often limited to the records of those with known criminal histories.
- **Inadequate Digitization** - In many States, these records are not yet digitized, making it even more difficult to cross-reference data quickly and efficiently.
- **Under Reporting** – Many of the missing person cases are not registered with police, thus making it difficult to identify the person.
- **Inadequate Evidences** - Victims of hit-and-run accidents without identification documents or mobile phones, or those with mental health issues and travelling to unfamiliar places.

#### What are the advantages of using Aadhaar in forensic?

- **Identification of deceased individuals** – Identification of unclaimed or unidentified bodies who are mostly migrant workers, homeless individuals.
- **Finding Missing Person** – Identifying missing or trafficked children, persons with mental health issues traffic.
- **Right to Life and Dignity** – Faster recognition of a deceased person enables for respectful final rites and closure for families.
- **Effective Crime Investigation** – Access to fingerprint data can offer essential scientific support to an investigation.
- **Enhancing Criminal Justice** – Effective investigation enhances the criminal justice system.
- **Uphold Public Safety** – Crime reduction using Aadhaar improves public safety and reduces crime rate.

#### What are the limitations in using the Aadhaar in forensic?

- **Privacy Protection** - UIDAI takes privacy seriously, enforcing strict guidelines to protect individuals' demographic and biometric information.
- **Biometric Prohibition** - Section 33 of Aadhaar Act prohibits sharing of “core biometric information”, which includes fingerprints and iris scans, with anyone for any reason.
- **Restriction in Access** - Section 33(1) of the Aadhaar Act allows the disclosure of certain information under an order of a court not inferior to that of a High Court judge.
- **Right to Privacy** - Supreme Court Judgement in Justice Puttaswamy case held Right to Privacy as a fundamental right protected under Article 21.

- **Data Privacy Law** - Digital Personal Data Protection (DPDP) Act, 2023 protects the personal identity data of citizens.
- **Technical Limitation** - The technological architecture of UIDAI for Aadhaar-based authentication does not allow for matching prints, including latent and chance finger prints, against the other finger prints in the UIDAI database.

### What lies ahead?

- Re-evaluating privacy restrictions in Aadhaar Act on specific contexts, such as identifying a deceased person.
- Providing the police with access to a deceased person's core biometric information, strictly based on a first information report (FIR).
- Enabling jurisdictional judicial magistrate to authorize the data access instead of High court judges to reduce the burden on the higher judiciary in cases not involving violations of privacy.
- Similar provisions might be adopted in India to ease identification challenges without compromising privacy.
- Implementing legal and ethical guidelines with transparency can ensure Aadhaar's continued relevance and secure its place as a trustworthy public utility.

### Quick Facts

- **UIDAI** – The Unique Identification Authority of India was established in 2009 to build a secure and centralized database that could help in the accurate identification of individuals across the nation.
- **Objective of UIDAI** – To streamline and secure identity verification processes, thereby reducing the risk of identity fraud and enabling individuals to access various governmental and non-governmental services.
- **Aadhaar** – It is a 12-digit unique identity number based on individual's demographic and biometric data, such as fingerprints and iris scans.

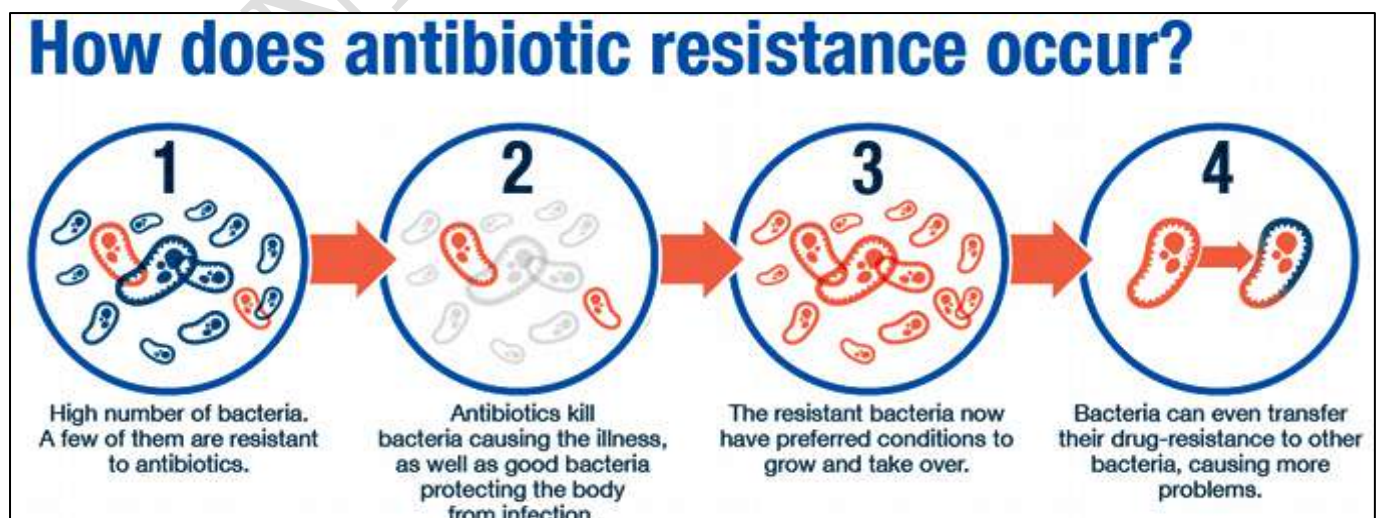
## 6.2 One Health Approach for Antimicrobial Resistance

### Why in news?

Recently United Nations General Assembly held a high-level meeting on AMR emphasizing prevention.

### What is anti-microbial resistance?

- **Antimicrobial** – It is a drug designed to treat and prevent infectious diseases in humans, animals, and plants.
  - Antimicrobials include antibiotics, antivirals, antifungals, and antiparasitic.
- **Antimicrobial Resistance** – AMR is a natural process that happens over time through genetic changes in pathogens and it no longer respond to anti microbials.
- It is further accelerated by human activity, mainly the misuse and overuse of antimicrobials to treat, prevent or control infections in humans, animals and plants.



- **Global Concern** – Antimicrobial medicines are the cornerstone of modern medicine.

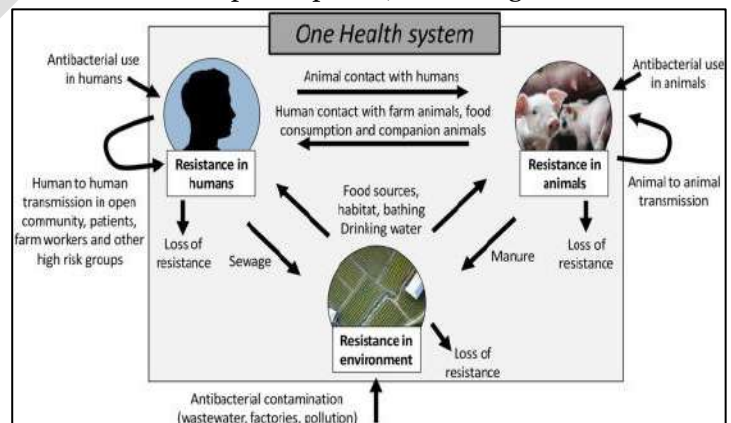


- The emergence and spread of drug-resistant pathogens threaten our ability to treat common infections.
- **Consequences:**
  - Increased mortality rate incurred by microbial infections.
  - Currently 5 million deaths per year globally.
  - Increased treatment cost and out of pocket expenditure on health.
  - Destabilize medical progress.
  - Threat of blood stream infections.

To know the causes of AMR, click [here](#)

### What are the challenges in fighting AMR?

- **Fragmented Policy Responses** – India’s regulatory oversight of antibiotic use spans across multiple departments in the ministries of health and family welfare, agriculture and environment.
- **Limited Data** – The absence of a centralized, cross-sectoral data repository hinders comprehensive policy development and effective monitoring affects AMR surveillance.
- **Lacks of Strong Enforcement Mechanism** – Enforcement remains weak due to limited manpower, resources and decentralized governance.
- **Antibiotic Misuse** – Ineffective measures have limited success in preventing antibiotic misuse across various sectors.
- **Inadequate AMR Training** – Many professionals lack essential training to manage AMR effectively in healthcare and veterinary hospitals.
- **Over Prescription of Antibiotics** – Frequent, unnecessary antibiotic prescriptions heighten resistance risks, particularly in underserved rural areas.
- **Self-Medication Practices** – People often use antibiotics without prescriptions, worsening resistance due to improper dosing and usage.
- **Industrial Scale Farming** – Expansion of agricultural production, including fisheries, dairy and poultry and regular antibiotic use for livestock growth has increased susceptibility to AMR.
- **Mishandling of Pharmaceutical Waste** – Improper drug disposal contaminates water, soil, exacerbating resistance in the environment.
- **Limited Technological Support** – Few tech tools exist to accurately monitor, analyze, and manage antimicrobial resistance data.
- **Limited Funding** – Financial limitations restrict research, innovation, and effective AMR control measures in healthcare.
- **Limited Alternative Treatments** – Preventive measures such as vaccines, and viable non-antibiotic treatment options are essential to combat AMR.
- **High Medical Cost** – It discourages people to approach health facilities and prefer over the counter self-medication.



### What is the role of one health in fighting AMR?

To know more about **one health**, click [here](#)

- **Integrated Disease Surveillance** – Disease monitoring across human, animal, and environmental sectors helps to address communicable diseases of zoonotic, transboundary animal diseases and diseases of epidemic/pandemic potential.

*One Health is an integrated, unifying approach that aims to **sustainably balance and optimize** the health of people, animals and ecosystems.*

- **Environmental Surveillance System** – To understand the disease transmission dynamics across human, animal husbandry and wildlife.
- **Outbreak Investigation** – Joint investigation and control of diseases across human, animal husbandry and wildlife sectors.
- **Prevention in Animal Sector** – Investing in biosecurity measures and vaccination programs in animal husbandry can significantly reduce antibiotic reliance.
- **Community-based Awareness** – Implementing community-based AMR awareness campaigns can address public misconceptions about antibiotic use.
- **Behavioral Changes** – Responsible use of antibiotics at the grassroots level could foster a shift toward preventive healthcare.
- **Sustainable Waste Management** – Green practices for waste management, particularly pharmaceutical waste, can minimize environmental AMR contamination.

### One Health AMR initiatives of India

- **National One Health Mission** - It aims to develop an integrated approach to address AMR, zoonotic diseases and environmental degradation.
- **National One Health Programme for Prevention and Control of Zoonoses** - To operationalize “One Health” Mechanisms for prevention and control of Zoonoses.
- **Centre for One Health** – It implements four National Health Programs
  - National Rabies Control Program (NRCP)
  - National One Health Programme for Prevention and Control of Zoonoses (NOHP-PCZ)
  - Program for Prevention and Control of Leptospirosis (PPCL)
  - National Programme for Prevention and Control of Snakebite Envenoming (NPSE)
- **National Action Plan on AMR (NAP-AMR)** – Initiated for 2017-2021 and now updating for 2022-2026, to tackle six crucial areas, including surveillance, research, and optimized antibiotic use across health sectors.
- **One Health Consortium** – India’s first multi-sectoral AMR surveillance initiative, bringing human, animal, and environmental health professionals together for comprehensive monitoring and action.
- **Delhi Declaration on AMR** – A collaborative pledge across various sectors to control AMR spread through integrated policies.
- **Indian Priority Pathogen List** – Guiding research list and new antibiotic development for high-risk pathogens.
- **Chennai Declaration** - Recommendations for healthcare providers to improve AMR prevention and *antibiotic stewardship*.
- **AMR Surveillance and Research Network (AMRSN)** - Indian Council of Medical Research (ICMR) established it in 2013 to generate evidence and monitor trends and patterns of drug-resistant infections across India.

### What lies ahead?

- Harmonizing regulations and fostering inter-departmental collaboration are critical to developing a coherent AMR strategy.
- Establishing stringent guidelines and policies for veterinary and agricultural use of antibiotics is crucial for addressing AMR.
- Awareness programmes and strict prescription regulations are necessary to curb misuse at the community level.
- Tailored training programmes focused on AMR prevention and management are essential for improving practices across sectors.

## 6.3 Autonomy for Major Ports

### Why in news?

In a recent proposal Government looks to reduce red tape and reduce port infrastructure delays.

## What are the ports reform proposal by Government of India?

- **Ports in India** – With a coastline of over 7,500 kilometers, India is home to 12 major ports and over 200 non-major ports.
- **Proposal** – The Ministry of Ports, Shipping and Waterways is considering expanding the autonomy of major ports in making decisions.
- **Expand financial powers** – India's 12 major ports to undertake capital expenditure (capex) at their discretion only on using their internal resources.
- **Categorize ports** – Government plans to categorize India's 12 major ports into four groups based on the **size of operations** and other factors.
  - It will determine the ceiling for capex that can be undertaken without the need for approval.
- **Elevating to enterprise model** – This is part of a broader initiative to bring major ports onto the same operating field as central public sector enterprises.
- In 2023-24, major ports handled 721 million tonne (mt) of cargo, marking an 11.8% growth year-on-year, while non-major ports handled 817 mt, growing by 4.4%.

### Legislations governing ports in India

- **Port trust** - A port trust is a statutory authority in India that manages trade and shipping through a commercial seaport.
  - The first Port Trust Board was established in 1870 for Calcutta Port.
- **The Major Port Trusts Act of 1963** – It established port authorities for some major ports in India for the administration, management, and control of those ports.
  - The act brought the administration of Port Trust Boards under the national government.
- **The Major Port Authorities Act, 2021** – The act aims to make major ports in India more competitive with private players, and to improve the governance of ports.
- **Significance** – The act gives major ports more autonomy, and vests their administration, control, and management with the Boards of Major Port Authorities.
  - Ports can approve up to Rs 100 crore independently.
  - Spending over Rs 500 crore needs clearance from inter-ministerial bodies such as the GatiShakti Network Planning Group, the Public Investment Board, and the Union Cabinet.



### Other initiatives:

- **Maritime India Vision 2030 (MIV 2030)** – A blueprint to accelerate and harmonize the growth of India's maritime sector over the next decade.
- **Sagar Mala project** – A program launched in 2017 to invest \$123 billion in 415 projects related to port modernization and new port development.
- **Distriparks** – Areas where companies are established to perform trade and transport-related value-added services.

## What are the significances of enhancing port autonomy?

- **Port development** – Major ports may self-fund capital projects through their own source of revenue without ministry approval.
- **Reduce bureaucratic hurdles** – It allows the ports to execute the critical projects in swift manner which leads to **ease of doing business**.
- **Boost competitiveness** – It increases the efficiency of cargo handling in major ports like Paradip, Vizag, and Kandla.
- **Economic growth** – Improved port infrastructure reduces logistics costs, enhancing trade volumes and bolstering India's position in global trade networks.

- **Boosting regional trade** – Improved port operations can position India as a hub for regional trade, enhancing connectivity with neighboring countries.
- **Reducing turnaround time** – Streamlining operations reduces cargo handling delays, improving efficiency and reliability in trade logistics.
- **Providing level playing field** – Autonomy enables state-owned ports to compete effectively with private ports, which often enjoy operational flexibility.

#### What lies ahead?

- Improve infrastructure and streamline operations to compete with leading global ports.
- Reduce logistics costs and boosting efficiency to attract higher trade volumes.
- Strengthening regional connectivity improve their capacity and efficiency.

#### Quick facts

Ports in India are categorized based on their administration, cargo handling capabilities, location, and functions.

- **On the basis of administration**
  - **Major ports** - Ports administered directly by central government.
  - **Non-major ports** - Ports that administered by state governments.
- **On the basis of Cargo handled**
  - **Industrial ports** - It handles large-scale industrial shipments specializes in bulk cargo like grain, ore, oil, and chemicals.
  - **Commercial ports** - Which handles a wide range of consumer goods and containerized cargo
- **On the basis of location**
  - **Inland ports** - Located away from the sea, but connected to it by a river, canal, or lake. Inland ports are often used for storing and dispatching cargo.
  - **Outports** – It is located in deep waters that serves the main port to handle large ships.
- **On the basis of specialized functions**
  - **Oil ports** – Also known as oil terminals that store, process, and ship oil products.
  - **Ports of call** – It is an intermediate stop for ships to transshipment of cargo or fuel refilling.
  - **Packet stations** – It is also known as ferry ports that is exclusive for transportation of passengers and mail.
  - **Entre port** – A collection center for goods from different countries that are then exported
  - **Naval ports** – Ports which have only strategic importance. These ports serve warships and have repair workshops for them.

## 7. HEALTH

### 7.1 Pandemic Fund Project

#### Why in News?

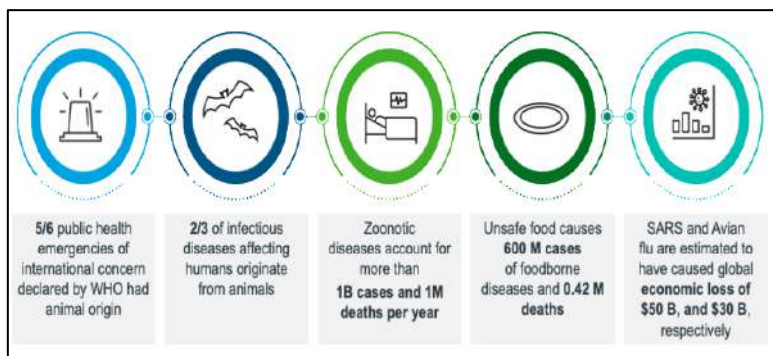
Recently “Animal Health Security Strengthening in India for Pandemic Preparedness & Response” initiative has been launched by the Indian government under Pandemic Fund Project.

#### What are the needs of animal health management?

- **Public Health Emergencies** - In the past few decades, WHO declared 6 public health emergencies of international concern, and 5 of these have animal origin.
- **Increasing Zoonosis** – About two-thirds of infectious diseases affecting humans originate from animals.
- **Zoonotic Mortality** – Zoonotic diseases account for more than 1Billion cases and 1Million deaths per year.



- **Pandemic Preparedness** - COVID-19 pandemic acknowledged that pandemic preparedness and response (PPR) needs a One Health approach and a focus on animal health security.
- **Protect Livestock Wealth** - 536 million livestock and other animals of India requires measures to prevent and manage infection outbreaks.
- **Food Safety** - Unsafe food causes 600 M cases of foodborne diseases and 0.42 M deaths.
- **Prevent Economic Losses** - SARS and Avian flu are estimated to have caused global economic loss of USD50 Billion and USD30 Billion, respectively.
- **Poverty Threats** - Animal disease outbreaks also threaten to reverse the gains made in poverty reduction.



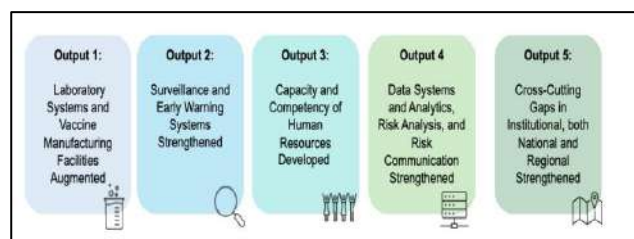
### What is the Pandemic Fund Project?

- **Pandemic Fund Project** – The project “Animal Health Security Strengthening in India for Pandemic Preparedness & Response” is launched under the G20 Pandemic Fund.
- **Nodal Ministry** - Union Ministry of Fisheries, Animal Husbandry and Dairying.
- **Objective of the Project** - To enhance the country's capacity to prevent, detect, and respond to animal health threats.
- **Implementation** - It is being implemented through three implementing entities Asian Development Bank (ADB), the World Bank, and the Food and Agriculture Organization (FAO).

***G20 Pandemic Fund** was created by G20 countries under Indonesian presidency in 2022 to assist low-and middle-income countries in strengthening their capacities to identify, report and contain future pandemics.*

### What are the major interventions under the project?

- **Augmentation of Laboratory Systems** - Upgrading and expanding animal health laboratories and developing laboratory networks.
- **Strengthening of Surveillance and Early Warning Systems** - Enhancing early warning systems and building robust sentinel and passive surveillance mechanisms to detect potential outbreaks at an early stage and facilitate timely interventions.
- **Human Resources Development** - Enhance the skills and capabilities of animal health human resources.
- **Upgrading data management systems** - Strengthening of Data Systems, Analytics and Risk Analysis for better risk assessment, improved decision-making, and more effective communication strategies related to animal health risks.
- **Addressing Institutional Capacity Gaps** - Strengthen institutional capacity at both national and regional levels by supporting the development of a disaster management framework for the livestock sector and AMR management.



### What are the expected outcomes of the project?

- **Outcome** – Impact of the project would be
  - To reduce the risk of pathogen emergence from animals (domesticated and wildlife)
  - Prevent transmission to the human population
  - Endangering the health, nutritional security, and livelihoods of vulnerable populations.
- The project is designed to enhance India's animal health security through the following five key outputs

### Quick facts

#### 2019 Livestock Census

- Total livestock population of India 535.78 million.
  - 192.9 million cattle

- 148.88 million goats
- 109.85 million buffaloes
- 74.26 million sheep
- 9.06 million pigs
- All other animals taken together contributed just 0.23% of the total livestock population in India.

## 6.4 CKM Syndrome

### Why in News?

World Diabetes Day is observed on November 14.

### What is CKM syndrome?

- **CKM Syndrome** – It is a complex disorder made up of cardiovascular disease, kidney disease and obesity and Type 2 diabetes.
- Obesity and Type 2 diabetes are metabolic conditions and each of the four conditions in CKM syndrome can lead to or worsen one another.
- **Symptoms** - CKM syndrome symptoms may include any of the issues you get with the four conditions that make up cardiovascular-kidney-metabolic syndrome.
  - Chest pain.
  - Shortness of breath.
  - Syncope (passing out).
  - Swelling in your legs, feet, hands or ankles.
  - Pain in your legs while walking.
  - Tiredness.
  - Loss of appetite or an increase in appetite.
  - The need to pee more often.
  - Dry skin.
  - Sleep apnea.
  - Gout.
- **Insidious Growth** – It is often marked by a gradual rise in body weight and waist circumference that soon escalates into obesity, setting off a chain reaction in the body.
- **Premature Death Vulnerability** - Major organs such as the heart, the kidneys, liver and blood vessels bear the brunt, leaving those affected vulnerable to premature death.
- **NCD Burden** – As per Global Burden of Disease (GBD), the burden of non-communicable diseases (NCDs) account for 69% of premature deaths and 68% of years lost to disability.
- **India NCD Burden** – As per National Family Health Survey (2019-21)
  - Diabetes prevalence - 16.1%
  - Obesity - 40.3%
  - Hypertension – 24% of men and 21% of women
- **Tamil Nadu NCD Burden** – As per 2020 Tamil Nadu STEPS survey,
  - Overweight - 28.5%
  - Obesity - 11.4%
  - Hypertension - 33.9%
  - Diabetes - 17.6%

*The **WHO STEP** wise approach to NCD risk factor surveillance (STEPS) is a simple, standardized method for collecting, analysing and disseminating data on key NCD risk factors in countries.*

### What are the reasons for high prevalence of CKM?

- **Influence of Globalization** – Long work hours, night shifts, ignoring our need for rest, idolizing workaholism.

- **Unhealthy Lifestyle** – Long working hours and frequent night shifts lead to brain fatigue and reduced secretion of happy hormones, often counterbalanced by eating super-palatable foods which are rich in salt, sugar and butter.
- **Extended Work Hours** – It disrupts hormone levels, with cortisol (the “stress hormone”) driving unhealthy carbohydrate and lipid metabolism.
- **Poor Glycemic Control** – Distribution of rice, a high glycemic food, through the Public Distribution System (PDS), has contributed to obesity.
- **Poverty** – Low socioeconomic status is associated with use of tobacco and alcohol, physical inactivity, and poor diet.

### What are the challenges?

- **Lack of Holistic Risk Assessment** – Current health management models Miss Key opportunities for optimal, holistic risk assessment.
- **Fragmented Care** - Patients with multiple affected organs see separate specialists for each issue, leading to, drug interactions, repeated visits, and, ultimately, a loss in wages and productivity.
- **Inadequate Management** - Less than one-fourth of the affected individuals receives any measure of controlling their blood pressure.
- **Low Awareness** – Lack of awareness among people about the causes, impacts of NCDs and unhealthy lifestyle practices.

<b>YOUNG &amp; UNHEALTHY</b>			
	1-4 yrs	5-9 yrs	10-19 yrs
<b>DISEASES OF OVERNUTRITION (%)</b>			
Overweight	3.7	4.9	
Obesity	1.3	1.1	
Pre-diabetes	10.3	10.4	
Diabetes	1.2	0.6	
Hypertension		4.9	
High total cholesterol	3.2	3.7	
<b>DISEASES OF UNDERNUTRITION (%)</b>			
Anaemia	40.6	23.5	28.4
<b>MICRONUTRIENT DEFICIENCIES (%)</b>			
Iron	32.1	17.0	21.5
Vitamin D	13.7	18.2	23.9
Vitamin A	17.5	21.5	15.6
Vitamin B12	13.8	17.2	30.9
Zinc	19.0	16.8	31.7

*Source: ICMR-National Institute of Nutrition Report on Dietary Guidelines for Indians*

### What are the impacts?

- Current trends of rising obesity, diabetes, and hypertension rates threatens SDG targets, health budget and the economy as a whole.
- **Premature Death** - In India, non-communicable diseases (NCDs) account for approximately 64% of all deaths, adversely affecting not only people’s health.
- **Economic Impact** – The economic loss attributed to NCDs (excluding mental health) in India is projected to reach USD 3.55 trillion between 2012 and 2030.
- **Health Budget** - Coronary angioplasty and dialysis tops the list of claims under the Chief Minister’s Comprehensive Health Insurance Scheme (CMCHIS) of Tamil Nadu and Ayushman Bharat Health Insurance.
- **Household Financial Instability** – NCD associated mortality and morbidity affects leads to loss of income and increased out-of-pocket expenses for treatment and care.

**SDG Target 3.4** - By 2030, reduce by one third premature mortality from non-communicable diseases through prevention and treatment and promote mental health and well-being.

### What are the government measures in tackling NCD?

- **NPCDCS** - National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases and Stroke (NPCDCS) is being implemented in all States across the country with the focus on
  - Strengthening of infrastructure
  - Development of human resource
  - Emphasis on health promotion
  - Early diagnosis, management and referral.
- **PBS** - Population based prevention and control, screening and management initiative for common NCDs is being implemented under Health Wellness Centre in National Health Mission (NHM).
- **National NCD Portal** – It provides for implementation of PBS for prevention, control, Screening and management of the population-based screening of common NCDs.
- **National Multi-Sectoral Action Plan for Prevention and Control of Common NCDs** – It offers a road map and menu of policy options to guide multi-sectoral efforts involving other Ministries/Departments towards attaining the NCD targets.

*Under NP-NCD, 724 District NCD Clinics, 210 Cardiac Care Centre, 326 District Day Care Centres and 6110 Community Health Centres NCD Clinics have been setup.*



- **Whole of Society Approach** - India is proceeding towards the illness to wellness concept with the “Whole of Government and Whole of Society” approach.
- **Digital Health Technologies** - Telemedicine, mobile health applications, and data analytics can enhance patient engagement, improve access to care, and facilitate monitoring and evaluation.
- **Ayushman Bharat Health Account Number (ABHA-ID)** - It is being maintained and tracking of every single individual with NCDs is done through National NCD Portal.
- **National Health Policy 2017** - It stipulates the target of relative reduction of 15% in tobacco use by 2020 and of 30 % by 2025, from the baseline levels of 2010.
- **Fit India Movement** – It is a nation-wide movement in India to encourage people to remain healthy and fit by including physical activities and sports in their daily lives.
- **Eat Right Movement** – It was launched by FSSAI, to improve public health in India and combat negative nutritional trends to fight lifestyle diseases.
- **ICMR Dietary Guidelines** – It provides 17 dietary guidelines to meet the requirements of essential nutrients and prevent non-communicable diseases (NCDs) such as obesity and diabetes.

ICMR DIETARY GUIDELINES	
	<b>GUIDELINE 1</b> Eat a variety of foods to ensure a balanced diet
	<b>GUIDELINE 2</b> Ensure provision of extra food and healthcare during pregnancy and lactation
	<b>GUIDELINE 3</b> Ensure exclusive breastfeeding for the first six months and continue breastfeeding till two years and beyond
	<b>GUIDELINE 4</b> Start feeding homemade semi-solid complementary foods to the infant soon after six months of age
	<b>GUIDELINE 5</b> Ensure adequate and appropriate diets for children and adolescents both in health and sickness
	<b>GUIDELINE 6</b> Eat plenty of vegetables and legumes
	<b>GUIDELINE 7</b> Use oils/fats in moderation; choose a variety of oil seeds, nuts, nutriceals and legumes to meet daily needs of fats and essential fatty acids (EFA)
	<b>GUIDELINE 8</b> Obtain good quality proteins and essential amino acids (EAA) through appropriate combination of foods and avoid protein supplements to build muscle mass
	<b>GUIDELINE 9</b> Adopt a healthy lifestyle to prevent abdominal obesity, overweight and overall obesity
	<b>GUIDELINE 10</b> Be physically active and exercise regularly to maintain good health
	<b>GUIDELINE 11</b> Restrict salt intake
	<b>GUIDELINE 12</b> Consume safe and clean foods
	<b>GUIDELINE 13</b> Adopt appropriate pre-cooking and cooking methods
	<b>GUIDELINE 14</b> Drink adequate quantity of water
	<b>GUIDELINE 15</b> Minimize the consumption of high fat, sugar, salt (HFSS) and ultra-processed foods (UPFs)
	<b>GUIDELINE 16</b> Include nutrient-rich foods in the diets of the elderly for health and wellness
	<b>GUIDELINE 17</b> Read information on food labels to make informed and healthy food choices

#### What lies ahead?

- Integrated care for CKM, shifting from segmented care to unified, simultaneous management of risk factors.
- Rather than isolating diabetes, hypertension, heart disease, and kidney disease, they should be viewed as symptoms of a broader metabolic condition.
- An integrated clinic could address these issues, with a multidisciplinary team of a diabetologist, cardiologist, nephrologist, dietician and physiotherapist working together.
- Regular weight and obesity screenings ff preschool through secondary schoolchildren to identify high-risk individuals early.
- Partial replacement of rice in the PDS with millets to diversify the diet and reduce the high glycemic food.
- Regulation of work hours and shifts is as essential a public health measure as any medical intervention.
- Create awareness among people about the necessity of healthy diets.

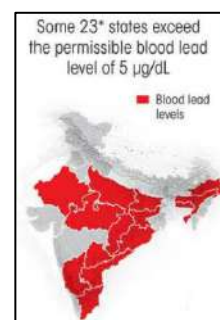
## 6.5 Lead Poisoning

### Why in news?

India lacks a targeted, comprehensive legal framework to combat lead poisoning with India experiencing alarming levels of exposure.

### What is lead poisoning?

- **Lead poisoning** – It occurs when toxic lead particles accumulate in the body, primarily through environmental and industrial exposure and it’s also known as Plumbism and Saturnism.
- Lead can be ingested through mouth, inhaled through the respiratory system or absorbed by the skin, as per the World Health Organization (WHO).
- **Safe limit of lead exposure** – There is ***no known safe level of exposure to lead.***





- **Lead poisoning in India** - India bears the world's highest health and economic burden due to lead poisoning.
- According to the 2020 UNICEF report, 275 million children in India record blood lead levels of beyond the tolerable limit of **5 µg/dL**.
- **Common sources of lead poisoning**

Occupational	Environmental	Others
<ul style="list-style-type: none"> <li>• Lead smelters</li> <li>• Painter/decorators</li> <li>• Battery manufacturers</li> <li>• Stain-glass workers</li> <li>• Jewellery makers</li> <li>• Bronze workers etc</li> </ul>	<ul style="list-style-type: none"> <li>• Paint (walls, furniture)</li> <li>• Toys</li> <li>• Water</li> <li>• Food</li> <li>• Air (petrol, industry)</li> <li>• Dust/soil</li> </ul>	<ul style="list-style-type: none"> <li>• Traditional Medicine</li> <li>• Cosmetics lead shot</li> <li>• Lead glazed ceramics</li> <li>• Vehicular exhaust</li> <li>• Contaminated spices</li> </ul>

According to a 2020 report by the UN Children's Fund (UNICEF) 275 million children in India record blood lead levels beyond the tolerable limit of 5 µg/dL.

### What are the impacts of lead poisoning?

- **Health effects** – Lead poisoning's health effects are severe and broad-reaching, affecting nearly every organ.
  - Impair cognitive development and behavioral issues.
  - Irreversible neurological damages.
  - Hypertension, kidney damage, and reduced fertility.
  - For pregnant women, exposure can lead to miscarriages, preterm birth, and birth defects.
- **Financial burden** – Increased dependency of affected population on social services, leads to economic burden.
- **Amplifies poverty cycles** – Those living in below poverty line often face higher risks of exposure due to proximity to industrial zones or reliance on lead-tainted products.

### WHAT LEAD DOES

Lead has no biological function in the body; rather, it can impair physical and developmental growth

**1. FOETUS**  
**INTAKE ROUTE**  
Placenta

**EFFECTS\***  
Delay in neurological development  
Premature birth  
Low birth weight

**TREATMENT PROTOCOL**  
Chelation and nutritional intervention for the mother

**3. CHILDREN**  
**INTAKE ROUTE**  
Inhaled air, skin contact, ingestion

**EFFECTS\***  
Decreased nerve conduction velocity  
Hampered cognitive development and intelligence  
Hearing loss  
Jaundice  
Anemic  
Encephalopathy  
Impact on vitamin D metabolism if lead is deposited on bones

**TREATMENT PROTOCOL**  
Chelation (Medication that binds with lead and facilitates excretion through the urine); nutritional intervention to ensure that essential elements are not lost from the body

**2. INFANTS, YOUNG CHILDREN**  
**INTAKE ROUTE**  
Mother's milk, inhaled air, skin contact

**EFFECTS\***  
Decreased activity of enzymes that produce heme  
Impaired physical and developmental growth  
Low intelligence quotient

**TREATMENT PROTOCOL**  
Chelation and nutritional intervention

**4. ADULTS**  
**INTAKE ROUTE**  
Inhaled air, ingestion, skin contact

**EFFECTS\***  
Decreased activity of enzymes that produce heme, an iron-containing compound crucial for all organs  
Changes in blood pressure  
Damage to renal function  
Fluctuation in sperm count

**TREATMENT PROTOCOL**  
Chelation; nutritional intervention for pregnant women

\*Note: \*Effects mentioned vary depending on blood lead level Source: Expert comments, World Health Organization

- **Affects labour markets** – It can reduce the productivity of labour and further impacts economic growth.
  - Productivity lost due to lead exposure in 2019 was \$906 billion, equivalent to 0.68% of world GDP.
- **Consumer safety** – Increased risk to children as they are far more likely to ingest lead indirectly by chewing on toys or other objects with lead.

### What are the challenges in combating lead poisoning?

- **Multiple exposure sources** - Sources of lead poisoning change from location to location, and there are usually multiple exposure sources in any given place.
- **Inefficient structural arrangement** – India's existing laws concerning lead are fragmented across multiple agencies which leads to inefficiency and inaction.
- **Lack of coordination** - Existing Battery Waste Management Rules, 2022, remains ineffective due to lack of coordination.
- **Illiteracy** – Inadequate education among people in key pollution areas, affects the effectiveness of awareness creation.
- **Poverty** – It pushes the people to work in often harsh environment and exposed to lead.
- **Informal recycling** - More than 50% of all batteries in India are estimated to be recycled in the informal sector.

*India's legal landscape includes nine pieces of primary legislation and nine pieces of subordinate legislation that touch upon various aspects of lead regulation.*

### What are the international measures to combat lead poisoning?

- **Partnership for Lead-Free Future** – Headed by USAID and UNICEF, this partnership was launched in 2024 to promote a lead-free environment by addressing pollution sources and fostering international cooperation.
- **Global Alliance to Eliminate Lead Paint (GAELP)** - It is a voluntary partnership formed by the United Nations Environment Programme (UNEP) and the World Health Organization (WHO) to prevent exposure to lead through promoting the phase-out of paints containing lead.
- **Basel convention** – This international treaty regulates the transboundary movement of hazardous wastes, including lead-containing materials, aiming to ensure safe disposal practices.
- **International lead poisoning prevention week** – It is organized by World Health Organization on October 20-26 to create awareness among the people about lead poisoning.

### What measures are needed to combat lead poisoning?

- **Targeted measures** – Implementing a dedicated lead prevention law or enhancing current environmental and health regulations to comprehensively address lead sources—from production to disposal—is essential for cohesive action.
- **International obligations** – As India is a signatory to United Nations Environment Programme's (UNEP) efforts to eliminate lead in paint its laws need to be in line with their framework.
- **National surveillance** – Developing a national lead registry to monitor blood lead levels in vulnerable populations.
- **Regulatory impact assessments** – Conducting assessment of lead pollution both before and after implementation to ensure that the law is evidence-based and aligned with its objectives.
- **Identify and control lead sources** – Mapping areas prone to high lead exposure, such as industrial zones and urban slums.
  - Extending producer responsibility to manufacturers can ensure safer product lifecycle management.
- **Circular economy** - Recycling of lead-based products like car batteries and lead base products to reduce lead contamination.
- **Improve healthcare response** – Training health professionals to recognize lead poisoning symptoms, and routine screenings in high-risk populations.
  - Facilities such as Ayushman Bharat Arogya Kendras could incorporate lead testing.
- **Raise public awareness** – Collaborations with NGOs, schools, and media can inform communities about risks and prevention strategies.
- **Self-regulation through market forces** – Motivating industries to adopt safer practices through incentives such as subsidies and access to credit.

## 8. GOVERNANCE

### 8.1 Constitutional Governance

#### Why in news?

November 26 of 2024 year will mark the commemoration of the 75th anniversary of the adoption of the Constitution of India.

#### What is constitutional governance?

- **Constitutional governance** – It refers to the system of government where the powers, functions, and limits of each branch of government are defined by a constitution.
- It is also about permeating a deep sense of constitutional culture that has captured the collective consciousness of Indians across different cultures, faiths and beliefs.
- **Constitution** - It establishes the framework for the political and legal organization of a country and act as the supreme guiding principle.
  - It defines the structure of government, the distribution of powers, and the fundamental rights of individuals.
- **Organs of constitutional governance:**

- Legislature,
- Executive and
- Judiciary.

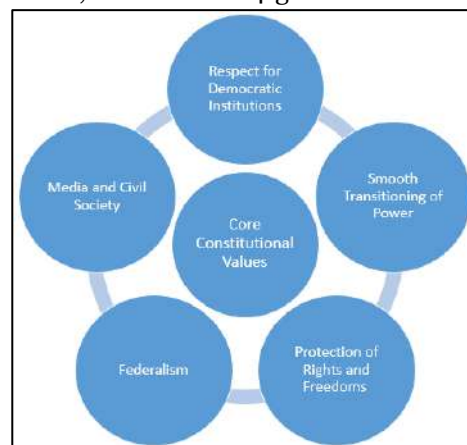
● **Principles and features of constitutional governance are:**

- **Rule of law** - All individuals, including government officials, are subject to and accountable under the law.
- It implies that no individual or institution is above the law.
- **Democratic accountability** - Every action by the government must conform to the provisions of the Constitution.
- **Rights and duties** - Citizens are empowered with rights and duties to ensure their active participation in the democratic process.
- **Checks and balances** - Executive, legislature, and judiciary operate within the bounds of the law.
- **Separation of powers** - The powers of the government are divided among the legislative, executive, and judicial branches to prevent the abuse of power.
- **Federalism** - India follows a federal structure with a division of powers between the central and state governments.

**What are the core constitutional values that shaped India's constitutional culture?**

- **Faith in democratic process** – Despite numerous political and social challenges, Indian citizens have shown a remarkable commitment to participating in voting in elections.
- Since the first elections in 1951-52, there has been consistent voter turnout, with the 2024 general elections witnessing a **65.79% turnout**.
- **Smooth transition of power** – Regardless of differences, political parties have always respected the people's mandate, ensuring a smooth transition of power after elections.
- It is the people of India who win each election without any exception.
- It has demonstrated to the world that its understanding of problems and challenges will shape our decisions relating to elections.
- **Protection of fundamental rights** – The framers of the Constitution, recognized the importance of safeguarding these rights against any potential misuse of state power.
- Over the years, Indian courts have played a vital role in upholding these rights to ensure that constitution protects citizen.
- **Federalism and diversity** – The framers were mindful of India's pluralism and sought to balance national unity with state autonomy.

India's Constitutional Journey	
1946	Cabinet mission is dispatched to India to discuss modalities for transfer of power.
9 Dec 1946	Constituent assembly convenes for the first time.
29 Aug 1947	Establishment of drafting committee.
4 Nov 1949	Draft is finalized and submitted.
26 Nov 1949	Constituent Assembly adopts final draft making it official.
26 Jan 1950	Entry into force of the new constitution.
The Constituent Assembly took <b>2 years, 11 months and 17 days</b> to complete drafting the Constitution for Independent India. During this period, it held 11 sessions covering a total of 165 days.	
<ul style="list-style-type: none"> <li>● <b>Samvidhan Divas</b> – Constitution Day is celebrated on <b>November 26th</b> to commemorate the adoption of the Constitution of India in 1949.</li> <li>● <b>Notified</b> – In 2015 by Ministry of social justice and empowerment.</li> <li>● <b>Significance</b> – The day holds historical and symbolic importance, marking India's transition from a British colony to an independent democratic republic.</li> <li>● The Constitution continues to serve as a living document, guiding India through its complex political, social, and economic journey.</li> <li>● As India celebrated the 75th year of its constitutional journey in 2024, it is crucial to reflect on the role the Constitution has played in shaping India's democracy, governance, and legal framework.</li> </ul>	



- By granting special privileges and autonomy to states, it acknowledges their unique identities while fostering a unity.
- Federalism has also been strengthened through the establishment of panchayats and municipalities.
- **Media and civil society** - The Indian media is a diverse and heterogeneous institution with views and perspectives that are generated across India in different languages.
  - **Democratization of Information** - Transition of print media to broadcast and further innovations in media and technology have democratized access to information and indeed the role of media.
- Media and civil society have instilled faith in Indian democracy.

#### What lies ahead?

- Reinforce the core values that have shaped its constitutional culture.
- Inclusive governance to address India's challenges in the coming decades.
- Strengthen Judiciary by reforms, and recognizing the role of technology in governance.
- Ensure judicial accountability, and promoting socio-economic rights to achieve a more equitable society.

### Features of Indian Constitution

- **Longest written constitution** – Geographical vastness of country and diversity, Single constitution for both center and state.
- **Fundamental Rights and duties** – The Constitution of India guarantees six fundamental rights to its citizens.
- **Blend of rigidity and flexibility** – It can also be amended to reflect the evolving needs of society to navigate through significant challenges, including internal conflicts, regionalism, and social inequalities.
- Despite these amendments, the core spirit of the Constitution, which champions justice, liberty, equality, and fraternity, remains intact.
- **Directive Principles of State Policy** – Directives to the government to maintain social and economic democracy in the country.
- **Parliamentary System** – The constituent assembly decided to continue parliamentary form of government both for the center and the states as it is well-suited to accommodate India's diverse population,
- **Federal system with unitary basis** – Our constitution has both unitary and federal features.
- **Federal features** - Written constitution, supremacy of constitution, rigidity of constitution, independent judiciary, and bicameralism are federal features.
- **Unitary features** – Strong center, emergency provision, single citizenship, flexibility of constitution, integrated judiciary, all India services, governor appointment.
- **Universal adult franchise** - All men and women enjoy an equal right to vote. Each citizen above the age of 18 years has the right to vote.
- **Single citizenship** – All citizens enjoy a common uniform citizenship.
- **Integrated judiciary**– The integrated system of court enforces both central as well as state laws.
- **Independent judiciary** – Provide independence by security of tenure, expenses charged on consolidated fund of India and separation of judiciary from executive.
- **Fundamental duties** – Which were inserted by 42<sup>nd</sup> and 86<sup>th</sup> constitutional amendment serves as a reminder to citizen of duties that they have to their country.
- **Secularism** – Means it doesn't uphold any particular religion as the official religion of the state.
- **Independent bodies** – Constitution has setup various independent bodies and are envisaged as bulwarks on Indian constitution.
  - Election Commission, CAG and Finance Commission.
- **Emergency provisions** – To safeguard the sovereignty, unity, integrity, and security of the country.
- **Three-tier government** – 73<sup>rd</sup> and 74<sup>th</sup> amendment act provide rural and urban local bodies that ensure grass root level government.



## 9. INTERNATIONAL RELATIONS

### 9.1 International Criminal Court

#### Why in news?

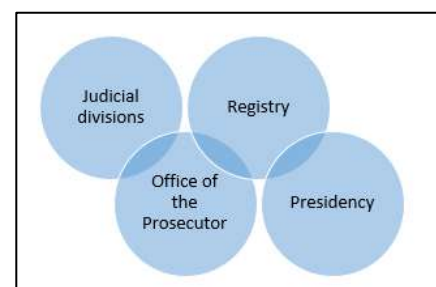
Recently, the International Criminal Court has issued arrest warrants to Israeli Prime Minister Benjamin Netanyahu, his former defence minister, and a Hamas leader, for alleged war crimes and crimes against humanity.

#### What is International Criminal Court?

- **ICC** – International criminal court was established under a treaty called the *Rome Statute*.
- It is the founding treaty that governs the framework of the ICC.
- The Rome Statute was adopted at the Rome Conference on July 17, 1998, and entered into force on July 1, 2002.
- The ICC is the ***world's first permanent international criminal court***.
- **Headquarters** – Hague, Netherlands.
- **Member countries** – Presently, **124 countries** are party to the Rome Statute.
- ICC members include all European Union nations, the UK, Japan, Brazil, Afghanistan, Australia, and Canada, as well as the Palestinian territories and Jordan in the Middle East.
- ***India is not a member of the ICC.***
- **Function** – It investigates and punishes individuals charged with the gravest crimes of concern to the international community.
- **Decisions are binding** – The judgement of ICC are binding to the member parties.
- It relies on the cooperation of States for support, particularly for making arrests, freezing assets, and enforcing sentences.

#### What is the organizational structure of ICC?

- The ICC is composed of 4 primary organs, which are:
- **The Presidency** – It is responsible for the *overall administration* of the Court.
- **The judicial divisions** – It is responsible to *issue arrest warrants* and hear appeals.
- **The Office of the Prosecutor** – It is responsible for receiving substantiated information on crimes, *conducts investigation*, and prosecution before the Court.
- **The Registry** – It provides *judicial and administrative support* to all organs of the Court.



#### What is the jurisdiction of the International Criminal Court?

- **Territorial jurisdiction** – ICC have jurisdiction ***on both State Parties and non-state Parties*** which commits crime on the territory of a State Party.
- The ICC can also practice its jurisdiction over cases referred by the UN Security Council to it.
- **Functional jurisdictions** – ICC has jurisdiction over the following crimes
- **Genocide** – Intentional acts to destroy the nation, ethnic, racial, or religious group by killing its members.
- **Crime against humanity** – Inhumane acts directed against a civilian population.
- **War crimes** – Crimes that breaches Geneva Conventions in the context of armed conflict which includes:
  - Use of child soldiers,
  - Killing or torture of persons such as civilians or prisoners of war and
  - Intentional attacks against hospitals, historic monuments or buildings dedicated to religion, education, art, science, or charitable purposes.
- **Crime of aggression** – It is the use of armed force by a State against the sovereignty, integrity or independence of another State.

#### What does this arrest warrant mean?

- **Background of the arrest warrant** – Palestine had referred the war crimes by Israel to ICC which is reinforced by other member countries such as Bangladesh and South Africa.
- **Reason for warrant** – Charges against Israel Prime Minister Netanyahu and his allies include the **use of starvation** as a method of warfare, murder, persecution and other inhumane acts.
- Hamas military Chief Mohammed Deif is accused of **mass killings, hostage-taking and rape during** the attacks on Israel.
- **Significance** – Although ***Israel is not a member***, ICC have jurisdiction over crimes committed by non-state Parties on the territory of a State Party.
- **Obligation to members** - The members of the ICC, are obliged to arrest the two Israelis and hand them over to the court.

*This kind of arrest warrant curtails international travel for those accused and deepens international pressure on Israel.*

**How ICC is different from ICJ?**

International Court of Justice	International Criminal Court
<ul style="list-style-type: none"> <li>• UN's principal judicial organ.</li> </ul>	<ul style="list-style-type: none"> <li>• Independent of the UN and it can receive referrals from the UN Security Council.</li> </ul>
<ul style="list-style-type: none"> <li>• 193 UN member states.</li> </ul>	<ul style="list-style-type: none"> <li>• 123 member states.</li> </ul>
<ul style="list-style-type: none"> <li>• Resolves disputes between states such as border issues or treaty violations.</li> </ul>	<ul style="list-style-type: none"> <li>• Prosecutes individuals for crimes like genocide, war crimes, and crimes against humanity.</li> </ul>

**What lies ahead?**

- Strengthen accountability and justice through global cooperation.
- Address the concerns about political bias and improve transparency in investigations.
- Promote diplomatic collaboration to enhance the legitimacy of international justice systems.
- Independent and impartial investigation to stop the inhumane activities across the world.

**9.2 Global Plastic Treaty**

**Why in news?**

The fifth and final session of the Intergovernmental Negotiating Committee (INC) is held in Busan, South Korea November 2024 to finalize a legally binding Global Plastic Treaty.

**What is global plastic treaty?**

- **About** – The global plastic treaty is a **legally binding agreement** aimed to combat plastic pollution in land and marine environments.
- **Goal** – End plastic pollution by 2040 by creating a circular economy for plastics.
- This means managing plastics responsibly throughout their lifecycle, from design and production to use and disposal.
- **Progress so far** – In March 2022, 175 countries agreed to develop a legally binding international agreement on plastic pollution.
- **Finalizing the treaty** – It is mandated by the United Nations Environment Assembly (UNEA) and is **under negotiation** by the Intergovernmental Negotiating Committee (INC) by 2024.
- **Expected Outcomes** – Banning or phasing out certain high-risk plastics, especially single-use items.
- Establishing design requirements for plastics to make them easier to recycle.
- Creating a framework for international cooperation to tackle plastic pollution.

Intergovernmental Negotiating Committee
<ul style="list-style-type: none"> <li>• <b>Origin</b> – The Intergovernmental Negotiating Committee (INC) was formed by UNEA through a resolution in 2022.</li> </ul>

- **Objective** – The Intergovernmental Negotiating Committee (INC) was tasked to draft a global treaty to address plastic pollution by 2024.
- **Four INC sessions** have been held since 2022 in Uruguay, France, Kenya and Canada.
- **Final session** – In Busan, South Korea (2024).
- **Key Areas of Negotiation** – Focus on the *life cycle of plastics*, including production, usage, and disposal.
  - *Approve legally binding targets* for recycling and reducing certain plastic products and additives.
  - Discussions on a *just transition* for workers impacted by reduced plastic production.

### What is the need for a global plastic treaty?

- **Rising plastic production** – Global production doubled from 234 million tonnes (2000) to 460 million tonnes (2019).
  - It is expected to reach 700 million tonnes by 2040.
- **Waste and Pollution** – Plastic takes more than 200 years to decompose and the environment faces significant challenge as only less than *10% of global plastic has been recycled*.
- **Micro plastic accumulation** – Globally 400 million tonnes of waste generated annually, with micro plastics polluting both land and ocean ecosystems.
- **Climate change connection** – Plastics contribute *3.6% of global greenhouse gas emissions* (2020).
  - Emissions expected to rise by *20% by 2050* if current trends persist.
- **Health risks** – Plastic chemicals got mixed with food chain system and disrupt *endocrine systems, cancer, reproductive disorders* and cause severe health conditions.

*India is the largest contributor to global plastic pollution, responsible for 20% of the world's plastic emissions, amounting to 9.3 million tonnes annually.*

### What is the India's stance on the treaty?

- **Opposition to production caps** – India does not support restrictions on polymer production, considering it beyond the mandate of the UNEA's 2022 resolution in Nairobi.
- **Call for regulation of chemicals** – Advocates for decisions on harmful chemicals based on scientific studies, leaving regulation to domestic authorities.
- **Emphasize on phasing out plastic** – Recommends practical, nationally driven regulation of phased-out plastic items, accounting for local circumstances.
  - *India has banned 19 categories of single-use plastics in 2022*.
- **Need for safe waste management mechanism** – Formulate mechanism to assess and address infrastructure needs for effective waste management.
- **Financial and technical assistance** – Seeks inclusion of funding, technical support, and technology transfer in the treaty's provisions.

### What lies ahead?

- Finalize the global treaty by negotiating with all parties in 5<sup>th</sup> INC session.
- Reach consensus on production caps and financial mechanisms.
- Ensure inclusivity and equitable participation of all nations.
- Establish robust monitoring and enforcement mechanisms.
- Mobilizing resources for effective implementation, especially in developing countries.

### Multilateral Fund Proposed by India

- **Key features** – Modeled after the Montreal Protocol for ozone-depleting substances.
- Provides grant-based financing for *developing countries to transition to sustainable practices*.
- Funded by *periodic replenishment from developed countries* and private contributions.
- **Governance structure** – Subsidiary body with *equal representation* from developed and developing countries.
- Responsible for *operational policies, guidelines and resource disbursement*.
- **Focus areas** – *Technology transfer* to developing nations.
- *Support for incremental* costs related to treaty compliance.

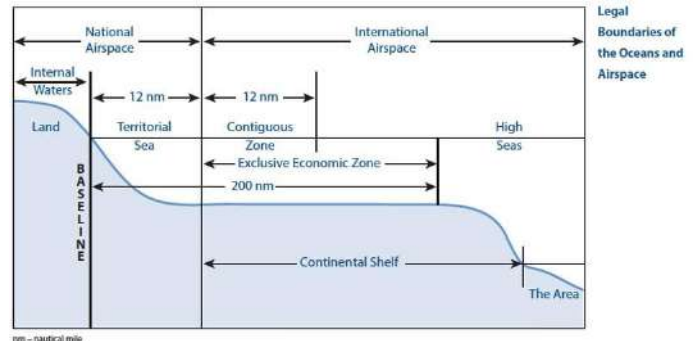
### 9.3 High Sea Treaty

#### Why in the news?

India recently signed the Biodiversity beyond National Jurisdiction (BBNJ) Agreement or the High Seas Treaty at the United Nations General Assembly in New York on 2024.

#### What are high seas?

- **High seas** – It is the open ocean areas that are outside the jurisdiction of any country that is beyond territorial waters and exclusive economic zones.
- Territorial waters extend from the baseline to 12 nautical miles (1 nautical mile = 1.852 km).
- Beyond that up to 200 miles (370 km) lies the Exclusive Economic Zone.
- **International waters** – High seas are part of International waters and they belong to no one and it is the responsibility of everyone to protect it.



- **Significance of high seas:**

- The ocean is the primary source of protein for 3 billion people and accounts for 90% of freights.
- Fishing, freight transport & communications through submarine cables.
- It can provide clean, renewable energy from waves and currents.
- The deep seabed is home to minerals and rare earths that are essential to emerging technologies.
- The IUCN estimates that there are between 500,000 and 100 million species living in the oceans and only about 250,000 species have been recorded.
- The ocean produces more than 50% of the oxygen.
- It stores more than 90% of the excess heat caused by global warming due to human activities.
- Phytoplankton contribute to CO2 absorption and 25% of carbon dioxide from human activities is absorbed by the ocean.
- **Regulation** – The **International Seabed Authority (ISA)** regulates exploration and mining while maintaining environmental protection in high seas.

*The high seas account for 65% of the ocean surface, and 43% of the Earth.*

#### What is high sea treaty?

- **About** – It is adopted to regulate all human activities in the high seas to ensure that ocean resources, are utilized in a sustainable manner, and their benefits are shared equitably among countries.
- It is also known as the agreement on biodiversity beyond national jurisdictions.
- **Binding in nature** – It is a **legally binding** treaty.
- **Parties** – So far, 105 countries have signed the treaty and it is ratified by 14 countries.
- India has signed the treaty but yet to ratify it.
- **Ratification** mandates the country to be **legally bound** to the provisions of an international law.
- **Signing** indicates that a country agrees with the provisions of the international law concerned and is **not legally bound** to follow that law.
- The High Seas treaty would come into force 120 days after at least 60 countries submit their formal ratification documents.

#### United Nations Convention on the Law of the Sea (UNCLOS)

- The United Nations Convention on the Law of the Sea (UNCLOS) is **legally binding** international treaty that establishes rules for using the world's oceans and their resources.
- **Purpose** – UNCLOS sets out the legal framework for all marine and maritime activities.
- It also provides a framework for further development of specific areas of the law of the sea.
- **Dispute resolution** – UNCLOS sets rules for resolving disputes between state parties.
- **Parties** – As of October 2024, 169 sovereign states and the European Union are parties to UNCLOS.
- **India is a party** to the UNCLOS.



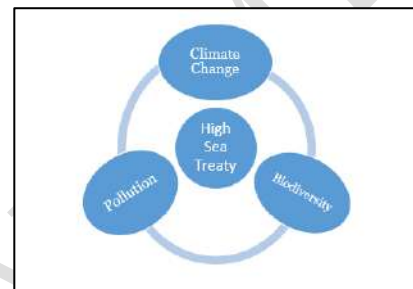
- **Objectives of the treaty:**

- Demarcation of marine protected areas (MPAs).
- Sustainable use of marine genetic resources and equitable sharing of benefits arising from them.
- Initiate the practice of environmental impact assessments for all major activities in the oceans.
- Capacity building and technology transfer.

*UN Biodiversity Conference, COP15, which concluded in Montreal, Canada last year agreed to protect 30% of the planet's lands, coastal areas and inland waters by the end of the decade.*

### What is the need for high sea treaty?

- **Protection of biodiversity** – According to the International Union for Conservation of Nature (IUCN) only **1.44% of high seas** are currently protected.
- **Tackling global commons issues** – To address overexploitation, biodiversity loss and pollution including **17 million tonnes** of plastic dumped in 2021.
- It aims to protect **64% of the ocean** categorized as global commons.
- **Strengthening the UNCLOS framework** – The treaty provides **implementation guidelines** to UNCLOS framework of equitable access, resource usage and biodiversity protection of high seas marine protected areas.
- **Enhanced global collaboration** – Establishes frameworks for international collaboration in issues like deep-sea mining, ocean acidification and plastic pollution.
- **Attain sustainable development goal** – Supports SDG 14 (Life below Water) for sustainable ocean conservation.
- **Relevance for India** – The treaty aligns with India's maritime policies with Environment Impact Assessment mandates and promotes the Blue Economy.
- Strengthens India's Indo-Pacific position under the SAGAR initiative.



*India's Security and Growth for All (SAGAR) policy, unveiled in 2015, proposed an integrated regional framework to meet the security objectives in the Indian Ocean.*

### What are the shortcomings of the treaty?

- **Challenges in marine-protected areas (MPAs)** – Weak enforcement mechanisms to regulate activities in MPAs.
  - Only 1.44% of high seas are currently protected.
  - Difficulty in achieving the 30% restoration target by 2030.
- **Issues with marine genetic resources (MGRs)** – Risk of monopolizing the genetic resources by technologically advanced nations.
  - Disputes over intellectual property rights and benefit-sharing.
- **Lack of clear mechanisms** – To ensure equitable access and open knowledge.
- **Barriers to implementation** – Lack of resources and expertise in Small Island and landlocked nations.
  - High costs of conducting environmental impact assessments (EIAs).
  - Limited global cooperation due to geopolitical tensions.

### What lies ahead?

- The treaty must be ratified by a minimum number of countries to come into force.
- Establishment of institutional mechanisms bodies for monitoring, compliance, and enforcement of the treaty's provisions.
- Capacity building for developing nations and support for Small Island and landlocked nations to meet treaty obligations.
- Transfer of technology and financial assistance for conservation and impact assessment.

## G.S PAPER III

### 10. ECONOMY

#### 10.1 The Paradox of Stagnant Rural Wages

##### Why in News?

Despite the high growth rate of Indian economy, the rural wages growth has been very minimal.

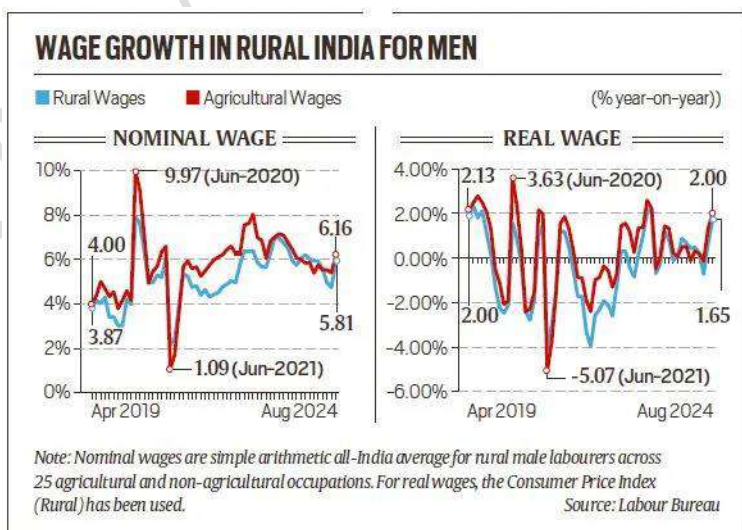
##### What is the disparity in rural wages?

- **Economic Growth** - The Indian economy has grown at an average annual rate of **7.8% in the last three fiscal years** (April-March) alone.
- **Farm Sector Growth** – Average growth rate of farm sector in this period 4.2%.
- **Nominal Rural Wage Growth** - The average nominal year-on-year growth in rural wages 2018-19 to 2023-24 is 5.2%.
  - The Growth in Agricultural wages – 5.8%
- **Less Real Growth** - Inflation-adjusted average real annual growth was **-0.4%** for rural and **0.2%** for agricultural wages during this period.
- **Disparity** - Real rural wages remains stagnant, if not negative, when the country's GDP and the farm sector growth have been decent-to-good.
- **Impact of the Disparity** - When jobs and incomes do not exhibit growth commensurate with wider GDP measures, it affects the consumption, sales leading to stagnant economy.

**Rural consumption** went up by just 0.5% y-o-y in the second quarter of FY24, the slowest pace recorded in eight quarters.

##### What are the reasons for the disparity in rural wages?

- **Rising Female LFPR** - Labour Force Participation Rates (LFPR) among women is increasing.
  - The all-India average female LFPR was only 24.5% in 2018-19.
  - It rose to **41.7%** in the latest official **Periodic Labour Force Survey for 2023-24** (July-June).
- **Increasing RLFPR** - Rural female LFPR has increased from 26.4% in 2018-19 to 47.6% in the following five years.
  - Sharp jump of 21.2 percentage points in the rural female LFPR since 2018-19.
- **Less Male LFPR Growth** - During 2018-19 to 2023-24, the male LFPR has gone up from 75.5% to 78.8% for all-India and from 76.4% to 80.2% for rural India.



**LFPR** is the percentage of the population aged 15 years and above that is working or seeking/willing to work for a relatively long part of a particular year.

- **Better Living Standards** - Flagship programmes like Ujjwala, Har Ghar Jal, Saubhagya, and Swachh Bharat have eased the access to clean cooking fuel, electricity, piped drinking water, and toilets.
- **Declining Women's Burden** – These schemes have also freed up rural women's time and effort that went into fetching water or collecting firewood and dung.
- **Increasing Productivity of Women** - Being able to cook faster using LPG cylinders has enabled them to deploy their energies towards more productive outside employment.

- **Increase in Rural Workforce** - Freeing up of women's time and rise in female LFPR have, also significantly boosted the aggregate size of the rural workforce.
- **Reduction in Rural Wage** - The rightward shift of the labour supply curve (more people willing to work at the same or lower rates) has then exerted downward pressure on real rural wages.
- **Increasing Female Farm Labour** – Most of the women entering the rural labour force are working in greater numbers on farms.
  - Share of agriculture in rural female employment has increased from 71.1% to 76.9% between 2018-19 and 2023-24.
- **Declining Farm Income** - Supply of more labour into the already marginally productive sector, had further depressed the farms wages.
- **Less Labour-Intensive Growth** – The Growth process is becoming increasingly capital-intensive and labour-saving as well as labour-displacing.

*If growth is coming from sectors or industries requiring **fewer workers** for every unit of output, then most of the income generated is from capital (i.e. profits of firms) as against labour (wages/compensation of employees).*

### What can be done to improve rural wages?

- **Boost Labour Demand** - Rural wages can only increase if the demand for rural labour grows faster than its supply.
- **Promote Rural Non-Farm Employment** – It is necessary to absorb the increasing rural labour supply especially the female labours.
- **Rural Infrastructure Development** - Rural electrification, roads and banks can increase real agricultural wages by facilitating the nonfarm livelihood and employment.
- **Enhance Skill Development** - Invest in skill development programs to improve the employability and productivity of rural workers.
- **Income Transfer Schemes** – State government schemes like Maharashtra's Ladki Bahin Yojana supplements the rural wages with government basic incomes to women.
- **Farm Income Supplement** – Rs.6000-per-year income transfer to some 11 crore farmer households under the KISAN Schemes.
- **Subsidized Food** - 5 kg/month free-grain scheme for over 81 crore people under through public distribution system.
- **MGNREGA** – MGNREGA wage acts as the minimum wage limit in rural areas and increasing the MGNREGA wage will also increase rural wages.

### Quick Facts

- **Wage Rate Index** – It depicts movement of relative change experienced in the wage rates over a period of time.
- Labour Bureau compiles and releases data on Absolute Wage Rate, Wage Rate Indices and Wage Rate at Industry/Stratum level.
- Wage Rate Indices are being compiled on the base year 2016 = 100.
- **Industrial Coverage** - At present the Wage Rate Indices are being compiled for 37 industries (30 manufacturing industries, 4 mining industries and 3 plantation industries).
- The wage growth has been estimated in both nominal (current value) and real (after deducting annual inflation based on the consumer price index for rural India) terms, and for all rural as well as agricultural occupations.

## 10.2 Dedicated Freight Corridors for Transforming India's Economic Landscape

### Why in news?

Recent study by the University of New South Wales analyzed the impact of DFCs on India's economy, particularly the WDFC.

### What is a dedicated freight corridor?

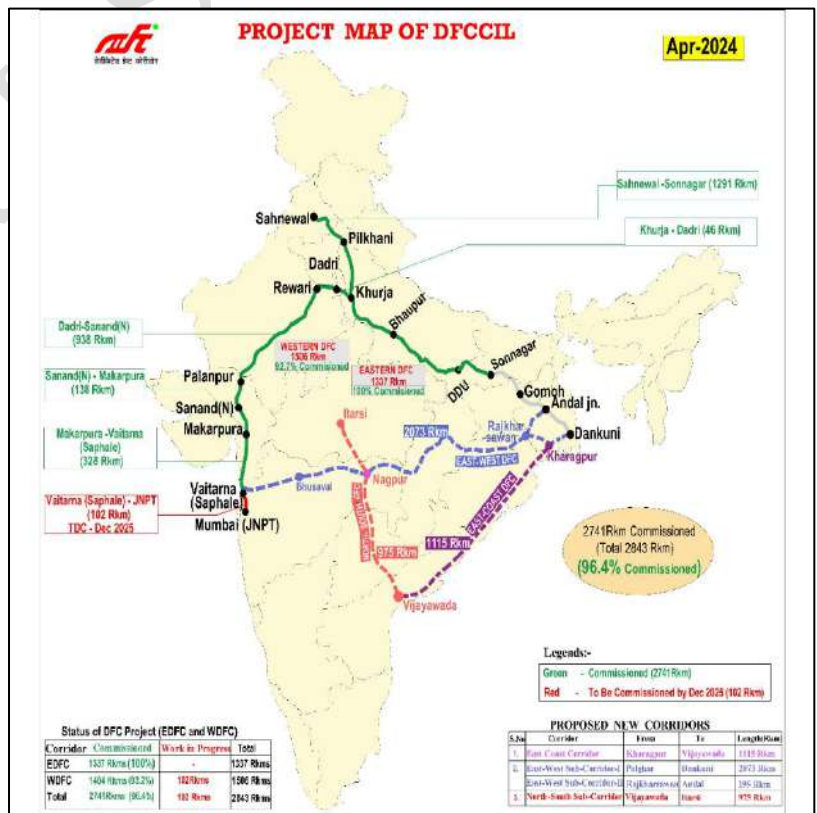
- **Dedicated Freight Corridors (DFCs)** – They are specialized rail routes created solely for the transportation of freight, independent of passenger rail traffic.

- **Exclusive for Freight** - Unlike mixed-use rail networks, DFCs focus exclusively on freight, allowing for the transit of heavier, longer, and double-stack container trains at higher speeds.
- **Dedicated Freight Corridor Corporation of India Limited** – To undertake planning & development, mobilization of financial resources, construction, operation & maintenance, and business development of the dedicated freight corridors.
- **Significance** - The primary goal of these corridors is to increase the efficiency, speed, and capacity of freight transportation across the country.
- The **National Rail Plan** envisages increasing rail's share of freight traffic to **45% by 2030**.

Dedicated Freight Corridors in India		
Corridor	Route	Length
Eastern Dedicated Freight Corridor (EDFC)	From Ludhiana in Punjab to Dankuni in West Bengal	1,337 km
Western Dedicated Freight Corridor (WDFC)	From Jawaharlal Nehru Port in Mumbai to Dadri in Uttar Pradesh	1,506 km
Proposed Corridors		
East Coast Corridor	Kharagpur to Vijayawada	1,115 km
East-West Sub-corridor I	Palghar to Dankuni	2,073 km
East-West Sub-corridor II	Rajkharsawan to Andal	195 km
North-South Sub-corridor	Vijayawada to Itarsi	975 km

**Why the DFCs are vital for economic Growth?**

- **Enhanced Freight Efficiency** - DFCs allow faster and more efficient freight transportation, which is critical for industrial productivity.
- **Improves Industrial Productivity** - DFCs enable industries to maintain leaner inventories and rely on timely deliveries, reducing costs across the supply chain.
- **Logistic Cost Reduction** – Dedicated freight route reduces the transportation cost of goods.
- **Reduction in Commodity Price** - With reduced travel time and costs, the DFCs have directly impacted commodity prices, making goods more affordable.
- According to an Australian study, freight cost reduction on the DFCs has led to a 0.5% decrease in the prices of transported goods, which has positive ripple effects across various sectors of the economy.
- **Boost to Railway Revenue** - The increased efficiency and dedicated freight handling capacity of the DFCs have contributed substantially to Indian Railways' revenue.
- The Australian study indicated that between FY 2018–19 and FY 2022–23, the DFCs contributed to 2.94% of the growth in rail revenues.
- **Reduce Rail Congestion** - Over 52% of passenger traffic and 58% of freight traffic concentrated on just 16% of the rail route length.
- The DFCs help alleviate this pressure by providing a separate channel for freight, thereby freeing up capacity for passenger trains on other routes.
- **Greater Economic Benefits**, especially in states with lower per-capita GDP, suggesting that these corridors have a 'social-equalizing effect'.





- **Equitable Growth** - Reduced transportation costs in economically disadvantaged regions, the DFCs help stimulate local economies and increase access to affordable goods(On the growth track)
- **Support Regional Trade** – DFCs connects different regions to promote economic hubs, fostering regional equity.
- **Export Growth** – Improvement in connectivity to major ports makes India more competitive in global trade.
- **Sustainable Growth** – Usage of DFCs reduces carbon emission from road transport and help achieving sustainable goal 11.
- It is expected that DFC will save more than 450 million ton of CO<sub>2</sub> in first 30 years of operation.

### Dedicated Freight Corridor Corporation of India (DFCCIL)

- The Dedicated Freight Corridor Corporation of India Limited (DFCCIL) is a special purpose vehicle established in 2006 for constructing, operating, and maintaining the DFCs.
- DFCCIL has been instrumental in managing the extensive and complex task of building and commissioning these corridors.
- **Vision** – To create a partnership with Indian Railway for retaining and expanding the market share of railways through efficient and reliable service with customer focus.
- **Mission** – To build a corridor with appropriate technology that enables Indian Railways to regain its market share of freight transport by creating additional capacity and guaranteeing efficient, reliable, safe, and cheaper options for mobility to its customers
- To set up Multimodal logistic parks along the DFC to provide complete transport solution to customers.

#### What lies ahead?

- Create an integrated freight network and enhance India’s economic resilience.
- Conduct comprehensive studies to quantify the economic impact of DFCs and identify ways to optimize future corridor designs and operational strategies.
- Promotion of multimodal logistics to integrate other mode of transports with freight corridors.
- As DFCCIL continues its work, and studies validate the DFCs' impact, these corridors will shape India’s industrial landscape, fostering regional equity and sustainable growth for decades to come.

***SDG 11** mandates to provide access to safe, affordable, accessible and sustainable transport systems for all.*

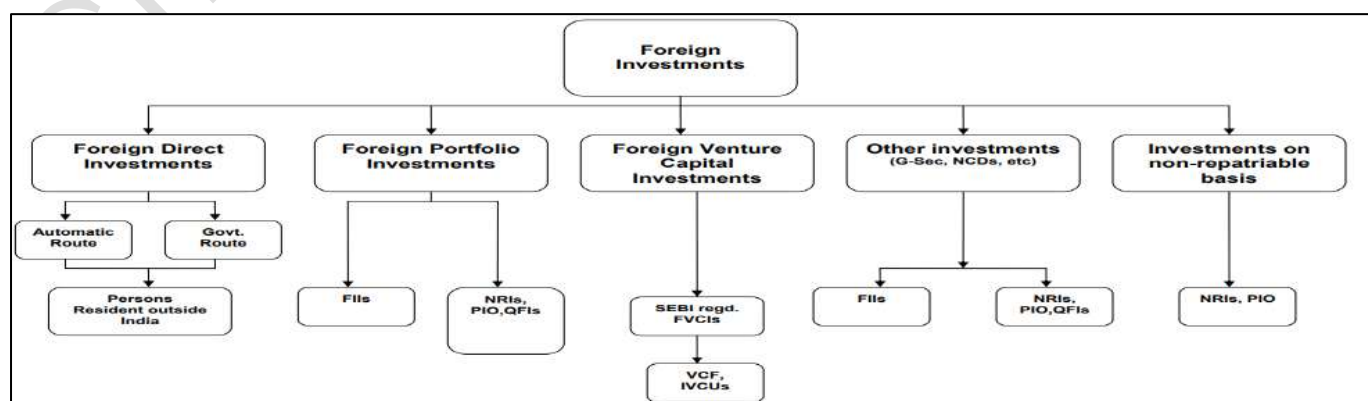
### 10.3 Reclassification of FPI to FDI

#### Why in news?

The Reserve Bank of India (RBI) introduced a streamlined operational framework to allow foreign portfolio investors (FPIs) to convert their investments to foreign direct investment (FDI).

#### What is the classification of foreign investment?

- Foreign investment in India is governed by sub-section (3) of Section 6 of the Foreign Exchange Management Act, 1999



### What are FDI and FPI?

	Foreign Direct Investment (FDI)	Foreign Portfolio Investment (FPI)
<b>Definition</b>	Investment made by foreign investors to obtain a substantial interest in the enterprise located in a different country.	Investing in the financial assets of a foreign country, such as stocks or bonds available on an exchange.
<b>Nodal Ministry</b>	Consolidated FDI Policy is drafted Department for Promotion of Industry and Internal Trade (DPIIT), Ministry of Commerce and Industry.	Finance Ministry
<b>Type</b>	Direct Investment	Indirect Investment
<b>Market</b>	Inflows in primary market	Inflows in secondary market
<b>Role of Investors</b>	Active Investor	Passive Investor
<b>Degree of Control</b>	Direct control over the company management	No direct control but can influence board meeting decision.
<b>Term</b>	Long term investment	Short term investment
<b>Investment Instruments</b>	Direct Capital Investment involving mergers, acquisitions, or partnerships	Stocks, ADRs, GDRs, bonds, mutual funds, and exchange traded funds
<b>Entry and Exit</b>	Difficult	Relatively easy
<b>Risks Involved</b>	Stable	Volatile

### What are the Pros and cons of FPI?

- Single FPI Regime came into effect from 1st June, 2014 by subsuming FIIs, their sub-accounts and qualified foreign investors (QFIs).

Pros	Cons
<ul style="list-style-type: none"> <li>• Increases Capital availability.</li> <li>• Entry and exit are relatively easy.</li> <li>• Quick return on investment.</li> <li>• Increase the liquidity of domestic financial markets.</li> <li>• Encourages investment in growth opportunities.</li> <li>• Bring foreign exchange into the economy</li> </ul>	<ul style="list-style-type: none"> <li>• Volatility in markets when large outflows occur during market downturns.</li> <li>• No direct control on management.</li> <li>• Exposure to political risk</li> </ul>

### What is the new regulatory framework on FPI?

- FPI threshold - Under Foreign Exchange Management (Non-debt Instruments) Rules, 2019, investment made by the FPI should be less than **10 %** of the total paid-up equity capital.
- **Crossing threshold** - FPIs exceeding a **10% stake** in a company must divesting their holdings or reclassifying such holdings as *within 5 trading days* following the transaction that breaches the limit.
- **Approvals** - It is subject to approvals from both the Indian government and the invested company.
- **Increased disclosure requirements** - To ensure compliance, the RBI requires full reporting under the *Foreign Exchange Management Regulations, 2019*.
- They need to identify and disclose their ownership structure and the ultimate beneficial owners.

- **SEBI's revised guidelines** - It mandates that any FPI choosing reclassification must notify its custodian.
- The custodian will then facilitate the transfer of securities to the designated FDI account, ensuring compliance with all reporting requirements.
- **Prohibited sectors** -The facility of reclassification shall not be permitted in any sector prohibited for FDI, such as defense and telecom, to protect national security.

#### What are the implications of the framework?

- **Streamline foreign investments** - Providing a structured path to retain the investment, When an FPI, along with its investor group, inadvertently crosses the threshold.
- **Market stability** - This shift could bring more stability and reduce market volatility associated with short-term foreign investments.
- **Enhanced governance** - The compliance requirements, especially those related to beneficial ownership, improve transparency in the market.
- **Increased compliance costs** - Stricter disclosure norms and other regulatory requirements increase compliance costs for foreign investors.
- **Promotion of long-term investment** - By encouraging FPIs to convert substantial investments into FDI, the government aims to promote long-term foreign investments.
- **Change in investment patterns** - The restrictions may redirect FPI interest toward non-sensitive sectors with fewer ownership caps.
- Sensitive sectors might experience reduced foreign investment due to regulatory hurdles and caps on ownership.
- **Prevent tax evasion** – The rules aimed to prevent any attempts at tax evasion or money laundering.



*FPIs have pulled out over Rs 1.36 lakh crore from the cash market since October 1 this year.*

#### What lies ahead?

- Focus on maintaining transparency while ensuring India remains competitive in attracting foreign capital.
- Reduce market volatility to make resilient economic foundation less susceptible to short-term market shocks.

### 10.4 Achieving self-reliance in fertilizer production

#### Why in news?

With the crisis continuing in Ukraine and Gaza, experts and policymakers are concerned about further increase in the prices of the components used for making petroleum-based chemical fertilizers.

#### What are the challenges in fertilizer imports in India?

- **Geopolitical tension** – The rising conflicts such as in Russia – Ukraine and Gaza have disrupted fertilizer imports.
- **Price volatility** – Fluctuation in crude oil prices, could increase fertilizer production costs.
- **Rise in import bill** – When fertilizer cost increases it further burdens exchequer on budgetary allocations.
- **Supply chain vulnerabilities** – Delays in shipments due to geopolitical tensions directly affect India's agricultural sector.

*The Centre allocated Rs 1.79 lakh crore as fertilizer subsidy under the Budget estimates for 2023-24.*

### Status of fertilizer production in India

- **India's fertilizer production** - In FY24 India produced **435.95LMT** of fertilizer which led to decline in fertilizer import.
- The Indian fertilizer industry is expected to grow at CAGR of 4.2% from 2024 to 2032.
- The country imports 20-25% of its overall fertilizer needs.
- **Major import partners** - India's fertilizer imports were mostly from countries such as China, Russia, Saudi Arabia, UAE, Oman, Iran and Egypt.
- **Declining imports** - Fertilizer imports dropped by nearly 10% in 2024.
  - Urea imports declined by 7%
  - DAP by 22%
  - NPKs by 21%

<b>Indigenous fertilizer production (435.95LMT)</b>	<ul style="list-style-type: none"> <li>• Urea - 250.72 LMT</li> <li>• NPK - 89.67 LMT</li> <li>• Diammonium Phosphate (DAP) - 42.22 LMT</li> <li>• Single Super Phosphate (SSP) - 53.34 LMT.</li> </ul>
<b>Imported fertilizer (143.72LMT)</b>	<ul style="list-style-type: none"> <li>• Urea - 20%</li> <li>• DAP - 50-60%</li> <li>• <b><i>Muriate of Potash (MOP) - 100%</i></b></li> </ul>
<b>Total fertilizer consumption (579.67LMT)</b>	<ul style="list-style-type: none"> <li>• Urea - 341.73 LMT</li> <li>• DAP - 92.64 LMT</li> <li>• MOP - 23.93 LMT</li> <li>• NPK - 121.37 LMT</li> </ul>

### What are the measures taken to achieve self-sufficiency in fertilizers?

- **Upgrading fertilizer plants** – Plants in regions like Gorakhpur and Ramagundam have been revitalized with advanced, energy-efficient technology.
- **Self-sufficiency in urea** - The Union government has set 2025-26 as the deadline by which the country will end all urea imports.
- **Nano urea production** - Six Nano Urea plants and four Nano DAP plants have been set up in the country
- **Organic farming** – Paramparagat Krishi Vikas Yojana (PKVY) promotes organic farming and offers Rs 50,000 per hectare for three years, with Rs 31,000 directly allocated to farmers for organic inputs.
- **Sustainable agriculture** – National Mission for Sustainable Agriculture (NMSA) implements strategies to make Indian agriculture more resilient to climate change.
- **Neem coated fertilizer** – 100% Neem coating of subsidized urea is mandated to enhance efficiency and prevent misuse.
- **One Nation, One Fertiliser** – Pradhan Mantri Bhartiya Jan Urvarak Pariyojana scheme aims to implement One Nation One Fertilizer by introducing Single Brand for Fertilizers and Logo.
- **Alternate fertilizers** – PM Promotion of Alternative Nutrients for Agriculture Management (PM PRANAM) promotes balanced and sustainable use of chemical fertilisers, adopting alternative options like organic, nano, and bio-fertilisers, and encouraging natural and organic farming.

*Urea accounts for about 70% of the overall fertiliser subsidy bill.*

*The Indian Farmers Fertiliser Cooperative (IFFCO) has sold about 3.3 million tonnes of locally produced nano urea worth about Rs 7 crore from August 2021 to February 2024.*



## What measures can be taken to achieve self-sufficiency in fertilizer production?

- **Revival and modernization of plants** – Focus on reopening defunct plants and modernizing existing ones to increase production capacity.
- **Research and innovation** – Promote nano fertilizers to precise delivery of nutrients with increased efficiency and reduced wastage.
- **International collaborations** – Encourage collaboration of Indian companies with global fertilizer producers to integrate cutting-edge technology.
- **Policy reforms and incentives** – Increase public, co-operatives, private participation in fertilizer production by providing various incentives, including subsidies, tax relief, and funding support.
- **Import diversification** – Diversify the import sources to mitigate risks associated with over-reliance on a single supplier.
- **Eco-friendly alternatives** – Promotes eco-friendly and organic fertilizers to reduce the environmental impact of chemical fertilizers.
- **Organic farming promotion** – Initiatives such as bio-waste and compost-based fertilizers aim to reduce dependency on chemical fertilizers, fostering sustainable agricultural practices and helping preserve soil health.
- **Promotion of bio-fertilizer** – It is an eco-friendly alternative to chemical fertilizers that can help India achieve self-sufficiency.

## 10.5 Intellectual property rights

### Why in news?

India secures position in top 10 countries in Patents, Trademarks, and Industrial Designs as per WIPO 2024 Report.

### What are the highlights of the WIPO 2024 report?

- **WIPO report** - The World Intellectual Property Report, published *biennially* by the World Intellectual Property Organization (WIPO), provides insights into global IP trends and innovations.
- **India's growth in patents** - India recorded a 15.7% increase in patent applications, ranking 6th globally with 64,480 applications in 2023.
- This marks the fifth consecutive year of double-digit growth, with over half of these applications from domestic applicants.
- **Industrial design surge** - India's industrial design sector also witnessed significant growth, with applications rising by 36.4%.
- This surge reflects the increasing focus on product design, manufacturing, and the creative industries in India.
  - **Leading sectors of Industrial Design** – Textiles and Accessories, Tools and Machines, and Health and Cosmetics, together accounted for nearly half of the design filings.
- **Strength in trademark filings** - With a 6.1% increase in 2023, India ranked 4<sup>th</sup> globally for trademarks.
  - **Leading sectors in trademark filings** - Health (21.9%), Agriculture (15.3%), and Clothing (12.8%).
- India's trademark office now holds the 2<sup>nd</sup> largest number of active trademark registrations worldwide, with over 3.2 million trademarks in force.
- **Patent-to-GDP ratio** - Over the past 5 years, India's IP activity has shown significant growth.
- Between 2018 and 2023, patent and industrial design applications more than doubled, while trademark filings increased by 60%.
- This surge reflects the growing importance of intellectual property in India's economic expansion, with the country's patent-to-GDP ratio rising sharply from 144 in 2013 to 381 in 2023.



- **Global patent trends** - Worldwide, 3.55 million patent applications were filed in 2023, a 2.7% increase from 2022, with Asian economies like China, Japan, South Korea, and India leading the charge.
- This surge highlights Asia's dominance in IP and innovation.

### What is intellectual property?

- **Intellectual Property (IP)** - It refers to creations of the mind, including inventions, literary and artistic works, designs, and symbols used in commerce.
- IP is protected by laws that allow creators to earn recognition or financial benefits from their innovations.
- **Types of intellectual property**
- **Patents** - Exclusive rights for inventions, allowing owners to decide how or if others may use their invention.
- **Copyright** - Rights for creators over literary and artistic works, such as books, music, and films.
- **Trademarks** - Symbols or marks that distinguish the goods or services of one entity from others.
- **Industrial designs** - Protection for the aesthetic aspects of articles, including patterns and colors.
- A design may consist of three-dimensional features, such as the shape or surface of an article, or of two-dimensional features, such as patterns, lines or color.
- **Geographical indications** – These are signs used on goods that have a specific geographical origin and possess qualities, a reputation or characteristics that are essentially attributable to that place of origin.
- **Trade secrets** - These are IP rights on confidential information which may be sold or licensed.

### What are the importance of Intellectual Property?

- **Encourages innovation and creativity** - By protecting creators' rights, IP fosters an environment where innovation can thrive.
- Inventors are motivated to develop new technologies, knowing their efforts are legally safeguarded.
- **Economic growth** - IP-intensive industries contribute substantially to GDP and job creation.
- IP rights allow businesses to commercialize their products, generating revenue and spurring economic activity.
- **Attracting investments** - Strong IP protection encourages foreign and domestic investment in research and development, fueling industrial growth and global competitiveness.
- **Consumer confidence** - IP rights ensure that consumers receive authentic products, improving trust and safety in the marketplace.

### What are the Indian government measures to improve IP?

- **National IPR Policy 2016** - This comprehensive policy unifies all IP rights under a single framework, focusing on innovation promotion, IP protection, and policy review mechanisms.
- **Cell for IPR Promotion and Management (CIPAM)** - CIPAM, established under the National IPR Policy, coordinates policy implementation and promotes IP awareness across sectors.
- **National Intellectual Property Awareness Mission (NIPAM)** - NIPAM aims to spread IP awareness and provide training in educational institutions, building a culture of innovation from a young age.
- **Startup Intellectual Property Protection (SIPP) scheme** - This program supports startups in managing and protecting IP assets, fostering innovation and entrepreneurship in the tech and creative industries.
- **Atal Innovation Mission (AIM)** - Launched by NITI Aayog in 2016, AIM encourages innovation and entrepreneurship.

### What lies ahead?

- Enhancing IP education and awareness to help innovators understand IP benefits and protection mechanisms, especially at grassroots levels.
- Strengthening IP enforcement to boost investor confidence and protect innovators' rights.
- Investing in IP infrastructure to streamline processes, reducing wait times and improving IP service quality.
- Encouraging domestic innovation to reduce dependence on foreign patents and strengthen India's self-reliance in innovation.

## 10.6 Underperformance of Manufacturing Sectors in India

### Why in news?

India has been under-performing in labour-intensive manufacturing sector for past two decades.

### What is the status of manufacturing sector in India?

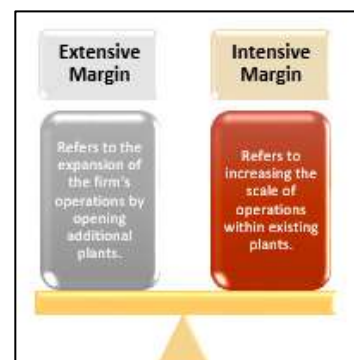
- **GDP Contribution** – The manufacturing sector remains a significant contributor to Indian economy contributing **17% of India's GDP**.
- **Employment Generation** – The sector continues to be a major source of employment, over 27.3 million workers.
- **Global Competitiveness** – India has strengthened its position as a global manufacturing hub, attracting investments and exporting a wide range of products.
- The manufacturing sector's growth rate averaged 7% per year between 2014-15 and 2019-20.
- Merchandise exports for the period April-February 2023-24 were 394.99 Billion USD.
- **Emerging Sectors** – Sectors such as electronics, electric vehicles, renewable energy, and pharmaceuticals in manufacturing are experiencing rapid growth, driven by government support and market demand.

### India's targets in manufacturing sector

- To increase the share of manufacturing to 25% in GDP by 2025.
- To create 100 million additional industrial jobs (from about 60 million) by 2025.
- Achieve USD 1 trillion merchandise exports target by 2030.

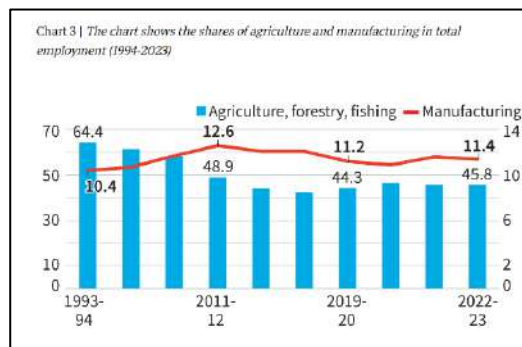
### What are the challenges for the growth of manufacturing sector?

- **Stagnation of large plants** – Large plants in India have not grown over time despite a number of favorable developments such as policy liberalization and contractualisation of labour.
- **Rise in multi-plants** – In the last 20 years, there has been rise in multi-plants where it operates with multiple production facilities within a state.
- The share of multi-plants rose from 15% in 2001 to 30% of total plants in 2022.
- **Stagnating of employment growth** – Employments in manufacturing has declined from 12.6% in 2011-12 to 11.4% in 2022-23.
- **Strategic Plant Proliferation** – Firms choose to increase the number of plants (**extensive margin**) rather than expanding the size of existing plants (**intensive margin**).
- **Split in big investments** – Investments in manufacturing have been split across a number of factories.
- NSSO sample surveys, manufacturing employment has declined from 12.6% in 2011-12 to 11.4% in 2022-23.



### Why firms opting for multi plants?

- **Legal risks** – A dispute in a big plant would entail greater risks relative to that in a smaller plant.
- In an extreme situation shutting down a plant with 500 employees is less costly than one with 5,000 employees.
- **Diversifying policy** – A drop in orders from one client that affects one plant.
- **Policy regulations** – Indian plants are kept too small by regulations, especially labour laws.
- The risks of broader political environment in which the firm feels that large plants is be vulnerable to the whims of the Centre and state governments.
- **Geographical advantage** – Smaller plants can be closer to dispersed labour pools, especially of women.
- **Flexibility in hiring** – In multi-plant units, there is a flexibility in hiring and firing labour as it helps the firms to shuffle based on demand.
- **Difficulty in land acquisition** – Land is difficult to acquire in contiguous parcels to sustain large plants.

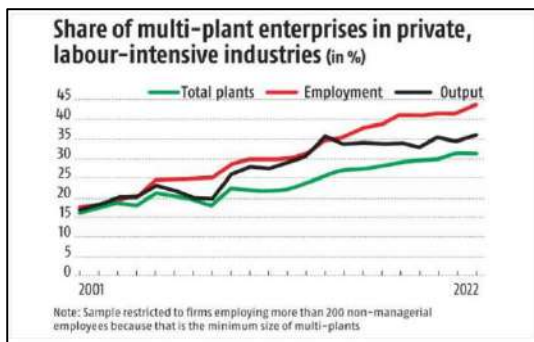


- **Contract Labor** – Firms may find it more cost-effective or efficient to replace some of full time employees with contract labor.
- This could be due to factors such as flexibility, reduced labor costs, or avoiding certain labor regulations.
- The share of contract labour in total employment has increased from 22% in 2001 to 41% by 2022.

**The Industrial Disputes Act, 1947** mandates a threshold of 100 employees for establishments to lay off employees or shut down without having to seek government approval.

#### Why small units undermining manufacturing growth?

- **Lower productivity** – 500 workers are more productive if they work in one plant than if they are split into two plants of 250 workers each.
- This pattern of large firms not becoming larger and remaining low productive is the root cause for *India's stagnating export performance*.
- For example, Bangladesh's market share in global apparel exports skyrocketed from 2.5% to 8% over two decades, while India's share stagnated at around 3%.
- **Overestimation of the size of plants** – The Annual Survey of Industries (ASI) suggest that India's largest manufacturing plants are bigger than they actually are.
- This leads to an *overestimation of the size of plants*.
- **Fragmented supply chain** – It leads to inefficiencies and higher cost in logistics.
- **Limited market reach** – It restricts growth potential by confining businesses to local or niche markets.



*The Annual Survey of Industries (ASI) is the principal source of industrial statistics in India. The Annual Survey of Industries (ASI) is being conducted since 1959 under ministry of labour and employment.*

#### What lies ahead?

- Changes in the law and implementation for expansion of manufacturing units.
- Reforms in industrial policy to align trade and industrial policies to promote domestic value addition.
- The special economic zones needs to be increased so that small firms expand to large unit.
- Creation of land banks to attract large firms like to establish larger units in India.

## 11. AGRICULTURE

### 11.1 Agrobiodiversity

#### Why in News?

As per the latest IPCC report, human-induced global warming of 1.1 degree Celsius has spurred changes to the earth's climate that are unprecedented in recent human history.

#### What is Agrobiodiversity?

- **Agrobiodiversity** - The variety and variability of animals, plants and micro-organisms that are used directly or indirectly for food and agriculture, including crops, livestock, forestry and fisheries.
- **Components** - It comprises the diversity of
  - Genetic resources (varieties, breeds) and species used for food, fodder, fibre, fuel and pharmaceuticals.
  - Non-harvested species that support production like soil micro-organisms, predators, pollinators
  - Diversity of the agro-ecosystems.
- **Neglected Crops** - They are domesticated plant species used for food, medicine, cultural practices within local communities but not widely commodified or studied as part of mainstream agriculture.

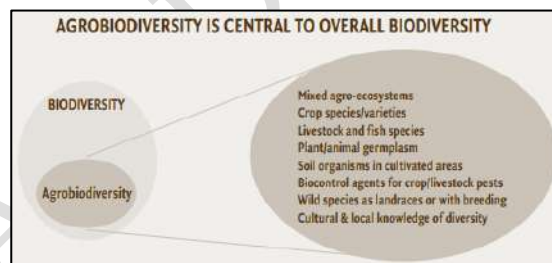


- **Edible Crop Diversity** - As per FAO estimates, there are more than 30,000 edible plants, and over 6,000 plants consumed by human beings and around 700 are cultivated on large scale.
- **Agrobiodiversity of India** - More than 9,000 plant species including medicinal and wild flowers have been consumed for over 4,000 years of Indian civilizational history.
- **Rice Varieties** - More than 40,000 landraces or farmer varieties are developed over thousands of years by the Indian farming communities in rice crop alone.
- **ICAR Varieties** - National Bureau of Plant Genetic Resources has collected more than 4.3 lakh accessions of about 1,500 crop species mostly from farmers' fields and to some extent from wild ecosystems.
- An estimated 20,000 varieties were made available during the past century to farmers for cultivation through formal institutional sources.
- **Agrobiodiversity heritage** – Globally Important Agricultural Heritage Systems (GIAHS) are agroecosystems inhabited by communities that live in an intricate relationship with their territory.
- Koraput Traditional Agriculture, Kuttanad below Sea Level Farming System are GIAHS in India.

*Accession is a distinct, uniquely identifiable sample of seeds representing a cultivar, breeding line or a population, which is maintained in storage for conservation and use.*

### What are the needs of Agrobiodiversity?

- **Ripple effect of climate Change** – It is threatening our ability to grow these staple crops in many locations as they are not well suited to grow in the challenging conditions brought by greater droughts, flooding and rising temperatures.
- **Decline in soil fertility and organic matter** – It affects the productivity of agricultural system
- **High dependency on limited crops** - 3/4<sup>th</sup> of the food humans consume globally comes from just 12 plant and 5 animal sources.
- **Limited diet** - Just three crops wheat, rice and corn, accounting for 51 % of the calories included in the diet.
- **Food security risk** - Massive dependence on these crops poses a risk to food security due to climate vagaries and emerging pests.



### What are the benefits of Agrobiodiversity?

- **Crop diversification** - Expanding the use of neglected crops can help to diversify agriculture and food systems.
- **Food diversity** – It introduces a greater variety of foods into global supplies—including more nutritious cereals, fruits and vegetables, and roots and tubers
- **Nutritional benefit** - Many neglected staple crops like Finger millet, Fonio, and teff have higher iron and amino acid contents than maize, rice, and wheat.
- **Climate resilience** – It enhances the strength to recover from the impacts of changes and extreme weather
- **Economic benefit** - Diversity of crops provides employment and alternate sources of income for farmers.
- **Reduce consumer vulnerability** – Additional agricultural production, diversification of food sources reduces food price volatility and increase consumer food price stability.

### What are the challenges?

- **Threads to traditional wisdom** - Lack of documentation threatens the loss of this rich food diversity.
- **Ineffective seeds management** - Limited access to seeds due to the poor performance of the seed multiplication and distribution system.
- **Mono-cropping** - The widespread practice of growing single crops over large areas reduces genetic diversity and makes crops more susceptible to pests and diseases.
- **High-yielding varieties** - The shift towards high-yielding, genetically uniform crops has led to the loss of traditional varieties and landraces.
- **Cultural shifts** - Modernization and industrialization often prioritize short-term gains over long-term sustainability.

### Way Forward?

- Promotion of neglected crops and forgotten foods and collective actions at global, national and regional levels.
- Collaborations with startups and hotel management institutes are helping in standardization of recipes and taking this culinary knowledge and heritage to modern audiences.
- Recognize farming communities and indigenous people as custodians of knowledge for sustainable transformation rather than mere beneficiaries.
- Promote women-led collectives and enterprises to grow and sell nutritious neglected crops.
- Unleashing potential of millets for sustainable food, agriculture.

## 11.2 Sustainability in export of agricultural commodities

### Why in news?

Increasing exports of key commodities like tea, sugar, and millets poses multiple challenges to the sustainability of production, processing, and distribution systems.

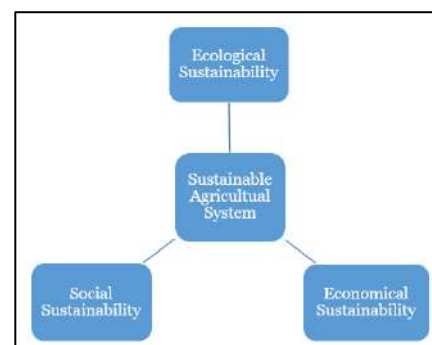
### What is the recent trend of agricultural exports in India?

*India is in **8<sup>th</sup>** position in global agriculture exports in 2023 as per WTO report.*

- **Indian agriculture** - India has a vast domestic consumption base that supports a variety of agricultural sectors, including tea, sugar, and millets.
- **Agri export growth** - India's agricultural export value surged from 8.7 billion dollars in 2004-2005 to **53.1 billion dollars** in 2022-2023, reflecting the expanding demand for Indian agricultural products globally.
- **Surge in sugar exports** - India is the world's 2<sup>nd</sup>-largest sugar producer, with 34 million metric tonnes of production, about a fifth of the global production.
  - Sugar exports values at 4,600 million dollars in FY 2021-2022 which by 291% from 2013.
  - About 50 million farmers depend on sugarcane cultivation in India.
- **Increased tea exports** - India is the 2<sup>nd</sup> largest tea producer and **4<sup>th</sup>-largest tea exporter**.
  - In 2022-2023, tea exports reached 793.78 million dollars.
  - The top export destinations of Indian tea are the United Arab Emirates, Russia, Iran, the U.S. and the U.K.
- **Millets export growth** - Millets are gaining importance to reduce malnutrition and balance diet.
  - In 2022-2023, millet exports were valued at 75.45 million dollars.

### What are the sustainability issues in Indian agricultural system?

- **Ecological factors:**
  - **Biodiversity loss** - The expansion of monoculture crops like sugarcane and tea replaces diverse ecosystems, leading to significant biodiversity loss.
  - **Human-wildlife interactions** - 70% of tea plantations are situated at the periphery of forests and migratory routes of elephants which results in frequent interactions with humans and human property.
  - **Synthetic pesticides usage** - Synthetic pesticides constitute up to 85% of total pesticide use in tea plantations and increase in the incidence of DDT, Endosulfan 35 EC, Dicofol 18.5 EC, and Cypermethrin 10 EC in tea.
  - **Pressure on water resources** - Intensive water use for crops like sugarcane depletes groundwater levels, creating stress on water resources and limiting availability for other crops and communities.
- **Economic aspects:**
  - **Vicious debt cycles** - Many farmers remain trapped in debt cycles due to low income and high production costs.
  - This restricts their ability to invest in sustainable practices or adopt new technologies that could improve crop resilience and productivity.
  - **Supply chain issues**- With a complex supply chain, farmers and small-scale producers become vulnerable to market fluctuations.



- Any disruption in the supply chain can have significant impacts on their livelihoods and the consistency of export.
- **Social aspects:**
- **Labor rights** - Laborers in the tea and sugar industries often lack access to fair wages, health benefits, and safe working conditions.
- **Hazardous working conditions** - Workers in these industries are exposed to pesticides without protective gears.

*On average, 1 kg of sugar requires between 1,500 and 2,000 kg of water and Sugarcane and paddy occupy around 25% of the gross cropped area in India and consume 60% of the country's total irrigation water.*

#### What are the potential solutions to ensure sustainability?

- **Sustainable farming practices** - Promote long-term ecological and socio-economic sustainability.
- **Enhance social equity** – Address wage gaps and labor concerns such as hazardous working conditions and skilling labors.
- **Millets a sustainable option** - Promote millet cultivation can help reduce the environmental footprint of agricultural exports.
- **Better management practices** - Implement efficient management practices in tea and sugar plantations can improve resource use, reduce chemical dependency, and mitigate environmental impact.
- **Monitoring pesticides usage** - Monitor maximum residue limits for pesticides to improve the quality and safety of agricultural exports.
- **Enforcement of existing labor regulations** - Strengthen and enforce labor regulations is critical to protect workers' rights and ensure safer working conditions.
- **Ensuring sustainability** - Encompass sustainability at pre-sowing, on-farm production and post-harvest stages.
- **Efficiency in water use** - Implement drip irrigation in water intensive crops could lower water consumption by 40-50%.
- **Alternate cropping patterns** – Reduce stress on land degradation and Improve soil management.

*Millets require minimal water and are resilient to harsh conditions, making them an ideal sustainable crop for both domestic use and export.*

## 12. ENVIRONMENT

### 12.1 UNCBD COP16 OUTCOMES

#### Why in News?

Recently COP 16 was concluded in Cali Colombia in November 2024.

#### What is UNCBD?

- **UNCBD** – United Nations Convention on Biological Diversity (CBD) is a biennial conference that came into force in **1993**, after the **1992 Rio Earth Summit**.
- **Ratification** – In total, **196 countries**, including India, have ratified the CBD and are parties to the COP.
- US is the only UN member state not to have ratified the treaty.
- **Objectives of CBD**
  - The conservation of biological diversity
  - The sustainable use of the components of biological diversity
  - The fair and equitable sharing of the benefits arising out of the utilization of genetic resources
- **Supplementary Agreements**
  - **Cartagena Protocol of 2003** – Ensure the safe handling, transport and use of living modified organisms (LMOs) resulting from modern biotechnology.

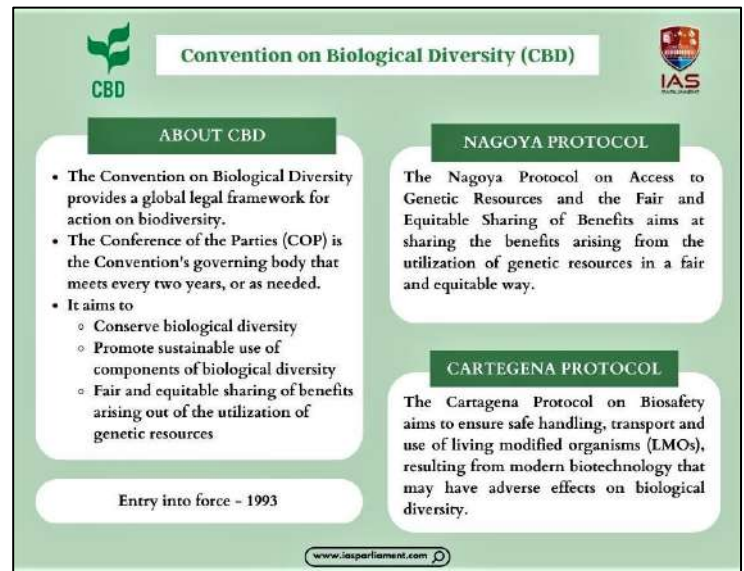
*UN Framework Convention on Climate Change (UNFCCC) and the UN Convention to Combat Desertification (UNCCD) also instituted at the 1992 Rio Earth Summit.*

- **Nagoya Protocol of 2014** – Sharing the benefits arising from the utilization of genetic resources in a fair and equitable way.
- **Global Biodiversity Framework** - The Kunming-Montreal Global Biodiversity Framework (GBF) was adopted in COP 15.
  - It sets 4 goals for 2050 and 23 targets for 2030.

To know about UNCBD COP – 15, Click [here](#)

### What are the outcomes of COP 16?

- **Cali Fund** – It was launched with a focus on ensuring fair and equitable distribution of benefits derived from *digital sequence information* (DSI) related to genetic resources.
  - Pharmaceutical, biotechnology, animal and plant breeding and other industries benefiting commercially from DSI uses should contribute to “the Cali Fund,” based on a percentage of their profits or revenues.
- **Use of Cali Fund** - *At least half of the fund* directed toward Indigenous Peoples and local communities, emphasizing support for women and youth.
- **Kunming Biodiversity Fund (KBF)** – It was launched with a USD 200 million contribution from the Government of China to deliver 2030 Agenda and SDG targets and 2050 goals of the Kunming-Montréal Global Biodiversity Framework, particularly in developing countries.
- **National Biodiversity Targets** – A total of 119 countries out of 196 parties to the CBD have submitted national biodiversity targets and additionally, 44 countries have developed National Biodiversity Strategy and Action Plans.
- **Recognition of Africa** - Role of people of African descent in implementing the Convention has been recognized to ensure fair and equitable benefit-sharing from the use of genetic resources.
- **Indigenous Peoples and Local Communities Body** – Establishment of a new permanent subsidiary body for preservation and protection of the knowledge, practices, and innovations of Indigenous Peoples.
- **Programme of Work** - To ensure Indigenous Peoples and local communities can meaningfully participate in conservation, sustainable resource use, and equitable sharing of biological diversity benefits.
- **Synthetic Biology Technology** – A new thematic action plan on synthetic biology was launched to address inequities in technological access by promoting capacity-building, knowledge-sharing, and technology transfer in developing countries.
- Synthetic biology utilizes engineering principles to create or modify organisms through DNA sequencing and genome editing, opening doors to both opportunities and regulatory challenges in biodiversity.
- **Invasive Alien Species Management** – Endorsement of guidelines on matters of invasive alien species for establishing databases, improving cross-border trade regulations, and enhancing coordination with e-commerce platforms.
- **Ecologically Or Biologically Significant Marine Areas (EBSAs)** – New mechanisms to identify new EBSAs and update existing ones.
- The EBSAs are special areas in the ocean that serve important purposes, to support the healthy functioning of oceans and the many services that it provides.
- **Sustainable Wildlife Management and Plant Conservation** – Decision on sustainable wildlife management was made, to monitor, capacity-building, and active participation of Indigenous Peoples, local communities, and women.



**Digital Sequence Information (DSI)** refers to the digital data derived from genetic resources, such as DNA sequences of plants, animals, and microorganisms.

**Global Biodiversity Framework Fund (GBFF)**, agreed at COP 15 in 2022 and established by the Global Environment Facility (GEF), accepts contributions from governments, the private sector, and philanthropies.



- Plant conservation efforts were also highlighted, with a focus on ensuring measurable progress aligned with global biodiversity targets.
- **Global Action Plan on Biodiversity and Health** – To help curb the emergence of zoonotic diseases, prevent non-communicable diseases, and promote sustainable ecosystems.
- The strategy embraces a holistic “One Health” approach that recognizes the health of ecosystems, animals, and humans as interconnected.
- **Risk assessment** - Parties to the Cartagena Protocol on Biosafety welcomed new, voluntary guidance on assessing the risks posed by living modified organisms (LMOs) containing engineered gene drives.

### What are the INDIA’s updated NBSAP?

- **National Biodiversity Strategy and Action Plan (NBSAP)** - India’s first plan was created in 1999, followed by the Global Environment Facility (GEF) Project from 2000-2003 that fostered wider stakeholder engagement in biodiversity planning.
- **National Biodiversity Action Plan (NBAP)** – It was created in 2008 and was further refined in 2014 to align with the Aichi Biodiversity Targets established during the CBD’s 2010 meeting.
- **Updating NBSAP** – India updated the National Biodiversity Strategy and Action Plan in alignment with the Kunming-Montreal Global Biodiversity Framework, setting *23 national biodiversity targets*.
- **Inclusive Approach** – India adopted ‘Whole-of-Government’ and ‘Whole-of-Society’ approach in updating its NBSAP
- **Ecosystem Restoration And Species Recovery** – Through community-driven conservation efforts focusing on the restoration of degraded ecosystems, the protection of wetlands, and the sustainable coastal management.
- **Adoption Of a Transformative Approach** – Bottom-up approach for implementation, mainstreaming biodiversity, sectoral integration, and inter-agency cooperation to ensure effective implementation at all levels.

### What did COP16 fail to achieve?

- **Lack Of Strategy** – COP16 also failed to adopt a strategy for raising \$200 billion a year by 2030 to implement the Global Biodiversity Framework.
- **Minimal Funding** – Only about USD 407 million was pledged to the interim funding mechanism, the Global Biodiversity Framework Fund in Cali.
- **Lack Of Progress** – Developed countries are lagging on their commitments to provide \$20 billion annually in international biodiversity financing by 2025.
- **Non consensus over targets** – It also failed to reach a consensus on how the GBF’s four goals and 23 targets will be monitored.

### What lies ahead?

- Achieve more on resource mobilization targets and advances on the monitoring framework.
- Foster cooperation in bringing consensus among all other countries to achieve the goals.
- Implement National biodiversity targets to reduce the biodiversity crisis.

### Quick Facts

- The International Day for Biological Diversity (IDB) – On May 22 to increase understanding and awareness of biodiversity issues.
- **Theme (2024)** – Be part of the Plan
- **International Year of Biodiversity** – 2010
- **Decade on Biodiversity** – 2011 to 2020

## 12.2 Delhi’s Persistent Air Quality Crisis

### Why in News?

Delhi’s average air quality in October was in the very poor category at 356 which is the worst in the country, as per the Central Pollution Control Board.

### What are the major contributors to Delhi air pollution?

- **Construction Dust** – Dust from construction sites contributes 20-30% of all air pollution emitting large amounts of PM<sub>10</sub> and PM<sub>2.5</sub> into the atmosphere.
- **Cold Air Traps** – During winter cold air retains this particulate matter for longer period and thus most polluted months in the year are generally November, December and January.
- **Stubble Burning** – Coincidence of Diwali festival and stubble-burning season in Punjab, Haryana & UP.

*The most polluted months in the year are generally November, December and January, according to the data on monthly AQI averages.*

### What are the measures taken to combat air pollution?

- **Graded Response Action Plan (GRAP)** – [Commission for Air Quality and Management \(CAQM\)](#) activates various measures under GRAP plan depending on [Air Quality Index](#) levels.
- It has four stages, each with different restrictions based on the air quality.
- **Vehicle Restrictions** – Diesel vehicles over ten years old and petrol vehicles over 15 years are restricted from entering Delhi.
- **Disincentivizing Private Transport** - New Delhi Municipal Council (NDMC) hiked parking fees for private 2-wheeler and 4-wheeler vehicles.
- **Cleaner Transportation** - Intercity buses plying to Delhi daily from various cities in Haryana, UP and Rajasthan have been shifted completely to cleaner BS-VI diesel/CNG/EV mode.
- **Environment Compensation Charges** - RFID (radio-frequency identity) system was implemented by South Delhi Municipal Corporation (SDMC) for collection of tolls and from commercial vehicles entering Delhi.
- **Construction Regulations** – Stringent dust control measures at construction sites, including anti-smog guns and remote monitoring, aim to reduce particulate matter generated by these activities.
- **Stubble Burning Control** – Crop diversification, promoting basmati variety, low straw and early maturing paddy varieties, and direct seeding of rice methods have been planned to reduce paddy straw generation.
- **National Clean Air Programme (NCAP)** - It set targets of **40% reduction** in particulate matter concentration, **by 2026** in 131 of India's most polluted cities.
- **Artificial Rain** - Cloud seeding to induce rain and reduce pollution is being considered as a potential emergency measure by the Delhi government.
- **Air Pollution Control at Pollution Hotspots** - Identification and mitigation the local sources of air pollution to immediate impact on the improvement in the air quality around these hotspots are being carried out.
- **Ban on Pet Coke and Furnace oil** – Use of pet coke & furnace oil as fuel in NCR is banned since October 24, 2017.
- **OECMS** - Online Continuous Emission Monitoring System have been installed in red category air polluting industries in Delhi-NCR.

*World Health Organisation suggest that daily average PM 2.5 levels should not exceed 15 µg/m<sup>3</sup> and for PM 10 levels, the limit is set at 45 µg/m<sup>3</sup>. Recent data from the Delhi Pollution Control Committee (DPCC), the PM 2.5 and PM 10 levels reached up to 445 µg/m<sup>3</sup> and 1,566 µg/m<sup>3</sup>.*

Particulate Matter Sources	PM <sub>10</sub>	PM <sub>2.5</sub>
Road Dust	56%	38%
Transport Sector	9%	20%
Industrial Emissions	10%	11%
Domestic Fuel Burning	11%	12%

**Fight against pollution**  
A look at the city's Graded Response Action Plan to fight air pollution

**STAGE 1: POOR QUALITY AIR**  
(AQI between 201 and 300)

- Mechanised sweeping, washing of roads
- Enforcing ban on firecrackers, increased scrutiny of vehicles for pollution standards
- Large unregistered C&D sites can be shut

**STAGE 2: VERY POOR AIR**  
(AQI between 301 and 400)

- Dust control measures at C&D sites
- Parking fee to surge by 3-4 times
- Stop use of coal/firewood in eateries
- Augmenting frequency of CNG/electric bus and Metro services

**STAGE 3: SEVERELY POLLUTED AIR**  
(AQI between 401 and 450)

- Bar BS-III petrol and BS-IV vehicles from roads
- Govts can take decision on shutting primary schools
- Govts can take decision on shutting primary schools
- Ban on all non-essential construction work

**STAGE 4: SEVERE+**  
(AQI between 451 and 500)

- Ban on entry of diesel commercial vehicles (barring BS-VI) in Delhi, except those carrying essential commodities or providing essential services
- Odd-even vehicle policy may be rolled out

### What are the reasons for ineffectiveness of these measures?

- **Lack of Coordination** - Delhi, Haryana and Punjab are at loggerheads on the issue of stubble burning.
- **Failure to Check Crop Burning** - CAQM has failed its mandate of driving change in the post-harvest practices of farmers in Delhi's neighbourhood.

- **Inadequacy of emergency measures** – They are not to address most other factors that drive NCR’s pollution, including vehicular and industrial pollution.
- **Lack of Public Awareness** – Domestic burning of bio masses and not using of private transport are still prevalent among the public.
- **Deficiency in Urban Management** – Greening the city and cleaning the road dust are still lacking.

### What needs to be done to improve air quality?

- Implementing advanced forecasting models to anticipate pollution spikes for proactive interventions.
- Reducing waste burning in pockets by better collection and segregation of waste, replacing biomass for cooking in urban slums by providing easier access to LPG.
- Strengthen public transport infrastructure, enhancing dust and vehicle emission controls.
- Replace CNG vehicles with EV buses as the former emits nitrogen oxides which contribute to smog and particulate matter.
- Proactive planning and comprehensive, year-round measures rather than reactive emergency responses.
- Engage in multi-state coordination for stubble burning solutions remain crucial for a healthier future in the capital.

## 12.3 Nature Restoration Law for India

### Why in news

Recently The European union approved its Nature Restoration Law which aims to make continent-wide efforts to restore degraded ecosystems.

### What is European Union’s Nature restoration law?

- **Nature Restoration Law** – NRL was adopted by the EU’s Environmental Council in 2024 to restore the health of Europe’s ecosystems.
- **Aim** – Recover at least 20% of the EU’s land and sea areas by 2030 and all ecosystems by 2050.
- The NRL is part of the EU’s Biodiversity Strategy for 2030 and the **European Green Deal**.
- **Components of NRL**
  - **Land restoration** - Restoring drained peatlands under agricultural use.
  - **Coastal restoration** - Restoring the habitats of iconic marine species such as dolphins and porpoises, sharks and seabirds.
  - **Agricultural ecosystems** – Reversing the decline of pollinator population by 2030.
  - **River restoration** – Restoring at least 25,000 km of rivers to a free-flowing state by 2030.
  - **Greening urban space** – No net loss of green urban space and tree cover by 2030, and an increase in their area thereafter.

### European Green Deal

- The European Green Deal is a package of policy initiatives, which aims to set the EU on the path to a **green transition**, with the ultimate goal of reaching **climate neutrality by 2050**.
- **Features:**
  - **Fit for 55** - Target of 55% less emissions by 2030, in comparison to 1990.
  - **EU Emissions Trading System** - To generate revenues that will be reinvested in innovation, climate action, and social support.
  - Improving energy efficiency, energy security and reducing dependence from Russia by REPowerEU.
  - Enhancing the competitiveness of Europe's net-zero industry
  - Restoring the wealth of our environment.

### What are the socio-economic benefits of nature restoration?

- **Economic growth** – According to the World Economic Forum, nature restoration could globally generate economic returns of up to USD10 trillion annually by 2030.
- **Enhancing agricultural productivity** – Restoring nature improves soil fertility, water retention, and enhanced pollination.
- **Reduce water scarcity** – Restoring forests and wetlands improve water supply and quality.
- **Meeting SDG targets** – Goal 15 calls for the sustainable management of forests and combating desertification.

- **Job creation** – Increased employment in rural areas, especially in sectors like reforestation and agriculture thus improve the livelihood.
- **Tourism promotion** – Eco-tourism development in rural areas leads to sustainable growth.
- **Mitigate climate change** – By restoring its ecosystems, India can enhance its carbon sinks and meet its commitments under the Paris Agreement.
- **Disaster resilience** – Developing infrastructure that are disaster resilient to floods, droughts, and extreme weather events, making communities more resilient to climate-related disasters.

#### Why India needs a natural land restoration law?

- **Increasing land degradation** - According to the ISRO's Desertification and Land Degradation Atlas, nearly 30% of India's total geographical area is under land degradation.
- India's land degradation increased to 97.85 million hectares in 2018-19, a sharp increase from 94.53 million hectares in 2003-05.
- **Desertification** - It is a growing concern in India, with 83.69 million hectares affected in 2018-19.
- **No legally binding targets** – It needs a more comprehensive approach and a law that mandates the restoration of its degraded landscapes, ensuring the long-term sustainability of its ecosystems.
- **River pollution** – India's major rivers are degraded due to the rapid urbanization.
- **Water scarcity** – 820 million Indians face high to extreme water stress and 200,000 Indians die every year due to inadequate water, sanitation and hygiene.
- **Maintain ecological balance** - India is one of the world's biodiversity hotspots, is pushing several species towards extinction.
- Deforestation and poor land management accelerate erosion, depleting arable land and impacting food security.

*Land degradation is prevalent in key States such as Gujarat, Karnataka, Maharashtra and Rajasthan, which together form 23.79% of India's desertified land.*

#### What are the recommendations for India's NRL?

- **Restoration targets** – India should aim to restore 20% of its degraded land by 2030, with a goal of restoring all ecosystems by 2050.
  - This includes forests, wetlands, rivers, agricultural lands, and urban green spaces.
- **Wetland restoration** – Restore 30% of degraded wetlands by 2030 as critical wetlands such as the Sundarbans and Chilika Lake support biodiversity and carbon sequestration.
- **Biodiversity in agriculture** – Agriculture dominates India's landscape so promoting agroforestry and sustainable practices could restore farmlands.
- **River restoration** – Focus on restoring free-flowing rivers, such as the Ganga and Yamuna, addressing pollution and obstructions.
- **Urban green spaces** – Promoting urban forests in cities which face heat islands and declining air quality.
- Ensure that no net loss of green spaces in urban areas.

### 12.4 India's Road to Net Zero by 2070

#### Why in news?

As the effects of climate changes becoming more evident, India's commitment to achieve net-zero carbon emissions by 2070 needs to be sustainable.

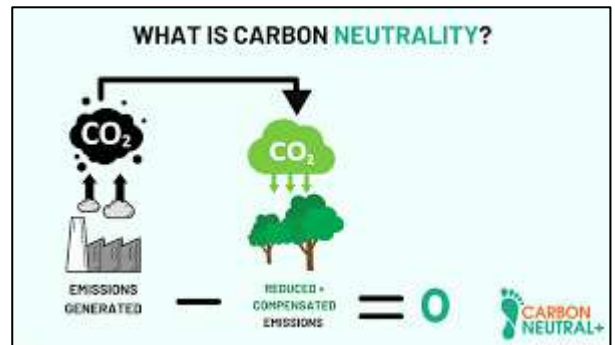
#### What are the needs to achieve net zero carbon?

- **Net zero** – It is also known as carbon-neutrality that refers to achieving a balance between the carbon emitted into the atmosphere and the carbon removed from it.
- **India's target** – India, announced the target to achieve net-zero carbon emissions by 2070 at **COP26** in Glasgow in 2021.
- **Significances of carbon neutrality:**
- **Climate change mitigation** – Limiting the average temperature rise to 1.5°C above pre-industrial levels is important to avoid severe climate change impacts.

*Currently, global temperatures have already risen by 1°C since 1880 due to industrial revolution.*



- **Biodiversity protection** – Reduces pollution and conserves natural habitats, aiding in the protection of diverse ecosystems.
- **Cleaner air and water** – Decreases pollution, leading to improved air and water quality, which is beneficial for human health and the environment.
- **Quality of life** – Promotes sustainable urban development, leading to cleaner, healthier, and more livable communities.
- **Strategy** – India follows long-term low-carbon development strategy based on two principles to achieve net zero.
  - Equity and climate justice
  - Common but differentiated responsibilities
- **Sustainable path** – By embracing sustainable practices on climate action, India achieves sustainable future that balances development and fighting climate change.
- **Opportunities in achieving net zero** – Transitioning to a net-zero economy presents economic and social opportunities.
- **Energy security** – Net-zero strategies involve diversifying energy sources and reducing reliance on fossil fuels, thereby improving a region's energy security.
- **Employment generation** – Emerging industries like renewable energy, green infrastructure, and carbon capture and storage (CCS) will generate new employment opportunities.
- **Environmental protection** – The transition to net zero benefits the environment as it requires responsibly using and preserving natural resources.
- **Attracts investment** – Investors increasingly consider environmental, social, and governance (ESG) factors when making investment decisions.



India is the **3<sup>rd</sup> largest** GHG emitter after china and US despite.

India stands **4<sup>th</sup> globally** in renewable energy installed capacity, according to the International Renewable Energy Agency.

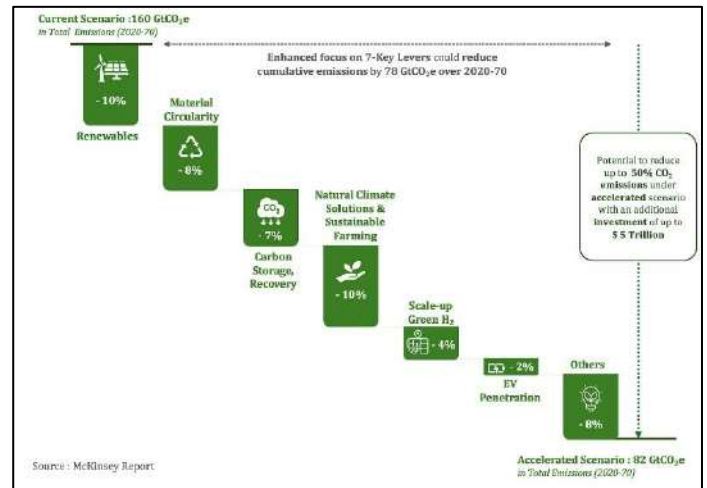
### What are the challenges to achieve net zero?

- **Resource limitations** – India's large population and limited resources present significant challenges.
- Achieving net-zero will require substantial land for renewable energy projects.
- **Financial constraints** – Achieving net zero demands significant investment in renewable energy, technological advancements, and infrastructure development.
- Decarbonization in agriculture, cement and steel sectors, requires high costs.
- **Technological gaps** – India's limited capacity to access the advanced technologies in green energy will hinder path net zero.
- **High dependence on fossil fuels** – Around 50% energy needs is sourced from coal energy.
- **Growing energy demand** – Estimated power demand could increase nine- to tenfold by 2070 and meeting it entirely with renewable energy requires 5,500 GW of solar and 1,500 GW of wind capacity by 2070.
- **Inequality** – The impacts of climate change disproportionately affect economically weaker sections of society.
- According to the World Inequality Database, the emissions of the richest 10% in India are 20 times higher than those of the poorest 10%.

### What is the sustainable path for achieving net zero?

- **Energy efficiency** – Promoting energy-efficient appliances and adopting passive design elements in buildings can reduce reliance on energy-intensive air-conditioning and heating systems.
- Passive design strategies are energy-efficient and environmentally friendly ways to use a building's natural surroundings to improve indoor comfort and reduce energy consumption
- **Sustainable transport** – Encouraging public transportation and promoting electric vehicles and railways can cut emissions in urban areas.

- **Mindful consumption** – Encouraging locally produced goods and mindful dietary choices can reduce freight induces carbon foot prints.
- **Life** movement for adoption of environment-conscious lifestyle which focus on individual behavioural change towards climate change.
- **Policy measures** – Scaling up renewable energy production through policy measures and addressing issues in bottlenecks in policy execution.
- **PM Surya Ghar Muft Bijli Yojana**, which promotes rooftop solar installations, are pivotal in decentralizing energy production and reducing dependency on fossil fuels.
- **Renewable energy adoption** – Through budgetary allocation more emphasis on sources like solar, wind, hydro, geothermal, and biomass to generate electricity.
- **Viability gap funding** – The government has expanded the provision of financial support by means of viability gap funding for public-private partnerships (PPPs) in infrastructure projects.
- **Creating more carbon sinks** - Increase the number of trees and green spaces to absorb the carbon human activities.
- **Standardizing carbon markets** - Carbon markets are trading schemes that provide financial incentives for climate change mitigation.
- **Nuclear energy** – Expanding nuclear power offers a reliable, low-carbon energy source that complements renewable energy.
- **Innovative technologies** – Investment in energy storage and smart grid technologies will enhance the efficiency and reliability of renewable energy systems.
- **International cooperation** – For addressing complex global challenges, and enabling more effective solutions for achieve the sustainable development.



### What lies ahead?

- Address the inequity in climate action to achieve sustainable development across all streams.
- Explore alternative funding options for green infrastructure projects.
- Balancing green energy transition along with upliftment of poverty driven population.
- Ensure that economic growth and environmental responsibility go hand in hand.

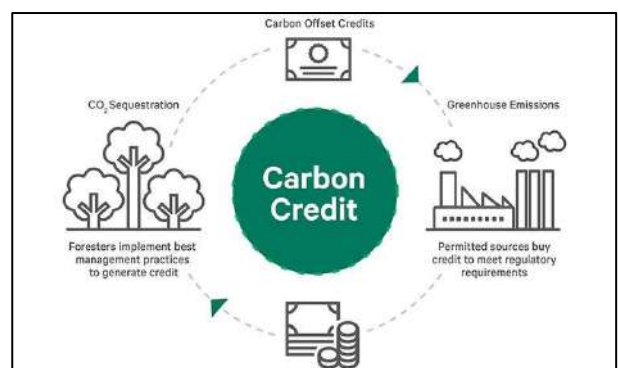
## 12.1 UN Framework about Carbon Market

### Why in news?

The new rules by United Nations about carbon trading between nations was recently approved at 29<sup>th</sup> edition of the Conference of the Parties (COP) in Baku, Azerbaijan.

### What is carbon market?

- **Carbon market** – It is a trading system where carbon credits are bought and sold.
- **Key Features:**
  - **Carbon Credits** – One tradable carbon credit is equal to one tonne of carbon dioxide or its equivalent amount of a different greenhouse gas reduced, sequestered or avoided.
  - **Offsets** – Once used, carbon credits become offsets and are no longer tradable.
  - **Standardization** – To compare GHG effects, emissions are standardized in CO<sub>2</sub>-



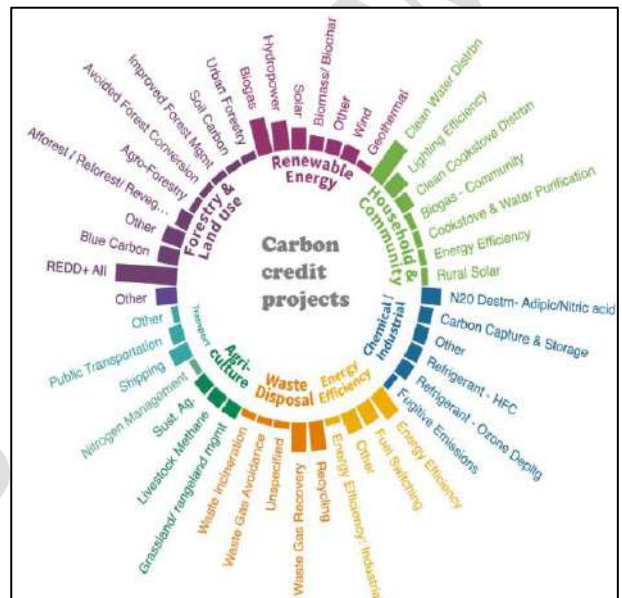
equivalents (CO<sub>2e</sub>) using 100-year Global Warming Potentials (GWPs).

- **Article 6** – It was first introduced in Paris Agreement 2015, which offers carbon trading as a way for countries to reduce their greenhouse gas emissions cooperatively.
- **Significance** – Carbon markets are seen as key tool in achieving net-zero goals by 2050.
- They enable countries to balance their emissions by offsetting them through credit trading.
- Carbon markets are one of the ways to deliver on the New Collective Quantified Goals (NCQG).
- **Global cooperation** – The market allows for cooperation across borders, reducing the cost of implementing climate action plans.

The COP 29 estimated that carbon market could reduce the cost of implementing national climate plans by 250 billion dollar per year by enabling cooperation across borders.

### What is the framework for carbon market approved in COP 29?

- **Article 6** – Under this article, **COP 29 approved two pathways** for countries and companies to trade carbon offsets.
  - **Article 6.2** – Direct country-to-country trading (bilaterally trade)
  - **Article 6.4** – Separate UN-backed marketplace (global carbon).
  - **Article 6.8** – The third cooperative carbon-reduction mechanism wasn't discussed much at COP29 is for non-market approaches.



- **Supervisory Body** – It is established to ensure the integrity and effectiveness of the carbon market by setting rules and standards for carbon credit transactions.
- **Credit verification** – Verification of carbon credits which come from genuine green projects.
- **Registry oversight** – It provides centralized tracking of traded credits to prevent double counting.
- **Host country approval** – The country where the carbon reduction project occurs, the host country must approve the project.
  - This ensures that the projects align with national climate plans.
- **Sustainable development goals** – Carbon market projects should contribute to the broader goals of sustainability, such as poverty reduction, health improvements or biodiversity conservation.

Global carbon trading mechanism could be a reality and that the first UN-sanctioned carbon credits would be available in 2025.

### What are the shortcoming of carbon market?

- **Greenwashing** – When a company or government makes deceptive claims about its environmental efforts.
  - Only 16% of carbon credits result in actual environmental benefits.
- **Lack of transparency** – Countries participating in the carbon market under Article 6.2 are not required to disclose how they plan to prevent double counting of credits, leaving room for uncertainty.
  - This weakens the enforcement of compliance and leaves room for countries to trade flawed or unverified carbon credits
- **Lack of compliance** – The COP29 rules are not mandatory for countries to stop using carbon credits from projects which are in compliance with emission standards.
  - Sharing key details about carbon trading such as risk of project failure, is also optional.
- **Overemphasis on offsetting** – Carbon markets allow developed countries to offset rather than reduce emissions at their source.
  - This reliance on offsetting rather than direct reductions delays meaningful action against climate change
- **Loopholes in methodologies** – The formula for calculating carbon credits does not account for the complexities of long-term environmental outcomes.

- **Concern of additionality principle** – It is when carbon credit projects claim emission reductions that would have occurred even without the project.
  - It makes the credits ineffective in addressing actual climate change mitigation.

#### What are the significance of this carbon market to India?

- **Economic gains** – Attracting investments through FDI for renewable energy and green projects.
  - Revenue generation by selling carbon credits in global markets.
- **Climate goals support** – The funding from carbon markets will fuel energy transition in India.
- **Technology transfer** – Access to low-carbon technologies, fostering innovation and industrial modernization in India.
- **Social and regional development** – Rural employment through afforestation, clean energy, and conservation projects.
- **Achieving equity** – In addressing climate change through fair carbon market rules for developing nations.
- **Climate leadership** – India's active participation in carbon markets demonstrates leadership in climate action, bolstering its international reputation while negotiating favorable terms in global forum.

#### What lies ahead?

- Global Implementation cross-border cooperation in carbon credit trading.
- Integrity in addressing concerns like double counting and additionality.
- Strict monitoring and stricter verification mechanisms are needed to maintain the integrity of the system.
- Technological Innovations for carbon capture and storage (CCS) and other innovative methods of emission reductions to meet the growing demand for credits.

#### Quick facts

##### India's carbon trading market

- The Carbon Credit Trading Scheme (CCTS) is a market-based mechanism in India to reduce carbon emissions.
- **Key features** – The CCTS includes two key mechanisms:
  - **Compliance mechanism** – Addresses emissions from energy use and industrial sectors.
  - **Offset mechanism** – Incentivizes *voluntary actions* from entities not covered under compliance.
- The CCTS is expected to take *effect by 2026*.
- The Ministry of Power (MoP) will oversee the regulatory framework of the CCTS, with the Bureau of Energy Efficiency acting as the designated administrator.

## 13. SCIENCE & TECHNOLOGY

### 13.1 Digital (Sequence Information DSI)

#### Why in News?

Recently held CoP16 biodiversity conference set up 'Cali fund' to support biodiversity conservation in countries providing digital sequence information.

#### What is digital sequence information?

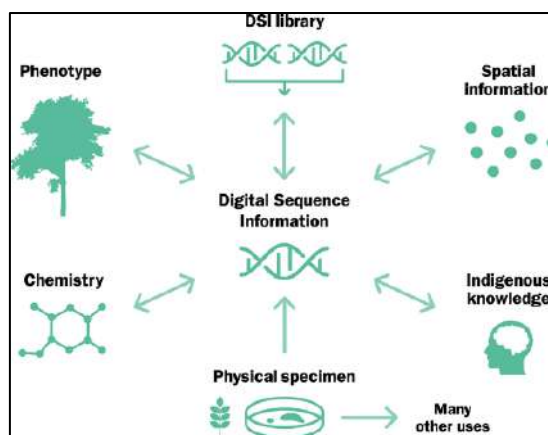
- **Genetic sequence** – DNA sequencing is the process of determining the nucleic acid sequence order of nucleotides in DNA.
- The unique genetic codes and sequences in all living organisms hold the information needed to develop and function.
- **Digital Sequence Information (DSI)** – It is digital data of genetic information of plants, animals, microbes.
- **Data types** – It covers any information derived out of these nucleotide or amino acid sequences, genome sequences, their biochemical composition, gene locations, genetic maps.



- **DSI Databases** – It is typically stored in global databases, such as GenBank, EMBL-EBI, or DDBJ.

### What are the significances of DSI?

- **Basic science research** – It allows researchers to investigate how genes interact with each other and helps in evolutionary studies.
- **Biodiversity conservation** – It enables scientists to analyze the genetic material of endangered or extinct ones, without requiring physical samples.
- **Disease research** – For identifying and tracking pathogens like viruses, bacteria, and parasites, which is vital for public health monitoring.



- For example, during the COVID-19 pandemic, the global sharing of the SARS-CoV-2 genome via DSI databases allowed scientists worldwide to develop diagnostics, treatments, and vaccines quickly.
- **Vaccine development** – Vaccine research relies on DSI which helps to analyze and create vaccines for emerging strains.
- **Agriculture and food security** – Crop improvement by identifying genes associated with desirable traits such as drought resistance, pest tolerance, and higher yields in crops.
- **Bioprospecting** – Genetic codes of plants, animals and microbes are used to find new compounds that can be used in pharmaceuticals, cosmetics or other commercial purposes.
- **Precision medicine** – Where a patient's genetic makeup is analyzed to personalized medicine for effective treatments.
- **Product development** - Industries like pharmaceuticals, cosmetics, agriculture and advanced lab technologies uses DSI to create or improve their products.

**Bioprospecting** is the systematic and organized search of useful products derived from bio resources including plants, microorganisms, animals that can be developed further for commercialization and overall benefits of the society.

**Stone-washed denim jeans** get their streaked quality from nature - specifically from enzymes developed from microbes found in super salty soda lakes.

Large companies and other major entities benefiting commercially from DSI will contribute to "the **Cali Fund**," based on a percentage of their profits or revenues.

### Why is it Important to adopt multilateral mechanism in COP – 16?

- At COP16, countries are aiming to create a single, multilateral system focused on generating revenues for conservation from the use of DSI.
- **Access and benefit sharing** – To globally determine the access and benefit sharing mechanism for digital sequence information.
- **Global access to genetic resources** – To facilitate the free exchange of genetic data through publicly accessible databases.
- **Complex law system** – The laws to govern the use of genetic material vary widely from country to country complicating the sharing of biological material for research.
- **Intellectual property rights** – To determine the ownership of digitally sequenced genes and how they can be patented or commercialized.
- **Ethical implications** – The vast amounts of DSI available could be used for unethical purposes, such as unauthorized genetic modification or bioweapons development.
- **Revenue for countries** – To enable Species-rich countries, including tropical giants like Brazil and India, capitalizing on their biodiversity through compensation or royalties from companies using DSI in their product.
- A U.N.-commissioned study estimated that a charge of 0.1% to 1% on annual revenues of companies using DSI could generate between USD1 billion and USD10 billion annually.

### What lies ahead?

- Determine how DSI revenues would be distributed for use in nature conservation.
- Develop charging mechanism on certain sectors like pharmaceuticals a percentage of their revenue or profit to use DSI databases
- Ensure free access for non-profit research that benefits humanity.
- Support poorer nations in developing their own genetic research.

## UNCBD

- **UNCBD** – The Convention on Biological Diversity (CBD) that came into force in **1993**, was an outcome of the **1992 Rio Earth Summit**, along with the UN Framework Convention on Climate Change (UNFCCC) and the UN Convention to Combat Desertification (UNCCD).
- **Frequency of Conference** – **Biennially** since 1994.
- **COP 16** – The 16th meeting of the Parties was held in **Cali, Colombia** in 2024.
- Originally, Turkey was the host it but after a series of earthquakes in February 2023 they had to withdraw.
- **Ratification** – In total, 196 countries, including India, have ratified the CBD and are, parties to the COP.
- US is the only UN member state not to have ratified the treaty.
- **Objectives of CBD**
  - The conservation of biological diversity
  - The sustainable use of the components of biological diversity
  - The fair and equitable sharing of the benefits arising out of the utilization of genetic resources
- **Supplementary agreements**
  - **Cartagena Protocol of 2003** – Ensure the safe handling, transport and use of living modified organisms (LMOs) resulting from modern biotechnology.
  - **Nagoya Protocol of 2014** – Sharing the benefits arising from the utilization of genetic resources in a fair and equitable way.
- **The International Day for Biological Diversity (IDB)** – On May 22 to increase understanding and awareness of biodiversity issues.
- **Theme (2024)** – Be part of the Plan
- **International Year of Biodiversity** – 2010
- **Decade on Biodiversity** – 2011 to 2020
- **Global biodiversity framework** - The Kunming-Montreal Global Biodiversity Framework (GBF) was adopted in COP 15.
- It sets 4 goals for 2050 and 23 targets for 2030.

To know about UNCBD COP – 15, Click [here](#).

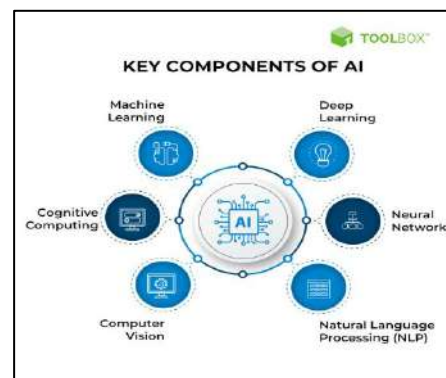
## 13.2 AI in Governance

### Why in news?

The role of Artificial intelligence in transforming governance in India is immense due to the scale and size of data availability and rapidly digitization in India to revolutionize governance, in India.

### What is Artificial Intelligence?

- **Artificial Intelligence** – AI refers to the ability of machines to do cognitive functions such as thinking, perception, learning, problem-solving and decision-making.
- **Objective** – To create machines that can emulate capabilities and carry out diverse tasks, with enhanced efficiency and precision.
- **Techniques** – AI can be achieved through components like Machine Learning, Natural Language Processing, Computer Vision and Robotics.
- **AGI (Artificial General Intelligence)** – It refers to a machine or a software that can perform any intellectual task that a human can do.



### What is the role of AI in governance?

- **AI in governance (GovAI)** – It is the use of AI in governance in every aspect of service delivered by government.
- **Killer app of AI** – It is believed that *governance is the biggest application of AI*.
- AI in governance will make government sharper, more targeted and give life to the idea of **maximum governance**.
- **Digital transformation in governance** – Integrating AI with Digital Public Infrastructure (DPI) will bring AI enabled platforms DPI in Aadhaar, UPI and Digi Locker that will revolutionize governance.

**Digital Public Infrastructure (DPI)** is a digital framework that allows governments, businesses and citizens to interact, share resources, and expand economic opportunities.

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

- **Trends of emerging data ecosystem** – The recent trends in India on data repository indicates biggest potential on AI application.
- **Largest data repositories** – As more Indians access and use the internet and the digital environment, they consume and **generate massive amounts of data**.
- And these data are stored as vast stores of personal and non-personal data with the help of DPIs and digitalization process.
- **Application in wide range of sectors** – AI can also benefit various sectors such as healthcare, agriculture, education, infrastructure, fisheries, animal husbandry, national disaster and climate prediction, smart mobility and transportation.

**90-crore Indians** are connected to the Internet and by 2026 that figure will touch 120 crore, making India the largest connected and digitalized country in the world.

### What are the benefits of integrating AI in governance?

- **Efficient government** – With the intersection of DPI and AI, the government can become more efficient and ensure that the same resources can be used to make an **impact across a broader spectrum** of society.
- **Enhanced decision-making** – Data-driven policy and scheme designing by evidence-based data analytics, stakeholder consultation, and pilot programs to address socio-economic challenges effectively.
- **Improved service delivery** – AI-powered automation can streamline public services, **reduce delays** and **enhance the accessibility**.
- **Inclusive governance** – AI-powered tools bridge language barriers by **Language translation** and promote communication, education, and cultural exchange in diverse, multilingual societies.
- **Increased transparency and accountability** – AI systems help *monitor processes*, detect anomalies and *reduce corruption*, *fostering trust* in governance.
  - Transparent and fair *procurement in public sector* contracting ensure accountability.
- **Attaining of maximum governance** – By reducing government intervention in the common man's day-to-day activities and empowering the people to ensure their own as well as the country's growth and development.
  - It also includes making government processes easier by reducing red-tapism and corruption and encouraging e-governance.
- **Better resource allocation** – AI optimizes the allocation of financial and material resources, ensuring efficient utilization in critical areas like infrastructure, healthcare and education.
  - Optimized tax collection and curbing evasion for robust public finances and sustainable development.
- **Better healthcare prediction and medicine discovery** – AI-driven models *predict disease outbreaks* and *accelerate drug discovery* and *personalized medicine*.
- **Enhanced national security and cybersecurity** – Advanced surveillance and threat detection boost security to ensure a safe and law-abiding environment.
- **Enhanced National disaster and climate prediction** – Predictive analytics using satellite data enhance the early warning systems and disaster preparedness by mitigating risks to safeguard communities.
- **Growth in Agriculture, fisheries, animal husbandry** – Data-driven practices improve yield, resource efficiency, and sustainability, ensuring food security and better livelihoods for rural populations.

**GovAI** can accelerate the IndiaAI ecosystem, resulting in a vast network of companies and innovators developing AI models, solutions and platforms.

### What are the challenges?

- **Lack of competence** – Advances in AI are being slowed by shortage of workers with skills and experience in deep learning, natural language processing and robotic process automation.
- **Minimal data ecosystems** – Limited availability of high-quality, organized and interoperable datasets restricts potential of AI.
- **High resource costs** – Developing and deploying AI systems requires significant investment in infrastructure, expertise, and maintenance, posing a barrier for budget-constrained entities.
- **Lack of awareness** – Low awareness about AI's capabilities and potential among policymakers and citizens limits adoption and trust in AI-driven initiatives.
- **Privacy and security issues** – In using data of public as India doesn't have any explicit legislation regarding data anonymization.
- **Lack of collaborative strategy** – Fragmented efforts and insufficient coordination among government agencies, private entities, and academia hinder scalable and impactful AI integration.

### What lies ahead?

- Initiate structural collaboration between the government and entrepreneurs and startups in the innovation ecosystem, with the goal of developing AI models.
- Develop localized AI solutions to cater India's linguistic diversity, rural challenges, and unique socio-economic conditions.
- Increase AI adoption in every aspect of governance, driving automation, predictive analytics, and real-time decision-making
- Focus on capacity building by investments in education, skill development, and research will address the skill gap, equipping the workforce to develop and manage AI solutions.

## 14. RENEWABLE ENERGY

### 14.1 Waste to energy incinerator (WTE)

#### Why in news?

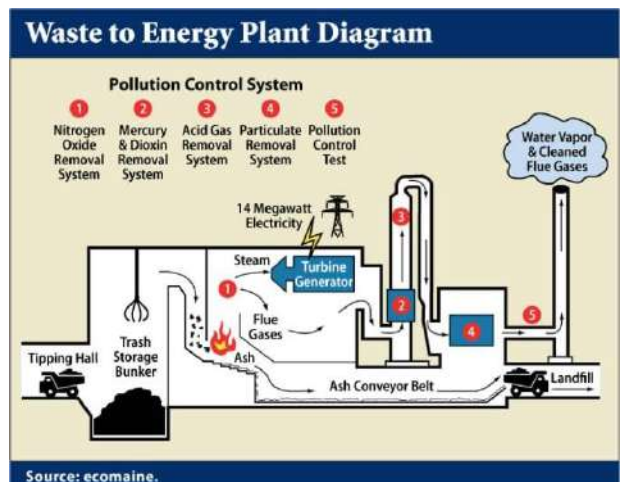
A recent investigative report by the New York Times on Delhi's Waste-To-Energy (WTE) incinerators, said that it makes more harm than its benefits.

#### What is waste to energy incinerator?

- **Waste-to-energy incinerator** – It is a facility to burn municipal solid waste (trash) at high temperatures to generate heat which is then used to produce steam, powering a turbine to generate electricity.
- **Waste type** – Typically handles municipal solid waste (MSW) from household waste and commercial waste, in urban areas.
- **Significance** – It is essentially a system that converts waste into usable energy through the process of incineration.
- **Generates electricity** from the solid waste
- **Avoids landfilling** in large cities
- **Recover valuable resources** such as metals that can be sent for recycling and kept in the economy.

#### What are the issues in WTE Incinerators?

- **Lack of proper disposal mechanism** – Improper disposal and illegal dumping of ashes produced in the process.
- While this process does generate electricity, it also produces **two types** of ash,
- **Bottom ash** – 20-30% of the original waste volume that remains as sediments after combustion.
- **Fly ash** – Captured by air pollution control devices, is problematic due to its concentration of toxic substances.










- **Failure to sort waste** – Hazardous materials like batteries and e-waste are burned without proper segregation, increasing toxic emissions.
- **Release of toxic gases** – WTE incinerators release toxic gases due to burning unsegregated waste, low calorific value and high moisture content wastes.
- **Economic viability** – Dependence on carbon credit markets for financing needs will disrupts the project when there is a fall of carbon markets.
- **Lack of monitoring and enforcement** – Despite rules that prohibit the ash from being dumped in residential areas, open-bed trucks with incinerated trash spread to neighborhoods.
- **Public discontent** – Protests and lawsuits due to growing health concerns from local communities.

**Status of waste to energy incineration plants in India**

- A total of **14 waste-to-energy** plants have been installed in India, out of which seven plants were closed.
- These plants processing approximately **11,000 tons of municipal solid waste** (MSW) per day, with a cumulative installed capacity of 132.1 MW.
- Delhi's first WTE incinerator, commissioned in 2010 in Okhla, was designed to process 2000 tons of garbage daily.
- Recently Tamil Nadu government proposed to build waste to energy incineration plants to dispose the landfills in Chennai.

### What are the impacts?

- **Environmental impacts:**
  - **Air pollution** – Toxic pollutants like dioxins, heavy metals, and particulate matter, from the smoke billowing and the ashes dumped near homes worsen the air quality.
  - **Ground water Contamination** – Due to the dumping of ashes in open area the groundwater is contaminated.
  - **Carbon emissions** – Incineration of mixed waste produces toxic particles, including carbon monoxide, nitrogen oxides, and Sulphur dioxide due to inefficient burning.
    - High levels of CO<sub>2</sub> and other greenhouse gases negate the "**green**" claims of WTE plants.
- **Health impacts:**
  - **Respiratory diseases** – The lead and arsenic-laced smoke and ash which contains as many as **eight times the permissible levels** of heavy metals such as cadmium.
    - Inhalation of pollutants leads to **asthma, bronchitis, and other lung ailments.**
  - **Neurological and cardiovascular risks** – Long-term exposure linked to nervous system disorders and heart diseases.
  - **Impact on vulnerable groups** – The chemicals and heavy metals in the air and soil can cause **birth defects, cancer** and other life-threatening conditions in children and old ages.
  - **Risk in pregnancy** – Persistent organic pollutants like **Dioxins and Furans** released during combustion interfere with hormone regulation and fetal development.
    - In Delhi the area around the plant sees the rise in miscarriages, lesions on their skin.

	ABOVE E.P.A. GUIDELINE	IMPACT
 48 Cd CADMIUM	19x higher	Prolonged exposure can produce toxic effects to the skeletal system and cause kidney, lung and bone disease.
 25 Mn MANGANESE	11x higher	Can lead to manganism, a rare form of Parkinson's disease, and affect the reproductive system, causing maternal and fetal complications.
 33 As ARSENIC	10x higher	Can cause respiratory, vascular and cardiovascular diseases, neurological problems and diabetes.
 82 Pb LEAD	4x higher	Can affect the nervous, reproductive, cardiovascular and immune systems. Children can suffer brain development disorders and lifelong impairments like a lowered I.Q.
 27 Co COBALT	3x higher	Can cause cancer and skin, heart, lung and eye problems.

### What lies ahead?

- Strict enforcement of guidelines and rules in handling ashes and air filtration system.
- Adopt safer technologies and invest in waste segregation are crucial for a sustainable solution.
- Decentralized waste management in households and by local communities for sustainable waste management.
- Balanced approach to align energy needs with ecological integrity is essential for India's future.
- Promotion of Co-processing of waste at cement plants as an effective waste management solution.

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