Today's Prelims Topics

Delimitation & the South

Context

Recently the Chief Minister of Tamil Nadu expressed concern that delimitation based on population will **"undermine the voices of South Indian states."**

What is Delimitation?

- **Delimitation** is the process of **redrawing boundaries of Parliamentary and Assembly constituencies** to ensure **equal representation** based on population changes.
- It also involves **fixing the number of seats** allocated to each state in **Lok Sabha and State Assemblies**.
- The process is carried out by an independent body called the **Delimitation Commission.**
- **Importance of Delimitation:**
    - **Ensures Equal Representation:** Each constituency should have roughly the same population size to ensure fair voting power.
    - **Reflects Population Growth Trends:** Helps in adjusting representation as populations increase or decrease over time.
    - **Prevents Political Imbalance:** Without delimitation, some areas may have **more MPs per voter**, leading to **under-representation** elsewhere.

Legal and Constitutional Basis for Delimitation

- **Article 82**: Requires Parliament to **revise the allocation of Lok Sabha seats** among states **after every Census**.
- **Article 170**: States that the **number of seats in State Legislative Assemblies** must also be readjusted.
- **Delimitation Act**: Passed **whenever delimitation is needed**, and a **Delimitation Commission is set up**.
- Till date **4 Delimitation Commissions** have been formed in **1952, 1963, 1973 & 2004. (UPSC Prelims 2024)**

Related Constitutional Amendments

- **42nd Amendment (1976)**: **Froze the number of Lok Sabha and Assembly seats** until the **2001 Census** to encourage **population control**.
- **84th Amendment (2002):** Extended the freeze until 2026.

Delimitation Commission: Composition and Powers

- It is a temporary body set up by the Government of India whenever delimitation is required.
- **Composition:**
    - **A retired/working Supreme Court judge** (Chairperson)
    - **Chief Election Commissioner.**
    - **State Election Commissioners** of the concerned states
- **Powers and Functions:**
    - **Redraws constituency boundaries** based on **latest Census data**.
    - **Allocates seats fairly** among states and constituencies.
    - **Consults political parties** and stakeholders before finalizing boundaries.
    - **Decisions cannot be challenged in court (Article 329)**.

- Delimitation Commission's orders are laid before the Lok Sabha and the legislative assemblies concerned, **but they cannot affect any modifications in the orders. (UPSC Prelims 2012).**

Concerns of Southern States Regarding Delimitation

- Southern states, such as **Tamil Nadu, Kerala, Karnataka, Andhra Pradesh and Telangana,** fear that delimitation based on latest population data would **reduce their representation in Parliament.**
- **Reason:**
    - **Population growth in South India is much lower than in North India** due to better economic growth, literacy, and family planning policies.
    - Northern states like **Uttar Pradesh, Bihar and Madhya Pradesh** have experienced higher population growth, which could result in more seats for them at the cost of southern states.

UPSC PYQ

Q. How many Delimitation Commissions have been constituted by the Government of India till December 2023? **(2024)**

(a) One
(b) Two
(c) Three
(d) Four

Answer: D

Source:

- **Indian Express - Delimitation**

Coal-Fired Power Plants and Their Impact on India's Crop Yields

Context

A recent study led by researchers at Stanford University has revealed that coal-fired power plants are significantly reducing India's rice and wheat yields.

Major Pollutants and Their Effects on Crops

- **Nitrogen Oxides (NO_x)**
  - **Phytotoxic (toxic to plants)** – interferes with **cellular function and enzymatic activities**.
  - Contributes to **ozone (O_3) formation**, which damages plant tissues.
  - Reduces **chlorophyll content**, leading to **lower photosynthesis rates**.
  - **Study Findings:**
    - India loses up to 10% of rice and wheat yields due to NO_2 pollution.
    - Rice and wheat yield losses = ₹7,000 crore (~$820 million) annually.
- **Sulphur Oxides (SO_x)**
  - **Causes acid rain**, which **lowers soil pH**, reducing nutrient availability.
  - **Damages leaf surfaces**, leading to **stunted growth** and **reduced crop yield**.
  - **Reduces soil microbial activity**, affecting **nitrogen fixation** and plant growth.
- **Carbon Dioxide (CO_2)**
  - Excess CO_2 can boost photosynthesis (CO_2 fertilization effect), but, when combined with **higher temperatures and water stress**, it **reduces crop quality and yields**.
- **Particulate Matter (PM10 & PM2.5)**
  - **Blocks sunlight**, reducing **photosynthesis efficiency**.
  - **Clogs stomata (leaf pores),** restricting CO_2 uptake and leading to slower growth.
  - **Soil contamination** from deposited ash reduces soil fertility and alters pH levels.
- **Heavy Metals (Mercury, Arsenic, Lead, Cadmium)**
  - **Accumulates in soil**, reducing **nutrient uptake**.
  - **Toxic to plants**, leading to **growth inhibition and lower yields**.
  - Can enter the **food chain**, posing health risks to humans.

Policy Recommendations

- **Pollution Control in Coal Power Plants:**
  - **Install Flue Gas Desulfurization (FGD) units** to reduce **SO_2** emissions.
  - **Use Selective Catalytic Reduction (SCR) technology** to cut **NO_x** emissions.
  - **Upgrade Electrostatic Precipitators (ESPs) and Bag Filters** to reduce **PM emissions**.
- **Renewable Energy Transition:** Shift towards solar, wind and hydroelectric power to reduce coal dependence.
- **Agricultural Adaptation Measures:**
  - **Develop pollution-resistant crop varieties** through biotechnology.
  - **Implement soil remediation techniques** (e.g., liming) to restore fertility.

Source:

- **The Hindu - Coal-fired power plants reduce yield**

National Assessment and Accreditation Council

Context

Recently NAAC has undergone a series of reforms after CBI launched an inquiry regarding bribery cases on its assessors.

About National Assessment and Accreditation Council (NAAC)

- **NAAC** is an **autonomous body** under the **University Grants Commission (UGC)** that assesses and accredits **higher education institutions (HEIs) in India**.
- It was established in **1994** & is Headquartered in **Bengaluru, Karnataka.**
- **Benefits of NAAC Accreditation:**
    - **Institutional Recognition** – Accredited institutions gain credibility and national recognition.
    - **Eligibility for UGC Grants** – Many government schemes and financial aid require NAAC accreditation.
    - **Better Placements & Global Recognition** – Enhances the reputation of institutions and attracts recruiters.

Recent Reforms in NAAC Accreditation

- **Introduction of Hybrid & Online Evaluation:**
    - To ensure **transparency and avoid corruption**, NAAC is shifting to **online and hybrid assessments** instead of purely physical evaluations.
- **Removal of 900 Peer Assessors:**
    - To **eliminate corruption and misconduct**, NAAC removed **900 peer assessors** found guilty of irregularities.
- **Recruitment of 1,000 New Assessors:**
    - NAAC has recruited **1,000 new assessors** with strict selection criteria.
- **Introduction of Data-Driven Assessment:**
    - NAAC is increasingly using **data analytics, student feedback, and AI-based monitoring** for fair assessments.

Source:

- The Hindu - NAAC

IREDA Shareholders Approve ₹5,000 Crore Fundraising via QIP

Context

The Indian Renewable Energy Development Agency Ltd. (IREDA) has received shareholder approval to raise up to ₹5,000 crore through Qualified Institutional Placement (QIP).

What is Qualified Institutional Placement (QIP)?

- QIP is a capital-raising method where a listed company issues equity shares, debentures or other securities to Qualified Institutional Buyers (QIBs) without needing regulatory approval from market authorities like SEBI.
- **Qualified Institutional Buyers (QIBs)**: These are **institutional investors** with financial expertise, such as: **Mutual Funds, Foreign Portfolio Investors (FPIs), Banks & Financial Institutions, Insurance Companies, Pension Funds etc.**
- **Advantages of QIP:**
    - **Faster fundraising** – Less regulatory scrutiny than other public offerings.
    - **Lower costs** – No need for extensive disclosures like in an IPO or FPO.
    - **Dilution control** – Allows companies to raise capital without significantly diluting promoter holdings.

Other Types of Share Issues

- **Initial Public Offering (IPO):**
    - The first time a **private company** issues shares to the public to become **publicly traded**.
- **Follow-on Public Offering (FPO):**
    - A public issue of shares **by an already listed company** to raise additional capital.
- **Rights Issue:**
    - A company offers **new shares to existing shareholders** at a discounted price.
- **Preferential Allotment:**
    - Shares are issued to a **specific group of investors (not the general public)**, including promoters, institutional investors or strategic partners.
- **Private Placement:**
    - Shares are **offered directly to a few selected investors** (institutional or high-net-worth individuals). **E.g. QIP**

Source:

- The Hindu - QIP

Gharial & its conservation efforts

Context

Recently the Madhya Pradesh Chief Minister released 10 gharials into the Chambal River at the National Chambal Gharial Sanctuary in Morena.

About Gharials

- **Distinctive Features:**
  - Long, narrow snout with interlocking sharp teeth (adapted for catching fish).
  - **Bulbous snout tip** (ghara) in males, used for sound production and courtship displays.
  - Webbed feet and weak legs, making them excellent swimmers but poor walkers.
  - **Communal nesting:** Many females lay eggs in the same area.
  - **Parental Care:** Unlike crocodiles, gharials don't carry hatchlings in their mouths but guard them after hatching.
- **Size and Physical Characteristics:**
  - **Males:** Grow **up to 6 meters** (20 feet), weigh **160–250 kg**.
  - **Females:** Smaller, growing **2.6–4.5 meters**.
  - **Teeth: 110+ teeth**, designed to grip slippery fish.
- **Distribution:** Found in **India, Nepal and parts of Bangladesh**.
- **Preferred Habitat: Freshwater rivers** with deep pools, **sandy banks** and slow-moving currents.
- **Ecological Role:** Primarily **fish-eating** but also **clean up carrion**, keeping rivers healthy.
- **Cultural Significance:** Depicted as the divine mount of Goddess Ganga in Indian mythology.
- **Conservation status:**
  - **IUCN:** Critically Endangered
  - **WPA:** Schedule-I

Why Is Gharial Conservation Needed?

- **Past Population Decline:**
  - **1950s-60s: More than 80% decline** in India's gharial population.
- **Major Threats:**
  - **Historical Threats:** Overhunting for **skins, trophies, eggs, and traditional medicine**.
  - **Modern Challenges:**
    - **Habitat destruction** (dam construction, irrigation canals, embankments).
    - **Siltation and sand-mining** disrupting nesting sites.
    - Pollution and river course changes.

Distribution of Gharial in India

- **Major Protected Areas:**
  - National Chambal Sanctuary (NCS) (Madhya Pradesh, Rajasthan, Uttar Pradesh).
  - Katerniaghat Sanctuary (Uttar Pradesh).
  - Son River Sanctuary (Madhya Pradesh).
  - Satkosia Gorge Sanctuary (Odisha).
- **Madhya Pradesh** hosts over **80%** of the Gharial population of India & is a champion in Gharial conservation efforts.. It also has the title of **"Gharial State".**

Source:

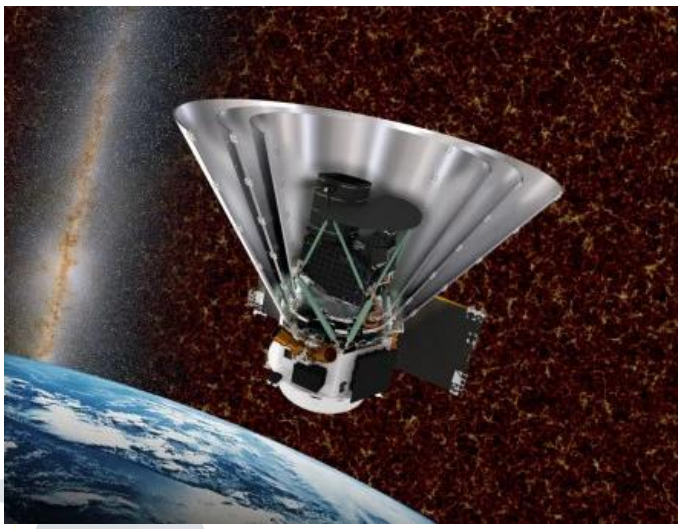
- **Indian express - Gharials**

SPHEREx: NASA's New Space Telescope Mission

Context

NASA is set to launch **SPHEREx (Spectro-Photometer for the History of the Universe, Epoch of Reionization, and Ices Explorer)**, a **mega telescope designed to scan over 450 million galaxies**.

About SPHEREx



- The launch will take place aboard a **SpaceX Falcon 9 rocket** from **Vandenberg Space Force Base, California**.
- **Aim:** To uncover clues about the origins of life, cosmic history and the early universe.
- **Mission Duration:** 2 years.
- **Technological Innovation:** SPHEREx will use advanced **spectroscopy and imaging techniques** adapted from **Earth satellites and interplanetary missions**.

Mission Goals: Understanding the Universe's Evolution

- **Peering Back in Time:**
  - SPHEREx will investigate **dusty stellar clouds** and study **cosmic events soon after the Big Bang**, which occurred **over 13 billion years ago**.
  - The observatory will **map the entire sky every six months** in **optical and** near-infrared wavelengths, capturing detailed data from both nearby and distant galaxies.
- **The Most Detailed Sky Map Ever Created:**
  - SPHEREx will generate a **colorful 3D map of the sky** using data from **102 infrared color bands**—a level of detail never before achieved.
  - The **spectroscopically rich map** will help scientists:
    - Identify the **distribution of key life-forming molecules** in the universe.
    - Understand how **galaxies evolved over billions of years**.
    - Improve models of **planetary formation**.
- **Searching for the Origins of Life:**
  - The telescope will **analyze key chemical components**, including **water, oxygen, carbon dioxide and other molecules**, that may have played a role in the formation of planets and life.
  - It will focus on **stellar nurseries** (regions abundant in gas where new stars are formed) as well as **discs around stars** that might host **developing planetary systems**.
- **Mapping Ice in Molecular Clouds:**
  - SPHEREx will focus on **molecular clouds** (dense regions of space filled with **thick interstellar dust grains** where **planets and stars eventually form**).

Source:

- **Indian Express - NASA new space telescope**

Gold Card Visa Program

Context

U.S. President Donald Trump has announced a new visa initiative called the "Gold Card" program, which offers permanent residency and a pathway to citizenship for foreign investors.

About Gold Card Visa Program

- **Flat Fee:** Instead of requiring investments in businesses or job creation, applicants would simply pay **$5 million** to the U.S. government.
- **Fast-Track Green Card:** This program would **grant immediate Green Card privileges** and provide a **path to U.S. citizenship**.
- **Replacement for EB-5:** This program is set to replace the EB-5 immigrant investor visa scheme
- **Potential Benefits for the U.S.:**
    - **Increased Investment in U.S. Economy:** High-net-worth individuals could boost real estate, luxury markets, and businesses.
    - **Simplification of Immigration Process:** Eliminating job creation requirements could reduce bureaucracy.
    - **Reduction in Fraud Risks:** Since the EB-5 program was accused of abuse, a straightforward high-cost purchase model may be easier to regulate.
- **Indians & the Gold Card:**
    - **In FY 2023, only 631 Indians** received Green Cards through **EB-5**, despite its much lower investment requirement.
    - Given the **higher $5 million cost (₹43+ crore)**, it is unlikely that many Indian investors will be attracted to the Gold Card program.

EB-5 Program

- It was introduced in **1990.**
- It grants Green Cards to foreign investors who invest at least **$1.05 million** ($800,000 in specific areas) in U.S. businesses and create at **least 10 jobs.**

Source:

- Indian Express - US gold card

Places in News

Simandou Iron Ore Mine

- The mine is expected to **shake up the global seaborne iron ore market** with its **high-grade ore and large-scale infrastructure**.

Key Infrastructure Developments

- A **620-kilometre (384-mile) railway line** is being built to transport ore from the mines to the coast.
- A **new port** with dedicated **trans-shipment vessels** will facilitate bulk carrier loading offshore.

- It is a **massive iron ore mine** located in **Guinea, West Africa**.
- It is **Africa's largest mining project.**
- Simandou's ore contains **65.3% iron content**, **higher than most Australian iron ore**.
- **Ownership Structure:**
  - **75%** controlled by Chinese companies, including Baosteel.
  - **25%** owned by Rio Tinto, the world's largest iron ore miner.

Source:

- The Hindu - Simandou Mine

Editorial Summary

Maternity Benefit Issue

Context

- Maternity benefits in India are a critical aspect of ensuring the health and well-being of pregnant women and their children.
    - However, despite legal entitlements, many women are deprived of these benefits due to inadequate implementation and restrictive policies.

Legal Entitlements

Under Pradhan Mantri Matru Vandana Yojana (PMMVY)

- **Type**: Centrally Sponsored Direct Benefit Scheme.
- **Ministry**: Ministry of Women and Child Development.
- **Launch Year**: 2017.
- **Integration**: Incorporated into **Mission Shakti in 2022**.
- **Legal Basis**: Implemented under the **National Food Security Act (NFSA), 2013**.
- **Objectives:**
    - **Compensation for Wage Loss**: Provides financial assistance to ensure women can rest before and after childbirth.
    - **Improving Health-Seeking Behavior**: Encourages pregnant and lactating women to access healthcare facilities.
    - **Promoting Gender Equality**: Offers cash incentives for a second child if it is a girl.
- **Beneficiaries:**
    - Women belonging to **Scheduled Castes (SC) & Scheduled Tribes (ST)**.
    - Women with **40% or more disability (Divyang Jan)**.
    - Women holding a **BPL Ration Card**.
    - Women beneficiaries under **Pradhan Mantri Jan Aarogya Yojana (PMJAY)**.
    - Women holding an **E-Shram Card**.
    - **Women farmers** who are beneficiaries of **PM-Kisan Samman Nidhi**.
    - Women holding an **MGNREGA Job Card**.
    - Women from **families with an annual income below ₹8 lakh**.
    - **Pregnant and lactating frontline workers**, including **AWWs, AWHs, and ASHAs**.
    - **Any other category** as prescribed by the Central Government.
- **Exclusions:** Women in **regular employment** with the **Central/State Government** or **Public Sector Undertakings (PSUs)**.
    - Women already **receiving similar benefits** under any other law.
- **Benefits:**
    - **For the first child**: ₹5,000 in **two installments**.
    - **For the second child (if a girl)**: ₹6,000 in **one installment** after birth.
- **Exceptions:** In case of **miscarriage/stillbirth**, the beneficiary is **eligible for benefits in a future pregnancy** as a fresh applicant.

Features of NFSA 2013 for Pregnant and Lactating Mothers

- **Nutritional Support**: Pregnant women, lactating mothers, and children (6 months to 14 years) receive **nutritious meals** under the **Integrated Child Development Services (ICDS)** and **Mid-Day Meal (MDM) schemes**.
    - **Enhanced nutritional standards** are set for **malnourished children** up to 6 years of age.
- **Maternity Benefit**: Pregnant and lactating mothers are entitled to **a minimum financial assistance of ₹6,000**.

Mission Shakti

- **Ministry**: Ministry of Women and Child Development
- **Objective**: To enhance **women's safety, security, and empowerment** through targeted interventions.
- **Implementation Period**: **2021-22 to 2025-26** (15th Finance Commission period).
- **Structure**: Comprises **two sub-schemes**
    - **Sambal (Women's Safety & Security)**
        - **One Stop Centres (OSC)** – Provides support to women facing violence.
        - **Women Helpline (181-WHL)** – 24x7 assistance for women in distress.
        - **Beti Bachao Beti Padhao (BBBP)** – Promotes education and welfare of the girl child.
        - **Nari Adalat** – Community-based dispute resolution for women.
    - **Samarthya (Women's Empowerment)**
        - **Pradhan Mantri Matru Vandana Yojana (PMMVY)** – Maternity benefit scheme for pregnant and lactating women.
        - **Shakti Sadan (Ujjwala & Swadhar Greh)** – Shelter and rehabilitation for women in distress.
        - **Working Women Hostel (Sakhi Niwas)** – Secure accommodation for working women.
        - **National Creche Scheme (Palna)** – Childcare support for working mothers.

Criticism of PMMVY

- **Violation of NFSA 2013**: The **NFSA mandates ₹6,000 per child**, but PMMVY provides only **₹5,000 for the first child** and **₹6,000 for the second child (only if a girl)**, violating the Act's universal maternity benefit provision.
- **Low Coverage and Declining Reach**: **Effective coverage peaked at only 36% in 2019-20** and drastically declined to **9% in 2023-24**.
    - **Budget allocation dropped** to ₹870 crore in 2023-24, nearly **1/3rd of the amount 5 years earlier**.
- **Implementation and Technical Issues**: **Frequent software failures** and **Aadhaar-linked payment issues** have led to delays in disbursement.
    - **Excessive bureaucratic hurdles** make it difficult for women to claim benefits.
- **Discriminatory Benefits**: Women in the **formal sector receive 26 weeks of paid leave**, while those in the **unorganized sector receive only ₹5,000** after meeting strict conditions.
- **Lack of Transparency**: The **Ministry of Women and Child Development** does not **proactively disclose** key data on PMMVY.
    - Information regarding **applications, approvals, and disbursements** is difficult to access.
- **Insufficient Financial Assistance**: The **₹5,000-₹6,000 assistance** is **inadequate** given rising inflation and healthcare costs.
    - Unlike other schemes, **PMMVY benefits have never been revised** since its launch in 2017.

State-Level Initiatives (Alternative Models)

- **Tamil Nadu – Dr. Muthulakshmi Reddy Maternity Benefit Scheme (Since 1987)**
    - **₹18,000 per child** provided as maternity assistance.
    - Coverage stood at **84% in 2023-24**, significantly higher than PMMVY's all-India coverage (<10%).
    - The **DMK government plans to increase it to ₹24,000**.
- **Odisha – Mamata Scheme (Since 2009)**
    - **₹10,000 per child**, **doubled before the 2024 elections** to enhance benefits.
    - Coverage was **64% of all births in 2021-22**.

- Follows **simplified processes**, reducing exclusion errors seen in PMMVY.

Comparison with PMMVY

- **Higher financial support**: Both Tamil Nadu and Odisha provide **better benefits than PMMVY**.
- **Wider coverage**: These states **cover more births** and ensure **better accessibility**.
- **Simplified implementation**: Fewer bureaucratic hurdles and better **awareness campaigns** improve uptake.

Conclusion

The PMMVY's restrictive nature and inadequate implementation have led to significant gaps in providing maternity benefits, despite legal entitlements. States like Tamil Nadu and Odisha demonstrate that more effective and generous schemes are possible, highlighting the need for reform at the national level.

Source: **The Hindu: A leap backward for maternity entitlements**

The impact of ethanol on the environment

Context

- The Ethanol Blended Petrol (EBP) programme in India aims to reduce dependence on fossil fuels and lower carbon emissions by blending ethanol with petrol.
    - However, concerns have been raised about its environmental impact, particularly in regions like Andhra Pradesh.

About Ethanol Blended Petrol (EBP) Programme

- It was introduced in **2001** as a pilot project in India to address concerns related to **growing energy consumption, rising oil imports, and increasing carbon emissions** from vehicles.
- The programme promotes blending ethanol—produced from grains like **broken rice and corn**—with petrol to reduce fossil fuel dependency and encourage **renewable energy sources**.
- In **2020**, the Government of India **advanced the ethanol blending target from 2030 to 2025**, setting an ambitious goal of **20% ethanol blending in petrol**.

Targets and Progress of the EBP Programme

- **Current Status (2024):** The ethanol blend percentage in petrol stands at **15%** nationwide.
- **Target (2025-26):** Achieve **20% ethanol blending** in petrol.
- **Requirement: 1,016 crore litres** of ethanol annually to meet the **20% blending target**.
- **Production Capacity (2022): 947 crore litres** of ethanol in India.
- **Key Ethanol Producing States:**
    - Andhra Pradesh
    - Maharashtra
    - Haryana
    - Punjab

Environmental Impact of Ethanol Production

- **Water Resource Depletion:**
    - **Ethanol factories require 8-12 litres of water per litre of ethanol**.
    - **Groundwater exploitation** occurs, especially in **perennial river basins like the Krishna**, which already face water shortages.
    - Farmers in Andhra Pradesh fear ethanol production will deplete water for **drinking and agriculture**.
- **Air, Water, and Soil Pollution:**
    - **Harmful emissions from ethanol factories** include **acetaldehyde, formaldehyde, and acrolein**, which are known **carcinogens**.
    - These pollutants **do not find a mention in environmental clearances**, raising concerns about oversight.
    - Effluent discharge from factories has **polluted canals and drinking water sources** in Andhra Pradesh.
- **Factory Location & Public Concerns:**
    - **Red Category Industry:** Ethanol distilleries have a pollution score of **60+**.
    - However, the government has **exempted them from public hearings**, allowing their setup near **human settlements**.
    - Protests have been ongoing in **Gummaladoddi, Gandepalli, and Arugolanu villages** of Andhra Pradesh against pollution from ethanol factories.

Contradictions in Environmental Gains

- A **Niti Aayog report** states that **20% ethanol blending** reduces:
    - **Carbon monoxide emissions by 30% in four-wheelers**.

    - **Carbon monoxide emissions by 50% in two-wheelers**.
- However, environmentalists argue that the **gains are negated** by **air and water pollution from ethanol production**.

Way Forward

- **Strengthening Environmental Regulations:** Ensure **strict pollution control measures** for ethanol factories.
    - **Include harmful emissions** like acetaldehyde and formaldehyde in environmental clearance norms.
- **Sustainable Water Management:** Implement **water recycling technologies** in ethanol production plants.
    - **Limit ethanol production in water-stressed areas**.
- **Community Involvement & Transparency: Reintroduce public hearings** for ethanol factories.
    - Conduct **independent environmental impact assessments** before granting clearances.
- **Balancing Industrial Growth with Ecology:** Encourage **waste-to-energy ethanol production** to reduce environmental impact.
    - Subsidize **pollution control technologies** to help factories comply with norms.
- **Alternative Feedstocks for Ethanol:** Promote **cellulosic ethanol** (derived from agricultural waste) instead of **water-intensive grains**.
    - Reduce reliance on food grains to **prevent competition with agriculture**.

Source: **The Hindu: The impact of ethanol on the environment**

Focus on Quality of Teaching, Not in 3-Language Formula

Context

Tamil Nadu has long refused to adopt the three-language formula, preferring a two-language policy.

How Language Was Perceived Post-Independence

- **Language as a Tool for National Integration**: After Independence, policymakers viewed language as a critical element for fostering national unity.
- **Debate on National and Official Language**:
  - The Constituent Assembly debated whether India should have a single national language.
  - Hindi was considered by some as the unifying language, but its multiple dialects and regional resistance made consensus difficult.
  - Eventually, English was retained as an associate official language alongside Hindi.
- **Education and Language Policy**:
  - Language was primarily seen as a **medium of instruction**, not as a cognitive tool for children's learning.
  - Early policymakers believed English would gradually lose prominence, but the opposite happened.
  - The dominance of English-medium private schools grew over time, contrary to initial expectations.

Tamil Nadu's Concerns with the Three-Language Formula

- **Historical Opposition**: Tamil Nadu has followed a two-language policy (Tamil and English) for decades, rejecting the three-language formula.
- **Fear of Imposition of Hindi**: The state perceives the three-language formula as a way to push Hindi onto non-Hindi-speaking regions.
  - The anti-Hindi agitation of the 1960s remains a strong political and cultural memory in Tamil Nadu.
- **Lack of Reciprocity in the Hindi Belt**: Tamil Nadu argues that northern states do not implement the policy in spirit, as they do not introduce South Indian languages like Tamil, Telugu, or Kannada in schools.
  - **Example:** Schools in Uttar Pradesh and Madhya Pradesh do not offer Tamil or Punjabi as a third language.
- **Continued Resistance**: Given these concerns, Tamil Nadu is unlikely to change its stance on the issue.

Focus on Quality of Teaching, Not on the Three-Language Formula

- **Issue of Poor Teaching Standards**: The real challenge is not the number of languages taught but the **quality of language education**.
  - Language teaching in schools has suffered due to outdated methods and poor teacher training.
- **English Education Crisis**: Several states have introduced English from early grades, but teacher proficiency remains low.
  - Andhra Pradesh, despite making English the medium of instruction, struggles with teacher competency.
- **Hindi and Other Indian Languages Also Suffer**: Hindi is treated more as a cultural symbol than as a functional language for learning.
  - Many regional languages face similar issues within their states.
- **Declining Reading Habits**: Schools fail to create habitual readers, leading to a broader decline in language skills.

  - Despite early reading being a focus, students are not encouraged to explore literature beyond textbooks.
- **Need for Teacher Training and Curriculum Reform**: Improving the **training of language teachers** is more critical than imposing new language policies.
  - Reviving institutions that once provided quality training, like Hyderabad-based English institutes, could help address the issue.

Conclusion

The real challenge in language education is **not the number of languages taught but the quality of instruction**. Tamil Nadu's opposition to the three-language formula is rooted in historical resistance to Hindi imposition, while the broader issue across India remains the **poor standards of language teaching**. Instead of policy battles, efforts should focus on **enhancing teacher proficiency, curriculum quality, and student engagement with languages**.

Source: **Indian Express: The Quality of Teaching**

Securing Critical Minerals (New Oil)

Context

- In the 20th century, oil was the primary driver of global conflicts, shaping America's involvement in wars like the Gulf War.
- Today, critical minerals (lithium, cobalt, nickel, rare earths, etc.) are the backbone of future technologies.

Why Critical Minerals Play a Crucial Role in Geopolitics?

- **Foundation of Future Technologies:** Critical minerals like lithium, cobalt, nickel, and rare earth elements are essential for electric vehicles (EVs), semiconductors, renewable energy, and advanced defense systems.
    - Nations that control these resources have leverage over global supply chains and technological advancements.
- **US-China Strategic Rivalry:** China dominates **75% of the global rare earth supply** and controls key refining facilities.
    - The US is highly dependent on imports, making it vulnerable to supply disruptions, similar to oil dependence in the past.
- **Weaponization of Supply Chains:** Countries can **restrict mineral exports** as a geopolitical tool.
    - **Example: China banned the export of key rare earth processing technologies** in 2023, limiting competitors' access.
- **Energy Transition & National Security:** The global shift to clean energy (solar, wind, EVs) increases demand for critical minerals.
    - Nations without secure supply chains risk **falling behind in industrial and defense capabilities**.
- **Economic Leverage & Resource Wars:** Countries rich in minerals (e.g., **Ukraine, Greenland, Democratic Republic of Congo**) become strategic battlegrounds for resource control.
    - **Example**: The **US seeks greater access to Ukraine's lithium and graphite reserves** to reduce dependence on China.
- **Strategic Alliances & Supply Chain Diversification:** The **US, EU, India, and Japan** are forming alliances to secure mineral supplies.
    - India is **signing agreements with Australia, Argentina, and African nations** to reduce import dependence.

India's Position in Critical Minerals

- **India is highly import-dependent**, lacking large domestic reserves.
- **Key reserves in India**:
    - **Lithium:** Found in Jammu & Kashmir, but exploration is at an early stage.
    - **Rare Earths:** India has **5% of global reserves**, mainly in Andhra Pradesh and Odisha.
    - **Graphite:** Large reserves in Jharkhand, Odisha, and Arunachal Pradesh.
- **Current Challenges**:
    - Limited exploration and mining infrastructure.
    - Dependence on imports of **critical minerals is even greater than oil dependency**.
    - Need for investment in domestic refining and processing facilities.

Lessons for India

- **Need for Domestic Exploration**: Despite rich geology, **India has insufficient mineral exploration**.
    - Liberalizing the sector and incentivizing private players is crucial.
- **Strategic Foreign Partnerships**: India has been **signing supply agreements with friendly countries** but must secure long-term partnerships to ensure resource security.

- **Developing a Self-Sufficient Manufacturing Base**: India's **ambition to become a global manufacturing hub** (EVs, renewables, electronics) requires a steady supply of critical minerals.
    - Encouraging domestic refining and processing will reduce reliance on China.
- **Policy Reforms for Mineral Security**: Allow private companies to **monetize their mineral discoveries** as per global best practices.
    - Strengthening public-private partnerships in mining and refining is essential for long-term self-sufficiency.

Source: **Indian Express: Securing New Oil**

Enhance Use of Nuclear Energy

Context

India has set an ambitious target to increase its nuclear power capacity to 100 GW by 2047, a significant leap from the current 8.2 GW.

Current Status & Targets

Current Status

- **Installed Nuclear Capacity**: ~7 GWe (as of 2024).
- **Operational Reactors**: 22 reactors.
- **Fuel Dependence**: Heavily reliant on imported uranium due to limited domestic reserves.
- **Technology**: Pressurised Heavy Water Reactors (PHWRs) dominate; Fast Breeder Reactors (FBRs) under development.

Targets

- **100 GWe by 2047** as part of "Viksit Bharat" vision.
- **Expanding PHWRs**: 700 MWe PHWRs are planned as the backbone of expansion.
- **Fast Breeder Reactors (FBRs)**: To enable closed nuclear fuel cycles.
- **Thorium-Based Reactors**: Developing **Advanced Heavy Water Reactors (AHWRs)** and **Molten Salt Reactors (MSRs)**.
- **Bharat Small Reactors (BSRs)**: Small modular reactors for decentralized power supply.

Challenges

- **Fuel Supply Constraints:**
  - **High uranium demand**: ~18,000 tons of uranium needed annually for 100 GWe capacity.
  - **Limited Domestic Uranium**: India has **low-grade uranium deposits** and relies on imports.
  - **Global dependence**: Countries like Canada, Kazakhstan, and Australia supply India.
- **Delays in Fast Breeder Reactors (FBRs):**
  - **Prototype Fast Breeder Reactor (PFBR)**: 500 MWe reactor is still not operational after long delays.
  - **Slow progress** in large-scale deployment of breeder reactors, limiting fuel recycling.
- **Thorium Utilization Bottlenecks:**
  - **Processing challenges**: Thorium-uranium cycle requires advanced fuel cycle technologies.
  - **Lack of Industrial-Scale Deployment**: Most thorium research remains at the lab level.
- **Infrastructure & Manufacturing Gaps:**
  - **Limited domestic reactor-building capacity**.
  - **Dependence on foreign technology** for some critical components.
  - **Small Modular Reactors (SMRs) lack commercial deployment experience**.
- **Public & Regulatory Hurdles:**
  - **Public opposition** to nuclear power due to safety concerns.
  - **Land acquisition & site selection issues** for large-scale nuclear expansion.

Solutions & Way Forward

- **Fuel Supply Security:**
  - **Expand domestic uranium mining**: Fast-track exploration and mining of reserves.
  - **Increase global uranium partnerships**: Long-term supply deals with Kazakhstan, Russia, Canada, Australia.
  - **Accelerate Thorium Fuel Cycle**: Deploy **HALEU-Thorium fuel** in PHWRs to reduce uranium dependency.

- **Fast Breeder & Recycling Acceleration:**
  - **Operationalize PFBR**: Resolve delays and expand FBR deployment.
  - **Invest in spent fuel reprocessing**: Large-scale recycling of uranium and plutonium.
  - **Molten Salt Reactors (MSRs)**: Begin pilot deployment to improve fuel efficiency.
- **Infrastructure & Indigenous Manufacturing:**
  - **Scale up Bharat Small Reactors (BSRs)** for decentralized power.
  - **Boost Private Sector Role**: Involve Indian companies in reactor manufacturing and component supply.
  - **Leverage Retired Coal Plant Sites** for new nuclear plants, avoiding land acquisition hurdles.
- **Public Awareness & Safety Measures:**
  - **Enhance safety standards**: Strict regulatory oversight to build public trust.
  - **Transparent communication**: Educate people on nuclear energy benefits.
  - **Disaster-Resilient SMRs**: Deploy only designs that require minimal evacuation zones.
- **Policy & Financial Support:**
  - **Simplify nuclear regulations** for faster approvals.
  - **Public-Private Partnerships (PPP) in Nuclear**: Leverage private investment in small reactors.
  - **Boost R&D Funding**: Increased budget for **Bhabha Atomic Research Centre (BARC)** and **Indira Gandhi Centre for Atomic Research (IGCAR)**.

Source: **Indian Express: The power of New Nuclear**