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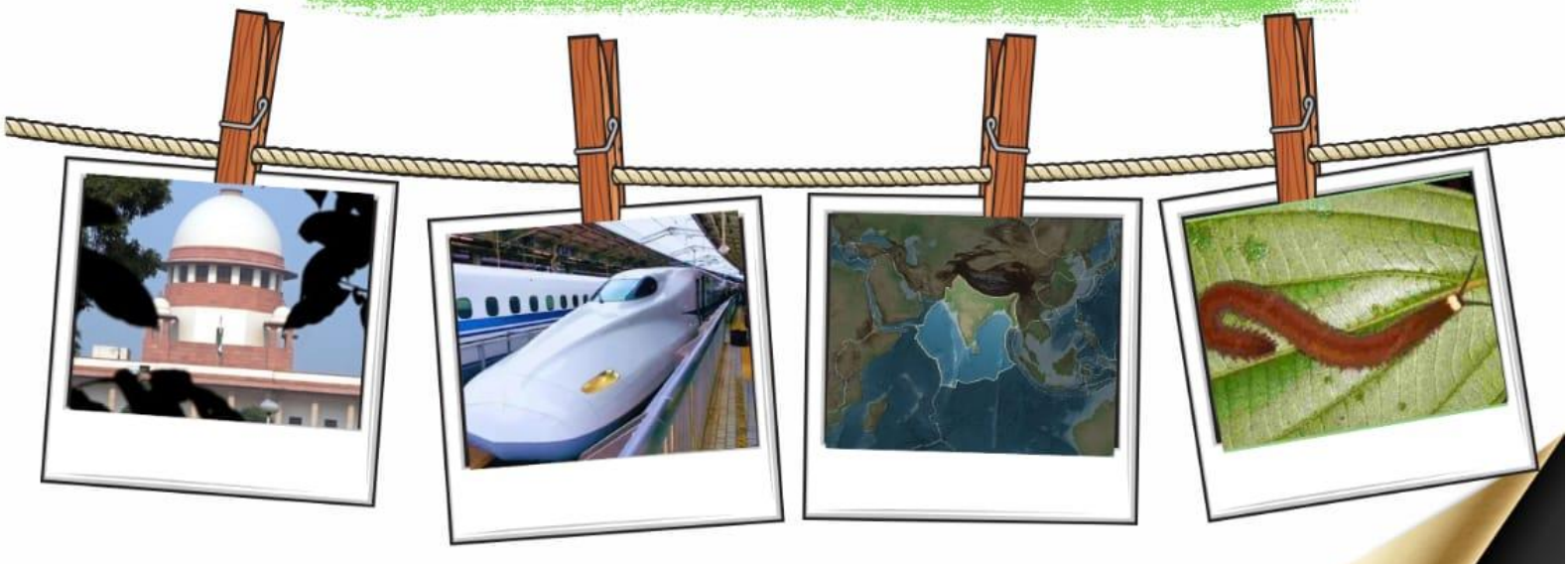
TOGETHER WE SCALE HEIGHTS

Weekly Current Affairs

To The Point

by Dhananjay Gautam

13 to 19 April 2025



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GS Paper 2 – Governance, Constitution, Polity, Social Justice

Supreme Court's Wake-Up Call on Child Trafficking in India

Context: In a recent strong observation, the **Supreme Court of India** has issued a critical warning to parents and authorities, urging them to stay **vigilant against the rising menace of child trafficking**. The Court pointed out how **traffickers misuse juvenile protection laws** to coerce children into illegal activities and organized crimes.

Understanding Child Trafficking:

Child trafficking refers to the **recruitment, transportation, transfer, harboring, or receipt of a child** for the purpose of **exploitation**.

Major Forms of Child Trafficking:

- **Forced Labor**: Children are coerced into working in **domestic help, agriculture, construction**, and other labor-intensive industries.
- **Sexual Exploitation**: A significant number of children are forced into **prostitution** or **online sexual exploitation**.
- **Illegal Adoption**: **Criminal networks abduct children** and sell them under the guise of **adoption**.

Current Scenario & Statistics:

- Between **2018 and 2022**, **over 10,000 cases** of child trafficking were reported, but only **1,031 convictions** were secured.
- **States like Uttar Pradesh, Bihar, and Andhra Pradesh** record the **highest number of trafficked children**.
- As per **NCRB 2022 data**, **3,098 children under 18** were rescued.

Key Challenges in Tackling Child Trafficking:

- **Low Conviction Rate**: Despite arrests, the **conviction rate is under 5%**, indicating weaknesses in **investigation and prosecution**.
- **Lack of Awareness**: Many cases remain **unreported** due to **fear, stigma**, and lack of **legal knowledge**.
- **Inter-State Criminal Networks**: Traffickers exploit **state borders**, making it hard for enforcement agencies to crack down effectively.

Legal and Institutional Framework in India:

Constitutional and Legal Safeguards:

- **Article 23 of the Indian Constitution**: Prohibits **trafficking in human beings** and **forced labor**.
- **Immoral Traffic (Prevention) Act, 1956 (ITPA)**: Penalizes **trafficking**, especially for **sexual exploitation**.

- **Protection of Children from Sexual Offences (POCSO) Act, 2012**: Safeguards children from **sexual abuse** and **pornography**; establishes **special courts**.
- **Juvenile Justice (Care and Protection of Children) Act, 2015**: Identifies children at risk and ensures **rehabilitation** via **Child Welfare Committees**.
- **Bharatiya Nyaya Sanhita (BNS), 2023**:
  - **Section 143 & 144**: Relate to **human trafficking offenses**.
  - **Section 111**: Covers **organized crimes**, including **trafficking for prostitution**.
- **Bhartiya Nagarik Suraksha Sanhita (BNSS)**: Recognizes trafficking as a **cognizable** and **non-bailable offense**.

Institutional Support Mechanisms:

- **Anti-Human Trafficking Units (AHTUs)**: **827 units** established nationwide, including in **BSF** and **SSB** forces.
- **Crime Multi Agency Centre (Cri-MAC)**: A **24x7 digital platform** by MHA to share crime data across agencies.
- **Ujjawala Scheme**: A **comprehensive program** by the **Ministry of Women and Child Development** for **rescue, rehabilitation, reintegration**, and **repatriation** of trafficking victims.

Global Efforts Against Child Trafficking:

- **UN Palermo Protocol (2000)**: A landmark treaty to combat human trafficking through **prevention, protection**, and **prosecution**.
- **UNODC Global Report on Trafficking in Persons (2024)**: Shows a **25% surge** in trafficking victims, with **children comprising 38%** of those affected.
- **International Labour Organization (ILO)**: Works to **eliminate child labor** via programs like the **International Programme on the Elimination of Child Labour (IPEC)**.

Conclusion:

The **Supreme Court's remarks** underline the urgent need for **collective action** against child trafficking. This includes:

- **Parental awareness**
- **Swift legal action**
- **Robust enforcement**
- **Stronger inter-state coordination**

By recognizing the **magnitude of the issue**, enhancing **legal mechanisms**, and promoting **community vigilance**, India can take significant strides toward **eradicating this grave crime** and ensuring a **safe, protected future** for every child.

GS Paper 3 – Environment and Ecology

Particulate Matter Trading Scheme in Gujarat

Context: A recent study has revealed that the **Surat Emission Trading Scheme (ETS)** in Gujarat has delivered **significant environmental and economic gains**, marking a milestone in India's fight against air pollution.

Overview of the Scheme:

Launched in **2019**, the **Surat ETS** is:

- The **world's first market-based system** targeting **particulate matter (PM) emissions**.
- **India's first pollution trading scheme** of any kind.
- Based on a **cap-and-trade** model, where total emissions are **capped**, and **permits are traded** among industries.

Implemented by:

Gujarat Pollution Control Board (GPCB) in collaboration with the **Energy Policy Institute** at the **University of Chicago**.

How Does the ETS Work?

Monitoring Through Technology:

- **318 coal-using industrial units** were mandated to install **Continuous Emissions Monitoring Systems (CEMS)**.
- Real-time emissions tracking replaced outdated spot-check methods.

Cap Setting and Trading:

- GPCB set a **cap of 170 tonnes/month** based on actual CEMS data.
- **Permit Allocation**:
    - **80% of permits**: Issued for **free**, based on a unit's emissions capacity.
    - **20% of permits**: **Auctioned weekly** to promote market efficiency.
- **Penalties**: Industries that exceed their permits face **proportional fines**.

Key Achievements of Surat ETS:

Parameter	Impact
Pollution Reduction	**20–30% decrease** in PM emissions
Cost Efficiency	**Over 10% reduction** in abatement costs
Compliance	**99% adherence** to environmental regulations

Significance of the Programme:

- **Environmental Innovation**: First-ever **cap-and-trade for PM**, demonstrating **India's global leadership** in innovative environmental governance.
- **Data-Driven Governance**: Use of **real-time CEMS** ensures **evidence-based policymaking** and regulatory transparency.
- **Replicability**: Proven success opens the door to **scaling** this model to other cities and pollutants like **NOx and SO_2**.

Understanding Particulate Matter (PM):

Particulate matter refers to tiny solid or liquid particles suspended in the air. These particles are classified by size:

- **PM10**: Coarse particles (≤10 µm)
- **PM2.5**: Fine particles (≤2.5 µm)
- **PM0.3**: Quasi-ultrafine particles (<0.3 µm)
- **PM0.1**: Ultrafine particles (≤0.1 µm)

Sources of PM:

Natural Sources:

- Dust storms
- Forest fires
- Volcanic eruptions

Anthropogenic (Human-Made) Sources:

- **Vehicle emissions**
- **Industrial pollution**
- **Construction dust**
- **Biomass & fossil fuel burning**

Health Impacts of PM Exposure:

- **Respiratory Illnesses**: Asthma, bronchitis, **COPD**
- **Heart Conditions**: Heart attacks, **hypertension**
- **Neurological Effects**: **Cognitive decline**, developmental issues
- **Premature Mortality**: Long-term exposure leads to **early deaths** from lung and cardiovascular diseases

Conclusion:

The **Surat PM Trading Scheme** is a **path-breaking initiative** that blends **technology, economics, and regulation** to tackle pollution. Its success is a **blueprint for other Indian cities** and a **testament to India's innovation** in environmental policy.

GS Paper 3 – Science and Technology

Role of V2G Technology in Strengthening India's Power Sector

Context: The **Kerala State Electricity Board (KSEB)**, in collaboration with **IIT Bombay**, has launched a **pilot project** to test the integration of **Electric Vehicles (EVs)** with the state power grid through **Vehicle-to-Grid (V2G)** technology.

This initiative aims to explore how **EV batteries** can **support the grid during peak demand periods**, especially when **solar power** is unavailable—transforming EVs into **flexible energy storage units**.

What is Vehicle-to-Grid (V2G) Technology?

V2G enables **bi-directional energy flow** between **electric vehicles** and the **power grid**.

How It Works:

- **Grid-to-Vehicle (G2V):** Power flows from the grid to charge the EV.
- **Vehicle-to-Grid (V2G):** EVs send stored energy back to the grid during high-demand times.

Other Applications:

- **Vehicle-to-Home (V2H):** Powering household devices using EV batteries.
- **Vehicle-to-Vehicle (V2V):** Sharing energy between EVs.

How V2G Can Strengthen India's Power Sector:

1. Demand-Side Management:

- **Peak Load Reduction:** EVs discharge energy during peak hours, reducing stress on power stations.
- **Load Balancing:** EVs can be charged during off-peak hours, flattening demand curves.

2. Supporting Renewable Energy:

- **Energy Storage for Renewables:** Stores excess **solar** or **wind power** for later use.
- **Grid Stabilization:** Offers **frequency regulation** and **voltage support** for better reliability.

3. Enhancing Grid Flexibility:

- **Emergency Backup Power:** EVs can act as **portable power banks** during outages.
- **Decentralized Storage:** Reduces dependence on **centralized energy plants**.

4. Economic Advantages:

- **Cost Savings for EV Owners:** Earn incentives by **selling surplus energy** back to the grid.
- **Utility Efficiency:** Improves **grid reliability** and reduces operational costs.

5. Environmental Benefits:

- **Cleaner Energy Usage:** Promotes **low-carbon solutions** by integrating clean energy into everyday transport.
- **Smart Charging Systems:** Enables real-time energy management through **intelligent communication networks**.

Global Trends in V2G Adoption:

Growing Implementation in EV-Dense Regions:

Countries like the **USA**, **UK**, and **Netherlands** are leading the way, using V2G to boost **grid efficiency** and **renewable energy use**.

Incentivized Participation:

- **United Kingdom & Netherlands:** EV users earn compensation for grid support.
- **California, USA:** Offers incentives for contributing to **grid services** like stability and frequency regulation.

Disaster Resilience:

EVs function as **emergency energy sources** during blackouts or **natural calamities**, improving community resilience.

V2G in India: Current Landscape:

Still in Early Stages:

India's focus is currently on **building EV charging infrastructure**, with **limited V2G integration** so far.

Ongoing Pilot Programs;

Some **DISCOMs** (distribution companies) are exploring **smart charging** and **V2G models**. The **Central Electricity Authority (CEA)** has formed a **technical committee** to study reverse energy flow regulations.

Key Challenges:

- **Grid Readiness:** The current grid setup isn't fully ready for **decentralized systems**.
- **Renewable Intermittency:** Inconsistent solar/wind supply creates **balancing issues**.
- **Market Barriers:** Lack of **regulatory frameworks** and incentives.

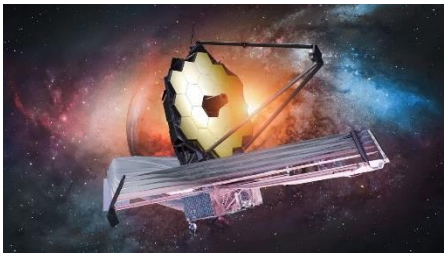
What Needs to Be Done?

To realize the full potential of V2G in India, the following steps are crucial:

- **Develop Bi-Directional Infrastructure**
- **Implement Regulatory Reforms** for energy buy-back and net metering
- **Incentivize EV Owners** to participate in energy balancing
- **Invest in Smart Charging Systems** for real-time energy coordination

GS Paper 3 – Science & Technology

James Webb Space Telescope (JWST): Unveiling the Secrets of the Universe



Context: The **James Webb Space Telescope (JWST)**, launched in **December 2021**, is the most **advanced space observatory** ever constructed. It is the result of a groundbreaking collaboration between **NASA**, the **European Space Agency (ESA)**, and the **Canadian Space Agency (CSA)**.

Positioned at the **second Lagrange Point (L2)**, approximately **1.5 million kilometers** from Earth, JWST enjoys a **stable and unobstructed view** of the cosmos. Unlike the Hubble Telescope, JWST operates primarily in the **infrared spectrum**, allowing it to **peer through cosmic dust** and observe the **earliest galaxies** and **distant exoplanets** with remarkable clarity.

Key Components of JWST:

- **Optical Telescope Element (OTE)** – Gathers light from distant celestial objects.
- **Integrated Science Instrument Module (ISIM)** – Contains the powerful imaging and spectroscopic instruments.
- **Sunshield** – A five-layered structure that protects instruments from the **Sun's heat** and maintains ultra-cold temperatures.
- **Spacecraft Bus** – Supplies power, navigation, and communications for telescope operations.

A Breakthrough Discovery: Possible Signs of Life on K2-18b

What is K2-18b?

K2-18b is a **super-Earth exoplanet** located **124 light-years away** in the **Leo constellation**. It lies in the **habitable zone** of its star—where conditions might allow for **liquid water**, a crucial ingredient for life.

What Did JWST Discover?

In a recent study led by **Cambridge University researchers**, JWST detected **atmospheric chemical signatures** that may point to **biological activity** on K2-18b. Specifically, traces of:

- **Dimethyl Sulphide (DMS)**
- **Dimethyl Disulphide (DMDS)**

These compounds are **biosignature gases** on Earth—**produced primarily by marine phytoplankton and certain bacteria**. The presence of these gases in **vast quantities** (thousands of times more than Earth's levels) raises the **strong possibility** of some **life-supporting ecosystem** on this distant world.

Why This Discovery Matters:

- It's the **first time** JWST has possibly identified **biosignatures** on an **exoplanet**.
- The study provides a **new direction** for the **search for extraterrestrial life**, shifting focus to **water-rich and hydrogen-rich super-Earths**.

- **K2-18b's** atmosphere also contains **carbon dioxide (CO_2)** and **methane (CH_4)**, further supporting the **potential habitability** of this planet.

Did You Know?

- **JWST** can observe objects that are over **13 billion years old**, offering insights into the **early universe**.
- The telescope's mirror is made of **beryllium** and coated with **gold**, optimizing it for **infrared reflection**.
- **L2**, its orbital point, keeps the Sun, Earth, and Moon behind it, ensuring **thermal stability** and a **clear view** of deep space.

A New Era in Space Exploration:

The **James Webb Space Telescope** is not just a telescope—it's a **cosmic time machine** that is helping us answer some of the most profound questions: **Are we alone in the universe? How did the first stars form? What lies beyond our solar system?**

With findings like those on **K2-18b**, humanity is on the verge of potentially discovering **life beyond Earth**—a milestone that could **redefine our place in the cosmos**.

GS Paper 1 – Geography, Society & Culture

Dal Lake: The Sparkling Jewel of Srinagar

Context: Recently, a **tourist shikara** tragically overturned in Srinagar's iconic **Dal Lake** as **strong winds** swept through parts of **Jammu and Kashmir**, plunging a tourist family and a boatman into the cold waters. Thankfully, rescue teams acted swiftly. This incident is a reminder of both the beauty and unpredictability of this legendary water body.

Overview of Dal Lake:

- **Dal Lake** is a **mid-altitude urban lake** located in the heart of **Srinagar**, the summer capital of **Jammu and Kashmir**.
- Cradled in the **Himalayan Pir Panjal Range**, it is often referred to as:
    - The **"Jewel in the Crown of Kashmir"**
    - Or **"Srinagar's Jewel"**
- The lake is also affectionately known as the **"Lake of Flowers"**, thanks to its blooming **lotus gardens** in summer.

Geography & Structure:

- **Area**: Spans approximately **18 sq. km**, forming part of a larger **wetland ecosystem** of **21.1 sq. km**.
- **Depth**: Has an **average depth** of **5 feet**, with the **deepest point** reaching **20 feet**.
- **Shoreline**: Measures about **15.5 km**, edged by a scenic **boulevard** filled with:
    - **Mughal-era gardens**
    - **Historic parks**
    - **Luxurious houseboats**
    - **Heritage hotels**

Unique Features of Dal Lake:

- **Floating Gardens**: Known as **"Raad"** in local Kashmiri, these gardens **float atop the lake's surface**, and come alive with **lotus flowers** during **July and August**.
- **Divided Basins**: The lake is separated by natural and man-made causeways into four main basins:
    - **Gagribal**
    - **Lokut Dal**
    - **Bod Dal**
    - **Nagin** *(often considered a separate lake)*
- **Islands Within**:
    - **Lokut Dal** houses **Rup Lank (Char Chinari)** – famous for its four majestic **Chinar trees**.

- **Bod Dal** contains **Sona Lank**, another picturesque island.

Cultural & Tourist Hotspot:

- **Shikara Rides**: The lake is renowned for its colorful **Shikaras** – traditional wooden boats that glide across the serene waters.
- **Floating Markets**: Vendors sell **Kashmiri handicrafts**, **flowers**, and **fresh produce** from their Shikaras, offering tourists a unique shopping experience.
- **Houseboats**: Tourists can stay in ornately decorated **houseboats**, enjoying **sunset views** and **Kashmiri cuisine** right on the lake.

Did You Know?

- Dal Lake freezes completely during **harsh winters**, creating a surreal, icy landscape.
- The word "**Dal**" in Kashmiri actually **means "lake"**, so "Dal Lake" is technically "Lake Lake".
- The lake has been featured in countless **Bollywood movies**, making it an iconic romantic and cultural symbol.
- **Environmental challenges**, such as encroachments and pollution, have led to multiple conservation efforts by the **Jammu and Kashmir Lakes and Waterways Development Authority (LAWDA)**.

A Living Heritage:

Dal Lake is more than just a water body—it's a **living, breathing icon of Kashmir's heritage**, ecology, and tourism economy. Whether it's the **gentle ride of a Shikara**, the **blooming lotus gardens**, or the **echo of history in Mughal gardens**, Dal Lake offers a magical experience to every visitor.

GS Paper 3 – Infrastructure Development

Shinkansen Trains & India's Bullet Train Dream

Context: In a landmark move to strengthen Indo-Japanese cooperation, **Japan will provide India with two Shinkansen train sets—E5 and E3 Series—free of cost** in **2026**. This gesture is a part of the ongoing collaboration in India's ambitious **Mumbai-Ahmedabad Bullet Train Project**.

Meet the Marvels: Shinkansen E5 & E3 Series:

E5 Series – The Pinnacle of Speed and Innovation

- **Operational since 2011**, the E5 Series is a symbol of modern engineering and comfort.
- Boasts a **top speed of 320 km/h**, making it one of the fastest trains in the world.
- Features include:
  - **Aerodynamic design** for reduced drag and noise
  - **State-of-the-art safety systems**, including earthquake detection and automatic braking
  - **Luxurious seating and smooth ride quality** ideal for long-distance, high-speed travel

Fun Fact: The E5 was selected as the base model for India's bullet train line due to its cutting-edge technology and efficiency.

E3 Series – The Reliable Veteran:

- A slightly **older model**, used primarily for **Mini-Shinkansen services** in Japan.
- While not as fast as the E5, it includes similar **safety and control mechanisms**.
- Designed for **routes with converted narrow-gauge tracks**, making it versatile for semi-high-speed operations.

India's Bullet Train Project: Mumbai to Ahmedabad

India's First High-Speed Rail Corridor:

- Implemented by **National High-Speed Rail Corporation Ltd. (NHSRCL)**
- Incorporates **Japanese Shinkansen technology** to ensure top-tier infrastructure and efficiency
- **Funded up to 80% by the Japan International Cooperation Agency (JICA)** via a soft loan

Timeline & Vision:

- **Initial deadline**: 2022
- **Revised completion date**: **2028**
- Total project length: **508 kilometers**, with trains expected to run at **speeds up to 320 km/h**
- A key component of **India's National Rail Plan (NRP) 2030**, aimed at transforming India's rail infrastructure

Additional Insights & Future Scope:

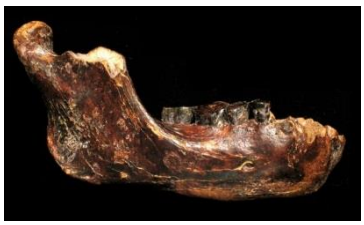
- The Shinkansen system has had **zero passenger fatalities** since its inception in 1964—a testament to its safety standards.
- The bullet train project is expected to **cut travel time** between Mumbai and Ahmedabad from **6-7 hours to just 2-3 hours**.
- The corridor will pass through **Maharashtra, Gujarat, and Dadra & Nagar Haveli**, integrating urban centers and promoting regional development.
- Once operational, it will boost:
    - **Employment opportunities**
    - **Make-in-India initiatives** via local manufacturing of components
    - **Green transportation**, reducing dependency on fossil fuels and reducing emissions

Conclusion: Speeding into the Future:

The collaboration between India and Japan on the bullet train marks not just an infrastructural milestone but a **technological and diplomatic triumph**. With the Shinkansen trains symbolizing speed, safety, and precision, India is set to take a bold leap into the era of **high-speed rail travel**.

GS Paper 1 – History and Culture

Ancient Jawbone Discovery Reveals Wider Reach of Mysterious Denisovans



Context: A **remarkable fossilized jawbone**, known as **Penghu 1**, has been recovered from the **Penghu Channel near Taiwan**, shedding new light on the **geographic spread** and **evolutionary history** of the **Denisovans** — a long-lost branch of the human family tree. This discovery, made accidentally during **commercial fishing operations**, is changing our understanding of where these ancient humans lived and how adaptable they were.

Who Were the Denisovans?

The **Denisovans** are an **extinct group of archaic humans** known mostly through scarce fossil remains and groundbreaking **genetic analysis**.

Origins and First Discovery:

- First identified in **2010** from DNA extracted from a **finger bone** found in **Denisova Cave, Siberia**.
- Genetic studies revealed they were a **distinct lineage**, closely related to both **Neanderthals** and **modern Homo sapiens**.

Physical Characteristics:

- Based on **DNA methylation reconstruction**, Denisovans likely had:
  - A **broader skull** structure.
  - A **longer dental arch** than Neanderthals or modern humans.
- Their **robust jawbones** and **large molars** suggest powerful chewing capabilities, possibly adapted to a tough diet.

Significance of the Penghu 1 Discovery:

Expanding Their Geographic Footprint:

The jawbone discovery off **Taiwan's coast** extends the known range of Denisovans to **East and Southeast Asia**, reinforcing their **adaptability to diverse environments**.

Previously Known Denisovan Fossil Sites:

- **Denisova Cave, Siberia (Russia)**: Finger bone and teeth.
- **Baishiya Karst Cave, Tibetan Plateau (China)**: Jawbone and rib fragment.
- **Cobra Cave, Laos**: A molar (likely Denisovan based on morphology).
- **Penghu Channel, Taiwan**: Newly found Penghu 1 jawbone.

This wide distribution shows Denisovans thrived from **icy highlands** to **subtropical coastal zones** — a level of ecological flexibility once underestimated.

Challenges in Dating the Fossil:

- The **exact age** of Penghu 1 remains undetermined due to the **lack of traditional stratigraphic context**.
- **Estimated to be between 10,000 and 190,000 years old**, based on nearby animal fossils.

Lasting Genetic Legacy:

Denisovans **interbred** with both **Neanderthals** and **early Homo sapiens**, contributing **genetic material** still present in modern human populations, especially in **Asia and Oceania**.

Modern-Day Impacts of Denisovan DNA:

- High-altitude **adaptation genes** in **Tibetans** trace back to Denisovans.
- Traits related to the **immune system** and **skin pigmentation** also show Denisovan influence.

Looking Ahead: Unlocking More Secrets:

New Frontiers in Research:

The Penghu 1 discovery underscores the importance of investigating **submerged landscapes**—once accessible during Ice Ages when sea levels were lower.

Future breakthroughs may come from:

- **Paleoproteomics**: Studying **ancient proteins** in fossils to identify species and relationships when DNA isn't preserved.
- **Underwater archaeology**: Exploring **submerged land bridges** and **coastal shelves** that may have supported early human populations.

Recognition in the Field:

In **2022**, Swedish geneticist **Svante Pääbo** was awarded the **Nobel Prize in Physiology or Medicine** for pioneering work on the **genomes of extinct hominins**, including **Denisovans**. His research has been foundational in understanding how ancient DNA informs **human evolution**.

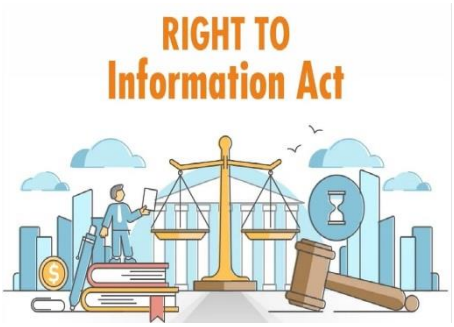
Did You Know?

- Modern humans carry up to **5% Denisovan DNA** in some **Melanesian and Aboriginal Australian populations**.
- Denisovan remains are **so rare**, most knowledge about them comes from **genomics**, not traditional fossil records.
- The **Denisovan genome** was the first of an extinct human group to be sequenced with such high quality.

Conlusion: The discovery of the **Penghu 1 jawbone** doesn't just expand the **map of Denisovan existence**—it deepens the mystery and wonder surrounding these **ancient relatives** of ours. As science advances, we may find even more clues buried in the **earth—or under the sea**.

GS Paper 2 – Polity, Governance, and Rights Issues

Concerns Arise Over Amendments to RTI Act Amid Data Privacy Reforms



Context: The **Union Minister for Information and Technology** has stated that **personal information required to be disclosed under existing laws** will still be accessible through the **Right to Information (RTI) Act**, even after the **Digital Personal Data Protection (DPDP) Act** is implemented. However, many civil society groups and activists remain concerned that recent **amendments may hinder transparency and public accountability**.

Key Change: Amendment to Section 8(1)(j) of the RTI Act

Under the proposed **Digital Personal Data Protection (DPDP) Rules**, the **RTI Act (2005)** will be amended to incorporate a **blanket prohibition on the disclosure of personal information**, regardless of whether it serves the **public interest**.

Concerns Raised:

- **Limits access** to information vital for **social audits**, investigations into **misuse of public funds**, and **exposing corruption**.
- Hampers the RTI's role in **verifying government welfare programs** like the **Public Distribution System (PDS)** and **NREGS**.
- Critics argue the amendment **disrupts the balance** between **privacy and transparency** maintained in the original Act.
- They **reject** the claim that this aligns with the **Supreme Court's 2017 ruling** on the **right to privacy** under **Article 21**.

Government's Justification:

The government claims the amendment:

- Will **not curtail transparency**, and
- Will **allow disclosure of personal data when legally mandated**.

The **2017 Supreme Court judgement** that recognized **privacy as a fundamental right** is cited as the **basis for the reform**.

RTI (Amendment) Act, 2019: A Recap

- **Tenure Reduced**: The term of the **Chief Information Commissioner (CIC)** and **Information Commissioners (ICs)** was reduced from **5 years to 3 years**.
- **Centralized Control**: Their **salaries and service conditions** are now determined by the **Central Government**, rather than being on par with **Election Commissioners**.

RTI Rules, 2022: Digitization Push

- **Online Filing**: Citizens are encouraged to file RTI applications through the **RTI Online Portal**.
- **Streamlined Processes**: Revisions made to improve **appeals** and **complaints procedures**.

The Right to Information Act (RTI), 2005 – An Overview

Purpose:

To **promote transparency** and **empower citizens** by granting access to information from **public authorities**.

Scope:

- Applies to **all government departments** and **organizations** substantially funded by the government.
- Ensures access to **records, files, contracts, correspondence**, and more.

Exclusions:

- National security, **confidential investigations**, and **sensitive data** are exempted.

Timelines:

- Responses must be provided **within 30 days**, extendable to **45 days** in special cases.

Penalties:

- Officials face penalties for **wrongful denial** or **misleading information**.

The Road Ahead

- **Digital Personal Data Protection Act (DPDP)** is **not yet operational**, as the **rules are still in draft form**.
- **Civil society organizations** are urging the government to **reconsider the amendments**, fearing erosion of **public accountability**.
- The **core strength of the RTI Act** lies in its ability to empower the public and **expose corruption** — a function that must not be compromised under the guise of privacy.

Conclusion:

While **data protection** is a legitimate concern in the digital age, it must not come at the **cost of transparency and democratic accountability**. The **RTI Act** has been a cornerstone of **citizen empowerment** and **good governance** in India. Any amendment should aim to **strengthen**, not **weaken**, the public's right to know.

GS Paper 3 – Economic Development, Science and Technology

India Needs an Ecosystem That Enables Deep-Tech Innovation

Context: At the **Startup Mahakumbh**, Commerce Minister **Piyush Goyal** criticized Indian startups for being too focused on **consumer-centric models** like **food delivery** and **influencer-driven apps**. He emphasized that **India must shift toward deep-tech innovation** to stay competitive globally.

Did You Know?

- **Startup Mahakumbh** is a flagship event promoting **entrepreneurship and innovation** in India.
- Theme: **'Startup India @ 2047: Unfolding the Bharat Story'**
- The event aims to **propel India** as a **global startup hub** by the time it reaches 100 years of independence.

Comparison with China: The Innovation Gap:

India	China
Focuses on **food delivery**, **betting platforms**, and **short-form content**	Invests in **electric vehicles (EVs)**, **AI**, **robotics**, and **battery tech**
Lacks significant **intellectual property (IP)** in deep-tech	Over **6,000 deep-tech startups**; nearly **$100B** in funding
Still evaluating AI model proposals	Leads with **DeepSeek**, an efficient AI model
Dependent on Chinese components for manufacturing	Strong **domestic hardware ecosystem**
Ranks **39th** in Global Innovation Index (2024)	Ranks **11th**

China's strategic focus on foundational technologies is what gives it a dominant edge in the global tech race.

Challenges Facing Indian Startups:

Innovation Deficit:

- **Global Indian talent**, like Satya Nadella (Microsoft) and Sundar Pichai (Google), thrive abroad while **local innovation lags**.
- India hasn't produced a globally competitive **AI model** yet.

Funding Gap:

- India invested **$160B in tech (2014–2024)** vs China's **$845B**.
- Only **10% of Indians** can afford discretionary spending—limiting consumer tech scalability.

Weak Education and Research:

- Many graduates are **unemployable**.
- Indian universities lack **global research credibility**.
- **Brain Drain: Top talent emigrates** for better research and entrepreneurial environments.
- **Risk-Averse VC Culture:** VCs favor **quick-return apps** over **long-gestation deep-tech ventures**.

- **Limited Global Presence:** Startups like **Zomato**, **Swiggy**, and **Flipkart** are **India-centric**, with little global reach.

Opportunities and Strengths

Startup Ecosystem Growth:

- India is the **3rd-largest startup ecosystem**, with **1.57 lakh+ recognized startups** (as of Dec 2024).
- Over **100 unicorns** span across SaaS, fintech, healthtech, and more.

Geographic Spread:

- Major hubs: **Bengaluru, Hyderabad, Delhi-NCR, Mumbai**.
- **Tier II & III cities** now account for over **51%** of recognized startups—showing **grassroots innovation**.

Tech Contributions:

- India has become a global leader in **SaaS** with companies like **Zoho**, **Freshworks**, **TCS**, and **Infosys**.
- Pioneered **digital public infrastructure** with **UPI**, revolutionizing digital payments via **Paytm** and **PhonePe**.

Space and Deep-Tech Potential:

- Startups like **Skyroot**, **Agnikul**, and **Digantara** are emerging in **space tech**.
- **Cybersecurity** startups are rising but often face **early exits via acquisition**.
- **Deep-tech investments grew 78% in 2024**, reaching **$1.6B**.

Key Areas to Focus On:

To truly transition into a **deep-tech powerhouse**, India must focus on:

- **Artificial Intelligence (AI)**
- **Smart manufacturing and Industry 4.0**
- **Medical technology (MedTech)**
- **Climate tech & green energy**
- **Defence tech and aerospace**
- **Quantum and advanced computing**

Conclusion: A Call for Bold Reforms

India has made **tremendous strides** in **SaaS**, **fintech**, and **digital payments**, but it still lags behind global powers like China in **deep-tech innovation and global competitiveness**.

To bridge the gap, India needs:

- **Bold, long-term investment** in R&D
- A **culture of risk-taking** among VCs
- **Stronger academic-industry collaboration**
- Policies that incentivize **deep-tech development**
- A national mission to **retain and empower Indian tech talent**

GS Paper 3 – Internal Security

Extradition of Tahawwur Rana: A Diplomatic & Legal Victory in the 26/11 Case

Context: After **16 years** since the devastating **26/11 Mumbai terror attacks**, **Tahawwur Rana**, a **key conspirator**, has finally been **extradited to India** from the **United States**. This marks a **watershed moment** in India's anti-terrorism efforts and a **remarkable success** in **India-US diplomatic and legal cooperation**.

Flashback: The 26/11 Mumbai Terror Attacks

- **Dates:** November 26–29, 2008
- **Casualties:** 166 dead, 238+ injured
- **Terror Outfit: Lashkar-e-Taiba (LeT)**, a **Pakistan-based terrorist organization**
- **Key Locations Attacked:**
  - **Chhatrapati Shivaji Terminus (CST)**
  - **Taj Mahal Palace Hotel**
  - **Oberoi Trident Hotel**
  - **Nariman House (Jewish Centre)**
- **Tactic Used:** Infiltration via **sea route** from Karachi, Pakistan

Did you know?

This attack was broadcast live, creating a new era of **media-covered urban terrorism**. It changed how India approaches **counter-terrorism and urban security**.

Who is Tahawwur Rana?

- **Nationality:** Pakistani-born, naturalized **Canadian citizen**
- **Profession:** Former officer in **Pakistan Army's Medical Corps**
- **Associations:**
  - Close associate of **David Coleman Headley** (aka Daood Gilani), a LeT scout
  - Linked to banned groups like **LeT** and **Harkat-ul-Jihadi Islami (HUJI)**
- **Arrested:** In **Chicago, October 2009**

His Role in the Attack:

- Provided **logistical and strategic support** to Headley
- Helped in **reconnaissance operations** and **coordinated planning** of attacks

Legal Proceedings & Extradition Journey:

Key Milestones:

- **US Magistrate Court** approves extradition after rejecting the **"double jeopardy"** defense
- **US Supreme Court** declines review plea, **finalizing Rana's extradition**
- **Special aircraft** deployed to fly him to India under **tight security**

Legal & Security Coordination:

- **Lead Counsel (India):** Senior Advocate **Dayan Krishnan**
- Supported by: **Narender Mann**, **Sanjeevi Sheshadri**, **Sridhar Kale**, and **NIA legal team.**

- **Security Escorts: National Security Guard (NSG)** & **NIA** officials

Current Status:

- **Arrested at IGI Airport**, New Delhi
- Produced before **NIA Special Court** at Patiala House
- **Remanded to 18 days** of NIA custody for interrogation

Political & Diplomatic Significance:

India–US Cooperation:

- Based on **India-US Extradition Treaty** (1997)
- Key players:
    - **US Department of Justice**
    - **Indian Ministry of External Affairs (MEA)**
    - **Ministry of Home Affairs (MHA)**
    - **Indian Embassy in Washington D.C.**

Political Acknowledgement:

- **Prime Minister Narendra Modi** thanked the US for its **support to India's justice system**
- Demonstrates strong **India-US strategic partnership** in **counterterrorism cooperation**

What is Extradition?

Extradition is a formal legal process through which one country **transfers a fugitive or accused** to another country where they face **criminal charges** or **sentencing**.

Core Principles:

- **Treaty-based process**
- **Dual criminality:** Offence must be punishable in both countries
- **Exemptions:** Political offences, persecution risks, or weak evidence

India's Extradition Framework:

- **Extradition treaties:** With **48 countries**
- **Extradition arrangements (non-binding):** With **12 nations**
- **Nodal Agency: MEA's Consular, Passport & Visa (CPV) Division**

Challenges in the Extradition Process:

- **Legal complexities:** Rana's case spanned over a **decade**
- **Double jeopardy claims:** Rejected but caused delays
- **Diplomatic roadblocks:** Depends on **bilateral goodwill**
- **Contrast with Headley:**
    - **David Headley** received a **plea bargain** in the US
    - Avoided extradition, serving a **35-year sentence** in the US

Interesting Fact: In 2013, Headley was declared a **prosecution witness**, further complicating extradition efforts but helping build a stronger case against Rana.

Conclusion: A Strategic Win for India -The extradition of Tahawwur Rana represents more than just justice—it's a **symbol of resilience**, **strategic diplomacy**, and a **testament to India's growing international influence**. It also sets a precedent for future cross-border **counterterrorism collaboration**.

Sunbird: Nuclear Fusion Rocket Aiming to Revolutionize Space Travel

Context: Sunbird, an ambitious **nuclear fusion-powered rocket** under development by the UK-based startup **Pulsar Fusion**, is making headlines for its potential to **redefine interplanetary travel**. With an **orbital demonstration planned for 2027**, this could be a **historic breakthrough** in propulsion technology.

What is Sunbird?

- **Speed Potential:** Expected to reach up to **805,000 km/h**, surpassing NASA's **Parker Solar Probe** (currently the fastest human-made object at **692,000 km/h**).
- **Travel Efficiency:**
  - Could reduce **Mars travel time by nearly half**
  - Could reach **Pluto in just 4 years** — a mission that currently takes around 9.5 years
- **Core Objective:** Dramatically **cut travel time** to planets beyond Earth, making long-distance **space missions more feasible and frequent**

Did You Know?

If Sunbird's concept is successful, it could support **crewed missions** beyond Mars — a milestone in **deep space exploration**.

Understanding Nuclear Fusion Propulsion:

What is Nuclear Fusion?

- **Fusion** is the process where **two atomic nuclei combine** to form a **heavier nucleus**, releasing a **huge amount of energy** — the same principle that powers the **Sun and stars**.
- Unlike **nuclear fission**, fusion:
  - Generates **minimal radioactive waste**
  - Offers a **higher energy yield**
  - Is considered **cleaner and safer**

Two Major Concepts in Nuclear Propulsion:

1. Nuclear Thermal Propulsion (NTP):

- Uses a **nuclear reactor** to heat **liquid hydrogen (LH_2)**
- Hydrogen expands into **plasma** and is ejected through a **nozzle** to create **thrust**
- **Advantages:**
  - Higher **exhaust velocity**
  - Can **double or triple payload capacity** compared to chemical rockets
- **Historical Context:** Ground tests started as early as **1955**, making it a **well-established** concept with decades of R&D

2. Nuclear Electric Propulsion (NEP):

- Converts **nuclear heat into electricity**, which then powers **ion thrusters**
- Thrusters build speed **gradually but efficiently**, suitable for **long-duration missions**

- **Key Components:**
  - **Compact nuclear reactor**
  - **Electric generator**
  - **Heat rejection system** (e.g., **heat pipes**)
  - **Electric propulsion system** (like **ion thrusters**)
- **Bonus:** While **solar panels** can also power electric propulsion, a **nuclear source** ensures **consistent energy output**—especially useful **beyond Mars** where solar power weakens

Why Sunbird Matters:

- **Fusion-based propulsion** could become the **next leap** in aerospace engineering
- **Faster interplanetary travel** could open doors to:
  - **Commercial space tourism**
  - **Rapid resupply missions**
  - **Deep space exploration** including **Jupiter's moons** or even **interstellar probes**
- **Pulsar Fusion's work** is backed by growing interest in **private space innovation** and **clean energy tech**

What's Next?

- **2027:** Planned **orbital demonstration** of the Sunbird fusion rocket
- Success could trigger **investments**, **international collaborations**, and possibly **future missions to Mars and beyond**

Conclusion:

Sunbird isn't just a rocket — it's a **glimpse into the future of spaceflight**. By combining the **limitless power of fusion** with cutting-edge propulsion engineering, Sunbird could drastically **shorten cosmic distances** and bring **deep space exploration** within humanity's reach.

GS Paper 3 – Environment, Ecology, and Biodiversity

Sea Lions: Unusual Aggression Linked to Algal Bloom and Neurotoxins

Context: A recent **algal bloom** along the **California coast** has led to the release of a **neurotoxin**, causing **sea lions** to exhibit **uncharacteristically aggressive behavior**. This has resulted in multiple **attacks on beachgoers** and **surfers**.

About Sea Lions: The Social Marine Mammals

Scientific Classification:

- **Family: Otariidae**, which encompasses five sea lion species:
  - **California Sea Lion**
  - **Northern Sea Lion**
  - **Southern Sea Lion**
  - **Australian Sea Lion**
  - **New Zealand Sea Lion**

Habitat & Distribution:

- Found along the **Western coasts of North America**, stretching from **southeast Alaska** to **central Mexico**.
- Prefer **rocky shores** and **sandy beaches**, where they haul out to rest, breed, and give birth.

Physical Traits:

- **External ear flaps** distinguish sea lions from seals.
- **Long foreflippers** enable them to move efficiently on land and in water.
- Males can weigh up to **1200 pounds (545 kg)**, with a mane-like fur around their necks, particularly noticeable in mature males.

Social Behavior:

- Typically **non-aggressive** and **social**, sea lions live in **large colonies**.
- Known for their playful nature, **intelligent** problem-solving abilities, and strong family bonds.

What is Causing the Sea Lions' Aggression?

Although generally calm, sea lions have recently displayed **violent and erratic behavior**, which has raised concerns among beachgoers and marine researchers alike. The culprit behind this sudden change is **domoic acid**, a neurotoxin produced by **toxic diatom algae**.

Domoic Acid: The Neurotoxin

- **Produced by:** The algae **Pseudo-nitzschia**, which forms blooms under **nutrient-rich conditions** in the ocean.
- **Effects on Marine Life:**
  - The **toxin** enters the **marine food chain**, affecting smaller fish and, in turn, larger predators like sea lions who consume these contaminated fish.

- Domoic acid causes **neurological damage**, leading to symptoms like **disorientation**, **aggression**, and **seizures** in sea lions.
- In severe cases, it can lead to **death** or long-term damage to brain function.

Impact of Algal Blooms:

- **Algal blooms** occur when **nutrient levels** in the ocean rise, often due to **human activities** such as agricultural runoff or changes in ocean currents.
- These blooms can be **harmful to both marine life** and humans, as the toxins can accumulate in shellfish, posing health risks.

Understanding the Risks: Neurotoxin Effects on Sea Lions

Sea lions, typically **gentle** creatures, are now exhibiting **lethal aggression** due to the effects of **domoic acid** on their nervous systems. In addition to aggression, these mammals may experience:

- **Confusion and disorientation**
- **Difficulty swimming**
- **Seizures** or uncontrolled movements
- **Erratic behavior**, including attacks on humans or other animals

This sudden shift in behavior has raised alarms, as these once-friendly animals become dangerous due to their altered brain chemistry.

The Bigger Picture: Environmental Implications

The increasing frequency of **algal blooms** and the spread of **neurotoxins** like **domoic acid** signal broader environmental changes. Factors contributing to this phenomenon include:

- **Climate change**, which may be altering ocean temperatures and currents, contributing to more frequent and intense algal blooms.
- **Pollution**, particularly nutrient runoff from agriculture and urban areas, exacerbating the conditions for these toxic blooms.

What Can Be Done?

- **Monitoring and research** are key to understanding how **toxic algal blooms** affect marine ecosystems and how they can be mitigated.
- **Regulations on nutrient runoff** and **environmental protection measures** could help reduce the occurrence of harmful blooms.

Conclusion: Protecting Both Sea Lions and Humans

The unusual aggression displayed by sea lions along the California coast highlights the **direct impact** of environmental changes on marine wildlife. The **presence of domoic acid** in the food chain has turned these typically **peaceful creatures** into a public safety concern, underlining the need for **sustainable environmental practices** and **better monitoring** of ocean health.

By understanding the interplay between **toxic algae**, **marine life**, and **climate change**, we can work towards protecting both **sea lions** and **human beachgoers** alike.

GS Paper 3 – Environment & Ecology

Plastic Parks in India: A Step Towards Sustainable Industrial Growth

Context: India's **Plastic Parks Scheme** is playing a transformative role in promoting **industrial development** and ensuring **environmental sustainability** within the nation's plastics sector.

What is a Plastic Park?

A **Plastic Park** is a specially developed **industrial zone** dedicated to **plastic-based industries**. These parks aim to:

- **Synergize and consolidate** the capacities of the domestic **plastic processing industry**
- **Attract investments** and boost **production** and **exports**
- **Generate employment opportunities**
- Promote **sustainable growth** through effective **waste management** and **recycling** systems

Why Plastic Parks Matter:

Plastic Parks are central to India's mission of:

- **Efficiently managing plastic waste**
- Encouraging **recycling and reuse**
- Strengthening the **chemical and plastic processing industries**

India is now the **12th largest plastic exporter** globally, with exports rising significantly from **$8.2 billion in 2014** to **$27 billion in 2022**, thanks to strategic initiatives like the Plastic Parks Scheme.

Current Status:

So far, **10 Plastic Parks** have received approval across various **states**, acting as **special plastic-industrial hubs** that cater to the growing needs of the industry.

Challenges in the Sector:

Despite being one of the largest industries, India's plastics sector remains **highly fragmented**, largely composed of **micro, small, and medium enterprises (MSMEs)**. This fragmentation limits the ability to leverage large-scale opportunities in the global market.

Government's Role and Support:

To address these challenges, the Government of India has introduced a robust scheme through the Department of Chemicals and Petrochemicals. Key highlights include:

- **Development of need-based Plastic Parks** with **modern infrastructure**
- Provision of **common facilities** through a **cluster development approach**
- **Financial support** covering up to **50% of the project cost**, with a ceiling of ₹**40 crore per park**

This approach aims to boost **domestic capabilities**, increase **private investment**, enhance **exports**, and encourage **innovation** in the plastics sector.

Conclusion: A Vision for the Future

The **Plastic Parks Scheme** represents a **pioneering initiative** to revamp the **infrastructure** of plastic processing in India. By promoting **innovation**, **sustainability**, and **global competitiveness**, the scheme is ensuring that India's growth in the **plastic trade** is **inclusive**, **responsible**, and **future-ready**.

GS Paper 3 – Economic Development

India Ends Transshipment Facility for Bangladesh Exports

Context: India has officially **withdrawn the transshipment facility** that previously allowed **Bangladesh to export goods** to third countries via **Indian ports, airports**, and **land customs stations (LCSs)**. This move is poised to have considerable implications for **Bangladesh's export logistics** and regional trade dynamics.

What Was the Transshipment Agreement?

Introduced in **2020** by India's **Central Board of Indirect Taxes and Customs (CBIC)**, the **transshipment agreement** was designed to:

- Strengthen **regional trade connectivity**
- Allow **Bangladeshi cargo** to move through Indian LCSs to international ports and airports
- Facilitate **seamless exports** from Bangladesh to destinations like **Europe, West Asia**, and beyond

Why Was It Revoked?

India cited **logistical bottlenecks** as the main reason behind this decision. Key concerns included:

- **Severe congestion** at Indian ports and airports
- Resulting **delays and increased operational costs**
- Negative impact on **India's own export timelines and efficiency**

The suspension of this facility is likely to **raise costs** and **complicate trade logistics** for Bangladesh, especially for shipments to **Western markets**.

India-Bangladesh Relations: A Snapshot

Historical Ties:

- **1971 Liberation War**: India played a **pivotal role** in Bangladesh's independence from Pakistan, cementing a foundation of strong bilateral ties.

Land Boundary Agreement (LBA):

- Signed in **2015**, this historic agreement:
  - Resolved **decades-old border disputes**
  - Enabled the **exchange of enclaves**
  - Simplified the **international boundary**

Connectivity and Infrastructure:

- **Five pre-1965 rail links** have been restored.
- Operational trains include:
  - **Maitri Express**
  - **Bandhan Express**
  - **Mitali Express**
- The **Akhaura-Agartala rail link** has significantly improved connectivity between **northeastern India** and Bangladesh.

Economic Ties:

- Bangladesh is **India's largest trading partner in South Asia**.
- In **FY24**, bilateral trade reached **US$ 12.90 billion**.
    - **India's exports**: US$ 11.06 billion
- Both countries participate in multiple trade agreements:
    - **Asia Pacific Trade Agreement (APTA)**
    - **SAARC Preferential Trade Agreement (SAPTA)**
    - **South Asian Free Trade Area (SAFTA)**

Strategic and Regional Cooperation:

- Active membership in **SAARC** and **BIMSTEC**.
- Regular **joint military exercises**:
    - **Sampriti** (Army)
    - **Milan** (Navy)
- Bangladesh imports approximately **2,000 MW of electricity** from India, highlighting energy interdependence.

Challenges in the Bilateral Relationship:

1. **Border Issues**: Despite the LBA, sporadic **border security incidents** and **illegal crossings** continue to pose challenges.
2. **Water Sharing Disputes: Teesta River sharing** remains unresolved, causing diplomatic strain.
3. **Trade Imbalance:** A persistent **trade surplus in India's favor** has triggered calls for a more balanced trade structure.
4. **Cross-Border Migration: Undocumented migration** into Indian states like **Assam and West Bengal** remains a politically sensitive topic.
5. **Security Concerns:** Issues like **smuggling**, **extremist activities**, and **border vulnerabilities** demand constant vigilance.
6. **China's Influence: China's growing footprint** in Bangladesh, especially in **infrastructure and defense**, is viewed by India as a strategic challenge.

The Way Forward:

India and Bangladesh share not just a **border**, but a deep-rooted bond forged by **history**, **culture**, and **geographical proximity**. With the **longest land boundary** between any of India's neighbors, Bangladesh remains a **key partner** in regional stability and growth.

Moving forward, both nations should focus on:

- **Strengthening dialogue**
- **Enhancing inclusivity in trade**
- **Balancing strategic partnerships**
- Promoting a **resilient and forward-looking relationship**

GS Paper 3 – Internal Security

Naxalmukt Bharat Abhiyan: From Red Zones to Growth Corridors

Context: India has made **remarkable progress** in countering **Left Wing Extremism (LWE)**, with a **significant decline in violence**, **reduction in affected districts**, and a visible **shrinking of Naxalite influence** across the country.

What is the Naxalite Movement?

Origins:

- Began in **1967** in **Naxalbari**, West Bengal.
- Initiated as a **radical leftist uprising**, advocating for the rights of **tribals and landless farmers**.

Geographical Spread:

- Expanded across the so-called **Red Corridor**, including:
  - **Chhattisgarh, Jharkhand, Odisha, Maharashtra, West Bengal, Andhra Pradesh, Telangana, Madhya Pradesh**, and **Kerala**.

Tactics Used:

- Operate through **guerrilla warfare**, targeting **state institutions**.
- Engage in **extortion**, **child recruitment**, and **violence** in the name of justice for the **marginalized**.

Consequences of Naxalism:

Political Impact:

- **Undermines state authority** and disrupts **democratic processes**.
- Creates **administrative vacuums** and weakens **law enforcement**.

Economic Impact:

- **Disrupts agriculture, mining, and infrastructure** projects.
- Leads to **higher security spending**, reducing focus on **development**.
- Deters **private investment** in affected regions.

Social Impact:

- Spreads **fear and alienation** among local communities.
- **Interrupts education and healthcare**, causing long-term **human development setbacks**.

India's Progress in Combating Naxalism:

- **Reduction in Affected Districts**: From **126 in 2010** to **just 38 in 2024**.
- **Violence Down by 81%**: From **1,936 incidents in 2010** to **374 in 2024**.
- **Over 8,000 Naxalites Surrendered**: In the last **10 years**.
- **Mainstream Integration**: Improvements in **infrastructure, education, healthcare**, and **governance** in previously LWE-dominated areas.

Key Government Initiatives:

1. **Security Related Expenditure (SRE) Scheme:**

- Part of the **'Modernization of Police Forces'** umbrella.
- Central government **reimburses security expenses** in LWE-affected districts.

2. **SAMADHAN Strategy:**

A comprehensive 8-point approach:

- **Smart Leadership**
- **Aggressive Strategy**
- **Motivation and Training**
- **Actionable Intelligence**
- **Dashboard-based KPIs & KRAs**
- **Harnessing Technology**
- **Action Plans for Each Theatre**
- **No Access to Financing**

3. **Fortified Police Stations: 612 police stations constructed** in vulnerable districts over the past decade.
4. **Aspirational Districts Programme: 35 LWE-affected districts** included for **focused development monitoring** under Ministry of Home Affairs.
5. **Special Central Assistance (SCA):**
   - **30 crore** annually for the most affected districts.
   - **10 crore** for **Districts of Concern** to bridge **infrastructure and development gaps**.

The Way Ahead:

1. **Community Participation**
   - Implement **confidence-building initiatives**.
   - Strengthen **tribal governance** and **grassroots institutions**.
2. **Education & Employment:** Offer **vocational training, job opportunities**, and **educational access** to youth in remote areas.
3. **Tech-Driven Security:** Leverage **modern surveillance, communication**, and **intelligence tools** to monitor and counter threats efficiently.

Conclusion:

The Government of India is committed to achieving a **Naxalism-free India** by **31st March 2026**, recognizing extremism as a **major obstacle to tribal and rural development**.

The success of **Naxalmukt Bharat Abhiyan** lies in a balanced approach that **combines strong security measures** with **inclusive development**. With **political determination**, **administrative efficiency**, and **community engagement**, a **peaceful and prosperous future** free from **Left-Wing Extremism** is not only possible—it is within reach.

GS Paper 2 – International Relation

India–Italy: Strengthening Strategic Ties for a Future-Ready Partnership

Context: The **Deputy Prime Minister of Italy, Antonio Tajani**, visited India with the aim of boosting **bilateral cooperation** and expanding engagement across key sectors like **trade, defence, clean energy**, and **technology**.

Deepening Bilateral Cooperation:

The dialogue between the two nations emphasized:

- Strengthening ties under the **India–Middle East–Europe Economic Corridor (IMEEC)**
- Advancing the **Joint Strategic Action Plan (JSAP) 2025–29**
- Building on the momentum of the **2023 Strategic Partnership**

India–Italy Relations: An Overview

Historical Ties:

- Italy's ancient **port cities** were vital points in the **spice trade route**, linking **India to the Mediterranean**.
- **Marco Polo's 13th-century journey** to India stands as a testament to early cultural and commercial links.

Diplomatic Milestones:

- **Diplomatic relations established in 1947**, grounded in shared values and civilizational heritage.
- In **2023**, the relationship was elevated to a **Strategic Partnership**.
- The launch of the **Joint Strategic Action Plan (2025–29)** in 2024 aims to consolidate and expand collaboration.

Economic and Trade Cooperation:

- **Bilateral trade** reached **$13.22 billion** in 2023–24.
- India exported goods worth **$7.94 billion** to Italy.
- **Italy is India's 4th largest trading partner** in the EU and ranked **17th in FDI inflows** from 2000 to 2023.

Defence and Maritime Collaboration:

- **INS Sumedha** and **ITS Morosini** conducted a **PASSEX exercise** near Sardinia in 2023.
- Italy's navy participated in **MILAN 2024**, India's premier multinational naval exercise.
- Defence collaboration is gaining momentum amid shared interests in maritime security and Indo-Pacific stability.

Multilateral and Green Convergence:

- Italy is an active participant in:
  - **International Solar Alliance (ISA)**
  - **Global Biofuel Alliance (GBA)**
  - **India–Middle East–Europe Economic Corridor (IMEEC)**

These initiatives reflect a shared commitment to **climate action** and **sustainable development**.

Cultural Diplomacy and People-to-People Ties:

- **Cultural exchange** thrives through food, fashion, yoga, and design.
- The **Executive Programme on Cultural Cooperation (2023–27)** promotes art, heritage, and educational ties.
- Around **200,000 Indians** live in Italy, fostering deeper social and economic links.
- The **Migration and Mobility Partnership Agreement (2023)** enables smoother migration for workers, professionals, and students.

Challenges in the Bilateral Relationship:

1. Trade and Regulatory Hurdles: Non-tariff barriers, **regulatory bottlenecks**, and **logistical constraints** limit potential trade growth.

2. The Italian Marines Case (2012): A diplomatic flashpoint that temporarily strained defence cooperation and tested legal frameworks.

3. Divergent Defence Policies: Italy's military exports to Pakistan raise concerns for India, impacting strategic trust.

Way Forward: A Roadmap for Enhanced Engagement

1. **Effective Implementation of JSAP 2025–29**: Prioritize **trade, innovation, education, defence**, and **sustainability**.
2. **Foster Innovation Ecosystems:** Set up **joint incubation centres** and **technology parks** in AI, space, green energy, and biotech.
3. **Streamline Investment Norms:** Reform **FDI policies** and **regulatory frameworks** to encourage mutual investments.
4. **Sectoral Diversification:**
    - Explore collaborations in:
        - **Fashion and luxury goods**
        - **Pharmaceuticals and food processing**
        - **Green technology and tourism**
        - **Advanced manufacturing**

Scientific and Technological Synergy:

During the **Italy–India Business, Science, and Technology Forum**, both sides emphasized:

- Cooperation in **AI**, **supercomputing**, **space technology**, and **defence innovation**.
- Exploring synergy in **fashion, clean energy**, and **digital transformation**.

Conclusion:

India and Italy are charting a new path toward a **Comprehensive Strategic Partnership**, rooted in **shared values, mutual interests**, and **global challenges**. By leveraging their strengths in **innovation, culture, trade, and sustainability**, the two nations are well-positioned to become **pillars of cooperation** in a multipolar world.

GS Paper 3 – Environmental Degradation

Reviving Roots: Preserving Traditional Seed Varieties for a Sustainable Future

Context: In the aftermath of the **Green Revolution** and the expansion of **modern agricultural practices**, **traditional seed varieties** are rapidly vanishing. These native seeds, which once thrived in diverse ecological and cultural settings, are now being replaced by **high-yielding hybrid varieties**.

What are Traditional Seeds?

Also known as **indigenous** or **heirloom seeds**, these are naturally evolved over generations and passed down through farming communities. Their unique features include:

- **Open-pollinated** and reusable by farmers
- Rich in **genetic diversity**
- Well-adapted to **local climatic and soil conditions**
- Deeply **rooted in traditional knowledge systems and culture**

Benefits of Traditional Seeds:

1. **Climate Resilience:**
   - Naturally **tolerant to droughts, floods**, and **extreme weather conditions**
   - Require **less irrigation** and fewer chemical inputs
2. **Biodiversity Conservation:** Help preserve **agro-biodiversity**, which is essential for **ecosystem health** and **future crop improvement**
3. **Nutritional Value:** Traditional grains like **millets and pulses** are rich in **fiber, protein**, and **micronutrients**, offering healthier alternatives to polished grains
4. **Economic Sustainability:**
   - Lower **input costs** due to **seed saving practices**
   - Reduce dependency on **commercial seed markets and agrochemicals**
5. **Cultural & Heritage Significance:**
   - Integral to **local festivals, rituals**, and **culinary traditions**
   - Example: **Navara rice** from Kerala, used in **Ayurvedic medicine** and temple offerings

Why Are Traditional Seeds Declining?

1. Policy Prioritization of HYVs:

- The **Green Revolution** emphasized high-yielding varieties (HYVs) of wheat and rice
- **Government incentives, MSP**, and procurement programs mainly support HYVs

2. Market and Consumer Bias:

- Public distribution systems and urban markets focus on **polished grains**
- **Low consumer awareness** limits demand for indigenous varieties

3. Weak Institutional Support:

- Limited presence of **community seed banks** and conservation efforts

- Inadequate **research and development** for traditional seed improvement

4. Commercialization of Agriculture:

- Rise of **agribusinesses** and input-heavy farming has pushed **GM and hybrid seeds**
- Mechanization and intensive input use have **displaced low-input traditional practices**

Key Initiatives and Success Stories:

1. **Odisha Millet Mission:**
   - Focuses on **reviving millets** in tribal districts
   - Ensures **nutritional security**, **market access**, and **farmer empowerment**
2. **Community Seed Banks:**
   - Active in **Andhra Pradesh, Odisha, and Karnataka**
   - Facilitate **seed conservation**, **exchange**, and **revival of native crops**
3. **M.S. Swaminathan Research Foundation:** The **Tribal Agrobiodiversity Centre in Jeypore**, Odisha conserves over **1,200 rice varieties**
4. **Global Contributions: FAO** and **Bioversity International** lead efforts to **document and protect agricultural biodiversity**
5. **Paramparagat Krishi Vikas Yojana (PKVY):** Promotes **organic farming** based on **traditional seed systems** and **local wisdom**

The Road Ahead:

1. Policy Shift:

- Integrate traditional grains into **MSP**, **PDS**, and **midday meal schemes**
- Include **climate-resilient crops** in the **National Food Security Mission**

2. Strengthen Seed Sovereignty:

- Scale up **community seed banks** and **regional conservation hubs**
- Encourage **Participatory Plant Breeding (PPB)** involving **farmers and scientists**

3. Branding & Market Access:

- Launch **awareness campaigns** promoting health and environmental benefits
- Promote **GI tags**, **organic certification**, and **online marketplaces** for indigenous crops

4. Education and Research:

- Revamp **agricultural education** to include **traditional ecological knowledge**
- Allocate **research funding** for improving **yields and resilience** of native varieties

Conclusion: Saving traditional seeds is not just about preserving the past—it's about **securing the future**. These seeds embody **resilience, nutrition, and sustainability**, offering solutions to climate challenges and food security. A holistic approach blending **policy, community participation, innovation**, and **awareness** can bring traditional seeds back to the heart of India's agricultural landscape.

GS Paper 3 – Environment, Ecology, and Biodiversity

Phawngpui National Park: Jewel of the Blue Mountains

Context: In a concerning development, **forest fires** have recently ravaged parts of **Phawngpui National Park** in Mizoram, impacting **nearly one-ninth of the park's total area**. According to state forest officials, the fires have posed a serious threat to the region's rich biodiversity and ecological balance. Rapid response efforts are underway to control the damage and prevent further destruction.

About Phawngpui National Park:

Also known as the **Blue Mountain National Park**, **Phawngpui** is a breathtaking natural sanctuary nestled in the **southeastern corner of Mizoram**, close to the **India-Myanmar border**. With its stunning elevation of **2,157 meters above sea level**, it is the **highest peak in Mizoram**, offering panoramic views of the **Chhimtuipui River** and distant **Myanmar hill ranges**.

Size and Significance:

- **Area**: 50 sq. km
- **Cultural Importance**: Regarded as a **sacred site** by the **Mizo community**, who believe it is inhabited by the **spirits of their ancestors**.
- Often shrouded in mist, the park **appears blue from afar**, lending it its poetic name.

Rich Flora: A Montane Marvel

Phawngpui is a treasure trove of **Montane Subtropical forests**, featuring:

- **Lush oak and rhododendron forests**
- Rare and endemic species of **bamboo**
- Picturesque grassy glades adding to its scenic beauty

Incredible Fauna: A Wildlife Haven

The park supports a remarkable array of wildlife, including:

- **Birds**:
  - **Blyth's Tragopan** (rare)
  - **Dark-rumped Swift**
  - **Mrs. Hume's Pheasant** – the **state bird of Mizoram**
- **Mammals**:
  - **Endangered species** such as the **Slow Loris**, **Tiger**, and **Leopard**
  - **Leopard Cat**, **Serow**, **Goral**, **Asiatic Black Bear**
  - **Primates** like the **Stump-tailed Macaque** and **Capped Langur**

Did You Know? – Fascinating Facts

- **Phawngpui** is part of the **Indo-Burma Biodiversity Hotspot**, one of the most biologically rich but threatened ecosystems in the world.
- The park is a hotspot for **birdwatchers**, particularly during the migratory season.

- It falls under the **Eastern Himalaya Endemic Bird Area**, attracting ornithologists from across the globe.
- The region's high-altitude climate and varied elevation provide unique microhabitats for flora and fauna.

Call to Action:

With climate change and human activity increasing the frequency of **forest fires**, it's crucial to support **conservation efforts** and promote **sustainable tourism** to protect this ecological and cultural treasure.

GS Paper 3 – Environment & Ecology

Rediscovery of a Living Fossil: Typhloperipatus williamsoni

Context: A team of scientists has **rediscovered** a rare and ancient species of **velvet worm**, *Typhloperipatus williamsoni*, after a gap of **111 years**. This remarkable finding took place in the **Siang Valley** of **Arunachal Pradesh**, India — the very region where it was first documented over a century ago.

About Typhloperipatus williamsoni:

- Belonging to the phylum **Onychophora**, this velvet worm is considered one of the **oldest living fossils** on Earth.
- Onychophorans have existed for over **350 million years**, surviving numerous mass extinction events — including the one that wiped out the dinosaurs.
- The group is extremely rare today, consisting of only **two families** and fewer than **200 species** globally.
- *T. williamsoni* was first collected in **December 1911** during the **Abor Expedition** led by **Stanley Kemp**, then superintendent of the **Indian Museum, Calcutta**.

A Unique Evolutionary Puzzle:

Recent **molecular analysis** reveals that *T. williamsoni* and its relatives in **South Asia** diverged from their **Neotropical (Central and South American)** and **African** cousins around **237 million years ago**. This suggests an ancient **Gondwanan lineage**.

What's truly fascinating is that unlike many invertebrates from **India and Southeast Asia**, which typically show close ties to **Australian species**, the **Asian onychophorans** — like *T. williamsoni* — have **no known relatives in Australia**. This makes them a **rare biogeographical anomaly** and a key subject for studying **continental drift** and **evolutionary isolation**.

What Makes Velvet Worms So Special?

- Velvet worms are **soft-bodied**, **segmented invertebrates** that hunt using a **slimy adhesive** they shoot to entangle prey.
- They bridge the evolutionary gap between **arthropods** (like insects and crustaceans) and **annelids** (like earthworms).
- They breathe through **spiracles** but cannot regulate water loss — making them highly sensitive to **humidity** and **microclimatic changes**.
- Their survival across ages speaks to their **adaptability** and the unique ecological **niches** they inhabit.

Conservation and Scientific Importance:

The rediscovery of *Typhloperipatus williamsoni* not only adds to the biodiversity records of **India's Northeast** but also highlights the **urgent need for conservation** in **biodiversity hotspots** like Arunachal Pradesh.

It stands as a reminder that **many ancient lifeforms** may still be hiding in Earth's unexplored corners — waiting to reshape our understanding of **evolution**, **ecology**, and **continental history**.

GS Paper 3 – Science and Technology

Saras Mk2: India's Indigenous Civil Aviation Leap

Context: The **Saras Mk2**, India's ambitious push into the civilian aviation sector, is gearing up for its **first test flight in December 2027**, as confirmed by the **Director of CSIR-National Aerospace Laboratories (CSIR-NAL)**. This marks a significant milestone for India's domestic aerospace capabilities.

Overview: India's First Light Civil Transport Aircraft

- **Saras Mk2** is a **19-seater**, **multi-purpose light transport aircraft** designed for **civilian use**.
- It is being developed by **National Aerospace Laboratories (NAL), Bengaluru**, under the **Council of Scientific and Industrial Research (CSIR)**.
- The aircraft is an **upgraded version of the earlier Saras Mk1**, which laid the foundation for this advanced model.
- Saras Mk2 is **India's first indigenously developed civilian aircraft** in its category.

Key Features & Capabilities:

- **Weight Class**: 7.5 tons
- **Passenger Capacity**: Up to **19 passengers**
- **Maximum Range**:
  - **775 km** with full capacity (19 passengers)
  - **2450 km** with reduced load (7 passengers)
- **Endurance**: **6 hours** of continuous flight
- **Service Ceiling**: **29,000 feet**
- **Cruise Speed**: **500 kmph**
- **Stall Speed**: **185 kmph**
- **Take-Off Distance**: **790 meters**
- **Landing Distance**: **740 meters**
- **Engines**: Powered by **2 Pratt & Whitney Canada PT6A-67A turboprop engines**, known for reliability and performance

Versatile Applications:

Saras Mk2 isn't just a passenger aircraft. Its **multi-role design** allows it to be configured for:

- **Medical evacuation (air ambulance)**
- **Disaster relief and emergency response**
- **Short-haul regional connectivity**, especially between **Tier-1 and Tier-2/Tier-3 cities**
- **Cargo transport and logistics support** in remote or underserved areas

Why Saras Mk2 Matters for India:

- **Boosts Indigenous Manufacturing**: Aligns with the **Make in India** and **Atmanirbhar Bharat** initiatives.
- **Improves Regional Air Connectivity**: Supports **UDAN (Ude Desh ka Aam Nagrik)** scheme to make air travel affordable and widespread.
- **Strengthens Civil Aviation Sector**: Reduces dependency on imported aircraft for regional operations.
- **Economic Growth Catalyst**: Facilitates trade, healthcare access, and disaster management in remote regions.

Did You Know?

- The **PT6A engine** used in Saras Mk2 powers more than **130 different aircraft types worldwide** and has logged over **400 million flight hours**, showcasing exceptional dependability.
- The original Saras Mk1 program faced challenges but was **revived with renewed vigor** post-2016 under a redesigned configuration and stricter safety protocols.

Looking Ahead:

As India continues to assert its technological capabilities in aviation, the **Saras Mk2** stands as a **symbol of innovation, resilience, and engineering excellence**. If all goes according to plan, **by the end of the decade**, we could see this indigenous aircraft **serving remote corners of the country and beyond**.

GS Paper 3 – Disaster Management

Ramgarh Lake: Reviving Jaipur's Historic Water Legacy

Context: The **revival of the iconic Ramgarh Lake**, once the primary **water source for Jaipur**, has officially begun. Located near the **Jamwa Ramgarh subdivision** in Rajasthan's capital district, the lake is being rejuvenated to restore its ecological, cultural, and historical significance.

Location & Historical Background:

- **Ramgarh Lake** is situated **32 km northeast of Jaipur**, in the **Jamwa Ramgarh** region of Rajasthan.
- This **man-made reservoir** was constructed in **1876** by the then ruler **Sawai Ram Singh II** to address the region's growing water needs.
- Spanning an area of around **15.5 sq. km**, the lake stretches **4 km in length** and **2 km in width**, making it one of the largest water bodies near Jaipur during its prime.

A Lost Lifeline:

- In earlier times, **Ramgarh Lake was the main source of drinking water for Jaipur**.
- It was naturally replenished by four rivers — **Roda, Banganga, Tala**, and **Madhoveni** — which flowed from the surrounding Aravalli hills.
- Due to extensive **deforestation, encroachments**, and **illegal mining** in the catchment area, these rivers have **dried up**, leading to the lake's desiccation over the years.

A Sanctuary for Nature:

- The **forests surrounding Ramgarh Lake** are home to a variety of **wildlife species** including **Nilgai, Chital, and lions**.
- Recognizing its ecological value, the area was **declared a Wildlife Sanctuary in 1982** by the Government of India.
- The lush ecosystem makes it a vital habitat for biodiversity and a potential hotspot for **eco-tourism and conservation efforts**.

Sporting & Cultural Significance:

- **Ramgarh Lake once hosted the rowing event** during the prestigious **1982 Asian Games**, marking its place in India's sporting history.
- Nestled between the lake and the **Aravalli Hills**, the **Ramgarh Polo Ground** is considered **one of the finest polo grounds in India**, adding a royal touch to its legacy.
- Nearby lies the **Jamwa Mata Temple**, a revered shrine located just below the lake, drawing both spiritual seekers and tourists alike.

Looking to the Future:

With the ongoing **revival project**, authorities aim to:

- **Rejuvenate the catchment area** through afforestation and conservation
- **Restore natural inflow** by rehabilitating the feeder rivers
- **Promote sustainable tourism** around the lake and sanctuary
- **Preserve historical and cultural assets**, including temples and sports grounds

Did You Know?

- The lake's embankment, crafted in the **19th century**, is an engineering marvel made without modern machinery.
- If successfully restored, **Ramgarh Lake** could significantly **boost Jaipur's groundwater table** and act as a **climate resilience buffer** during dry spells.

Ramgarh Lake: A Symbol of Heritage and Hope

As work continues to breathe life back into this historic gem, **Ramgarh Lake stands as a reminder** of our intertwined relationship with nature, culture, and sustainable development. It is not just a water body—it is a **living chapter of Jaipur's history** and a beacon for **ecological renewal**.

GS Paper 2 – International Relation

US-Iran Nuclear Talks 2025: Strategic Shifts, Challenges, and the Trump Factor

Context: The **resumption of nuclear negotiations** between the **United States and Iran**—this time in **Muscat, Oman**—has caught many observers by surprise. Despite deep-seated **mutual distrust** and heightened tensions, including recent **US strikes against Iran-aligned Houthis**, both parties chose diplomacy over escalation.

While the talks are **officially "indirect"**, the very act of returning to the table marks a **strategic recalibration**, especially on Iran's side. This new chapter may indicate the beginning of a **more pragmatic phase** in a historically volatile relationship.

Iran's Strategic Realignment: A Nation Under Pressure

Generational Shift in Iranian Society:

With the **average age in Iran now around 32**, most citizens were **not alive during** the 1979 Islamic Revolution, the **Iran-Iraq War**, or the 1989 **succession of Ayatollah Khamenei**. This generational gap has created a **disconnect between rulers and the ruled**.

Younger Iranians are:

- **Less ideologically driven**
- Focused on **economic opportunity**, civil liberties, and global integration
- Driving **protests and reform movements**, often met with state suppression

This youth-led demand for **change** is exerting pressure on Iran's leadership to **rethink its long-held policies**.

Economic Distress and Sanctions Fatigue:

The Iranian economy remains crippled by:

- **High inflation and unemployment**
- Currency devaluation
- A need for **$100+ billion in foreign investment** for sustainable growth

Even leaders previously skeptical of the West, like **Supreme Leader Khamenei**, are now reportedly **open to US investment**—a major policy shift. Reform-minded President **Masoud Pezeshkian** and seasoned diplomat **Abbas Araghchi** support re-engagement with the global economy.

Internal Political Alignment:

Remarkably, even **hardline conservatives** are not blocking talks, reflecting a rare **political consensus** around the need for diplomacy. Reformists are leveraging the economic crisis to promote a **revival of the nuclear deal**.

Regional and Global Dynamics:

- The once-feared **Axis of Resistance** (Iran's proxy network) has lost its cohesion.
- **Saudi Arabia and Gulf states**, once opposed to the 2015 JCPOA, now favor **regional cooperation** and **economic integration**.
- **Russia**, preoccupied with Ukraine and wary of instability, is quietly pushing Iran toward **diplomatic solutions**.

- **China**, a key trade partner, has also urged Iran to **stabilize regional relations** for economic reasons.

Trump's Role: From Maximum Pressure to Strategic Leverage

A Tumultuous History of US-Iran Negotiations:

Iran's nuclear diplomacy began with the **E3 (UK, France, Germany)** in 2003, eventually including the **US in 2013**. Talks have often been influenced by **military threats** and shifting American administrations.

Fallout from Trump's 2018 Withdrawal

In 2018, **President Trump unilaterally exited** the Joint Comprehensive Plan of Action (JCPOA) and re-imposed crippling sanctions. This hardened Iran's position, leading to:

- **Uranium enrichment reaching 60%**, edging closer to weapons-grade
- Khamenei's "**no war, no talks**" doctrine
- Deep skepticism about future US commitments

The Soleimani Assassination: A Turning Point

The **US drone strike on Qassem Soleimani** in January 2020 shocked Iran's leadership, reinforcing the perception that the **Trump administration favored force over diplomacy**. Trust eroded significantly.

Biden's Cautious Engagement

Under **President Biden**, indirect negotiations resumed (Vienna, 2021–22). However, Iran remained non-committal, wary of another **policy reversal** if Trump returned to power—a concern that now feels prescient in 2025.

Prospects for a New Deal: Opportunities and Obstacles:

Where Interests Align:

Despite tensions, both parties have **overlapping objectives**:

- **Washington** wants to **prevent nuclear weaponization**.
- **Tehran** seeks **sanctions relief** and **economic recovery**.

Iran continues to emphasize that its nuclear program is **peaceful**, citing **Khamenei's religious fatwa against nuclear arms**.

Key Challenges and Red Lines:

The potential **stumbling blocks** include:

- US demands for limits on **ballistic missile programs**
- Iran's support for **regional proxy groups** (e.g., Hezbollah, Houthis)
- **Israeli opposition** to any form of compromise—Tel Aviv has even hinted at **military options**

Trump's Maximalist Strategy Returns:

Trump is known for starting negotiations with **extreme demands**, only to walk them back for strategic gains. This "**art of the deal**" approach could inject volatility, yet also open **paths to compromise**.

There's speculation that the US may not **enforce a rigid stance**, allowing room for **flexible agreements**—possibly involving **tiered sanctions relief** in exchange for **verifiable enrichment limits**.

Iran's Strategic Flexibility:

Iran could:

- Reduce support to less controllable proxies like the **Houthis**, who act independently

- Seek **economic cooperation** with Gulf states, diluting Israeli resistance
- Use regional goodwill to counterbalance any Western skepticism

Role of the Region and the Need for Isolation:

To succeed, negotiations must be **insulated from regional crises** in:

- **Gaza**
- **Syria**
- **Lebanon**

Any escalation in these arenas could **derail talks** and return the US-Iran dynamic to a **conflict trajectory**.

Conclusion: Cautious Optimism Amid Uncertainty

A **renewed US-Iran nuclear deal is within reach**, but it remains **fragile and conditional**. The evolving **generational, economic, and geopolitical landscape** has pushed Iran to the table. Trump's return—and his unpredictability—adds both **opportunity and risk**.

To navigate this complex moment, both sides must:

- Exercise **diplomatic creativity**
- Resist **external provocations**
- Focus on **shared strategic interests**

The stakes are high—not just for Washington and Tehran, but for the **entire Middle East and global non-proliferation regime**.

BatEchoMon: India's First Smart Bat Detection System

Context: In a groundbreaking development, the **Indian Institute for Human Settlements (IIHS)**, Bengaluru, has introduced **India's first automated bat detection and monitoring system — BatEchoMon**. This innovative system is poised to transform the way scientists study **urban bat populations**, allowing for real-time monitoring that once required months of manual effort.

What is BatEchoMon?

BatEchoMon stands for **"Bat Echolocation Monitoring"**, a pioneering initiative that combines **ecology, engineering, and artificial intelligence** to track and identify bat species through their echolocation calls.

This fully **automated, real-time system** was designed by **bat biologist Kadambari Deshpande** and **engineer Vedant Barje**, under the mentorship of **Jagdish Krishnaswamy**. It was developed as a part of the **Long-Term Urban Ecological Observatory** at the **School of Environment and Sustainability**, IIHS, Bengaluru.

How Does BatEchoMon Work?

BatEchoMon uses an intelligent mix of **hardware, software, and machine learning** to autonomously detect and analyze bat activity. Here's what powers it:

Key Components:

- **Ultrasonic Microphone** (modified **AudioMoth**): Captures high-frequency bat calls.
- **Raspberry Pi Microprocessor**: Processes and classifies sound data on-site.
- **Solar-Powered Battery**: Ensures sustainable, off-grid energy supply.
- **Wi-Fi Module**: For remote data transmission and cloud syncing.

Operational Details:

- Activates **automatically at sunset**
- Records **continuously throughout the night**
- Uses a **Convolutional Neural Network (CNN)** to:
    - **Detect bat calls** amid background noise
    - **Classify calls** based on frequency and structure

Outputs and Insights:

- **Spectrograms** (time vs. frequency plots)
- **Audio files** of bat calls
- **Species-specific data** on call timing, density, and behavior patterns

Why is BatEchoMon Important?

Revolutionizing Bat Research:

- Traditionally, bat call analysis was **labor-intensive** and delayed — now, **real-time detection** means faster insights and more efficient conservation.

Urban Biodiversity Monitoring:

With cities expanding rapidly, understanding **how bats adapt to urban environments** is crucial. Bats help control insect populations and pollinate plants, making them vital for **urban ecosystem health**.

A Tech-Driven Conservation Model:

- BatEchoMon is among the few globally that **integrate AI in wildlife monitoring**. It offers a **scalable solution** for developing nations looking to modernize biodiversity tracking without heavy infrastructure.

Looking Ahead: The Future of Bioacoustic Monitoring

The success of BatEchoMon could inspire **similar systems for monitoring birds, frogs, or even marine life**, using acoustic signatures and machine learning.

In addition, data from BatEchoMon can:

- **Support policy-making** in urban planning
- Enhance **biodiversity indexes**
- Enable **citizen science** through open-access bat call libraries

Quick Facts: BatEchoMon at a Glance

Feature	**Details**
Developed by	IIHS, Bengaluru
Core Tech	AudioMoth, Raspberry Pi, CNN algorithm
Power Source	Solar-powered battery
Function	Autonomous bat call detection and classification
Outputs	Spectrograms, audio files, statistical reports
Significance	India's first real-time bat monitoring system

Conclusion: A New Era for Indian Bat Science

BatEchoMon is not just a scientific tool — it's a leap toward **modern, AI-integrated wildlife conservation**. With rising interest in **bioacoustics** and **urban ecology**, this system places India at the forefront of **smart environmental monitoring**.

It also sets the stage for **collaborative, tech-enabled conservation strategies** in an increasingly urbanized world.

GS Paper 2 – Governance, Constitution, Polity, Social Justice

Mehul Choksi Arrested in Belgium: India Moves for Extradition in 13,500 Crore PNB Scam

Context: Mehul Choksi, a key figure in the massive **13,500 crore Punjab National Bank (PNB) fraud**, has been **arrested in Belgium**. India has officially **requested his extradition** to face charges. Choksi, who had been a **citizen of Antigua and Barbuda since 2018**, relocated to Belgium last year citing **cancer treatment**.

What's Next for Choksi?

India-Belgium Extradition Treaty:

India and Belgium share a long-standing **extradition treaty (since 1901)** based on the principle of **dual criminality**—the offence must be punishable in both nations. However, **political offences or claims of persecution** are exempt.

Legal Timeline:

India must **submit substantial evidence** within **two months**, or Belgium may be forced to **release Choksi**.

Agencies on the Case:

- Choksi's arrest was driven by coordinated efforts from the **CBI (Central Bureau of Investigation)** and the **ED (Enforcement Directorate)**. Both agencies are preparing a detailed case that aligns with **Belgian legal requirements**.

Mutual Legal Assistance Treaty:

- A **2020 Mutual Legal Assistance Treaty** between India and Belgium is expected to **ease cooperation** in legal procedures, including extradition.

Potential Legal Hurdles for India:

2021 Dominica Abduction Controversy:

- Choksi's legal team is likely to bring up the **alleged 2021 abduction** from Antigua to Dominica. Photos revealed him **bruised and injured**, raising **serious human rights concerns**.

Claims of Coerced Consent:

- His lawyers allege that he was **forced to sign** a return consent form under duress—an effort to **bypass Antigua's legal safeguards**. His **UK-based lawyer** maintains that this violated his **fundamental rights**.

Interpol's Red Corner Notice Withdrawal:

- In 2023, **Interpol revoked its Red Corner Notice** against Choksi, citing the **Dominica incident** and a **potentially unfair trial** in India.

Health and Prison Conditions:

- Choksi is expected to argue that **poor health**, **inadequate prison conditions**, and **possible human rights violations** in India render extradition **unsafe and unjust**.

Citizenship Concerns:

- Although arrested in Belgium, Choksi's **Antiguan citizenship** could pose complications. His legal team may argue that **Belgium must consult Antigua** before approving extradition to a **third country**.

Criminal Allegations Against Mehul Choksi:

Gitanjali Group Expansion:

- Coming from a family of **diamantaires**, Choksi expanded the **Gitanjali Group**, launching luxury jewellery outlets in India and overseas. He and his nephew, **Nirav Modi**, also invested heavily in **celebrity endorsements**, featuring stars like **Kate Winslet** and **Rosie Huntington-Whiteley**.

PNB Scam Modus Operandi:

- Between **2014 and 2017**, Choksi and Modi allegedly worked with **corrupt PNB officials** to issue fraudulent **Letters of Undertaking (LoUs)**. These LoUs were used to **obtain overseas credit** to fund their operations and luxury lifestyles.

Loan Defaults & Scam Discovery:

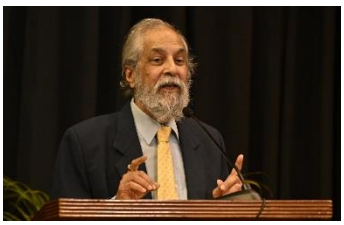
- The LoUs were repeatedly **rolled over** beyond the legal 90-day repayment window. Eventually, the **ballooning debt** led PNB to uncover the fraud and approach the **CBI**—by which time both men had fled India.

Fraud Scale & Fake Assets:

- Choksi is accused of defrauding PNB of **6,000+ crore**. The **ED seized assets** worth over **5,000 crore**, though lab tests revealed that many **diamonds were fake**. The total **current value** of his seized assets is estimated at **2,500 crore**.

GS Paper 2 – Governance, Constitution, Polity, Social Justice

India's Prison Conditions Threaten Global Extradition Efforts, Warns Justice Lokur



Context: India's deteriorating **prison infrastructure** is emerging as a major roadblock in its international **extradition efforts**, especially for high-profile economic fugitives. Former Supreme Court Judge **Justice Madan B. Lokur** has raised critical concerns about the **human rights standards** in Indian jails and their impact on the country's **legal credibility** abroad.

Alarming Warnings from Justice Lokur:

- At the launch of the **India Justice Report 2025**, Justice Lokur, currently serving as Chair of the **UN Internal Justice Council**, highlighted that unless India improves its **custodial conditions**, extraditions from nations like the **UK, Canada, and European Union countries** will continue to be denied on **humanitarian grounds**.

Background: India's Pursuit of Fugitives:

- India has been actively seeking the return of several economic offenders, such as **Mehul Choksi**, **Nirav Modi**, and **Vijay Mallya**, accused of large-scale financial fraud. However, these efforts are increasingly hampered by **international courts' reluctance** to send individuals back to what they view as **inhumane prison conditions**.

A UK Court's Blow to India's Case:

A pivotal moment came when a **UK appellate court refused** to extradite **Sanjay Bhandari**, a defence consultant facing charges of **tax evasion and money laundering**. The court cited **Tihar Jail's substandard conditions** and India's **failure to provide credible assurances** regarding prisoner welfare.

"This verdict sets a **troubling precedent**, affecting over **100 pending extradition cases**," warned Justice Lokur.

Disturbing Incidents from Indian Prisons:

Recent episodes have intensified global scrutiny:

- **Tillu Tajpuria**, a Tihar inmate, was **beaten to death on CCTV** while guards stood by.
- **Christian Michel**, linked to the AgustaWestland scam, refused bail, preferring jail over **restrictive bail conditions**.
- **Jagtar Singh Johal** and **Ankit Gujjar** both **died in custody**, raising serious questions about **oversight and accountability**.

India Justice Report 2025: Eye-Opening Insights:

This year's report provides a **data-rich snapshot** of systemic failures in India's justice machinery:

Police Force

- Only **1 civil police officer per 831 citizens**.
- **17% of police stations** lack **CCTV** monitoring.
- **30% lack women's help desks**.
- **No State/UT meets its women recruitment quotas**.

Prison System:

- **Uttar Pradesh** leads in **overcrowded prisons**.

- **91% of Delhi's jail inmates** are **undertrials**, reflecting **severe delays in justice**.
- **Mental health support** is nearly non-existent in many facilities.

Judiciary and Legal Aid:

- In **Bihar**, **71% of cases** in lower courts are pending for over **three years**.
- **Per capita spending**:
    - Judiciary: 182
    - Prisons: 57
    - Legal Aid: **6**
- **No State** allocates more than **1% of its total budget** to the judiciary.

Global Human Rights Standards Pose a Challenge:

Courts in **Europe and North America**, bound by **strict human rights charters** (e.g., **European Convention on Human Rights**, **Canadian Charter of Rights and Freedoms**), are unlikely to allow extraditions to India unless **tangible reforms** are demonstrated in:

- **Prison infrastructure** (clean water, health facilities, and hygiene),
- **Surveillance systems** (functional CCTV and real-time oversight),
- **Prison staff accountability** and **training** in rights-based detention practices.

Comparative Insight: How India Ranks Globally:

- As per **World Prison Brief**, India ranks **5th** globally in terms of **prison population**, yet allocates **far less per prisoner** than nations like the **UK, Germany, or South Africa**.
- The **UN Standard Minimum Rules for the Treatment of Prisoners** (also known as the **Nelson Mandela Rules**) continue to be **routinely violated** in India.

Conclusion: A Call for Urgent Reform

India's **democratic reputation** and its **position in international law forums** are at risk due to the persistent **neglect of custodial conditions**. As Justice Lokur emphasized, **legal strength** alone is not enough — **humane delivery of justice** is equally vital.

Without immediate reform in **prison management**, **judicial delays**, and **rights protections**, India's **extradition requests will falter**, and its **international legal standing** will face continued erosion.

GS Paper 3 – Agriculture, Economic Development

Indian Agriculture to 2047: Pathways to a Sustainable and Resilient Future

Context: The policy paper titled **"Indian Agriculture to 2047"**, released by the **ICAR–National Institute of Agricultural Economics and Policy Research (ICAR-NIAP)**, presents a long-term vision for transforming India's **agri-food system**. This comprehensive analysis reflects on the **six-decade evolution** of Indian agriculture while offering a roadmap to address future challenges and opportunities.

From Food Scarcity to Food Surplus: A Structural Shift

A Green Revolution Legacy:

Over the past 60 years, India has shifted from a **food-insecure nation** to a **food-surplus economy**, thanks to innovations such as the **Green Revolution**, along with **input subsidies** and **minimum support price (MSP)** mechanisms.

Economic Transformation:

- The **contribution of agriculture** to **national income** has reduced from **43% in the 1960s to 18%** today.
- However, the **agricultural workforce** has declined at a much slower pace, from **74% to 46%**, indicating a need for **rural employment diversification**.

Land Fragmentation:

- **Marginal holdings (≤1 hectare)** have grown from **51% to 68%** of total landholdings.
- The **average farm size** has shrunk from **2.28 hectares to 1.08 hectares**, making **economies of scale** harder to achieve.

Diversification of Agriculture:

- The contribution of **animal husbandry** to agricultural **Gross Value Added (GVA)** rose to **31%** in 2022–23.
- **Fisheries** now account for **7%**, reflecting a trend toward **multi-sector agri-based livelihoods**.

Key Challenges to Agri-Food System Transformation:

Despite notable progress, India's agri-food system faces **critical structural and environmental constraints**:

1. **Shrinking Agricultural Land:** Rapid **urbanization**, **industrialization**, and **population growth** are steadily eroding **arable land**, leading to competition between food production and urban infrastructure.
2. **Imbalanced Fertilizer Usage:**
   - Excessive use of **urea** due to **subsidy distortions** has led to **soil nutrient depletion**.
   - Low **nutrient-use efficiency** and **regional disparities** in fertilizer use affect both **yields** and **environmental health**.
3. **Water Stress**
   - **Groundwater over-extraction**, especially in the northwestern states, is unsustainable.
   - **Inefficient irrigation systems** and poor **water governance** have made agriculture highly **vulnerable to water scarcity**.
4. **Climate Change Impacts:**

- **Extreme weather events** such as droughts, floods, and heatwaves have caused a **25% decline in productivity growth**.
- **Rainfed areas**, which constitute over **50% of cultivated land**, are most at risk.

5. **Market and Policy Bottlenecks:**
   - A **cereal-centric policy approach** has skewed production patterns.
   - **Poor market access**, **weak value chains**, and **limited rural credit** remain major barriers for farmers.

Recommendations for a Sustainable Agri-Food System:

To future-proof Indian agriculture by 2047, the report offers a suite of forward-looking reforms:

1. Water Resource Management:

- Promote **rainwater harvesting**, **groundwater recharge**, and **micro-irrigation** (e.g., **drip and sprinkler systems**) for efficient water use.
- Encourage **crop diversification** towards **less water-intensive crops** like **millets** and **pulses**.

2. Energy and Input Reforms:

- **Gradually phase out electricity subsidies** to reduce over-pumping of water.
- Promote **nano fertilizers**, which increase nutrient efficiency and reduce environmental impact.
- Encourage **integrated nutrient and pest management**, **intercropping**, and **crop rotation**.

3. Research and Innovation:

- Increase investments in **agricultural R&D**, particularly in **climate-resilient crops**, **precision farming**, and **digital agriculture**.
- Scale up the use of **AI, drones, and IoT-based solutions** to improve farm productivity and decision-making.

4. Market and Price Policy Reforms:

- Strengthen **agricultural market infrastructure**, including **cold chains**, **warehousing**, and **logistics**.
- Reform **MSP policy** to make it **crop-neutral** and **region-sensitive**.
- Support **Farmer Producer Organizations (FPOs)** to improve **bargaining power and value addition**.

Additional Insights: Global Best Practices for India:

India can draw lessons from:

- **Israel's water management**, where over **80% of wastewater** is treated and reused for agriculture.
- **The Netherlands**, a leader in **agri-tech innovation**, despite having limited land.
- **Brazil's integrated agro-industrial model**, which connects smallholder farmers to global value chains.

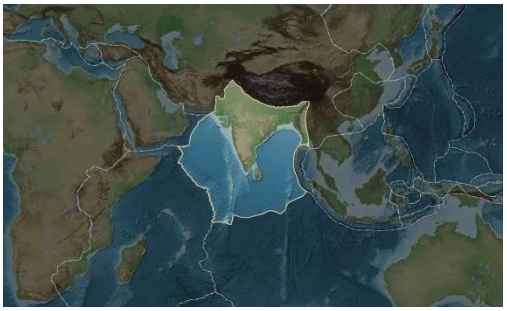
Conclusion: Vision 2047 – Towards Resilience and Prosperity

As India approaches its **centenary of independence**, the transformation of agriculture must move beyond production to focus on **sustainability, inclusivity, and resilience**. The policy roadmap offered by ICAR-NIAP envisions a **farmer-centric, market-oriented**, and **climate-smart** agricultural system.

Empowering smallholders, investing in **technology**, and making **policies more adaptive and responsive** will be critical to ensuring that **Indian agriculture thrives** in the face of 21st-century challenges.

GS Paper 1 – Geography

New Research Suggests the Splitting of the Indian Continental Plate



Context: Recent studies have proposed a **groundbreaking theory** suggesting that the **Indian Continental Plate** may be **splitting apart** as it interacts with the **Eurasian Plate**. This new insight challenges previous understanding and provides a fresh perspective on the geological processes shaping the region.

Understanding the Indian Continental Plate:

The **Indian Plate** is a major **tectonic plate** that interacts with four other significant plates:

- **Eurasian Plate**
- **Arabian Plate**
- **African Plate**
- **Australian Plate**

For over **60 million years**, the **Indian Plate** has been moving **northward**, colliding with the **Eurasian Plate**, leading to the formation of the **Himalayas** and the **Tibetan Plateau**.

Traditional Theories on the Emergence of the Himalayas and Tibetan Plateau:

1. **Underplating Theory:** The traditional explanation for the formation of the **Himalayas** suggests that the **denser Indian lower crust** is forced to slide beneath the **less dense Eurasian crust** as the plates converge. This **underplating** process leads to the upward thrust of material, forming mountain ranges.
2. **Subduction Theory:** In the conventional model of plate tectonics, **subduction** occurs when the denser plate slides beneath the less dense one. However, unlike oceanic plates, **continental plates** like the **Indian Plate** are much thicker and **more buoyant**, making **subduction** unlikely in the traditional sense.

A New Theory: Delamination and Splitting of the Indian Plate

- Recent research suggests a **third possibility** — that the **Indian Plate** is undergoing a process known as **delamination**. In this scenario, the **dense lower section of the plate** may be **peeling away** and sinking deeper into the **Earth's mantle**, causing the plate to split apart as it continues its northward motion beneath the Eurasian Plate.

What is Delamination?

- Delamination is a geological process in which a **tectonic plate's lower, denser section** detaches and sinks into the mantle, possibly leading to **tectonic shifts** and changes in the **structure of the plate** itself. This phenomenon could provide new insights into the **dynamics of plate interactions**.

Implications of the New Theory:

- If this theory holds true, it would have significant implications for our understanding of not only the **Himalayan formation** but also the **tectonic processes** at play in the **Indian subcontinent**. It could also help explain the **seismic activity** and **earthquakes** experienced in the region, as the **Indian Plate** continues to evolve and interact with surrounding plates.

Conclusion: A Changing Landscape of Earth's Tectonics

The possibility of the **Indian Plate** splitting apart introduces a new chapter in the study of **plate tectonics**. This evolving understanding promises to deepen our knowledge of the **geological forces** shaping the **Himalayas**, the **Tibetan Plateau**, and the broader **Indian subcontinent**. As further research unfolds, it could reshape how we view **continental drift**, **mountain formation**, and **plate interactions**.

GS Paper 3 – Science and Technology

Lichens: A Key to Life on Mars

Context: A recent experiment has demonstrated that **lichens** can survive and thrive in **Martian-like conditions**, marking a **significant step** towards understanding life's potential on Mars. This exciting development opens new doors for **space exploration** and the possibility of life beyond Earth.

What Are Lichens?

Lichens are not just one organism but a **symbiotic partnership** between two distinct life forms: a **fungus** and an **alga**. This unique combination creates a highly adaptable organism that can survive in extreme conditions.

Structure of Lichens:

- The **outer skin** and internal structure of a lichen are primarily made up of **fungal hyphae**, which are thread-like structures.
- Inside the fungal network, individual **algae cells** are interspersed, providing energy through **photosynthesis**.

No Roots, No Problem:

Unlike most plants, lichens do not have **roots** or specialized structures for absorbing nutrients from the soil. Instead, they depend on the **atmosphere** for **air** and **water**, which makes them highly sensitive to environmental conditions. This reliance on the atmosphere means that the **quality of the environment** directly impacts the **diversity** and **health** of lichen species.

Lichens on Earth: A Wide Presence

Lichens are incredibly widespread, covering about **6 to 8% of Earth's surface**. There are over **15,000 known species** of lichens, each adapted to thrive in different environments, from **mountain tops** to **desert landscapes**, and even **polar regions**.

Ecological Importance of Lichens:

- **Bioindicators**: Lichens are highly sensitive to **air quality** and **pollution**, making them effective **bioindicators** of environmental health.
- **Survival in Extreme Conditions**: Some species of lichens are capable of withstanding **harsh climates**, extreme temperatures, and limited water, making them an ideal candidate for studying life in other worlds.

Lichens and the Future of Space Exploration:

Lichens' ability to thrive in **extreme environments** like those simulated on Mars suggests that they may play a crucial role in future **space exploration**. Their **resilience** could help researchers understand how life might survive on other planets, especially in places with limited resources, such as **Mars**.

Conclusion: A Step Toward Life Beyond Earth

The discovery that lichens can thrive in Martian-like conditions brings us closer to understanding how life could exist on **Mars**. As scientists continue to study these fascinating organisms, they may hold the key to unlocking the secrets of **life in space** and the potential for **sustaining life on other planets**.

GS Paper 3 – Environmental and Climate Change Policies

World's First Global Carbon Tax on Shipping Industry

Context: In a landmark decision, **India** and **62 other countries** have voted in favor of the world's **first-ever global carbon tax**, which will be imposed on the **shipping industry** by the **United Nations' International Maritime Organization (IMO)**. This bold initiative marks a significant step toward reducing **greenhouse gas emissions** from one of the world's most carbon-intensive industries.

What is a Carbon Tax?

A **carbon tax** is a penalty imposed on businesses or industries that produce excessive **greenhouse gas (GHG) emissions**. It is designed to incentivize companies to lower their carbon footprint and shift toward **greener practices**.

How the Carbon Tax Works:

- **Levying per ton**: The tax is usually calculated based on the **quantity of GHG emissions** produced, often assessed per ton of **carbon dioxide (CO2)** released.
- **Objective**: The primary goal is to encourage companies to adopt **cleaner technologies**, reduce emissions, and move toward **sustainable practices** that benefit both the environment and the economy.
- **Type of Tax**: A **Pigouvian tax**, aimed at correcting the **negative externality** of carbon emissions.

Types of Carbon Taxes:

There are several models for imposing a carbon tax, each suited to different environmental and economic contexts:

1. **Emissions-Based Tax:** This tax is directly levied on the **amount of GHG emissions** produced by an entity, encouraging businesses to reduce their carbon footprint by improving energy efficiency.
2. **Goods-Based Tax:** Applied to **carbon-intensive goods** such as **gasoline, coal**, and other fossil fuels. The tax is linked to the **estimated emissions** associated with the production, transportation, and consumption of these products.
3. **Cap-and-Trade System:** A **market-based approach** where a government sets a **limit (cap)** on total emissions. Companies are allowed to buy, sell, or trade **emission permits** within that cap, creating an economic incentive for lower emissions.
4. **Carbon Tariff (CBAM):** Also known as the **Carbon Border Adjustment Mechanism (CBAM)**, this tax targets **carbon leakage** by imposing an **eco-tariff** on products imported from countries without a **carbon pricing** system. It ensures that international trade does not undermine domestic climate policies.

The International Maritime Organization (IMO):

The **IMO**, a **specialized agency of the United Nations**, plays a key role in regulating the **global shipping industry** and its environmental impact. The IMO's new carbon tax will apply to ships operating internationally, aiming to reduce their contribution to global emissions.

Role of the IMO in Global Climate Goals:

- The IMO is crucial in supporting **UN Sustainable Development Goal 14**: **Conserve and sustainably use the oceans, seas, and marine resources** for sustainable development.
- The IMO's work will be critical in reducing the **carbon footprint** of the **maritime sector**, which accounts for a significant portion of global emissions.

IMO's Structure:

- **Members**: The IMO has **176 member states** and three associate members: **Hong Kong, Macao**, and the **Faroe Islands**.
- **Headquarters**: Located in **London, UK**, the IMO consists of an **assembly** of member states and a **council**, which appoints the **Secretary-General**.

Important IMO Treaties:

- **International Convention for the Safety of Life at Sea (SOLAS)**: Ensures the safety of life at sea through regulations on ship design, operation, and management.
- **International Convention on Standards of Training, Certification, and Watchkeeping for Seafarers (STCW)**: Sets global standards for the training and certification of seafarers.
- **International Convention for the Prevention of Pollution from Ships (MARPOL)**: Aims to reduce pollution from ships, including **oil spills** and **emissions**.

The Global Shipping Industry and Its Environmental Impact:

- The shipping industry is responsible for a substantial share of global carbon emissions. As international trade continues to grow, **shipping accounts for approximately 2-3%** of global **GHG emissions**, making it one of the largest sources of pollution worldwide.

The **carbon tax** imposed by the IMO aims to create a **financial incentive** for the industry to adopt **cleaner fuels**, **energy-efficient technologies**, and **sustainable practices**.

Conclusion: A New Era for Global Climate Action

- The **global carbon tax on shipping** represents a **historic move** towards addressing climate change at a global scale. By targeting one of the most polluting industries, this initiative not only sets a precedent for future environmental taxation but also aligns with global efforts to reduce **greenhouse gas emissions** and limit global warming.

As countries like **India** continue to take **climate leadership**, this policy could serve as a model for tackling emissions in other sectors, contributing to the **global fight against climate change**.

GS Paper 1 – Indian Society

Thangjing Hill: Sacred Summit Amidst Strife

Context: Tensions have escalated in **Manipur** as a **Meitei organization** strongly criticized **Kuki civil society groups** for allegedly threatening Meitei pilgrims against undertaking their **annual religious journey** to **Thangjing Hill**. This age-old pilgrimage, steeped in cultural and spiritual reverence, now finds itself entangled in the region's ongoing **ethnic unrest**.

Geographical Setting of Thangjing Hill:

Thangjing Hill is situated in the **buffer zone** that lies between the **Churachandpur** and **Bishnupur** districts of Manipur.

It rests on a **north–south aligned mountain range**—known locally as the **Thangjing Range** or **Thangjing Hills**—which also serves as a **natural boundary** on the **western edge of the Imphal Valley**.

Legal and Environmental Status:

- The hill range is part of the **Churachandpur-Protected Forest**, declared as such in **1966** under **Section 29** of the **Indian Forest Act, 1927**.
- Additionally, **Thangjing Hill** has been recognized as a **protected historical site** under **Section 4** of the **Manipur Ancient and Historical Monuments and Archaeological Sites and Remains Act, 1976**.

Religious and Cultural Importance:

To the Meitei Community:

Thangjing Hill holds deep spiritual significance for the **Meitei people**, as it is home to the revered **Ibudhou Thangjing Temple**.

It is believed to be the **original abode of Lord Thangjing**, a prominent **ancestral deity** in the **Meitei pantheon** and one of the **four guardian deities of Manipur**.

To the Kuki Community:

Kuki communities, who refer to the area as **"Thangting"**, also consider the hill range to be a **culturally important site**. While the hill is not part of their mainstream religious canon, it lies within **territories inhabited by Kuki tribes**, making it symbolically and politically significant.

Current Dispute: Sacred Ground or Political Battleground?

Since the outbreak of **ethnic clashes in 2023**, **claims over access and rights to worship** at Thangjing Hill have become **highly contentious**.

What was once a **shared or overlapping spiritual space** is now a **flashpoint of ethnic assertion**, where the **right to pilgrimage** is being challenged by issues of **territoriality and identity**.

- The Meitei community insists on **uninterrupted access** to the hill for religious purposes.

- Kuki groups, citing **security concerns** and alleged **land claims**, have opposed such movements, deepening the divide.

A Shared Heritage at Risk:

- The current conflict risks eroding centuries of **cultural coexistence**, as both communities stake symbolic and emotional claims over **Thangjing Hill**.
- Experts stress that **dialogue, trust-building**, and **cultural preservation efforts** are crucial to avoid the hill becoming a symbol of division rather than unity.

Conclusion: Can Sacred Spaces Heal Divided Communities

Thangjing Hill, once a serene symbol of **spirituality**, now stands as a poignant reminder of Manipur's **ethnic fragility**. With its **legal, ecological, and religious importance**, the hill demands **inclusive stewardship**—not just by the communities who revere it, but also by **state authorities, historians**, and **peace advocates** working toward reconciliation in the region.

GS Paper 2 – Governance, Constitution, Polity, Social Justice

Supreme Court Raises Concerns Over Waqf Law Amendments Amid Legal Uproar

Context: In a major judicial intervention, the **Supreme Court of India** has critically examined key provisions of the **Waqf (Amendment) Act, 2025**, currently under challenge through more than **100 petitions**. The amendments have sparked a significant debate over constitutional, religious, and property rights.

Supreme Court's Intervention: A Landmark Judicial Review

A bench led by **Chief Justice Sanjiv Khanna**, along with **Justices P.V. Sanjay Kumar** and **K.V. Viswanathan**, has expressed serious reservations regarding certain provisions in the amended law that may **undermine the traditional waqf framework** in India.

Three Core Issues Flagged in the Waqf (Amendment) Act, 2025:

1. **Denotification of Waqf-by-User Properties:**

The amendment **removes recognition for waqf-by-user properties**, i.e., lands used for **religious or charitable purposes** over centuries without formal registration.

- **Petitioners argue** this change could **strip legal status** from nearly **4 lakh** of the **8 lakh waqf properties** in India.
- The court acknowledged the **historical importance** of such properties, many of which existed **prior to British land registration systems**.

2. **Inclusion of Non-Muslims in Waqf Bodies:**

The Act now permits **non-Muslims to serve** as **ex-officio members** of **Waqf Boards and the Central Waqf Council**.

- The bench questioned whether **religious institutions** should be governed by individuals **outside the faith**.
- Petitioners contend this **violates Article 26** of the Constitution, which guarantees the right of religious communities to **manage their own affairs**.

3. **Collector's Authority to Decide Property Status:**

The amendment empowers the **District Collector** to **determine if a property is waqf or government-owned**.

- The court warned this could **breach due process**, as it allows an **executive authority to act as a judge**, creating a **potential conflict of interest**.

Judicial Observations and Interim Relief Proposal:

While the Supreme Court emphasized its reluctance to stay legislative acts, **CJI Khanna noted this case is an exception**, given its **far-reaching impact**.

Proposed Interim Relief (Not Yet Formally Ordered):

- Properties already **judicially recognized as waqf** (including waqf-by-user) **should not be denotified**.
- Government officials may **inquire into land status**, but **cannot change property designation** without judicial review.
- **Non-Muslim appointments** may continue in Waqf bodies, provided **Muslims remain the majority**.

The court refrained from issuing a formal order as **Solicitor General Tushar Mehta** sought additional time to present the **government's position**. The matter is scheduled for **further hearing**.

Petitioners' Key Concerns:

- **Violation of Religious Freedom**: The amendment allegedly infringes on **Article 26**, eroding the **autonomy of the Muslim community**.
- **Historical Precedent Ignored**: Petitioners stressed that **waqf-by-user** was acknowledged even in the **Ayodhya judgment**.
- **Burden of Proof**: Forcing donors to **"prove" religious usage** is seen as an unjustified intrusion into **faith-based practices**.

Government's Defense:

Representing the Centre, **Solicitor General Mehta** argued:

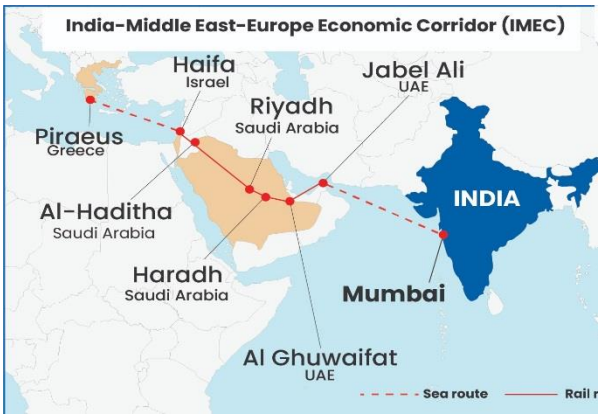
- **Waqf registration has been compulsory** since the **1923 Act**, including waqf-by-user properties.
- **Only two out of 22 members** in waqf bodies may be non-Muslims, and these are **ex-officio roles**.
- The **Collector's role is procedural** and subject to **judicial oversight**.

Despite these explanations, the court remained **unconvinced**, especially on **religious rights** and **property access issues**.

GS Paper 3 – Economic Development

India-Middle East-Europe Economic Corridor (IMEC) — A Game-Changer in Global Trade

Context: Describing the **India-Middle East-Europe Economic Corridor (IMEC)** as much more than a trade pathway, the **Union Minister of Commerce and Industry** called it a **"modern-day Silk Route"** that will reshape international commerce and connectivity. This visionary project is poised to transform how goods, energy, and data move across continents.



What is IMEC?

The **IMEC** is a **multinational, multimodal connectivity initiative**, formalized through a **Memorandum of Understanding (MoU)** signed at the **G20 Summit 2023 in New Delhi**. Signatory nations include **India**, **European Union**, **France**, **Germany**, **Italy**, **Saudi Arabia**, **United Arab Emirates**, and the **United States**.

Core Objective:

To build a comprehensive infrastructure network encompassing **ports, railways, highways, sea routes, and pipelines**, linking **India with the Arabian Peninsula, the Mediterranean region, and Europe**.

Economic and Strategic Benefits of IMEC:

1. Reduced Logistics Costs and Transit Time:

- IMEC is projected to **cut logistics costs by up to 30%**.
- It is expected to **reduce transportation time by around 40%**, significantly accelerating supply chains.

2. Enhanced Geostrategic Positioning:

- The corridor **bypasses critical maritime chokepoints** like the **Suez Canal**, offering a **secure and resilient trade alternative**.
- It strengthens **India's strategic ties** with the Middle East and Europe, enhancing regional influence.

3. Boost to Geoeconomic Integration:

- IMEC enables deeper **economic cooperation** across three major regions, fostering **cross-border investments**, **technology exchange**, and **energy connectivity**.

4. Counterbalance to China's Belt and Road Initiative (BRI):

- IMEC provides a **transparent and democratic infrastructure alternative**, reinforcing **rules-based international trade** and reducing dependency on **China-centric trade routes**.

Drawing Parallels: IMEC and the Historic Silk Route:

The Minister likened IMEC to the **ancient Silk Route**, which connected Asia with Europe from the **2nd century B.C. to the 15th century A.D.**. Just like its predecessor, IMEC is expected to be a **catalyst for economic prosperity, cultural exchange**, and **geopolitical influence**.

Roadmap for Implementation: Minister's Key Suggestions:

To ensure the success of IMEC, the Minister proposed a **multi-pronged strategy**:

1. Multi-Stakeholder Collaboration:

- Active engagement of **industry players**, **academia**, **think tanks**, and **governments** to align on execution plans and shared benefits.

2. Innovative Financing Models:

- Introduction of **long-term IMEC Bonds** and **public-private partnerships (PPPs)** to mobilize funding at scale and ensure project viability.

3. Sustainable and Smart Infrastructure:

- Use of **green technologies**, **digital logistics platforms**, and **AI-driven route optimization** for enhanced efficiency and sustainability.

A Step Toward a New Trade Order:

IMEC marks a significant milestone in shaping a **new world trade order** that is **inclusive, diversified, and strategically secure**. With **India playing a central role**, the corridor is set to drive **economic transformation**, not only for the participating countries but also for the **global South**, which seeks fairer trade access and connectivity.

Did You Know? – IMEC in Numbers

- **Over 8,000 km** of planned infrastructure spanning multiple regions.
- Potential to impact **over 2 billion people** across participating countries.
- Projected to mobilize **hundreds of billions of dollars** in investment over the next decade.

GS Paper 1 – Issues Relating of Health

Type 5 Diabetes Officially Recognized: A Malnutrition-Driven Diabetes Variant

Context: In a groundbreaking development, the **International Diabetes Federation (IDF)** has officially recognized **Type 5 Diabetes** — a **malnutrition-induced form** of the disease, primarily affecting **lean, undernourished adolescents and young adults** in low- and middle-income countries. Long overlooked, this **neglected subtype** is finally gaining the attention it deserves after nearly **seven decades of clinical ambiguity**.

What is Type 5 Diabetes?

Type 5 Diabetes is a **distinct metabolic disorder** where the primary issue is **severely impaired insulin production** due to **chronic malnutrition**, rather than insulin resistance as seen in **Type 2 Diabetes**.

- It predominantly affects **young, underweight individuals** with **a history of poor nutrition**, often beginning **in the womb**.
- The disease is **non-autoimmune** and **non-genetic**, setting it apart from Types 1 and 2.
- It has often been **misdiagnosed** as atypical Type 1 or Type 2, leading to **ineffective treatment**.

A Historic Step: Recognition and Endorsement

The term **"Type 5 Diabetes"** was formally introduced by **Prof. Peter Schwarz**, President of the **IDF**, in **January 2025**. It was **officially recognized** at the **75th World Diabetes Congress** in **Bangkok**, marking a **milestone in global diabetes research and policy**.

A Long-Overdue Acknowledgment

- First described in **1955 in Jamaica** as "J-type Diabetes"
- Later labeled by WHO (1985) as **"Malnutrition-Related Diabetes Mellitus (MRDM)"**
- **Removed in 1999** due to insufficient evidence, despite strong clinical signals

Global Prevalence and At-Risk Regions:

An Underreported Epidemic:

Type 5 Diabetes is now estimated to affect **approximately 25 million people globally**, particularly in the **Global South**.

- **Countries with significant cases** include: **India, Sri Lanka, Bangladesh, Uganda, Ethiopia, Rwanda, and South Korea**
- It primarily exists in **economically disadvantaged communities** with **long-standing food insecurity**

Recent Scientific Breakthroughs and Renewed Focus:

Why Now?

Recent research highlights how **malnutrition during early life stages** — including **fetal development and childhood** — causes **permanent damage to pancreatic beta cells**, impairing their ability to produce insulin later in life.

- **Micronutrient deficiencies**, particularly of **zinc**, **magnesium**, and **vitamin B12**, play a key role.

- Advances in **epigenetic studies** have shown that **in-utero malnutrition** alters gene expression linked to insulin production.

Key Clinical Features of Type 5 Diabetes:

How to Identify It?

Unlike other forms, **Type 5 Diabetes** is unique and often subtle in presentation:

- **Very Low Body Mass Index (BMI):** Often below **18.5 kg/m²**
- **Extremely Low Insulin Levels:** Lower than Type 2, slightly higher than Type 1
- **Minimal Body Fat:** Especially in limbs and trunk
- **Chronic Undernutrition:** With **low intake of protein, fiber, and micronutrients**
- **Absence of Autoimmune or Genetic Markers**

The Root Cause: Malnutrition from the Womb:

A Life-Cycle Disease:

Experts emphasize that **undernutrition during pregnancy**, coupled with **continued poor nutrition post-birth**, leads to lifelong pancreatic underdevelopment.

- Children who **remain lean and stunted** throughout adolescence are most at risk.
- Historical factors such as **colonial food policies**, **war-time scarcity**, and **intergenerational poverty** have contributed to its silent spread.

Current and Emerging Treatment Approaches:

While official treatment guidelines are still being drafted, early interventions focus on **nutritional rehabilitation** and **customized glycemic control**.

Preliminary Management Strategies Include:

- **High-Protein, Nutrient-Dense Diets:** To reverse malnutrition and support insulin production
- **Balanced Carbohydrate and Fat Intake:** Customized for age, BMI, and energy needs
- **Medical Management:** Anti-diabetic drugs or insulin, based on **individual glucose profiles**
- **Community-Based Programs:** Especially in low-resource settings, to deliver **sustainable nutrition and diabetes education**

The **Type 5 Diabetes Working Group**, established under the IDF, aims to roll out **formal diagnostic and treatment protocols** within the next **two years**.

Why This Matters: A Public Health Turning Point

The formal recognition of Type 5 Diabetes signals a **paradigm shift** in how the global health community understands and addresses **diabetes in undernourished populations**.

Key Implications:

- **Redefines diagnostic models** in countries with high undernutrition
- Promotes **targeted intervention programs** in vulnerable populations
- Influences **nutrition policies**, especially maternal and child health programs

GS Paper 3 – Infrastructure & Environmental Conservation

Silkyara Tunnel Breakthrough: A Leap Towards Seamless Himalayan Connectivity

Context: The **Silkyara Tunnel**, a crucial infrastructural marvel nestled in the rugged terrain of **Uttarakhand**, has recently achieved a **significant breakthrough**, marking a key moment in India's push for **all-weather road connectivity** in the Himalayan region.

Key Facts About the Silkyara Tunnel:

- **Location:** Positioned on the **Yamunotri National Highway**, the tunnel is located in the **Uttarkashi district** of Uttarakhand.
- **Length:** Spanning **4.5 kilometers**, it is the **longest tunnel** in the state under the **Char Dham Highway Project**.
- **Connectivity Goal:** The tunnel links **Silkyara to Dandalgaon**, both situated within Uttarkashi, drastically improving **intra-district mobility**.
- **Design:** Built as a **double-lane tunnel** with modern safety systems to withstand harsh Himalayan conditions.

Part of the Iconic Char Dham All-Weather Road Project:

Project Overview:

The **Char Dham Highway Project** is a **mega infrastructure initiative** launched in **2016** to upgrade and expand **889 km of mountain roads** across Uttarakhand.

- **Purpose:** Ensure **year-round connectivity** to the four sacred pilgrimage sites of the state:
  - **Badrinath**
  - **Kedarnath**
  - **Gangotri**
  - **Yamunotri**
- **Strategic Vision:** Enhance not just **religious tourism**, but also ensure **defense mobility** in the high-altitude border regions with **China**.

Why the Silkyara Tunnel Matters:

Strategic and Socio-Economic Significance:

- **Reduced Travel Time:** Once operational, the tunnel will **cut down travel distance** between **Gangotri and Yamunotri** by **approximately 26 km**, saving **travel time and fuel**.
- **Eco-Friendly Solution:** By reducing road traffic through mountainous terrain, it **minimizes environmental degradation** and **landslide risk**.
- **Pilgrimage and Emergency Access:** Provides **faster access** to remote areas during **natural disasters**, crucial in a disaster-prone region like Uttarakhand.

Engineering Excellence Amid Himalayan Challenges:

Construction and Challenges:

- **Terrain:** Constructing in the **fragile Himalayan geology** presents challenges like **landslides, water seepage, and seismic activity**.

- **Technology:** Tunnel boring and reinforcement employ **advanced drilling and geotechnical solutions**, complying with **international tunneling standards**.

Added Knowledge: The Global Context of Mountain Tunneling

- Similar high-altitude tunnel projects around the world include:
  - **Gotthard Base Tunnel** (Switzerland) – World's longest railway tunnel (57 km)
  - **Zojila Tunnel** (India) – Another strategic Himalayan tunnel in J&K for all-weather access to Ladakh
- India is **rapidly expanding its mountain infrastructure** to bolster both **tourism and defense logistics**.

In Summary: A Tunnel to Transformation

The **Silkyara Tunnel** is not just a passage through a mountain — it is a **gateway to progress, resilience, and regional upliftment**. It reflects India's growing capability in executing **large-scale infrastructure projects in extreme terrains**, combining **technology, tradition, and strategy**.

GS Paper 3 – Biodiversity and Environmental Conservation in India

New Frog Species Discovered in Assam: Leptobrachium aryatium

Context: In an exciting **scientific development**, researchers in **Assam** have identified a **new species of frog**, named ***Leptobrachium aryatium***, as a tribute to **Arya Vidyapeeth College**, Guwahati. This discovery adds a fresh chapter to the region's **rich biodiversity**.

Found in the Heart of Nature: Garbhanga Reserve Forest

The newly identified frog was found in the **Garbhanga Reserve Forest**, located on the **southwestern edge of Guwahati**, near the **Assam–Meghalaya border**. This forest is a **biodiversity hotspot**, playing a key role in maintaining the **climate stability** and **water systems** of the city.

Garbhanga is home to a stunning variety of **wildlife**, including:

- **Asian elephants**
- **Rare bird species**
- **Colorful butterflies**
- **Reptiles and amphibians**

Unfortunately, this delicate ecosystem is under **constant threat** from **urban development** and **habitat degradation**.

What Makes *Leptobrachium aryatium* Unique?

This newly recognized species is noted for its **distinctive features**, including:

- **Fiery orange-and-black eyes**
- A **reticulated throat pattern** that sets it apart from related species
- A **smooth, rhythmic call** at **dusk**, likely used for attracting mates

Originally misidentified as ***Leptobrachium smithi*** in **2004**, the frog was recently confirmed as a **new species** through advanced **molecular** and **morphological analysis**.

About the Leptobrachium Genus:

The genus ***Leptobrachium*** includes **38 known species** of **robust frogs** with:

- **Broad heads**
- **Short hind limbs**
- **Vividly colored eyes**

These frogs are distributed across **Southern China**, **India**, the **Sunda Shelf**, and the **Philippines**, typically residing in **humid forests** and playing a vital role in the **food web**.

A Call for Conservation:

The discovery of ***Leptobrachium aryatium*** not only enriches our understanding of amphibian diversity but also underscores the **urgent need** to **protect natural habitats** like Garbhanga. Every new species found is a reminder of the **unseen wonders of the wild** and the importance of preserving them for future generations.

GS Paper 1 – Indian Heritage & Culture

Exploring the Ancient Maritime Legacy: Dwarka & Beyt Dwarka

Context: The **Archaeological Survey of India (ASI)** has initiated an in-depth **scientific study** to explore the submerged archaeological remains at **Dwarka** and **Beyt Dwarka** in **Gujarat**, aiming to uncover the secrets of an ancient maritime civilization.

Dwarka: The Ancient Port City of Lord Krishna

Dwarka, located at the mouth of the **Gulf of Kutch**, holds immense **religious** and **historical** significance. Revered as one of the **Char Dham pilgrimage sites**, this city is traditionally believed to be the place where **Lord Krishna** settled after departing from **Mathura**.

ASI's findings since 1963 have revealed submerged structures, **stone jetties**, **anchors**, and **fortified walls**, all pointing to the existence of a prosperous **ancient port city**. Some key highlights include:

- **Dwarkadhish Temple (Jagat Mandir)**: A major **Krishna Bhakti shrine** rebuilt in the **16th century** after being destroyed by **Mahmud Begada**.
- **Sharada Peeth**: The western **matha** (monastery) established by the great philosopher **Adi Shankaracharya**.

As per legend, **Krishna** is said to have reclaimed land from the sea to establish **Dwarka**, making it the first capital of **Gujarat**.

Beyt Dwarka: The Sacred Island of the Mahabharata

Beyt Dwarka, also known as **Shankhodhar**, is an **island** located **30 km off the coast** of **Okha port** in Gujarat. This island is identified in the **Mahabharata** as **Antardvipa**, a place of great **mythological significance**.

Archaeological excavations on the island have traced human habitation back to both the **Harappan** and **Mauryan** periods, indicating its long-standing importance as a center of trade and culture. Some fascinating facts about Beyt Dwarka include:

- **Guru Vallabhacharya Temple**: A temple dedicated to **Guru Vallabhacharya**, associated with the island.
- **Historical Significance**: The area was once under the rule of the **Gaekwads of Baroda** and was briefly seized during the **1857 rebellion** by the **Vaghers**.

Modern Developments: Connecting Dwarka to the World

In 2024, the **Sudarshan Setu**, India's longest **cable-stayed bridge**, was inaugurated, significantly improving access to **Beyt Dwarka** and enhancing **tourism** and **research opportunities** for this historical island.

Conclusion: Unveiling the Past, Connecting the Future

The ongoing **archaeological explorations** at **Dwarka** and **Beyt Dwarka** are revealing fascinating insights into the region's **ancient maritime history**. These findings not only shed light on the past but also help preserve the rich **cultural heritage** of Gujarat for future generations.