Today's Prelims Topics

Why Earth Spinning Faster

Context

On July 9, earth was spinning **1.34 milliseconds faster** than usual according to the U.S. Naval Observatory and the International Earth Rotation and Reference Systems Service.

More in News

- **July 22 and August 5** are expected to be **between 1.2 and 1.5** milliseconds shorter than the standard 24-hour day.

- **Giant-impact hypothesis:** According to this theory, a Mars-sized body (named Theia) collided with the early Earth about 4.5 billion years ago.
    - This impact not only contributed material that formed the Moon but also may have altered both the speed and direction of Earth's rotation and given it its current axial tilt

Why Is Earth Spinning Faster Recently?

- **Movements in Earth's Core:** Changes in the **liquid outer core** relative to the mantle can alter the planet's angular momentum.
    - This internal mass redistribution speeds up or slows down Earth's spin.
- **Atmospheric and Oceanic Changes:** Shifts in **air pressure, jet streams, and ocean currents** redistribute mass across the globe, affecting rotation.
    - These changes often align with **seasonal cycles** and short-term climate patterns.
- **Moon's Changing Position:** When the **Moon is farther from Earth's equator**, it exerts **less tidal friction**, allowing Earth to spin faster.
    - However, over the long term, the Moon actually slows Earth down by gradually moving away (~4 cm/year).
- **Glacial Melting and Mass Redistribution: Melting polar ice** due to climate change redistributes mass toward the equator.
    - This increases Earth's **oblateness** (bulging at the equator), which can **slow down rotation**, but certain redistributions may also temporarily **speed it up**.
- **Short-Term Variability:** Earth's rotation has **never been perfectly steady**.
    - Just like now (fast spin), there have been **slow periods** in the past (e.g., 1970s, 1990s) when days regularly exceeded 24 hours.

Source: Indian Express

Anusandhan National Research Foundation (ANRF)

Context

The **Anusandhan National Research Foundation (ANRF)** has launched the ***Prime Minister Professorships*** to boost research in State universities by offering a **₹30 lakh annual fellowship**, also allowing participation from overseas scientists and retired experts.

About ANRF (Anusandhan National Research Foundation)

- **Formation:** In 2023 (**Statutory** Body under ANRF Act 2023)
- **Organisational Structure:**
  - **Governing Board**
    - **Chairman:** Prime Minister
    - **Vice Chairperson:** Union Minister of Science and Technology and the Union Minister of Education are the ex-officio vice-presidents.
    - **Members:** 15–25 distinguished researchers and professionals.
  - **Executive Council**
    - **Chairman:** Principal Scientific Adviser
    - **Members:** include the secretaries of various central government departments
- **Budget:**
  - ANRF is working with a budget of Rs 50,000 crore over five years.
  - Government Contribution: Rs. 14000 Cr.
  - Mobilisation through Private Sources: Rs. 36000 Cr.
- **Functions:**
  - To encourage research and development (R&D) and innovation in India's universities, colleges, research institutions, and R&D laboratories.
  - Collaborating with industry, academia, and government
  - Develop a regulatory framework to encourage collaboration and increase industry spending on R&D.
  - Preparing a research and development roadmap for short, medium, and long-term research and development.
- **Other Major Initiatives by ANRF:**
  - **Prime Minister Early Career Research Grant (PMECRG)**: It offers early-career researchers up to ₹60 lakh over three years, with flexible funding, overheads, and international travel allowed).
  - **Mission for Advancement in High-Impact Areas -Electric Vehicle (MAHA- EV) Mission:** It is focused on building domestic capabilities in key EV technologies such as Battery Cells, Power Electronics, Machines and Drives (PEMD) and Charging Infrastructure.

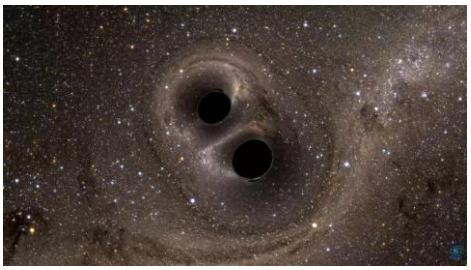
Source: TheHindu

Blackhole Merger

Context

On July 10, scientists reported the discovery of an unusually massive black hole merger.

About Black Hole Merger



- **Definition**: A **black hole merger** occurs when two black holes—extremely dense objects with immense gravity—spiral towards each other and eventually combine into a single, larger black hole.
- **Process**:
  - As black holes orbit each other, they emit **gravitational waves** (ripples in spacetime).
  - This emission causes them to **lose energy**, bringing them closer.
  - Eventually, they **collide and merge**, releasing a burst of gravitational waves.
- **Recent Discovery (GW231123)**:
  - Detected on **November 23, 2023**
  - Involved two massive black holes:
    - One ~137 times the Sun's mass
    - One ~103 times the Sun's mass
  - The result was an **even larger black hole**.
- **Significance**:
  - This event was **unusual** due to the large size of the original black holes, which are typically rare in this mass range.
  - Shows that **massive black holes can form by merging smaller ones**, not just from dying stars.

Source: TheHindu

How is Global shipping trying to Decarbonise?

Context

Global shipping targets decarbonisation by **2040–50 by replacing traditional fuels like VLSFO, diesel, and LNG with green alternatives such as green ammonia, e-methanol, and biofuels**—creating major opportunities for India in the green energy sector.

Green Fuel Production

- **Green hydrogen** is made via **electrolysis** of water using **renewable energy**.
- For marine use, more stable derivatives are preferred:
  - **Green Ammonia**: Made from green hydrogen and nitrogen.
  - **Green Methanol**: Produced from green hydrogen and captured industrial CO_2.
- India promotes **green ammonia** to reduce dependence on **LNG imports** for fertilizer.

Green Methanol as a Transition Fuel

- Green methanol is emerging as shipping's **preferred decarbonisation fuel** due to:
  - **Ease of use**
  - **~90% lower emissions** than traditional fuels.
  - **Compatibility** with existing ship engines (unlike green ammonia).
- Over **360 methanol-ready ships** are in use or under construction, supported by **Maersk, CMA CGM, Evergreen**, etc.
- **High costs**:
  - Green e-methanol = **$1,950/tonne** (Singapore, Feb 2024)
  - VLSFO = **$560/tonne**
- **Cost drivers**:
  - Needs **10–11 MWh** of renewable electricity per tonne.
  - High capital cost for **electrolyser infrastructure**.
- **Demand–Supply Gap**:
  - Demand projected at **14 million tonnes by 2028**, while supply may only reach **11 million tonnes**.

India's Decarbonisation Strategy & Green Fuel Export Plans

- India plans to **decarbonise domestic shipping** via:
  - Promoting green fuel for container ships.
  - Developing **green fuel bunkering hubs** at **Tuticorin (VOC Port)** and **Kandla**.
- Plans to **export green fuels to Singapore**, which manages **25% of global ship fuel demand**.
- Leverages its **large solar capacity** and **green tech expertise** to emerge as a **global green fuel supplier**.

Building India's Green Marine Fuel Hub – Challenges & Solutions

- **Key Challenges**:
  - Dependence on **imported solar panels and electrolysers**.
- **Progress & Solutions**:
  - Solar capacity growth: From **2.82 GW (2014)** to **105 GW (2025)**.
  - Use of **sovereign guarantees** to reduce borrowing costs via cheaper foreign financing.
  - Policy tools like:
    - **PLI schemes** for electrolyser production.
    - **CCUS (Carbon Capture, Utilisation & Storage)** incentives.
  - Goal: Build **local green fuel value chains** and reduce CO_2 transport costs.
  - Government aims to create **1.5 GW electrolyser manufacturing capacity**.
  - Expand industrial CO_2 sourcing for green methanol.

- Access to **low-interest loans (4%)** from multilateral development banks vs. 11–12% from domestic lenders.

Reviving Indian Shipbuilding via Green Fuel Push

- India supports **shipbuilding and shipowning** by:
  - Offering **demand-side incentives**.
  - Encouraging **foreign collaborations** (e.g., with South Korea, Japan).
  - Retrofitting old ships and building **new green fuel-capable ships**.
- Investment:
  - Committed **$10 billion** to build over **110 ships**.
  - Target: 10–20% of ships to be **green fuel-ready**, **Made in India**, and flying the **Indian flag**.
- Aims to **strengthen local shipbuilding** while meeting **global climate goals**.

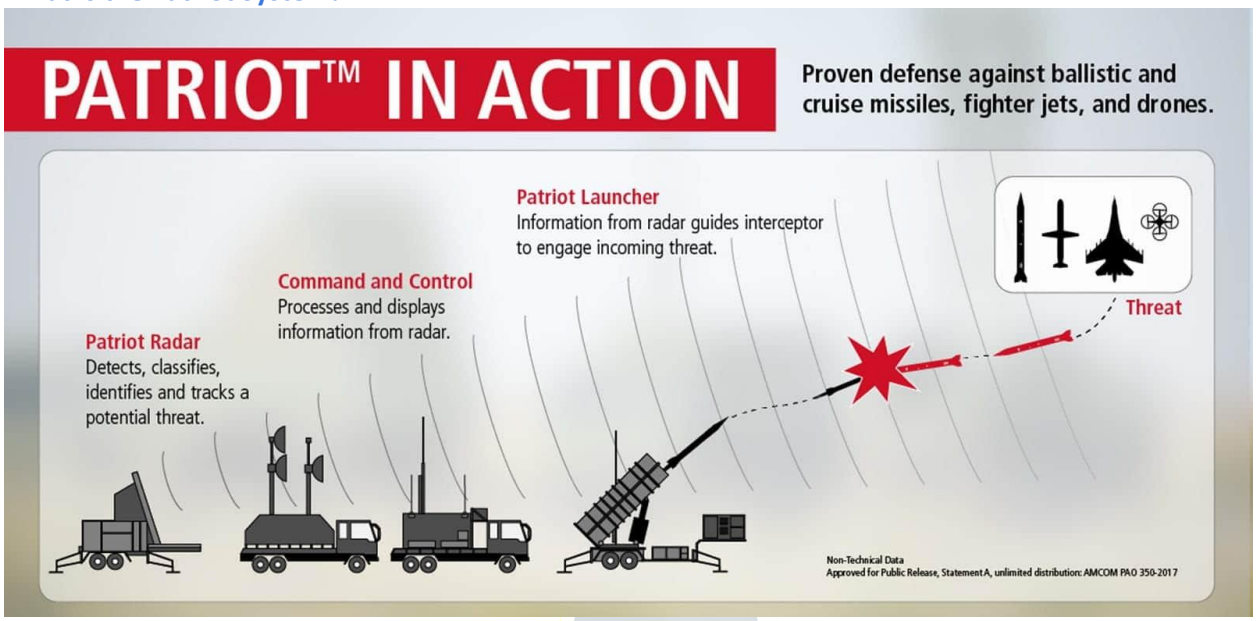
Source: TheHindu

Patriot Missile System

Context

The U.S. President has recently declared that **Washington will provide Patriot air defence systems to Ukraine** in response to **escalating Russian aggression**.

What is the Patriot System?



- **Full form**: *Patriot* stands for **Phased Array Tracking Radar for Intercept on Target (MIM-104)**.
- It is an **all-weather, all-altitude, surface-to-air missile defense system**.
- Originally designed for **anti-aircraft purposes**, but now upgraded to target:
    - **Ballistic missiles**
    - **Cruise missiles**
    - **Loitering munitions**
    - **Enemy aircraft**
- Equipped with a **Track-Via-Missile (TVM)** guidance system.
- Receives **mid-course correction commands** from a mobile control center.
- Two main interceptor types:
    - **PAC-2**: Uses a **blast-fragmentation warhead**.
    - **PAC-3**: Uses **hit-to-kill technology** for more precise target elimination.

Source: IndianExpress

Places in News

Sweida (Suwayda)

News? Israel launched strikes on Syrian government in Sweida.

About Sweida

- It is a **city in southwestern Syria**, located near the **border with Jordan**.
- **Population**: Predominantly **Druze**, a religious minority in Syria.
    - **Bedouin tribe** is also found here.

Fact

- Syria is bordered with **Turkey** to the north, **Lebanon** and **Israel** to the west and southwest, **Iraq** to the east, and **Jordan** to the south.

Source: The Hindu

Editorial Summary

Contesting the future of forest governance

Context

Recently, the Chhattisgarh forest department issued a letter designating itself as the nodal agency for implementing community forest resource rights (CFRR) under the Forest Rights Act (FRA), 2006.

- Later the letter was withdrawn after a spirited grassroots mobilisation, however it highlights the persistent attack on gram sabhas' autonomy in managing their forests.

Historical Background of Forest Management in India

- **Colonial Legacy of State Control**: Under British rule, large tracts of forests were brought under **centralized state control** through acts like the Indian Forest Act, 1865/1927.
    - Local communities were **dispossessed of their traditional rights**, and forest management shifted to maximize **timber production**.
- **Scientific Forestry Model**: Introduced by colonial foresters, this model emphasized **working plans** that prioritized **commercial logging**, often through **clear-felling** and **monoculture plantations**.
    - Ecologists like **Madhav Gadgil** later criticized this model for being ecologically destructive and **ignoring biodiversity** and **community livelihoods**.
- **Post-Independence Continuity**: Even after 1947, state forest departments continued to **follow colonial models**, with forests managed through **top-down working plans** and little local participation.

Community Forest Resource Rights (CFRR)

- CFRR is a key provision of the **Forest Rights Act, 2006**, which recognizes the **rights of Gram Sabhas to govern, protect, and manage customary forests**.
- **Objective**: To **correct historical injustices** caused by colonial forest policies and to **empower local communities** in forest governance.
- **Key Features**:
    - **Gram sabhas** can draft and implement **CFR management plans** based on local knowledge.
    - These plans are meant to **prioritize local livelihoods, biodiversity, and cultural practices**, and not merely timber extraction.
- **Integration with State Mechanism**: CFR plans are to be "**integrated**" with state working plans **on Gram Sabha terms**, not overridden by them.

Significance of Gram Sabhas in Forest Management

- **Democratic Decentralization**: Gram Sabhas represent **direct democracy** at the village level and embody **local self-governance** in forest resource management.
- **Ecological Understanding**: Their knowledge of local ecology is **lived, adaptive, and fine-grained**, offering a more **resilient response to climate change** than rigid working plans.
- **Livelihood Linkages**: Gram Sabhas **prioritize fuelwood, fodder, medicinal plants**, and **non-timber forest produce**, addressing actual community needs.
- **Customary Institutions**: They **preserve traditional conservation systems**, often more sustainable than scientific forestry.
- **Restoring Rights**: Their authority under the FRA is a **legal recognition of their stewardship**, reversing colonial alienation.

What Needs to Be Addressed

- **Violation of Autonomy**: Forest departments and Ministry of Tribal Affairs (MoTA) have tried to **impose working plan templates** (via National Working Plan Code (NWPC)), undermining **Gram Sabha-led planning**.
- **Administrative Resistance**: Forest departments continue to **delay or reject CFR claims**, **deny funds**, and **challenge CFRR titles**, clinging to colonial control.
- **Misuse of "Scientific Forestry"**: The **timber-focused science** used by forest departments does not align with CFRR's **livelihood and conservation goals**.
- **Lack of Institutional Support**: Many Gram Sabhas lack resources and capacity, and are **denied help from NGOs or allied agencies** under departmental pressure.
- **Poor Implementation**: Of the 10,000+ CFRR titles issued, **fewer than 1,000 villages have prepared management plans**, largely due to lack of support.

Way Forward

- **Reject NWPC Imposition**: CFR plans **must not be forced to follow National Working Plan Code formats**, which are complex and timber-oriented.
- **Strengthen MoTA's Role**: MoTA must act as the **protector of community rights**, not a passive observer swayed by the Environment Ministry.
- **Support Gram Sabha Planning**:Allow **flexible, iterative, and context-specific planning** rooted in traditional knowledge.
- **Provide Financial & Institutional Support**: Forest departments must **fund and protect CFR-holding Gram Sabhas** rather than obstruct them.
- **Shift the Science**: Embrace a **people-friendly forest science** that values **local stewardship**, **biodiversity**, and **ecosystem services** over timber extraction.

Source: The Hindu

The need to protect India's linguistic secularism

Context

India's linguistic and religious diversity sustains its secular fabric, but rising identity politics and language-based tensions threaten national unity.

How the Indian Constitution Guarantees Linguistic Secularism

- **Article 29**: Ensures every community's right to **conserve its distinct language, script, or culture**, protecting minority linguistic identities.
- **Eighth Schedule**: Recognizes **22 official languages**, symbolizing constitutional respect for **linguistic diversity**.
- **Article 343**: Declares **Hindi** in Devanagari script as the **official language of the Union**, not the **national language**.
- **Article 345**: Allows **States** to adopt their own **official languages**, respecting regional linguistic preferences.
- **No National Language**: By design, India avoids imposing a single national language, thereby **preventing linguistic majoritarianism**.

Why There Is No National Language in India

- **Constitutional Intent**: The framers chose **not to designate any national language** to preserve **India's multilingual identity**.
- **Diverse Population**: With **121 major languages** and **270 mother tongues**, imposing one language would be **divisive**.
- **Federal Ethos**: India's "**Union of States**" model protects **regional autonomy** and **cultural identities**.
- **Past Resistance**: Historical **anti-Hindi movements** in Tamil Nadu and northeastern States resisted central linguistic imposition.

Challenges Related to Linguistic Secularism in India

- **Language-Based Violence**: Recent attacks on **non-Marathi speakers** in Maharashtra show the **rise of linguistic identity politics**.
- **Hindi Imposition Fears**: Southern and northeastern States perceive Hindi promotion as **cultural domination**.
- **Cultural Marginalization**: Smaller languages not in the Eighth Schedule risk **erasure and neglect**.
- **Political Polarization**: Language issues are increasingly being **politicized for electoral gains**.
- **Lack of Educational Access**: Inequity in **mother tongue-based education**, especially for tribal and minority communities.

What Needs to Be Done

- **Promote Linguistic Pluralism**: Encourage the **use and documentation** of all languages, not just scheduled ones.
- **Strengthen Mother Tongue Education**: Implement **NEP 2020 provisions** supporting early education in **regional languages**.
- **Enforce Constitutional Protections**: Uphold **Articles 29, 343, and 345** rigorously to prevent linguistic discrimination.
- **Counter Identity Politics**: Discourage political actors from **fueling linguistic chauvinism**.
- **Expand Eighth Schedule**: Consider including more **unrecognized languages** to give them **constitutional backing**.
- **Foster National Integration**: Promote **inter-linguistic respect** through cultural exchanges and inclusive policy-making.

Source: The Hindu