Today's Prelims Topics

Badaga community

Context

The **Badaga community** celebrated the **Devahabba harvest festival** near **Udhagamandalam, Tamil Nadu**, honoring their traditional agricultural practices.

Badagas of Nilgiris

- The Badagas are a native tribal community living in the **Nilgiri Hills** of Tamil Nadu.
- Known for their **unique language**, **customs**, and **agricultural traditions**.
- They have maintained a **semi-isolated lifestyle**, allowing them to preserve their **rich cultural identity**.
- The **Badaga language** is a dialect of **Kannada**, typically written in either **Tamil** or **Kannada script**.
- Historically, Badagas were **farmers** cultivating **millets, vegetables, tea, and coffee**. (Today, many have diversified into **modern professions** while retaining a strong agricultural base).
- The Badagas primarily worship **Hethai Amma** (a revered goddess), along with **local deities** such as **Jadayaswamy**.
- **Major Festivals**:
    - **Hethai Habba** – Celebrates their clan goddess Hethai Amma.
    - **Jadayaswamy Festival** – Honours a local deity.
    - **Devahabba** and other **seasonal harvest festivals** are also significant.
- **Social Structure**: Follow a **clan-based system** with strong **village-level governance**. **Marriages are endogamous**, and weddings involve **traditional songs, dances, and rituals**.
- **Traditional Architecture**: Live in houses called **"hatti"**, built using **stone and wood**, with **tiled or thatched roofs**.
  Their villages are **compactly clustered** in the hill regions.

About Devva Habba Festival

- A **harvest festival** celebrated by the **Badaga community**.
- Also called **"Devahabba"**, meaning "Festival of the Gods."
- Held annually to **thank the deities** for a bountiful harvest and **seek blessings** for the next season.
- Involves **traditional rituals**, **community prayers**, and **white-clad processions** through the terraced fields.
- Reinforces social bonds and **transmits cultural values** across generations.

Other Major Harvest Festivals by Tribal Communities in India

1. **Karam Festival – Oraon, Munda, and Ho Tribes (Jharkhand, Chhattisgarh, Odisha)**
    - Celebrates nature, especially the **Karam tree**, symbolizing fertility and prosperity.
    - Involves songs, dances, and worship by young girls and women.
2. **Sohrai – Santhal Tribe (Jharkhand, Bihar, Odisha, West Bengal)**
    - A **cattle and harvest festival** celebrated post-harvest.
    - Includes mural painting, animal worship, and community feasts.

3. **Garia Puja – Tripuri Tribe (Tripura)**
    - Held in April to worship the deity **Garia** for prosperity and good crops.
    - Includes dancing, singing, and the use of traditional instruments like drums and bamboo flutes.
4. **Nuakhai – Tribes of Western Odisha (especially Sambalpuri, Gond, and Kondh)**
    - Celebrated to welcome the **new rice crop**.
    - Families offer the first produce to the deities before consumption.
5. **Chapar Bihu – Bodo Tribe (Assam)**
    - A version of the Bihu festival celebrated with dance, music, and **buffalo fights**.
    - Marks the end of sowing and beginning of the harvest cycle.

Source: TheHindu

Gold superheated far beyond its melting point can stay solid

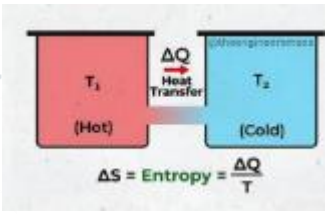
Context

Gold was found to stay solid even when superheated to **14 times its melting point**, challenging earlier theories. Rapid heating prevented it from melting, even for a **few trillionths of a second**.

What is Melting Point?

- The **melting point** is the temperature at which a **solid becomes a liquid** under standard atmospheric pressure.
- **Equilibrium Phase**: At this temperature, **both solid and liquid phases coexist** in equilibrium.
- **Material Specific**:
    - Different substances have different melting points.
    - Example: **Gold melts at 1,064°C (1,947°F)**.
- **Superheating**:
    - A **solid heated above its melting point without melting** is said to be **superheated**.
    - This is usually a very short-lived state before the solid melts.

Second Law of Thermodynamics



- States that the **entropy** of any **isolated system always increases over time**, or stays constant in the case of reversible processes.
    - **Entropy** is a measure of **disorder or randomness** in a system.
- Natural processes tend to move toward **maximum entropy (disorder)**.
- Explains why **heat naturally flows from hot to cold**, not the other way around.
- Defines the **irreversibility** of natural processes and sets limits on the **efficiency of energy systems**.
- Applies broadly to **mechanical, chemical, and cosmic systems**.
- **Applications of the Second Law of Thermodynamics:**
    - **Heat Transfer Systems**: Governs the natural direction of heat flow.
        - Fundamental in designing **heaters, coolers, radiators**, and **heat pumps**.
    - **Chemical Reactions**: Helps predict the **direction of chemical processes**.
        - Reactions tend to progress toward states of **higher entropy**.
    - **Machine and Engine Efficiency**: Sets the **maximum possible efficiency** of engines and machines.
        - Drives innovations to reduce energy losses in turbines, motors, and internal combustion engines.

Source: TheHindu

Prasat Preah Vihear, Prasat Ta Muen Thom

Context

Recently **Thailand and Cambodia** agreed to a ceasefire to curtail a century-old dispute over the **11th-century Preah Vihear Hindu temple.**

About Preah Vihear Temple

- A Hindu temple located in the Dangrek Mountains (Northern Cambodia).
- **Dedicated to Lord Shiva.**
- Constructed during the **Khmer Empire's** golden era (11th–12th century).
- Initially built by **King Suryavarman I (1002–1050) and later expanded by Suryavarman II (1113–1150).**
- Recognized as a UNESCO World Heritage Site.
- **Architectural Features:**
    - A prime example of classical Khmer temple architecture.
    - Built along an 800-metre-long north–south axis with a series of sanctuaries.
    - Comprises more than five gopuras (entrance towers), connected by long pavements and staircases.
    - Unique for its multi-tiered platforms and gopuras connected by a central path.
    - Some gopuras have stone roofs; others originally had wooden roofs, many now in ruins.

Prasat Ta Muen Thom

- A 12th-century ancient Khmer temple originally dedicated to Lord Shiva, later used for Buddhist purposes.
- Part of the **Prasat Ta Muen group**, which includes:
    - **Prasat Ta Muen Thom** (Hindu temple)
    - **Prasat Ta Muen** (Dharma Sala or rest house)
    - **Prasat Ta Muen Tot** (Hospital Shrine)

- **Constructed:** During the Khmer Empire under **King Udayadityavarman II** and later expanded by **King Jayavarman VII** (13th century).
    - Reflects Angkorian architecture and socio-religious life of the Khmer era (9th–15th century).
- **Architectural Features:**
    - **Prasat Ta Muen Thom**:
        - Made of sandstone, south-facing.
        - Houses a **Shiva Lingam** with a water outlet and surrounding cloister.
        - Includes nearby laterite libraries and a pool.
    - **Prasat Ta Muen Tot**:

- Functioned as a **hospital shrine**.
- Contains **Khmer-Sanskrit inscriptions** detailing medical appointments and public health services.

- **Prasat Ta Muen (Dharma Sala):** Likely served as a pilgrim's rest house along religious and trade routes.

Source: LiveMint

News in Short

Heavy Water

News? India's **first private facility** to upgrade **depleted heavy water** has been launched by **TEMA India**.

It will support **nuclear energy production**, earlier managed only by **BARC**, marking a major **private sector entry** in nuclear tech.

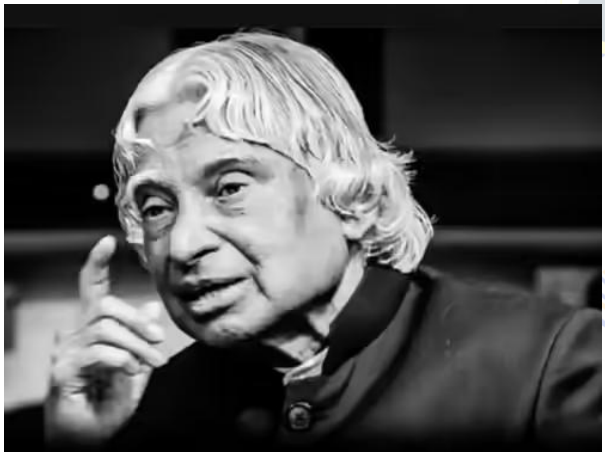
What is Heavy Water?

- **Chemical Name**: Deuterium Oxide (D_2O)
- **Composition:** Hydrogen atoms in regular water (H_2O) are replaced by **deuterium** (a heavier isotope of hydrogen).
- **Key Difference:** Heavier molecular weight changes physical properties.
- **Main Use:** Crucial in **nuclear reactors** as a **moderator** and **coolant**.
    - In pharmaceuticals used as a **tracer in metabolic studies**, a stabilizer for drug products, and a tool for studying drug interactions.

Source: IndianExpress

Personality in News

Dr. APJ Abdul Kalam (Missile Man of India)



News? Recently, Prime Minister Modi paid homage to former President, Dr. APJ Abdul Kalam on his death anniversary (27th July).

About him (1931- 2015)

- Born on **15th October 1931** in **Rameswaram, Tamil Nadu**.
- His birth anniversary is celebrated as **World Students' Day** and **National Innovation Day**.
- Served as the **11th President of India (2002–2007)**, completing a full term.
- **Awards Received:**
  - **Padma Bhushan** (1981)
  - **Padma Vibhushan** (1990)
  - **Bharat Ratna** (1997) – India's highest civilian award
- **Authored:**
  - Wings of Fire
  - India 2020: A Vision for the New Millennium
  - Ignited Minds: Unleashing the Power Within India
  - My Journey, Indomitable Spirit, Guiding Souls, Inspiring Thoughts, Envisioning an Empowered Nation.
- **Major Contributions:**
  - **Advancement in Fiberglass Technology**:
  - **Satellite Launch Vehicle (SLV-3)**
  - Headed the **Integrated Guided Missile Development Programme (IGMDP)** at DRDO.
  - Played a key role in the **Pokhran-II nuclear tests**, establishing India as a nuclear state.
  - Proposed a strategic roadmap in 1998 to transform India into a **developed nation** by 2020.
  - **Kalam-Raju Stent**– Co-developed a **low-cost coronary stent** with Dr. B. Soma Raju.
  - Actively involved in India's **LCA (Tejas)** project and avionics development.

	• Designed India's **first indigenous hovercraft 'Nandi'** during his early career. • **PURA (Providing Urban Amenities to Rural Areas)** **Source: PIB**

Editorial Summary

How is India preparing against GLOF events?

Context

With rising temperatures and subsequent glacial melt, the increased risk of GLOFs is threatening life and property in the higher Himalayas.

What are GLOFs Glacial Lake Outburst Floods (GLOFs)?

- They are sudden and violent discharges of water from glacial lakes, typically caused by:
    - Collapse of the lake's natural dam (often made of loose moraine or ice)
    - **Ice or rock avalanches** into the lake.
    - **Heavy rainfall or cloudbursts**, increasing water pressure.
    - **Seismic activity or glacier retreat**, weakening dam structure.
    - **Intense summer heat**, causing rapid melting of glaciers and lakes.
- The **Indian Himalayan Region (IHR)** is home to **~28,000 glacial lakes**, of which **7,500** are in India.

Types of Glacial Lakes in India

- **Supraglacial Lakes**: Formed on glacier surfaces; vulnerable to sudden melt during high temperatures.
- **Moraine-Dammed Lakes**: Formed at glacier snouts; unstable because they're held by loose debris or ice cores.

Risk Factors for India

- **Climate Change & Rising Temperatures:** 2023 & 2024 were **hottest years globally**, worsening glacial melt.
    - High-altitude regions experienced **localized heating**, raising GLOF risk in isolated pockets.
- **Infrastructure Exposure:** Many **hydropower plants, roads, and bridges** are built along Himalayan rivers prone to GLOF.
    - **Example**: The **2023 South Lhonak GLOF** wiped out the **Chungthang Dam** (₹16,000 crore project) in Sikkim.
- **Poor Monitoring and Forecasting: Few automated weather/water monitoring stations** due to high-altitude inaccessibility.
    - Most glacial lake expansion is tracked through **post-facto satellite data**, which **lacks real-time alert capability**.
- **Sedimentation and River Morphology Changes:** GLOFs carry large volumes of silt and debris.
    - In Sikkim, **Teesta riverbed rose several metres** post-GLOF, reducing its water-carrying capacity and increasing flood risks.
- **High Population & Ecological Vulnerability:** Downstream communities are **densely populated** and **ecologically sensitive**.
    - Livelihoods, biodiversity, and pilgrimage towns (like Kedarnath) are highly exposed.

How Is India Preparing for GLOF Risk?

- **Institutional Mechanism:**
    - **NDMA's Committee on Disaster Risk Reduction (CoDRR)** coordinates national-level response.
    - **Central Water Commission** and **State governments** are key implementation agencies.
- **National Programme (Budget: $20 million):** Initially identified **56 high-risk lakes**, now expanded to **195** (classified by risk level).
    - Supported by expected funds from **16th Finance Commission (2027–2031)**.

    - **Programme Objectives (5 Pillars):**
        - **Hazard Assessment**: Volume, depth, moraine stability.
        - **Monitoring Infrastructure**: Installation of **Automated Weather & Water Stations (AWWS)**.
        - **Early Warning Systems (EWS)**: Downstream communication of threats.
        - **Risk Mitigation**: Draining lakes, creating retention structures.
        - **Community Engagement**: Inclusion of locals in monitoring and expedition teams.
- **Technological Advancements:**
    - Use of **SAR interferometry** for slope stability analysis.
    - **Electrical Resistivity Tomography (ERT)** to detect hidden ice-cores in moraine dams.
    - **UAV surveys** for lake morphology and surrounding terrain.
    - **Remote sensing** for lake surface growth mapping.
- **Field Expeditions:** Successfully conducted in **J&K, Ladakh, Himachal Pradesh, Uttarakhand, Sikkim, Arunachal Pradesh**.
    - Installed **real-time monitoring** systems in Sikkim, sending 10-minute data updates.
    - Indo-Tibetan Border Police (ITBP) deployed for **manual early warning** in high-altitude zones.

Source: The Hindu

India's East Asia outreach

Context

External Affairs Minister S. Jaishankar's three-nation visit to Southeast Asia last month, even as India was in the midst of an election cycle, highlights the region's strategic importance to India's ambitions of becoming a key player in the Indo-Pacific.

India's Association with Southeast & East Asia

- **Historical and Civilizational Linkages:** India has deep-rooted **cultural, religious, and trade connections** with Southeast Asia going back centuries.
    - Spread of **Buddhism, Hinduism, Indian scripts, and maritime trade** shaped the cultural and diplomatic landscape of countries like Cambodia, Indonesia, Thailand, and Vietnam.
    - Ancient maritime routes created a strong civilizational bond between India and Southeast Asia, often referred to as **"Greater India"** in historical discourse.
- **Policy Evolution:**
    - **Look East Policy (1990s):** Initiated to rebuild ties post-Cold War and engage with dynamic Asian economies.
    - **Act East Policy (2014 onwards):** Gave renewed strategic and proactive focus to economic, security, and connectivity initiatives in Southeast and East Asia.

Strategic and Economic Importance of Southeast Asia for India

- **Economic Significance: ASEAN is India's 4th largest trading partner**.
    - India-Asean Free Trade Agreement has boosted trade liberalisation and cooperation.
    - Connectivity initiatives like:
        - **India–Myanmar–Thailand Trilateral Highway**
        - **Kaladan Multi-Modal Transit Transport Project** aim to integrate India with Southeast Asian supply chains.
- **Strategic and Geopolitical Importance:**
    - **Maritime Security:** India shares converging interests with Southeast Asia in **freedom of navigation**, particularly in the **South China Sea (SCS)**.
    - **Security Partnerships** with **Vietnam and the Philippines** have strengthened in areas like maritime surveillance, defence technology, counter-terrorism.
- **Normative Engagement in Indo-Pacific:** India champions a **rules-based order**, emphasizing adherence to **UNCLOS (1982)**.
    - Advocates peaceful resolution of disputes, particularly in contested zones like the **Second Thomas Shoal** (Philippines-China tensions).
    - India frames its Indo-Pacific vision around **ASEAN centrality**, supporting the group's pivotal role in regional architecture.

What are the Current Challenges

- **Limited Strategic Influence:** Despite efforts, **only 0.4%** of ASEAN respondents in a recent survey named India as the most influential political/strategic actor in the region — a **significant perception gap**.
- **Internal Divisions within ASEAN:** ASEAN is **fragmented** in responding to Chinese assertiveness in the South China Sea.
    - Lack of unity and coherent strategy weakens the effectiveness of multilateral forums.
- **China's Growing Assertiveness:** China continues to expand its influence in Southeast Asia through infrastructure (Belt and Road Initiative), military pressure, and economic aid, which overshadows India's outreach.
- **Implementation Lag in Connectivity Projects:** Key projects like the **Trilateral Highway** and **Kaladan project** face delays due to logistical, bureaucratic, and security challenges.

- **India's Capacity Constraints:** Limited economic resources, diplomatic bandwidth, and private sector engagement in Southeast Asia hamper the full realization of Act East objectives.

Way Forward

- **Deepen Strategic Partnerships:** Expand defence and maritime cooperation with countries like Vietnam, Philippines, Indonesia, and Singapore.
- **Accelerate Connectivity and Infrastructure:** Fast-track the **India–Myanmar–Thailand Highway** and related projects.
    - Expand digital connectivity and port infrastructure to link India's northeast with ASEAN.
- **Enhance Economic Integration:** Revise trade frameworks under the India–ASEAN FTA to address barriers.
    - Encourage Indian investments in ASEAN, especially in **digital economy, green energy, and manufacturing**.
- **Leverage Soft Power and Diaspora:** Build on India's **cultural heritage, Buddhism, yoga, and education** diplomacy.
    - Strengthen **people-to-people ties** through student exchanges, scholarships, and tourism.
- **Promote Multilateral and Normative Diplomacy:** India should continue to **strongly support** international laws like **UNCLOS** (United Nations Convention on the Law of the Sea) and stand for freedom of navigation in key waterways.
    - It must also actively **push for cooperation through regional groups like the East Asia Summit, ASEAN Regional Forum, and Quad+ platforms**, where countries work together to keep the region peaceful, stable, and fair for all.

Source: ORF

Slums in Flood Prone Area: Highest in India

Context

India has world's highest number of slum clusters in flood-prone areas

Key Issues for Slums in Flood-Prone Regions

- **High Exposure to Flood Risk:** Over **158 million slum dwellers in India** live in floodplains, especially in the **Ganga delta**.
    - Slum settlements are **32% more likely** to be located in flood-prone areas due to cheaper land.
- **Lack of Comprehensive Data:** In the **Global South**, including India, there's a **scarcity of accurate data** on flood exposure for vulnerable communities.
- **Unplanned Urban Expansion:** Cities are expanding into **high-risk flood zones**, without adequate risk assessments or planning regulations.
- **Socioeconomic Vulnerability:** People settle in such areas due to **job access, poverty, and lack of affordable housing**.
    - These settlements often have **limited education, no flood insurance**, and inadequate services.
- **Poor Infrastructure:** Basic infrastructure like **drainage, sanitation, and solid housing** is lacking, worsening the impact of floods.
    - Informal housing (tin sheets, tarps) is fragile and temporary.
- **Inequitable Urban Development: Real estate pressures and gentrification** push the poor into riskier zones.
    - **Builders avoid flood zones**, which are then occupied by migrant workers and the urban poor.

Impacts on Slum Dwellers

- **Direct Impacts: Loss of shelter, belongings, and lives** during floods.
    - **Damage to fragile housing** in informal settlements.
- **Indirect Impacts: Loss of jobs, access to education, health services**, and other essential services.
    - **Increased risk of diseases** due to poor sanitation and water stagnation.
    - **Cycle of poverty** worsens with repeated flooding events.
- **Social and Institutional Marginalisation: Limited access to disaster preparedness**, relief, and recovery measures.
    - **Exclusion from insurance schemes** and climate resilience planning.

Possible Solutions

- **Policy & Planning Measures:**
    - **Integrate Slums into Urban Flood Risk Management:** Recognise informal settlements in official planning maps.
        - Include them in early warning systems and relief programs.
    - **Implement Human-Centric Development:** Shift focus from just flood-prone "locations" to **people's vulnerability**.
        - Create **inclusive infrastructure plans** addressing the unique needs of the urban poor.
    - **Affordable and Resilient Housing:** Promote **flood-resilient construction** and affordable housing schemes in safer areas.
- **Local Collaboration & Empowerment:** Work **with slum communities** to co-create disaster response strategies.
    - Encourage **community-led infrastructure improvements**, like local drainage or waste management.

- **Skill Development and Employment:** Generate jobs in **sanitation, drainage construction, solid waste management**, which also build flood resilience.
- **Technological and Data-Driven Solutions:** Leverage **machine learning on satellite data** to map risk-prone zones and track slum expansion over time.
    - Use this data for **better urban planning** and targeted interventions.

Source: The Hindu