18th March 2026: DSC

1. Gynandromorph Crab in Silent Valley

Context

A rare case of a gynandromorphic freshwater crab (*Vela carli*) has been identified in Silent Valley National Park, Kerala, where a single organism displays both male and female biological characteristics.
This marks the first such observation within the Gecarcinucidae family, making it a noteworthy contribution to studies in evolutionary biology and biodiversity.

Relevance

GS Paper III: Environment & Ecology (biodiversity, Western Ghats, species diversity), Science & Technology (genetics, developmental biology)

Practice Question

"Rare biological anomalies like gynandromorphy provide critical insights into evolutionary biology and biodiversity conservation." Discuss with reference to recent discoveries in India. (250 words)

About the Discovery

The species *Vela carli* is endemic to the Central Western Ghats, reflecting a high degree of regional exclusivity and ecological specialisation.
The observed condition—gynandromorphy—refers to the coexistence of both male and female reproductive traits in a single organism, such as male organs along with female gonopores.
Researchers identified this phenomenon in three specimens discovered inside tree cavities, suggesting a potential link between habitat conditions and biological expression.

Silent Valley National Park

Situated in Kerala within the Nilgiri Hills of the Western Ghats, Silent Valley National Park forms part of the Nilgiri Biosphere Reserve, a UNESCO-recognised biodiversity hotspot.
It conserves one of India's last intact stretches of tropical evergreen forest, characterised by exceptional endemism and species diversity.
The park is traversed by the Kunthipuzha River, a tributary of the Bharathapuzha, which remains undammed, thereby maintaining pristine ecological conditions.
It is also known for flagship species such as the endangered and endemic Lion-tailed macaque and represents a landmark success of grassroots environmental activism during the Silent Valley Movement of the 1970s–80s.
Declared a national park in 1984, it is a vital centre for in-situ conservation and ecological research in peninsular India.

Scientific Significance

Gynandromorphy is an uncommon biological phenomenon, typically observed in insects and certain crustaceans, but never before documented in the Gecarcinucidae family.
It offers valuable insights into mechanisms of sex determination, genetic mosaicism, and developmental biology, contributing to advanced evolutionary genetics research.

Such anomalies also aid in understanding mutations, chromosomal irregularities, and environmental influences on reproductive processes.

Ecological Significance

This finding underscores the ecological richness of the Western Ghats, a globally recognised biodiversity hotspot noted for its high levels of endemism and species diversity.
Freshwater crabs like *Vela carli* play an important ecological role in nutrient cycling, decomposition of organic matter, and maintaining aquatic ecosystem balance.
The occurrence of such rare biological traits indicates ecosystems that are both healthy and complex, yet sensitive to environmental disturbances.

Multi-Dimensional Analysis

Environmental Dimension
The discovery reinforces the need to conserve fragile ecosystems like Silent Valley, which harbour unique endemic species with unexplored biological characteristics.

Scientific / Technological Dimension
It opens new avenues for research in genetics and developmental biology, particularly concerning sex differentiation, chromosomal dynamics, and evolutionary adaptations in crustaceans.

Governance Dimension
It highlights the role of institutions such as the Zoological Survey of India (ZSI) and academic collaborations in advancing biodiversity documentation and conservation science.

Ethical Dimension
It raises questions about conserving rare genetic phenomena while ensuring that scientific exploration does not disrupt delicate ecosystems.

Data & Facts

- Species: *Vela carli* (endemic to Western Ghats)
- Location: Silent Valley National Park, Kerala
- Phenomenon: Gynandromorphy (dual sexual traits)
- First instance recorded in Gecarcinucidae family
- Research published in *Crustaceana*

Challenges

There is limited scientific understanding of rare genetic conditions like gynandromorphy, restricting deeper ecological and evolutionary analysis.
Fragile ecosystems such as the Western Ghats face threats from climate change, habitat fragmentation, and anthropogenic pressures.
Additionally, there is insufficient long-term monitoring of lesser-known species such as freshwater crabs.

Way Forward

Strengthen biodiversity and taxonomic research focusing on lesser-known species and rare biological traits.
Enhance conservation efforts in the Western Ghats through stricter protection measures and community engagement.
Encourage interdisciplinary research integrating genetics, ecology, and environmental science.
Expand the role of institutions like ZSI and promote academic collaborations for systematic biodiversity documentation.

Conclusion

The discovery of a gynandromorphic crab in Silent Valley reveals the hidden intricacies of biodiversity and highlights the importance of scientific research and ecological conservation in protecting India's natural heritage.

---

2. India's First National Report on the Nagoya Protocol (NR1)

Context

India has submitted its First National Report (NR1) under the Nagoya Protocol for the period 2017–2025, outlining its progress in Access and Benefit Sharing (ABS) within the framework of the Convention on Biological Diversity (CBD).
The report showcases India's advancements in biodiversity governance, community participation, and equitable distribution of benefits from genetic resources, positioning the country as a global leader in ABS implementation.

Relevance

GS Paper II: International Relations (multilateral environmental agreements, global governance)
GS Paper III: Environment (biodiversity, ABS), Economy (bioeconomy), Governance (decentralisation)

Practice Question

"India has emerged as a global leader in Access and Benefit Sharing (ABS) under the Nagoya Protocol." Examine the institutional and legal factors behind this success. (250 words)

Institutional Framework

India has designated the Ministry of Environment, Forest and Climate Change (MoEFCC) as the National Focal Point and the National Biodiversity Authority (NBA) as the Competent National Authority for implementing the Protocol.
A three-tier institutional structure operates:

- National Biodiversity Authority (NBA) at the national level
- State Biodiversity Boards (SBBs/UTBCs)
- Biodiversity Management Committees (BMCs)

More than 2.76 lakh BMCs have been established, ensuring decentralised and participatory governance of biodiversity.

Legal & Policy Framework

The Biological Diversity Act, 2002 (amended in 2023), along with BD Rules 2024 and ABS Regulations 2025, operationalises the Nagoya Protocol in India.
The framework mandates Prior Informed Consent (PIC) and Mutually Agreed Terms (MAT) for accessing genetic resources and associated traditional knowledge.
India ensures transparency through clear procedures, permits, and compliance systems aligned with international ABS standards.

Access & Compliance Mechanism

Access to genetic resources requires mandatory PIC in all cases, with approvals issued in the form of agreements equivalent to permits.
India has granted 12,830 approvals and generated 3,556 Internationally Recognised Certificates of Compliance (IRCCs), accounting for approximately 60.24% of global IRCCs.
Monitoring is supported through Section 36A of the BD Act and digital ABS e-filing systems, enhancing traceability.

Benefit Sharing (ABS Outcomes)

India has collected around USD 34.6 million in monetary benefits, of which USD 16.83 million has been distributed to local communities, BMCs, and stakeholders.
Benefit-sharing rates range from 0.2% to 0.6% of ex-factory sale price, ensuring equitable distribution.
Over 210 individual claimants and 10,414 BMCs have benefited, strengthening community-based conservation.

Community Participation & Equity

Local communities are recognised as “benefit claimers,” ensuring inclusion of traditional knowledge holders.
BMCs and People’s Biodiversity Registers (PBRs) help identify biological resources and associated knowledge holders, enhancing grassroots governance.
Customary rights are protected under Sections 7, 36, and 41 of the BD Act, ensuring social justice.

Digital Governance & Innovation

Implementation is supported by digital tools such as the ABS e-filing portal and ABS Clearing-House (ABS-CH), ensuring transparency and traceability.
India issued the world’s first IRCC in 2015, demonstrating early leadership.
Ongoing efforts aim to develop integrated digital platforms for streamlined ABS processes.

Global Leadership & Cooperation

India contributes significantly to global ABS governance, accounting for the highest share of IRCCs and actively participating in CBD frameworks.
Collaborations include ASEAN-India initiatives, GEF, UNDP BIOFIN, and Indo-German ABS projects.
Participation in agreements such as ITPGRFA and the BBNJ Agreement (2024) further strengthens India’s global role.

Multi-Dimensional Analysis

Environmental Dimension
ABS promotes conservation, sustainable use of biodiversity, and reduces risks of biopiracy.

Economic Dimension
It supports the bioeconomy by monetising genetic resources and generating livelihoods.

Governance Dimension
Decentralised governance through BMCs ensures transparency, accountability, and community participation.

Social / Ethical Dimension
It ensures justice by recognising rights of indigenous communities and traditional knowledge holders.

Legal Dimension
A strong statutory framework ensures enforcement, including appeal provisions through the National Green Tribunal (NGT).

Challenges

Tracing the origin of biological resources is difficult due to intermediaries, weakening benefit-sharing mechanisms.
Limited awareness and language barriers hinder effective implementation of PIC and MAT processes.
Lack of designated checkpoints and complex IRCC documentation slows compliance.
Emerging issues like Digital Sequence Information (DSI) create new regulatory challenges.

Way Forward

Strengthen digital traceability systems and establish formal checkpoints for monitoring resource utilisation.
Enhance awareness and capacity-building among stakeholders.
Simplify procedures through integrated digital platforms.
Develop clear frameworks for DSI and strengthen international cooperation.

Conclusion

India's NR1 highlights a globally leading, community-oriented ABS framework. However, addressing challenges related to traceability, awareness, and emerging technologies is essential to ensure sustainable and equitable biodiversity governance.

3. NavIC Setback: Atomic Clock Failure & India's GPS Challenge

Context

ISRO reported a malfunction in the atomic clock onboard IRNSS-1F on 13 March 2026, impacting the operational efficiency of NavIC (Navigation with Indian Constellation), India's regional satellite navigation system.
Although the satellite had completed its intended 10-year lifespan, the failure highlights ongoing technological and reliability concerns in achieving an independent navigation system.

Relevance

GS Paper III: Science & Technology (space technology, navigation systems), Security (strategic autonomy), Economy (logistics, digital infrastructure)
GS Paper II: Governance (Digital India, public infrastructure, policy coordination)
Interview: Technological sovereignty vs global interdependence

Practice Question

"Failures in critical components like atomic clocks highlight the technological challenges in achieving space-based strategic autonomy." Examine with reference to NavIC. (250 words)

About NavIC (IRNSS)

NavIC, or the Indian Regional Navigation Satellite System, is India's indigenous navigation network designed to provide accurate positioning, timing, and navigation services across India and up to approximately 1500 km beyond its borders.
The system requires a constellation of seven satellites for optimal performance and offers improved signal availability in challenging terrains compared to GPS due to its overhead satellite configuration.

Role of Atomic Clocks

Atomic clocks are essential for precise timekeeping, which enables accurate determination of position, velocity, and timing (PVT) in navigation systems.
Any failure in these clocks directly reduces accuracy, reliability, and service continuity, thereby affecting sectors such as transportation, defence, surveying, and infrastructure planning.

Key Issues Highlighted

The malfunction of the atomic clock in IRNSS-1F adds to earlier failures observed in first-generation satellites, indicating deeper concerns regarding hardware reliability in space missions.
Additionally, the IRNSS-1H mission in 2017 failed to achieve orbit, weakening the constellation and delaying full operational capability of NavIC.

Global Navigation Systems (Comparative Context)

Major global navigation systems include GPS (USA), GLONASS (Russia), Galileo (European Union), and BeiDou (China), all of which provide global coverage through robust satellite constellations.
NavIC, in contrast, remains a regional system, limiting its competitiveness, though it offers higher precision within the Indian region and supports strategic autonomy.

Technological Advancements (Next-Gen NavIC)

The newer generation of satellites (NVS-series) incorporates indigenously developed atomic clocks, reducing reliance on foreign components and improving reliability.
The introduction of dual-frequency signals (L1, L5, and S-band) enhances compatibility with global systems and allows integration into consumer devices such as smartphones and wearable technologies.

Multi-Dimensional Analysis

Strategic / Security Dimension
NavIC is crucial for ensuring strategic independence by providing reliable navigation for military operations, missile systems, and secure communications, thereby reducing dependence on foreign systems like GPS.

Technological Dimension
Recurring issues with atomic clocks, satellite lifespan, and mission failures highlight existing gaps in high-precision engineering and advanced space technologies.

Economic Dimension
Efficient navigation systems support sectors like logistics, agriculture, disaster management, and infrastructure, contributing to economic productivity and digital economy growth.

Governance Dimension
Integration with initiatives such as Digital India, smart cities, and disaster response systems requires a robust and reliable NavIC infrastructure, necessitating coordinated policy efforts and sustained investment.

Global / Geopolitical Dimension
Dependence on foreign navigation systems poses strategic risks, particularly during conflicts when access to GPS may be restricted, making NavIC essential for technological sovereignty.

Data & Evidence

- Coverage: India and ~1500 km beyond
- Required constellation: 7 satellites
- Issue: Failure of IRNSS-1F atomic clock
- Mission lifespan: 10 years (earlier satellites), 12 years (NVS-series)

Challenges

Frequent failures of atomic clocks and satellite degradation affect reliability and accuracy.
Delays in launching replacement satellites hinder full constellation deployment.
Limited global coverage and ecosystem adoption compared to systems like GPS and BeiDou remain significant constraints.

Way Forward

Accelerate deployment of NVS-series satellites equipped with indigenous atomic clocks to ensure continuity and reliability.
Encourage widespread adoption of NavIC in smartphones, vehicles, and public infrastructure through regulatory support and incentives.
Strengthen research and development in precision timing technologies and enhance collaboration between ISRO, academia, and industry.
Expand coverage towards global or extended regional reach and build international partnerships for broader adoption.

---

4. Strait of Hormuz & “Revenge of Geography”

Context

The ongoing crisis in the Strait of Hormuz, triggered by Iran's blockage of a narrow ~20 nautical mile-wide maritime chokepoint, has disrupted global energy flows, emphasising the continued importance of geography in global politics.
This situation reinforces the idea of the "revenge of geography," where physical features continue to shape geopolitical outcomes despite technological advancements and globalisation.

Relevance

GS Paper I: Geography (physical features, human–environment interaction)
GS Paper II: International Relations (West Asia, maritime geopolitics)

Practice Question

"The Strait of Hormuz crisis highlights the enduring relevance of geography in geopolitics." Discuss in the light of the concept of 'revenge of geography'. (250 words)

Core Concept: Revenge of Geography

This concept suggests that geographical features such as mountains, rivers, and straits continue to influence political, economic, and strategic outcomes, limiting the extent to which humans can overcome natural constraints.
Even with technological advancements, strategic chokepoints and terrain continue to determine trade routes, military strategies, and power dynamics, reaffirming geography's lasting significance.

About Strait of Hormuz

The Strait of Hormuz is a narrow maritime passage, approximately 20 nautical miles wide, linking the Persian Gulf with the Gulf of Oman and serving as a crucial global energy corridor.
A substantial portion of the world's oil and gas trade passes through this route, making any disruption highly impactful for global energy security, markets, and geopolitical stability.

Maritime Chokepoints & Global Examples

Important maritime chokepoints such as the Strait of Malacca, Bab-el-Mandeb, Gibraltar, Bosporus, and the Bering Strait act as vital nodes for global trade and military movement.
For example, the Malacca Strait handles around 82,000 vessels annually, while Bab-el-Mandeb plays a key role in linking the Red Sea and the Indian Ocean, illustrating how narrow waterways influence global supply chains and conflicts.

Geography–History Linkages

Historical events demonstrate the decisive role of geography, such as the Battle of Tsushima (1905), the Umayyad entry into Europe via Gibraltar (711 CE), and control over the Bosporus during the Ukraine conflict.
These examples highlight how geographic features have shaped military strategies, trade dominance, and political developments across history.

Multi-Dimensional Analysis

Environmental / Geographical Dimension
Natural features like straits, peninsulas, rivers, plains, and isthmuses determine patterns of settlement, resource availability, and ecological systems, influencing human activity.

Economic Dimension
Global trade is heavily reliant on maritime routes, and disruptions at chokepoints can trigger energy crises, inflation, and supply chain disruptions, as seen in the Hormuz situation.

Security / Strategic Dimension
Chokepoints represent strategic vulnerabilities where nations can exercise control or coercion, making them focal points of naval strategy and geopolitical tensions.

Governance / Political Dimension
Control over key geographical locations shapes diplomatic relations, alliances, and national power, prompting investments in naval strength and maritime security frameworks.

Social / Civilisational Dimension
Historically, civilisations emerged around rivers and fertile regions such as the Nile, Indus, and Yellow River, underscoring geography's role in shaping societal development.

Human Agency vs Geography

Human interventions such as the Suez Canal and Panama Canal demonstrate the ability to modify geographical constraints, reducing travel distances and improving connectivity.
However, these interventions remain limited, as natural factors like terrain, climate, and chokepoints continue to impose constraints on human activity.

Key Insights for India

India's energy security remains vulnerable due to dependence on oil imports passing through the Strait of Hormuz, necessitating diversification strategies and strategic reserves.
India's focus on the Indian Ocean Region, including the Andaman and Nicobar Islands near the Malacca Strait, enhances its strategic leverage in maritime geopolitics.

Challenges

Heavy dependence on critical chokepoints creates vulnerabilities in global trade and energy systems.
Increasing geopolitical tensions may lead to the strategic use or "weaponisation" of geography, disrupting freedom of navigation.
Limited alternative routes reduce resilience against such disruptions.

Way Forward

Diversify energy sources and build strategic petroleum reserves to reduce vulnerability to chokepoint disruptions.
Strengthen maritime domain awareness, naval capabilities, and international cooperation to secure sea lanes.
Develop alternative trade routes such as the International North-South Transport Corridor (INSTC) and multimodal logistics networks.

Conclusion

The Strait of Hormuz crisis reaffirms that while technology enhances human capabilities, geography continues to play a decisive role in global affairs, requiring strategies that align national power with geographical realities.

5. Defence Vision 2047

Context

Defence Forces Vision 2047, articulated by the Defence Minister, lays out India's long-term roadmap to build technologically advanced, integrated, and multi-domain armed forces, aligning military transformation with the broader objective of achieving Viksit Bharat by 2047. This vision emerges in the backdrop of evolving warfare patterns—characterised by prolonged conflicts, technology-driven operations, and industrial-scale mobilisation—as observed in regions like Ukraine, West Asia, and Nagorno-Karabakh.

Relevance

GS Paper II: Governance (defence reforms, institutional integration), International Relations (defence partnerships)
GS Paper III: Security (military modernisation, emerging warfare), Economy (defence industry), Science & Technology (AI, drones, cyber)

Practice Question

"Defence Forces Vision 2047 marks a shift from military modernisation to a comprehensive national power strategy." Analyse. (250 words)

Core Vision & Pillars

The vision aims to develop armed forces that are technologically sophisticated, fully integrated across services, and capable of operating across multiple domains including cyber, space, underwater, and electronic warfare.
It broadens the concept of military strength to include industrial capacity, technological ecosystems, and economic resilience, recognising that national power in the 21st century is inherently multidimensional.

Evolution of Defence Reforms

The strategy builds upon earlier reforms such as the Defence Acquisition Procedure (DAP) 2020, the establishment of the Chief of Defence Staff (CDS), the push for theatre commands, and the development of defence industrial corridors.
A strong emphasis on Atmanirbhar Bharat in defence manufacturing and increased private sector participation marks a transition from import dependence to domestic capability creation.

Strategic Rationale

Modern warfare is increasingly prolonged, technology-intensive, and dependent on sustained industrial production, requiring not only precision systems but also the mass production of weapons, drones, and electronic platforms.
The growing importance of cybersecurity, data networks, and information warfare underscores the role of non-kinetic domains in determining conflict outcomes.

Economic & Industrial Dimension

Defence Vision 2047 integrates national security with economic growth by promoting a robust defence-industrial ecosystem that drives employment, innovation, and exports.
The defence budget, estimated at around ₹7.85 lakh crore, reflects the prioritisation of modernisation and the recognition that industrial capability is fundamental to military strength.

Self-Reliance vs Import Dependence

Despite policy initiatives, India continues to be the world's second-largest arms importer, accounting for approximately 8.2% of global imports (SIPRI 2026), highlighting structural dependence.
Challenges stem from legacy procurement systems, long gestation periods, and gaps in advanced manufacturing capabilities such as aerospace and high-end electronics.

Technology & R&D Dimension

India's defence R&D expenditure remains relatively low at around $2.8 billion (about 3.35% of the defence budget), compared to countries like China, which invests significantly more (~$44.4 billion, ~15%).
Overall R&D spending, at less than 0.7% of GDP, remains insufficient, indicating the need for stronger innovation ecosystems and closer collaboration between academia, industry, and the military.

Global Partnerships & Diplomacy

India is expanding defence cooperation beyond traditional partners such as the USA, France, Russia, and Israel to include countries like Australia, Japan, Brazil, Indonesia, and Gulf nations for co-production and exports.
Strategic partnerships and technology transfers are essential to accelerate domestic capability development and integration into global defence supply chains.

Defence Exports & MSME Ecosystem

Boosting defence exports requires proactive diplomacy, participation in global defence exhibitions, and targeted outreach to countries in the Global South seeking cost-effective solutions.
MSMEs form a critical component of defence supply chains but require consistent demand, financial support, and access to export markets to scale effectively.

Emerging Technologies Focus

Greater emphasis is being placed on emerging technologies such as drones, artificial intelligence, geospatial systems, and electronic warfare, reflecting the shift towards future warfare paradigms where unmanned systems act as force multipliers.
Collaborations like General Atomics–L&T drone manufacturing exemplify growing public-private and international partnerships.

Maritime & Indo-Pacific Dimension

With the Indo-Pacific region gaining strategic importance, India must enhance naval capabilities, underwater warfare capacity, and maritime surveillance to secure sea lanes of communication (SLOCs).

The Indian Ocean Region (IOR) remains central to India's strategic interests, necessitating sustained focus on naval modernisation.

Institutional Integration

The push towards theatre commands and joint operational planning reflects the need for integrated military operations across land, air, sea, cyber, and space domains.
Improving jointness and interoperability is essential for efficient resource utilisation and effective responses to multi-domain threats.

Challenges

Persistent dependence on imports and limited domestic capability in advanced technologies hinder full realisation of self-reliance.
Low R&D investment, bureaucratic delays, and policy inconsistencies constrain innovation and industrial growth.
Weak collaboration between industry and academia, along with limited MSME scaling, affects supply chain resilience.

Way Forward

Increase defence R&D investment and promote innovation ecosystems involving DRDO, academia, startups, and private players.
Accelerate implementation of theatre commands, streamline procurement processes, and reduce bureaucratic inefficiencies.
Strengthen defence export strategies, integrate MSMEs into global supply chains, and leverage partnerships for co-development.
Align defence manufacturing with broader industrial and skilling policies to ensure sustainable growth.

Conclusion

Defence Vision 2047 signifies a transition from conventional military modernisation to a comprehensive national power framework, integrating security, economy, and technology—essential for India's emergence as a major global power by 2047.

---

6. Supreme Court & Chambal Gharial Conservation

Context

The Supreme Court has taken suo motu cognisance of extensive illegal sand mining threatening the National Chambal Sanctuary, a crucial habitat for critically endangered gharials, highlighting judicial intervention in environmental governance.
Despite prior action by the National Green Tribunal (NGT), continued operations by organised sand mining networks have intensified ecological degradation, even impacting relocated gharial habitats.

Relevance

GS Paper II: Governance (judicial activism, federal coordination), Polity (Article 21, NGT)
GS Paper III: Environment (river ecology, biodiversity conservation), Security (environmental crime), Economy (resource extraction)

Practice Question

"Illegal sand mining represents a major threat to riverine ecosystems and governance." Examine with reference to the National Chambal Sanctuary. (250 words)

About National Chambal Sanctuary

The National Chambal Sanctuary is a tri-state protected riverine ecosystem spanning Rajasthan, Madhya Pradesh, and Uttar Pradesh, covering approximately 1800 km of the Chambal river system.
Out of this, around 600 km is officially notified as a protected sanctuary, making it India's only tri-state river sanctuary with significant ecological importance.
The sanctuary supports rich biodiversity, including species such as the gharial, Gangetic dolphin, Indian skimmer, red-crowned roof turtle, smooth-coated otter, and several other endangered aquatic and bird species.

About Gharial

The gharial (*Gavialis gangeticus*) is a critically endangered species listed on the IUCN Red List and is endemic to the Indian subcontinent.
It depends on clean, flowing river ecosystems (lotic systems) and is highly sensitive to habitat disturbances, especially the availability of sandbanks used for nesting.
Due to this sensitivity, it serves as an important indicator species for assessing river ecosystem health.

Key Issues Highlighted

Illegal sand mining has emerged as the most significant threat to the sanctuary, leading to destruction of sandbanks, alteration of river morphology, and reduction in water retention capacity.
These mining operations are organised, aggressive, and continuous, often facilitated by weak enforcement and favourable terrain, allowing activity even within eco-sensitive zones.
The relocation of gharials due to habitat degradation, followed by continued mining in new areas, reflects systemic governance failure and increasing risk of ecological collapse.

Multi-Dimensional Analysis

Environmental Dimension
Sand mining disrupts river ecosystems by destroying breeding habitats and altering natural flow dynamics, leading to biodiversity loss and ecological imbalance.

Governance Dimension
Weak enforcement mechanisms, poor inter-state coordination, and limited administrative capacity enable the dominance of sand mafias, reflecting governance shortcomings.

Legal / Constitutional Dimension
The issue invokes Article 21 (Right to Life), which includes environmental protection, and highlights the judiciary's role through suo motu action and continuing mandamus.

Social / Ethical Dimension
Illegal mining networks contribute to lawlessness and violence against officials, raising ethical concerns regarding resource exploitation versus ecological sustainability.

Economic Dimension
While sand mining supports construction demand, unregulated extraction results in long-term ecological costs and threatens livelihoods dependent on river ecosystems such as fishing and eco-tourism.

Security Dimension
The presence of organised sand mafias represents a form of environmental crime, posing serious challenges to law enforcement and governance stability.

Data & Evidence

- Sanctuary length: ~1800 km (600 km notified protected stretch)
- Spread across three states
- Habitat for critically endangered gharials and multiple endangered species
- Illegal sand mining identified as the primary threat to the ecosystem

Challenges

Inadequate monitoring mechanisms and lack of technological surveillance allow continued illegal mining in remote areas.
Poor coordination among states complicates enforcement, enabling offenders to exploit jurisdictional gaps.
Weak penalties and political-administrative nexus with mining mafias reduce deterrence.

Way Forward

Implement court-monitored enforcement with real-time surveillance using drones, GIS mapping, and satellite technology.
Strengthen inter-state coordination through joint task forces and unified regulatory frameworks.
Enhance penalties and ensure strict prosecution of illegal mining as a serious environmental offence.
Promote sustainable alternatives to sand and regulate legal mining through scientific assessments.

Conclusion

The Chambal case highlights the urgent need for integrated river ecosystem governance, where judicial oversight, technological monitoring, and cooperative federalism work together to protect biodiversity and uphold environmental rule of law.

7. 60th Jnanpith Award

Context

R. Vairamuthu, a distinguished Tamil lyricist and writer, has been chosen for the 60th Jnanpith Award, India's highest literary honour, marking a significant recognition of Tamil literature.

He becomes the third recipient from the Tamil language after a gap of 24 years, following Akilan and Jayakanthan, reflecting patterns in regional literary representation.

Relevance

GS Paper I: Indian Culture (literature, regional diversity)
GS Paper II: Governance (cultural policy, national integration)

Practice Question

"Literature reflects society while also shaping it." Examine in the context of contemporary Indian literary recognition such as the Jnanpith Award. (250 words)

About Jnanpith Award

Established in 1961 by the Bharatiya Jnanpith organisation, the Jnanpith Award is the highest literary recognition in India, honouring outstanding contributions across languages listed in the Eighth Schedule of the Constitution.
The award includes a citation, a cash prize, and a bronze statue of Goddess Saraswati, symbolising knowledge, wisdom, and literary excellence within India's cultural tradition.

About Vairamuthu

R. Vairamuthu is a well-known Tamil poet, novelist, and lyricist, celebrated for blending classical Tamil literary heritage with contemporary themes in both poetry and film lyrics.
He was awarded the Sahitya Akademi Award in 2003 for his novel *Kallikattu Ithikasam*, which portrays agrarian distress and displacement, reflecting a strong commitment to social realism.

Significance of the Award

Cultural Dimension
Recognition of Tamil literature—one of the oldest literary traditions globally—strengthens India's linguistic diversity and cultural plurality, aligning with constitutional values such as those under Article 29.

Social Dimension
Vairamuthu's works highlight issues such as rural distress, migration, and marginalised communities, demonstrating literature's role as a tool for social critique and reform.

Political / Governance Dimension
National literary awards like the Jnanpith promote inclusive representation of diverse linguistic traditions, contributing to national integration while respecting regional identities.

Economic / Soft Power Dimension
Such recognition enhances India's cultural diplomacy and soft power, promoting Indian languages internationally and supporting creative industries like publishing, cinema, and translation.

Data & Facts

- Jnanpith Award established: 1961
- First recipient: G. Sankara Kurup (Malayalam)

- Eligibility: Languages listed in the Eighth Schedule
- Tamil recipients: 3 (including Vairamuthu)
- Gap since last Tamil award: 24 years

Challenges / Criticism

Concerns have been raised regarding perceived regional imbalances in award distribution across languages and literary traditions.
Limited readership and declining engagement with literature due to language barriers reduce the broader societal impact of such awards.
There is also a need for improved translation and accessibility to ensure wider reach of regional literary works.

Way Forward

Promote structured translation initiatives through institutions like the Sahitya Akademi to facilitate cross-cultural literary exchange.
Integrate literary works into education systems and digital platforms such as the National Digital Library to revive reading culture.
Strengthen regional literary ecosystems through funding, recognition, and international promotion to ensure balanced representation.

Conclusion

The Jnanpith Award not only honours literary excellence but also reinforces India's cultural diversity and intellectual traditions, while highlighting the need for broader accessibility and inclusivity in literary recognition.

---

8. India's Manuscript Mapping Drive

Context

The Ministry of Culture has launched India's first nationwide manuscript mapping survey, spanning three months, aimed at documenting the country's vast manuscript heritage and building a unified repository under the Gyan Bharatam Mission.
Announced in the Budget 2025–26, the initiative reflects a strategic shift towards digitising cultural heritage and protecting it from intellectual piracy.

Relevance

GS Paper I: Indian Culture (manuscripts, knowledge systems, heritage conservation)
GS Paper II: Governance (digital governance, cooperative federalism, cultural policy)

Practice Question

"Digitisation of manuscripts is essential for preserving India's civilisational heritage while enabling knowledge democratisation." Examine in the context of the Manuscript Mapping Survey. (250 words)

Core Initiative & Features

The Manuscript Mapping Survey seeks to identify, catalogue, and digitise manuscripts held in institutions, private collections, and by individual custodians, creating a centralised national database for effective heritage management.
It follows a bottom-up administrative approach, beginning at the district level and aggregating data at state and national levels, ensuring comprehensive and decentralised coverage.
The initiative also incorporates already digitised manuscripts—estimated at over 10 lakh—into a unified platform, enabling consolidation of dispersed cultural resources.

Objectives

The mission aims to preserve fragile manuscripts, standardise digitisation processes, and improve access for research, thereby strengthening India's knowledge systems and cultural continuity.
It also seeks to prevent intellectual piracy, safeguard traditional knowledge, and establish India as a global knowledge hub through systematic documentation and dissemination.

Technology Integration

Geotagging technology is employed to accurately map manuscript locations, aiding targeted conservation strategies across different regions.
The Gyan Bharatam App facilitates real-time data entry by survey teams, ensuring efficiency, transparency, and uniformity in data collection.
Standardised digitisation protocols ensure interoperability and long-term usability within a national digital ecosystem.

Policy & Governance Framework

The initiative aligns with the New Delhi Declaration (Gyan Bharatam Conference, 2025), which envisions projecting India's cultural and intellectual heritage globally.
Institutional arrangements include state-level committees led by Chief Secretaries and district-level committees headed by District Magistrates, ensuring cooperative federalism and administrative accountability.
It reflects a model of data-driven governance integrating cultural preservation with Digital India initiatives.

Data & Significance

India possesses approximately one crore manuscripts—the largest collection globally—covering diverse fields such as philosophy, medicine, astronomy, literature, and arts.
With only about 10 lakh manuscripts digitised so far, the initiative addresses a significant gap in documentation, accessibility, and preservation.

Multi-Dimensional Significance

Cultural Dimension
The initiative preserves India's civilisational knowledge systems, ensuring continuity of intellectual traditions in a rapidly globalising world.

Governance Dimension
It exemplifies digital governance in cultural management, enabling improved policy planning, monitoring, and resource allocation.

Economic Dimension
Digitised manuscripts can support research, innovation, and cultural industries, contributing to tourism and the knowledge economy.

Social / Ethical Dimension
It promotes equitable access to knowledge while addressing issues of ownership, custodianship, and fair sharing of traditional knowledge.

Technology / Security Dimension
While digital archiving reduces physical deterioration risks, it raises concerns related to cybersecurity, data protection, and intellectual property rights.

Challenges

A shortage of trained experts in manuscript conservation and ancient scripts limits effective implementation.
Linguistic diversity and script variations complicate standardisation and digitisation processes.
Ownership disputes and reluctance among private custodians may hinder comprehensive coverage.
Infrastructure gaps and coordination challenges across administrative levels affect execution.

Way Forward

Develop a comprehensive legal and policy framework defining ownership, access rights, and intellectual property safeguards.
Leverage artificial intelligence and machine learning for script recognition, translation, and metadata creation.
Integrate with platforms like the National Digital Library and Bhashini to enable multilingual access.
Encourage public-private partnerships and incentivise custodians through financial and institutional support.

Conclusion

The Manuscript Mapping Drive represents a major step towards preserving India's vast intellectual heritage, combining technology, governance, and cultural policy to ensure both conservation and democratisation of knowledge.

18th March 2026: Daily MCQs

Q1. With reference to NavIC (IRNSS), consider the following statements:

1. It provides global navigation coverage similar to GPS.
2. It offers coverage over India and surrounding regions up to about 1500 km.
3. It requires a constellation of seven satellites for optimal functioning.
4. It is operated by the Indian Space Research Organisation (ISRO).

Which of the statements given above is/are correct?
A. Only One
B. Only Two

C. Only Three
D. All Four

Q1. (C)
Explanation:

- Statement 1: Incorrect – NavIC is **regional**, unlike global systems (GPS, BeiDou).
- Statement 2: Correct – Coverage extends to ~1500 km beyond India.
- Statement 3: Correct – Requires **7-satellite constellation**.
- Statement 4: Correct – Operated by **ISRO**.

Q2. With reference to the Strait of Hormuz, consider the following statements:

1. It connects the Persian Gulf with the Gulf of Oman.
2. It is one of the widest maritime chokepoints in the world.
3. A significant proportion of global oil trade passes through it.
4. It lies entirely within the territorial waters of a single country.

Which of the statements given above is/are correct?
A. Only One
B. Only Two
C. Only Three
D. All Four

Q2. (B)
Explanation:

- Statement 1: Correct – Key connector between **Persian Gulf & Gulf of Oman**.
- Statement 2: Incorrect – It is **narrow (~20 nautical miles)** → strategic vulnerability.
- Statement 3: Correct – Major global energy chokepoint.
- Statement 4: Incorrect – Shared maritime space (Iran–Oman region).

Q3. With reference to the Gharial (Gavialis gangeticus), consider the following statements:

1. It is adapted to fast-flowing riverine ecosystems.
2. It constructs nests primarily on rocky substrates.
3. It is endemic to the Indian subcontinent.

Which of the statements given above is/are correct?
A. Only One
B. Only Two
C. All Three
D. None

Q3. (B)
Explanation:

- Statement 1: Correct – Prefers **lotic (flowing river)** systems.
- Statement 2: Incorrect – Nests on **sandbanks**, not rocky surfaces.
- Statement 3: Correct – Endemic species.

Q4.
Assertion (A): The Jnanpith Award recognises literary works across multiple Indian languages.
Reason (R): The award is restricted only to classical languages of India.

A. Both A and R are correct and R is the correct explanation of A
B. Both A and R are correct but R is not the correct explanation of A
C. A is correct but R is incorrect
D. A is incorrect but R is correct

Q4. (C)
Explanation:

- Assertion: Correct – Covers **Eighth Schedule languages**.
- Reason: Incorrect – Not limited to classical languages; includes modern Indian languages.

Q5. With reference to the nationwide Manuscript Mapping Exercise, consider the following statements:

1. It seeks to integrate legacy digitised collections with newly identified manuscripts.
2. The exercise follows a purely centralised archival model.
3. It aims to address intellectual piracy of traditional knowledge.

Which of the statements given above is/are correct?
A. 1 and 3 only
B. 2 and 3 only
C. 1 only
D. 1, 2 and 3

Q5. (A)
Explanation:

- Statement 1: Correct – Integration of **~10 lakh digitised manuscripts**.
- Statement 2: Incorrect – Follows **bottom-up decentralised approach**.
- Statement 3: Correct – Targets **protection of traditional knowledge & anti-piracy**.