



**UPSC
Mentorship**
A Unit of Mentorship India

DAILY CURRENT AFFAIRS

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SOURCES



Table of Contents

1. Fish Fossil Provides Clues to Earth's Evolutionary History.....	2
2. Mission Mausam: Aiming to Improve Weather Forecasts.....	2
3. The Golden Fibre: Jute Cultivation in India.....	3
4. Realising the Rural-Urban Continuum.....	5
5. 'One Nation, One Election' to Be Implemented During Current Government's Term.....	6
6. CPCB Finds Four Locations in Ashtamudi Lake Unfit for Bathing.....	7
7. ICMR Signs Agreements for Clinical Trials of Four Drug Molecules.....	8
8. Post-Glacial Ecosystems Could Help Mitigate Climate Change: Decade-Long Study.....	9
9. Trilobite Fossils from New York Reveal Extra Set of Legs.....	10
10. What are AM, FM, and Signal Modulation?.....	10
11. New Research Rescues the Dodo's Reputation from Confusion and Myth.....	12
12. A Human Touch to India's Mineral Ecosystem.....	13
Daily Quiz.....	14
Solutions	17



GS I

1. Fish Fossil Provides Clues to Earth's Evolutionary History

Source: The Hindu

Prelims: Devonian Period, Coelacanth Fossils, Tectonic Activity

Mains: Evolutionary Biology, Fossil Discoveries, Earth's Geological History

Context: A newly discovered Devonian coelacanth fossil from Western Australia, named **Ngamugawi wirngarri**, reveals insights into Earth's evolution and tectonic activity, bridging the gap between primitive and modern coelacanth species.

Fossil Discovery:

- The fossil, found in the Gogo Formation in Western Australia, dates back to the Devonian period and is exceptionally well-preserved.
- It provides insight into a key transition in the evolutionary history of coelacanth fish.

Tectonic Activity Link:

- The study, published in Nature Communications, connects the discovery to a period of heightened tectonic activity.
- This may have played a role in the preservation of this ancient species and the shifting environments during Earth's early history.

Importance of Ngamugawi wirngarri:

- **Evolutionary Transition:**
 - Ngamugawi wirngarri represents a significant link in coelacanth evolution, marking a transition between primitive forms and more anatomically modern species.
 - Coelacanths, often considered "living fossils," provide valuable insights into early vertebrate evolution.
- **Gogo Formation Fossils:**
 - The Gogo Formation is known for its rich fossil record, and this new discovery adds to its significance
 - It helps scientists in understanding the evolutionary changes during the Devonian period, a time known for the diversification of fish and early vertebrates.

Conclusion:

- The discovery of Ngamugawi wirngarri adds a crucial piece to the puzzle of Earth's evolutionary history.
- By linking this fossil to tectonic movements and studying its anatomical features, scientists can further explore the evolutionary transitions of early vertebrates and the environmental factors that influenced them.

2. Mission Mausam: Aiming to Improve Weather Forecasts

Source: The Hindu

Prelims: India Meteorological Department (IMD), Weather Forecasting, Cloud Seeding

Mains: Mission Mausam, Weather Prediction Technology, Atmospheric Observations



Context: The Cabinet approved Mission Mausam, a ₹2,000 crore plan to boost India's weather forecasting, including monsoon predictions and extreme weather alerts, with advanced technology.

Objectives of Mission Mausam:

- **Enhanced Observations:** Improve monsoon forecasts and timely warnings for air quality and extreme weather events like cyclones.
- **Advanced Instruments:** Install 60 weather radars, 15 wind profilers, and 15 radiosondes by 2026 for real-time atmospheric data, including wind speeds, pressure, humidity, and temperature.
- **Technology Upgrades:** Deploy next-gen radars, advanced satellite systems, high-performance supercomputers, and GIS-based automated decision support systems.

Evolution from Monsoon Mission:

- **Predecessor:** Monsoon Mission (2012): Introduced dynamical models for weather simulation using high-performance computing, enhancing medium-range forecasts.
- **Dynamical Models:** Provided forecasts on various timescales and for specific events like heatwaves and cold waves.

Features of Mission Mausam:

- **Weather Management:** Explore weather modification techniques, including cloud seeding to influence rainfall.
- **Lightning Control:** Experiment with cloud chambers to reduce lightning strikes, which are major causes of natural deaths in India.
- **Cloud Chamber:** Set up at the Indian Institute of Tropical Meteorology (IITM) to study and simulate cloud interiors and refine weather modification techniques.

Challenges with Weather Modification:

- **Control Boundaries:** Cloud seeding outcomes can be unpredictable, with risks of unintended rainfall. The mission includes research to understand and refine these techniques.

Conclusion:

- Mission Mausam aims to advance weather forecasting and introduce innovative weather management strategies.
- Its success could transform India's ability to predict and manage extreme weather, improving preparedness and reducing related fatalities.

3. The Golden Fibre: Jute Cultivation in India

Source: The Hindu

Prelims: Jute, Natural Fibre, Environment-Friendly Alternatives

Mains: Jute Industry, Environmental Impact, Economic Importance of Jute Cultivation



MISSION MAUSAM

receives approval from Union Cabinet

- Aims to boost India's weather and climate-related science, research and services
- Will help to better equip stakeholders in tackling extreme weather events and the impacts of climate change



Context: Jute, the golden fibre, is crucial in India for sustainable packaging and as a cash crop. Assam is the second-largest producer, significantly supporting local livelihoods.

Importance of Jute:

- **Second Most Important Cash Crop after Cotton:**
 - major cultivating states is West Bengal, Assam, and Bihar
- **Economic Role:**
 - Approximately 14 million people in India rely on raw jute farming and trade for their livelihood.
 - Jute is a labour-intensive crop, providing vast employment opportunities, particularly to marginal and small farmers in Assam.
- **Major Jute-Producing Districts in Assam:** Nagaon, Goalpara, Barpeta, and Darrang are the primary regions where jute is cultivated.

Jute Cultivation Process:

- **Growth and Harvesting:**
 - Jute is a bast fibre crop that can be harvested after 100 to 150 days of vegetative growth.
 - Harvesting at the pre-bud or bud stage gives the best quality fibre, though yields are lower.
 - Harvesting during early pod formation is a compromise between quality and quantity.
- **Harvesting Method:**
 - Farmers cut the jute plants at ground level with sharp sickles or uproot them in flooded lands.
 - The plants are left for two or three days to shed their leaves before being tied into bundles for retting.

Retting Process:

- Retting is a crucial operation that determines fibre quality.
- Bundles of jute are submerged in water, weighted down with seasoned logs or concrete blocks, and kept in slow-moving clean water at an optimal temperature of 34°C.
- Retting is complete when the fibre separates easily from the stem.

Environmental and Economic Benefits:

- **Biodegradable Alternative to Plastic:** With the global push to reduce plastic use, jute offers a biodegradable, eco-friendly alternative for packaging, making it a valuable commodity in today's economy.
- **Value-Added Products:** In addition to its traditional uses, jute is now being explored for value-added products like paper, pulp, composites, and textiles, further boosting its economic potential.

Conclusion:

Jute Value Chain

The jute value chain *viz* the farm to fibre (jute growing), the fibre to yarn (spinning), the yarn to grey fabric (weaving), and the grey fabric to finished fabric (processing) is reflected below:



- Jute's role as a sustainable and economically significant crop positions it as a key player in India's agricultural and industrial sectors.
- As countries increasingly turn to eco-friendly alternatives to plastic, jute's importance will continue to grow, benefiting both the environment and the economy.

4. Realising the Rural-Urban Continuum

Source: The Hindu

Prelims: 73rd and 74th Constitutional Amendments, AMRUT, Swachh Bharat Mission

Mains: Urbanisation, Rural-Urban Governance, Financial Decentralisation, Inclusive Development

Context: India's rapid urbanisation creates challenges beyond traditional urban and rural frameworks, making it essential to view the country as a rural-urban continuum for effective infrastructure development and governance.

Background:

- **Urban Shift:** Significant growth in Tier II and Tier III cities and urban peripheries, necessitating an integrated approach to governance and infrastructure rather than treating these areas as separate from rural issues.
- **Over-Centralisation of Finances:** Central limiting the local bodies' financial autonomy. The 13th Finance Commission noted local bodies' constraints due to tied grants and insufficient untied funds.

Infrastructure Challenges:

- **Waste Management:**
 - **AMRUT:** Originally for 500 cities, now covers all statutory towns but overlooks census towns and urban villages. Kerala, for example, struggles with waste management as 90% of its area is urban.
 - **Swachh Bharat Mission:** Aims for open defecation-free status and waste management but lacks integration between rural and urban waste management projects, causing inefficiencies.

Need for Integrated Governance Models:

- **District Planning Committees:**
 - These committees, meant to integrate rural and urban planning under the 73rd and 74th Amendments, often face bureaucratic hurdles.
 - Strengthening them could improve rural-urban governance.
- **Kerala's Model:**
 - Kerala's integration of rural and urban governance under the Ministry for Local Self-Governments has proven effective, as seen in the resolution of issues related to solid waste management.

Financial and Resource Allocation:

- **Compartmentalised Resources:** India's resource allocation system, split between urban and rural areas, hampers effective planning. Integrated, flexible planning is needed to address both rural and urban needs.

Conclusion:

- India's transition to an urban society demands a unified approach to governance and resource allocation.
- Strengthening local governance structures like District Planning Committees, integrating infrastructure projects, and allowing flexibility in financial planning are crucial for achieving inclusive growth.



GS II

5. 'One Nation, One Election' to Be Implemented During Current Government's Term

Source: The Hindu

Prelims: Simultaneous Elections, Census, NDA Government

Mains: Electoral Reforms, Government Policy, Administrative Efficiency

Context: The government aims to implement the "One Nation, One Election" initiative, proposing simultaneous Lok Sabha and State Assembly elections. Additionally, the long-delayed decadal census is set to begin soon.

Implementation Plan:

- **Simultaneous Elections:**
 - The government plans to synchronize elections for both the national and state legislatures, reducing the frequency and cost of elections.
 - This initiative was highlighted in 2014 and has been endorsed by a committee led by former President Ram Nath Kovind.
- **Census Exercise:** The decadal census, which has been postponed since 2011, will commence shortly. This census is crucial for updating demographic data and informing policy decisions.

Government's Focus:

The government, marking 100 days of its third term, is committed to implementing these reforms despite being a coalition government.

Political and Administrative Context:

- **Long-Term Vision:** The government aims to continue the reforms and policies initiated over the past decade, focusing on efficient governance and substantial infrastructure projects.

Conclusion:

- The implementation of "One Nation, One Election" and the initiation of the census mark significant steps in administrative and electoral reform.
- These initiatives are expected to streamline the electoral process and provide updated demographic data, further enhancing governance efficiency and policy-making.



GS III

6. CPCB Finds Four Locations in Ashtamudi Lake Unfit for Bathing

Source: The Hindu

Prelims: Water Pollution, Environmental Protection, Ramsar Sites

Mains: Environmental Degradation, Water Quality Monitoring, Human Impact on Wetlands

Context: The Central Pollution Control Board (CPCB) has identified four locations in the Ashtamudi Lake, Kollam district, Kerala, as failing to meet the Primary Water Quality Criteria for Bathing, highlighting a critical environmental issue.

Water Quality Concerns in Ashtamudi Lake:

- The water quality at four locations—Thoppilkadavu near Perumon, and near Kundara ceramics was found to be non-compliant with bathing standards under the Environment (Protection) Rules, 1986.
- The monitored parameters include faecal coliform and streptococci levels, pH, dissolved oxygen, and biological oxygen demand (BOD), all of which exceeded the permissible limits.

Sources of Pollution:

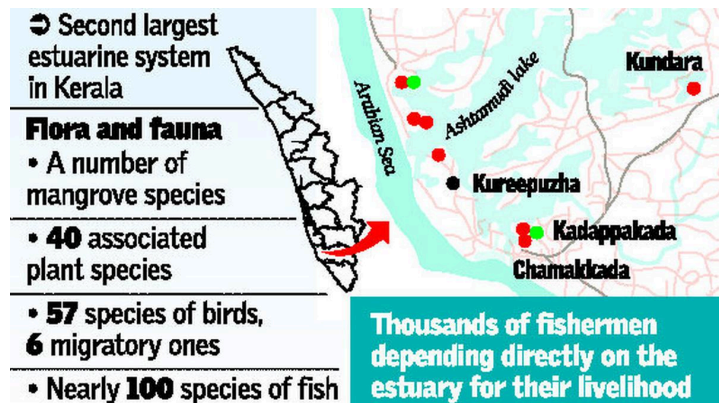
- Accumulated garbage, including plastic waste near the lake's banks, is a major contributor to water contamination.
- The CPCB has urged the state government to identify and address pollution sources in these locations, especially as Ashtamudi Lake is a designated Ramsar site, signifying its ecological importance.

Impact on Macrofauna:

- A study by the University of Kerala found significant contamination of the lake's ecosystem, with microplastics detected in fish (19.6%) and shellfish (40.9%), threatening the local aquatic biodiversity.
- The research was conducted as part of the Ecomarine Project, co-funded by the European Union's Erasmus programme, and revealed the broader environmental impact of pollution in the lake.

Conclusion:

- The findings point to a pressing need for immediate action to restore water quality in Ashtamudi Lake.
- Addressing pollution in Ramsar sites like Ashtamudi is critical not only for preserving biodiversity but also for maintaining the environmental health of water bodies crucial to local communities.



7.ICMR Signs Agreements for Clinical Trials of Four Drug Molecules

Source: The Hindu

Prelims: Clinical Trials, Drug Development

Mains: Advancements in Healthcare, Indigenous Drug Development, Public Health Initiatives

Context: The Indian Council of Medical Research (ICMR) has signed Memorandums of Agreement (MoAs) with multiple sponsors for conducting first-in-human clinical trials of four promising drug molecules.

Key Collaborations:

- **Multiple Myeloma Research:** ICMR has partnered with Aurigene Oncology Ltd. to study a small molecule aimed at treating multiple myeloma.
- **Zika Vaccine Development:** Indian Immunologicals Ltd. will collaborate with ICMR to develop a vaccine for the Zika virus.
- **Seasonal Influenza Virus Vaccine:** A trial for a vaccine against seasonal influenza will be conducted in partnership with Mynvax Private Ltd.
- **CAR-T Cell Therapy for Cancer:** ICMR and ImmunoACT will study CAR-T cell therapy for chronic lymphocytic leukemia, exploring a new therapeutic approach.

Infrastructure for Clinical Trials:

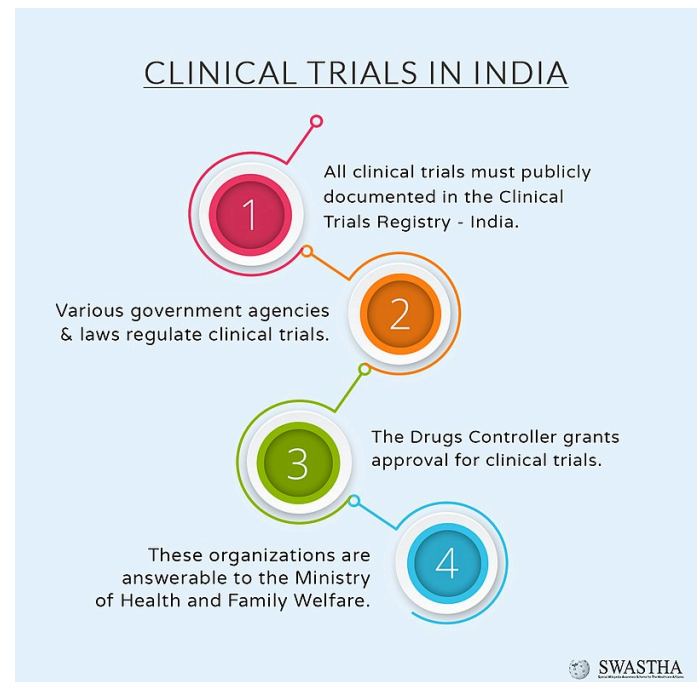
- The Network for Phase 1 Clinical Trials established by ICMR includes four premier institutions:
 - King Edward Memorial Hospital and Seth Gordhandas Sunderdas Medical College, Mumbai
 - Advanced Centre for Treatment, Research and Education in Cancer, Navi Mumbai
 - SRM Medical College Hospital and Research Centre, Kattankulathur
 - Postgraduate Institute of Medical Education and Research, Chandigarh

Significance:

- These collaborations are crucial for ensuring affordable and accessible advanced medical treatments for all citizens.
- Infrastructure for Phase 1 clinical trials will accelerate the development of indigenous drug molecules and innovative treatments.

Conclusion:

- ICMR's agreements for clinical trials mark a significant step in India's pursuit of pioneering treatments and vaccines.
- These collaborations will foster innovation in healthcare and support the development of affordable solutions to tackle serious diseases like cancer and viral infections.



8. Post-Glacial Ecosystems Could Help Mitigate Climate Change: Decade-Long Study

Source: The Hindu

Prelims: Glacial Retreat, Ecosystem Development, Climate Change Mitigation

Mains: Role of Post-Glacial Ecosystems in Climate Mitigation, Biogeochemical Processes, Global Glacial Study

Context: A Nature study finds glacial retreat worsens climate change, but post-glacial ecosystems could mitigate it. Effective management of these ecosystems is crucial for climate benefits.

Key Findings:

- **Deglaciation and Climate Impact:** Glacier retreat lowers surface reflectivity and releases carbon, worsening climate change. However, post-glacial ecosystems can sequester carbon and aid biogeochemical cycling.
- **Decade-Long Study:** Over ten years, 1,200 soil samples from nearly 50 glaciers were analyzed. Led by Prof. Gentile Francesco Ficetola and Silvio Marta, the study explores ecosystem development in glacial retreat areas.

Indian Contribution:

- **Indian Glacial Research:** Central University, Punjab and Jawaharlal Nehru University, Delhi, contributed to the study by analysing soil samples from India's Gangotri and Bara Shigri glaciers.
- **Ecosystem Development:** Microorganisms quickly colonize newly exposed areas, enriching the soil, followed by plants like lichens and mosses, fostering more complex ecosystems.

Potential for Climate Change Mitigation:

- Proper management of post-glacial ecosystems can significantly enhance their role in climate change mitigation by promoting biogeochemical processes.
- These areas can provide temporary habitats for species displaced by climate change, creating a balance in threatened ecosystems.

Conclusion:

- The study underscores the potential of post-glacial ecosystems as a natural tool in combating climate change.
- Effective management of these ecosystems could accelerate their development and enhance their role in mitigating environmental damage, offering hope in the global fight against climate change.



9. Trilobite Fossils from New York Reveal Extra Set of Legs

Source: The Hindu

Prelims: Trilobite Fossils, Arthropod Anatomy, Paleontology

Mains: Evolutionary Biology, Fossil Preservation, Insights into Arthropod Segmentation

Context: A *Palaeontology* study reveals a New York trilobite with an extra pair of legs under its head, revising assumptions about trilobite anatomy.

Additional Appendage Discovery:

- *Triarthrus eatoni* fossils reveal a fifth pair of appendages under the head, indicating that extra head appendages might be more prevalent in trilobites than previously thought.

Trilobite Anatomy:

- Trilobites, related to modern lobsters and spiders, have segmented bodies with a head, thorax, and tail.
- Their heads consist of fused segments with various appendages for sensory, feeding, and locomotion functions.

Methods of Segment Counting:

- **Groove Counting:** Observes furrows (grooves) on the exoskeleton to count head segments.
- **Appendage Counting:** Counts soft appendages like legs and antennae preserved in fossils, though these are rarely found and can lead to discrepancies.

Research Methodology:

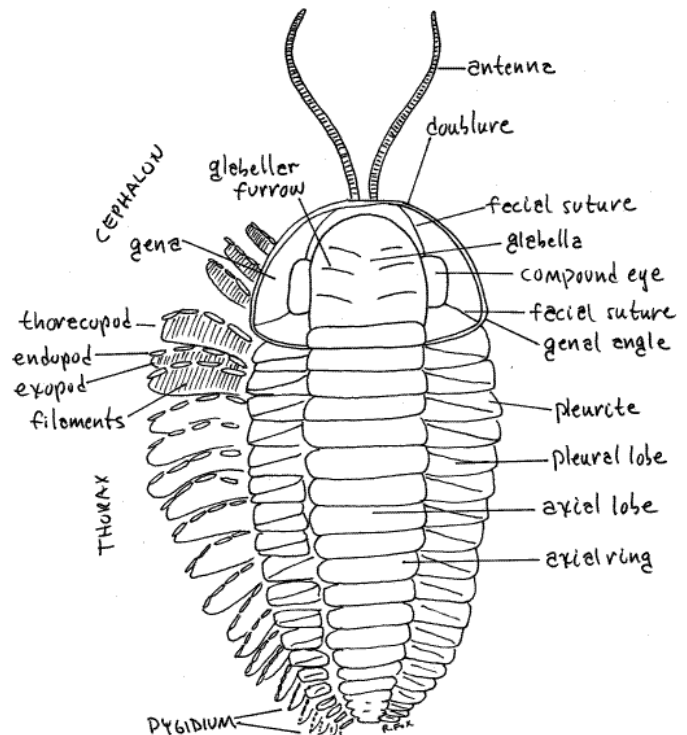
- The study analyzed *Triarthrus eatoni* specimens preserved with pyrite, revealing the additional, undocumented leg under the head.
- Comparisons with *Olenoides serratus* from the Burgess Shale helped model appendage attachment.

Resolving Anatomical Mismatches:

- The researchers' model resolves discrepancies between counting methods, showing the trilobite head had six segments
- One for the eyes and five for one pair of antennae and four pairs of walking legs.

Conclusion:

- The discovery of an additional appendage in *Triarthrus eatoni* offers new insights into trilobite anatomy and arthropod evolution, enhancing understanding of ancient arthropod biology.



10. What are AM, FM, and Signal Modulation?

Source: The Hindu

Prelims: AM, FM, PM, Modulation

Mains: Communication Technology, Signal Modulation, Digital vs. Analog Transmission

Context: Signal modulation is vital in communication technology, involving changes to wave properties such as amplitude, frequency, and phase to transmit information.

Signal Modulation:

- Modulation encodes information into carrier waves by modifying their amplitude, frequency, or phase, facilitating data transmission and reducing interference.

Types of Modulation:

- **Amplitude Modulation (AM):**
 - **Concept:** Varies the amplitude (height) of the wave. Higher amplitude represents stronger signals.
 - **Application:** Used in radio broadcasting for long-distance communication. AM signals travel over obstacles but are prone to interference.
 - **Frequency Range:** 535-1,705 kHz. Covers larger areas but has lower sound quality compared to FM.
- **Frequency Modulation (FM):**
 - **Concept:** Alters the frequency (waves per second) while keeping the amplitude constant. Higher frequency corresponds to higher-pitched signals.
 - **Application:** Employed in high-quality radio broadcasts, especially for music, due to its resistance to noise.
 - **Frequency Range:** 88-108 MHz. Provides superior sound quality but has a shorter coverage range.
- **Phase Modulation (PM):**
 - **Concept:** Changes the phase of the wave, adjusting the timing of wave peaks and troughs to encode information.
 - **Application:** Used in digital communications (e.g., Wi-Fi) for better noise resistance.
 - **Advantages:** More resistant to noise compared to AM and FM.

Digital vs. Analog Transmission:

- **Analog Transmission:** AM and FM are used for continuous signals, typical in traditional TV and radio.
- **Digital Transmission:** PM is used for discrete signals (0s and 1s), offering clearer and interference-free communication.

Importance of Signal Modulation:

- **Multiple Signals:** Modulation enables simultaneous transmission of different signals without interference.
- **Minimising Interference:** Advanced techniques, especially digital, reduce external interference.

ITU Role: The International Telecommunication Union (ITU) allocates frequency bands for various services to prevent interference.

Conclusion:

- Signal modulation (AM, FM, PM) is crucial for modern communications.
- While analog signals remain prevalent due to cost, digital transmission is increasingly favored for its quality and interference resistance.



11. New Research Rescues the Dodo's Reputation from Confusion and Myth

Source: The Hindu

Prelims: Dodo, Extinction, Biodiversity

Mains: Evolution, Human Impact on Extinction, Conservation

Context: The dodo, once thought to be a dumb bird, is being re-evaluated. New research using advanced technology offers fresh insights into its nature and extinction.

Historical Perception: The dodo, often depicted as a clumsy, foolish bird in literature, was historically viewed as a symbol of inevitable extinction due to its perceived lack of intelligence.

New Findings:

- Recent studies from the University of Southampton, Oxford University Museum, and the Natural History Museum reveal that the dodo was more agile and better adapted to its forest environment than previously believed, based on soft tissue analysis and historical research.

What Really Doomed the Dodo?

- This adaptation suited its environment but limited its flying ability.

Misconceptions and Evidence:

- Early Misidentifications:** Much of the early understanding of the dodo came from sailors' reports and inaccurate artist's impressions due to the bird's rapid extinction and lack of comprehensive evidence.
- Eyewitness Accounts:** Dutch mariner Volkert Evertsz described the dodo as a large, flightless bird capable of running swiftly. Anatomical evidence supports this, suggesting the dodo was faster and more agile than previously believed.

Human Impact:

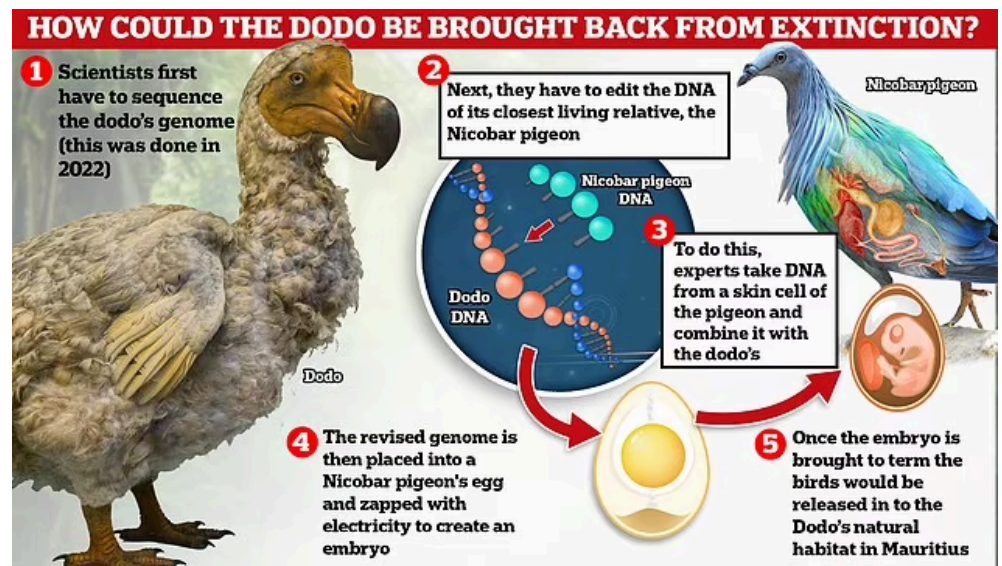
- The dodo's extinction highlights the impact of human activity on biodiversity. Understanding past extinctions can help protect current and future species.

Future Research:

- Ongoing research aims to determine if the dodo's extinction was inevitable or preventable, underscoring the importance of environmental stewardship and learning from past mistakes.

Conclusion:

- The dodo's story reveals the broader impact of human actions on biodiversity.
- Modern research shows that the dodo was more capable than once thought, emphasizing the need for responsible environmental management to prevent similar extinctions.



Editorial, Ideas and Opinions

12. A Human Touch to India's Mineral Ecosystem

Source: The Hindu

Prelims: Mines and Minerals (Development and Regulation) Act, District Mineral Foundation (DMF), PMKKKY

Mains: Mineral Resources, Inclusive Growth, Cooperative Federalism

Context: Since 2014, the Indian government has reformed mineral resource allocation and management, emphasising benefits for local communities through initiatives like the District Mineral Foundation (DMF).

Background:

- **Judicial Intervention:** In 2014, India's judiciary highlighted irregularities in coal block allocations, leading to substantial financial losses, as reported by the 2012 CAG report.
- **2015 Amendment:** Amendment of Mines and Minerals Act in 2015 to mandate mineral block auctions and establish the District Mineral Foundation (DMF) for local community benefits.

Transformation through DMF:

- **₹1 Lakh Crore Corpus:** The DMF has raised nearly ₹1 lakh crore for decentralised development in mining-affected areas, shifting from financial losses to regional development.
- **Pradhan Mantri Khanij Kshetra Kalyan Yojana (PMKKKY):** DMF operates under this scheme to implement projects in mining regions, ensuring sustainable livelihoods and complementing government schemes.

DMF's Role in Local Development:

- **Employment and Innovation:** DMFs support local self-reliance through self-help groups and technology training, such as drone technology in Katni.
- **Strategic Minerals:** DMFs aid in securing strategic mineral resources and focus on local community welfare.

Innovation and Inclusivity:

- **Governance Models:** DMFs use innovative governance, including elected and non-elected representatives.
- **Three-Year Plans:** DMFs develop targeted, sustainable projects and standardise best practices.

Convergence of Resources:

- **Integration:** DMFs align with state and central schemes to enhance livelihoods, promote medicinal plants, and develop rural infrastructure.
- **Cooperative Federalism:** DMFs demonstrate cooperative federalism by aligning local, state, and national priorities for maximum impact.

Conclusion:

- DMFs showcase how cooperative federalism can effectively address local needs and leverage resources for economic growth, transforming underserved regions and ensuring sustainable livelihoods.



Daily Quiz

Q1. Consider the following statements regarding the newly discovered Devonian coelacanth fossil, Ngamugawi wirngarri, and its implications for Earth's evolutionary history:

1. The Ngamugawi wirngarri fossil was found in the Gogo Formation of Western Australia and dates back to the Devonian period.
2. The fossil discovery is linked to a period of heightened tectonic activity, which may have contributed to its preservation.
3. Ngamugawi wirngarri represents a direct evolutionary ancestor of modern coelacanth species, marking a significant transition in their evolutionary history.

Which of the above statements is/are correct?

- A. 1 and 2 only
- B. 2 and 3 only
- C. 1 and 3 only
- D. 1, 2, and 3

Q2. Consider the following statements regarding Mission Mausam:

Statement 1: Mission Mausam includes plans to install 60 weather radars, 15 wind profilers, and 15 radiosondes by 2026 to improve real-time atmospheric data collection.

Statement 2: Mission Mausam will rely solely on the existing dynamical models from the Monsoon Mission without introducing any new technology or methodologies.

Which of the following is correct in respect of the above statements?

- A. Both statements are correct, and Statement 2 highlights the mission's use of existing models.
- B. Both statements are correct, but Statement 2 is not directly related to Statement 1.
- C. Statement 1 is correct, and Statement 2 is incorrect.
- D. Statement 2 is correct, and Statement 1 is incorrect.

Q3. Which of the following statements about jute cultivation in India is NOT accurate?

- A. Jute is predominantly cultivated in Assam, West Bengal, and Bihar, with Assam being the second-largest producer after West Bengal.
- B. Jute is harvested at the pod stage to maximize both quality and quantity of the fibre.

- C. The retting process for jute involves submerging bundles of jute in water, where they are weighted down and kept in optimal conditions for fibre separation.
- D. Jute provides significant employment opportunities, particularly benefiting marginal and small farmers in Assam.

Q4. Consider the following pairs:

Column I	Column II
1. AMRUT	Aims to provide basic infrastructure services in urban areas.
2. Swachh Bharat Mission	Faces challenges due to lack of integration between rural and urban waste management projects.
3. District Planning Committees	Intended to integrate rural and urban planning efforts but often faces bureaucratic hurdles.
4. Financial Decentralisation	Over-centralisation limits local bodies' financial autonomy.

How many pairs are correctly matched?

- A. 1 pair
- B. 2 pairs
- C. 3 pairs
- D. All are Correct

Q5. Consider the following statements regarding the "One Nation, One Election" initiative and the upcoming decadal census:

1. The government plans to implement simultaneous elections for both the Lok Sabha and State Assemblies to reduce the frequency and cost of elections, with the initiative having been highlighted in 2014 and endorsed by a committee led by former President Ram Nath Kovind.
2. The decadal census, which has been delayed since 2011, is set to commence soon and is essential for updating demographic data and informing policy decisions.
3. The "One Nation, One Election" initiative and the census exercise are being implemented as part of a new



government's agenda, marking a shift in political strategy and administrative priorities.

Which of the above statements is/are correct?

- A. 1 and 2 only
- B. 2 and 3 only
- C. 1 and 3 only
- D. 1, 2, and 3

Q6. Consider the following statements regarding the Central Pollution Control Board's (CPCB) findings on water quality in Ashtamudi Lake:

1. The CPCB identified four locations in Ashtamudi Lake as failing to meet the Primary Water Quality Criteria for Bathing, including Thoppilkadavu near Perumon and locations near Kundara ceramics.
2. The detected levels of contaminants such as faecal coliform, pH, and biological oxygen demand (BOD) were within permissible limits according to the Environment (Protection) Rules, 1986.
3. The sources of pollution include accumulated garbage and plastic waste, which contribute to the contamination of the lake's water.

Which of the above statements is/are correct?

- A. 1 and 2 only
- B. 2 and 3 only
- C. 1 and 3 only
- D. 1, 2, and 3

Q7. Consider the following statements regarding the Indian Council of Medical Research (ICMR) agreements for clinical trials:

Statement 1: ICMR has signed agreements for first-in-human clinical trials of four drug molecules, including a small molecule for multiple myeloma and a vaccine for the Zika virus.

Statement 2: The Network for Phase 1 Clinical Trials established by ICMR includes four premier institutions that will support the trials, which are crucial for the development of indigenous drug molecules and innovative treatments.

Which of the following is correct in respect of the above statements?

- A. Both statements are correct, and Statement 2 provides additional context on the importance of the established network.
- B. Both statements are correct, but Statement 1 does not mention all the collaborations included in the agreements.

- C. Statement 1 is correct, and Statement 2 is incorrect.
- D. Statement 2 is correct, and Statement 1 is incorrect.

Q8. Which of the following statements about the role of post-glacial ecosystems in climate change mitigation is NOT accurate?

- A. Glacier retreat decreases surface reflectivity and releases carbon, which exacerbates climate change, but post-glacial ecosystems have the potential to sequester carbon and aid in biogeochemical cycling.
- B. The decade-long study analyzed soil samples from nearly 50 glaciers, including contributions from Indian research institutions, highlighting the rapid colonization of newly exposed areas by microorganisms and plants.
- C. Proper management of post-glacial ecosystems is crucial for enhancing their role in climate change mitigation, as they can provide temporary habitats for species displaced by climate change and foster more complex ecosystems.
- D. Post-glacial ecosystems, once fully developed, are not expected to contribute significantly to climate change mitigation due to the limited capacity of these ecosystems to sequester carbon.

Q9. Which of the following statements about the discovery of an extra set of legs in trilobite fossils from New York is NOT accurate?

- A. The discovery of additional appendages in *Triarthrus eatoni* fossils reveals that extra head appendages might be more common in trilobites than previously assumed.
- B. Trilobites, related to modern lobsters and spiders, have segmented bodies with a head, thorax, and tail, but the newly discovered appendages were found under the thorax.
- C. The study used groove counting and appendage counting methods to resolve discrepancies in segment counting and confirmed that the trilobite head had six segments.
- D. Analysis of *Triarthrus eatoni* specimens preserved with pyrite, along with comparisons with *Olenoides serratus*, provided new insights into trilobite anatomy and arthropod evolution.

Q10. Which of the following statements about signal modulation and its types is accurate?



- A. Amplitude Modulation (AM) varies the frequency of the carrier wave, making it suitable for high-quality audio transmission but with limited coverage range.
- B. Frequency Modulation (FM) alters the amplitude of the carrier wave, providing superior sound quality but being more prone to interference compared to AM.
- C. Phase Modulation (PM) changes the phase of the carrier wave, offering better resistance to noise compared to AM and FM.
- D. Digital transmission uses Amplitude Modulation (AM) for discrete signals, which provides clearer communication with reduced interference.

Q11. Consider the following statements regarding new research on the dodo and its implications:

- 1. The dodo's inability to fly, due to its adaptation to a specific environment, was a key factor in its extinction, highlighting the bird's inherent limitations rather than the impact of human activity.
- 2. Recent studies reveal that the dodo was more agile and better adapted to its forest environment than previously thought, based on advanced soft tissue analysis and historical research from institutions like the University of Southampton and the Oxford University Museum.
- 3. Early misconceptions about the dodo, including the idea that it was a clumsy

and foolish bird, were based on sailors' reports and inaccurate artist's impressions rather than comprehensive evidence.

Which of the above statements is/are correct?

- A. 1 and 2 only
- B. 2 and 3 only
- C. 1 and 3 only
- D. 1, 2, and 3

Q12. Consider the following statements regarding the District Mineral Foundation (DMF) and its impact on India's mineral ecosystem:

- 1. The DMF was established as part of the 2015 amendment to the Mines and Minerals Act and has raised nearly ₹1 lakh crore for decentralised development in mining-affected areas.
- 2. The Pradhan Mantri Khanij Kshetra Kalyan Yojana (PMKKKY) operates independently of the DMF, focusing solely on the development of mining regions.
- 3. DMFs contribute to local development by supporting self-reliance through technology training, such as drone technology, and by aligning with state and central schemes for comprehensive resource utilisation.

Which of the above statements is/are correct?

- A. 1 and 3 only
- B. 2 and 3 only
- C. 1 and 2 only
- D. 1, 2, and 3



Solutions

1. Correct Answer is A

Explanation:

- **Statement 1 is correct:** The Ngamugawi wirngarri fossil was indeed discovered in the Gogo Formation of Western Australia and dates back to the Devonian period. This discovery is significant as it provides insights into a key period in Earth's evolutionary history.
- **Statement 2 is correct:** The fossil's discovery is linked to a period of heightened tectonic activity, which may have played a role in its preservation. This connection helps scientists understand the environmental factors influencing fossil preservation and evolutionary transitions.
- **Statement 3 is incorrect:** Ngamugawi wirngarri represents an important transitional form in coelacanth evolution but is not a direct ancestor of modern coelacanth species. Instead, it helps bridge the gap between primitive forms and more anatomically modern species, rather than being a direct ancestor.

2. Correct Answer is C

Explanation:

- **Statement 1 is correct** because Mission Mausam plans to install advanced weather monitoring instruments like radars and profilers to enhance data collection.
- **Statement 2 is incorrect** as Mission Mausam introduces new technologies and upgrades beyond the existing dynamical models from the Monsoon Mission.

3. Correct Answer is B

Explanation:

- Jute is generally harvested at the pre-bud or bud stage to achieve the best quality fibre, though this yields lower quantities.
- Harvesting during early pod formation is a compromise between quality and quantity, but not the optimal method for either.
- The other statements accurately reflect the major jute-producing states, the retting process, and the economic importance of jute in providing employment.

4. Correct Answer is D

Explanation:

- **AMRUT** : Aims to provide basic infrastructure services in urban areas.
- **Swachh Bharat Mission** : Faces challenges due to lack of integration between rural and urban waste management projects.
- **District Planning Committees** : Intended to integrate rural and urban planning efforts but often faces bureaucratic hurdles.
- **Financial Decentralisation** : Over-centralisation limits local bodies' financial autonomy.

5. Correct Answer is A

Explanation:

- **Statement 1 is correct:** The government indeed plans to synchronize elections for both the Lok Sabha and State Assemblies to streamline the electoral process and reduce costs. This initiative was first proposed in 2014 and has received endorsement from a



committee led by former President Ram Nath Kovind.

- **Statement 2 is correct:** The decadal census, which has been postponed since 2011, is scheduled to begin soon. This census is crucial for updating demographic data and will play a significant role in shaping future policy decisions.
- **Statement 3 is incorrect:** The “One Nation, One Election” initiative and the census exercise are being implemented during the current government's term, not as part of a new government's agenda. The current administration, marking 100 days of its third term, is pushing forward with these reforms as part of its ongoing policy and administrative strategy.

6. Correct Answer is C

Explanation:

- **Statement 1 is correct:** The CPCB has indeed found that four locations in Ashtamudi Lake, including Thoppilkadavu near Perumon and near Kundara ceramics, do not meet the Primary Water Quality Criteria for Bathing, indicating a significant environmental concern.
- **Statement 2 is incorrect:** The levels of contaminants such as faecal coliform, pH, and biological oxygen demand (BOD) were found to be exceeding permissible limits, not within them. This finding indicates a serious issue with the water quality at the monitored locations.
- **Statement 3 is correct:** The main sources of pollution identified include accumulated garbage and plastic waste near the lake's banks, which have contributed to the contamination of water quality in the lake.

7. Correct Answer is A

Explanation:

- Both statements are correct. Statement 1 correctly identifies the focus areas of the clinical trials, including multiple myeloma and Zika vaccine development, while Statement 2 highlights the significance of the established network of institutions supporting the trials.
- Statement 1, although correct in listing some collaborations, does not mention all the agreements such as the vaccine for seasonal influenza and CAR-T cell therapy, but it is still correct in general terms.
- Statement 2 adds context to the importance of the network established for these trials.

8. Correct Answer is D

Explanation:

- The study emphasises that post-glacial ecosystems have significant potential for climate change mitigation by sequestering carbon and enhancing biogeochemical processes.
- Effective management of these ecosystems can improve their role in mitigating environmental damage.
- Therefore, the claim that they will not contribute significantly to climate change mitigation is inaccurate.
- The other statements accurately reflect the findings of the study, including the impact of glacial retreat, the role of microorganisms and plants in ecosystem development, and the importance of proper management.

9. Correct Answer is B

Explanation:



- The additional appendages in *Triarthrus eatoni* were actually found under the head, not under the thorax.
- The discovery challenges previous assumptions about trilobite anatomy, revealing that extra head appendages may have been more common.
- The study used methods to count grooves and appendages to resolve anatomical discrepancies, and the findings provided new insights into trilobite anatomy and arthropod evolution.

10. Correct Answer is C

Explanation:

- Phase Modulation (PM) does indeed change the phase of the carrier wave and is known for its superior noise resistance compared to Amplitude Modulation (AM) and Frequency Modulation (FM).
- The other statements incorrectly describe the modulation methods or their applications.

11. Correct Answer is B

Explanation:

- **Statement 1 is incorrect:** While the dodo's adaptation to a flightless lifestyle may have contributed to its extinction, the primary factor was human impact, including habitat destruction and introduced species. The dodo's extinction underscores the significant role human activities play in biodiversity loss, rather than just the bird's inherent limitations.
- **Statement 2 is correct:** New research from institutions such as the University of Southampton and the Oxford University Museum indicates that the dodo was indeed more agile and better adapted to its environment than previously

believed. This insight comes from advanced soft tissue analysis and updated historical research.

- **Statement 3 is correct:** Early misconceptions about the dodo as a clumsy and foolish bird were largely based on sailors' reports and inaccurate artist's impressions. These early accounts did not reflect the dodo's true nature or capabilities.

12. Correct Answer is A

Explanation:

- **Statement 1 is correct:** The DMF was indeed established through the 2015 amendment to the Mines and Minerals Act and has raised nearly ₹1 lakh crore for development in mining-affected areas. This has shifted the focus from financial losses to regional development.
- **Statement 2 is incorrect:** The Pradhan Mantri Khanij Kshetra Kalyan Yojana (PMKKKY) operates under the DMF framework to implement projects in mining regions. It is not independent but rather complements the DMF's efforts in ensuring sustainable livelihoods and regional development.
- **Statement 3 is correct:** DMFs contribute to local development by supporting self-reliance through initiatives such as technology training and by aligning with state and central schemes to enhance livelihoods and infrastructure. This integration exemplifies cooperative federalism and the effective use of resources for local growth.





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