DAILY CURRENT AFFAIRS 04-12-2024

GS-1

1. **Earthquake**
2. **Pennaiyar River**
3. **Jarawa tribe**

GS-3

4. **New moiré superconductor**
5. **The stigma of HIV and the birth of biomedical waste regulations: a story of tragedy and reform**

Earthquake

Syllabus: GS-1; Physical Geography

Context

- 5.3-magnitude earthquake strikes Telangana; tremors felt in Hyderabad.

Definition

- An earthquake is a sudden release of energy in the Earth's crust or mantle, resulting in ground shaking.

Cause

- Typically caused by tectonic plate movements, volcanic activity, or human activities like mining and reservoir-induced seismicity.

Types of Earthquakes

- **Tectonic Earthquakes**: Caused by the movement of tectonic plates along faults.
- **Volcanic Earthquakes**: Associated with volcanic activity.
- **Collapse Earthquakes**: Result from underground mine collapses or caverns.
- **Induced Earthquakes**: Result from human activities like fracking, dam construction, or mining.

Key Terminologies

- **Focus (Hypocenter)**: The point beneath the Earth's surface where the earthquake originates.
- **Epicenter**: The point on the Earth's surface directly above the focus.
- **Seismic Waves**: Energy waves caused by the earthquake; categorized as:
    - **P-Waves (Primary Waves)**: Fastest and can travel through solids, liquids, and gases.
    - **S-Waves (Secondary Waves)**: Slower than P-waves and travel only through solids.
    - **Surface Waves**: Cause the most destruction and travel along the Earth's surface.

Measuring Earthquakes

- **Richter Scale**: Measures the magnitude of the earthquake.

- **Moment Magnitude Scale (Mw)**: A more accurate measure of earthquake magnitude.
- **Modified Mercalli Intensity Scale (MMI)**: Measures the intensity based on observed effects.

Major Earthquake Zones in India

India is divided into four seismic zones (Zone II to Zone V):

- **Zone V**: Highest seismic risk (e.g., Northeastern states, Himalayan region).
- **Zone IV**: High risk (e.g., Delhi, parts of Jammu and Kashmir).
- **Zone III**: Moderate risk (e.g., Kerala, parts of Rajasthan).
- **Zone II**: Low risk (e.g., central and southern India).

Impacts of Earthquakes

- **Environmental**: Landslides, tsunamis, and changes in river courses.
- **Economic**: Damage to infrastructure, businesses, and property.
- **Social**: Loss of lives, injuries, displacement of communities.

Government Initiatives

- **National Earthquake Risk Mitigation Project (NERMP)**: To strengthen the structural and non-structural capacities for earthquake risk reduction.
- **Bureau of Indian Standards (BIS)**: Guidelines for construction in seismic zones.

International Cooperation

- **Sendai Framework for Disaster Risk Reduction**: Global commitment to reducing disaster risks, including earthquakes.
- **UNESCO Initiatives**: Promotes seismic risk assessment and public awareness.

This structured information will help in answering both Prelims and Mains questions on earthquakes effectively.

Pennaiyar River

Syllabus: GS-1; Geography-Rivers

Context

- SC seeks report on dispute between Tamil Nadu, Karnataka over sharing of Pennaiyar river water.

More to know

Origin and Course:

- The Pennaiyar River, also known as the South Pennar or Dakshina Pinakini, originates from the **Nandi Hills** in Chikkaballapur district, Karnataka.
- The river flows through Karnataka and Tamil Nadu before emptying into the **Bay of Bengal**.
- Its total length is approximately **497 km**, with the majority of the river's course in Tamil Nadu.

Tributaries:

- The major tributaries of the Pennaiyar River include:

- **Markandeya River**
- **Chinnar River**
- **Pamban River**
- **Vaniyar River**

States Covered:

- **Karnataka**: It flows through districts like Kolar and Bengaluru Rural.
- **Tamil Nadu**: It passes through districts like Krishnagiri, Dharmapuri, Tiruvannamalai, Villupuram, and Cuddalore.

Economic and Agricultural Importance:

- The Pennaiyar River supports **irrigation** in both Karnataka and Tamil Nadu.
- It is a vital water source for **agriculture**, with crops like paddy, sugarcane, and millet being cultivated in its basin.
- The river also sustains local livelihoods, including fishing.

Dams and Reservoirs:

- Key infrastructure on the Pennaiyar River includes:
  - **Krishnagiri Dam** in Tamil Nadu
  - **Sathanur Dam** in Tamil Nadu

Environmental Aspects:

- The river faces issues like **pollution** and **reduced water flow** due to over-extraction and urbanization.
- Efforts are underway to conserve the river and its ecosystem.

Cultural and Historical Significance:

- The Pennaiyar River basin has historical importance with many ancient temples and archaeological sites along its course.
- The river is mentioned in ancient Tamil Sangam literature.

Dispute Over Water Sharing:

- There is an **inter-state water dispute** between Karnataka and Tamil Nadu over the utilization of the Pennaiyar River's water.

- The conflict is being addressed under the **Inter-State River Water Disputes Act, 1956**.

Jarawa tribe

Syllabus: GS-1; Tribes of India

Context

- As of November 2024, a significant step in their integration into the broader societal processes occurred when 19 members of the tribe were included in the electoral roll for the first time.

About

- The **Jarawa** tribe is one of the indigenous tribes of the **Andaman Islands** in India, specifically located on the **South and Middle Andaman Islands**.
- The Jarawas are part of the **Negrito** group of people, characterized by their short stature, dark skin, and curly hair.

Historical Background:

- The Jarawa tribe is considered one of the most ancient groups of humans in the world, having lived in isolation for thousands of years.
- They were first encountered by outsiders in the late 19th century when British colonizers arrived in the Andaman Islands.
- Historically, the Jarawas have been semi-nomadic, relying on hunting, gathering, and fishing as their primary means of sustenance.

Geographical Location:

- The Jarawas inhabit the forests of **South and Middle Andaman Islands**, particularly near the **Andaman Trunk Road**.
- They live in a **forest-based, isolated environment**, with minimal contact with the outside world.

Culture and Lifestyle:

- The Jarawas traditionally live in **temporary huts** made from materials found in the forest.

- Their diet consists mainly of **hunting animals, fishing**, and gathering fruits, roots, and honey from the forest.
- They are known for their **expert hunting skills**, using bows, arrows, and spears to hunt wild animals like pigs, deer, and other small animals.
- **Social structure**: The tribe is organized into small groups, and they live in a **patrilineal system** where lineage is traced through the father.
- The Jarawas have limited **agricultural practices** but rely primarily on the natural resources of the forest.

Language:

- The Jarawa speak the **Jarawa language**, a part of the **Austroasiatic language family**. It is considered one of the **most endangered languages** due to the small number of speakers.

Interaction with the Outside World:

- The Jarawas have traditionally maintained a strict policy of **isolation** from outsiders. However, over time, their isolation has been increasingly disrupted by contact with the outside world, particularly with the construction of roads through their habitat.
- The **Andaman Trunk Road** (ATR), which passes through their land, has brought tourists and settlers into their territory, affecting their traditional way of life.

Protection and Challenges:

- The **Jarawa Tribe** is recognized as one of the **Scheduled Tribes** under the Indian Constitution, and their rights to live in isolation are protected by law.
- In 1956, the **Andaman and Nicobar Islands (Protection of Aboriginal Tribes) Regulation** was passed, which prohibits contact with the Jarawa and other tribes living in isolation.
- The government has taken measures to **protect their culture**, especially in light of tourism activities. The **Andaman and Nicobar Administration** has restricted the movement of tourists in areas inhabited by the Jarawas to minimize cultural intrusion.
- Despite these protections, **illegal hunting, deforestation, and intrusion** by outsiders, including settlers, pose significant threats to the tribe's survival and habitat.

Conservation Efforts:

- Efforts have been made to **preserve the Jarawa tribe's autonomy** and protect their rights.
- **No Contact Policy**: The Indian government has adopted a no-contact policy with the tribe to prevent the transmission of diseases and ensure their continued survival in isolation.
- **Legal Measures**: The **National Commission for Scheduled Tribes (NCST)** and the **Ministry of Tribal Affairs** have been involved in efforts to safeguard the rights and culture of the Jarawa people.

Key Issues:

- **Tourism Impact**: There have been concerns about **tourism** along the Andaman Trunk Road, which increases exposure of the Jarawas to outsiders. The risk of disease transmission and cultural degradation is significant.
- **Environmental Degradation**: Encroachment and deforestation threaten the **ecosystem** on which the tribe depends for sustenance.
- **Health and Safety**: Given their isolation, the tribe has a vulnerability to diseases that could be devastating due to a lack of immunity.

Current Status:

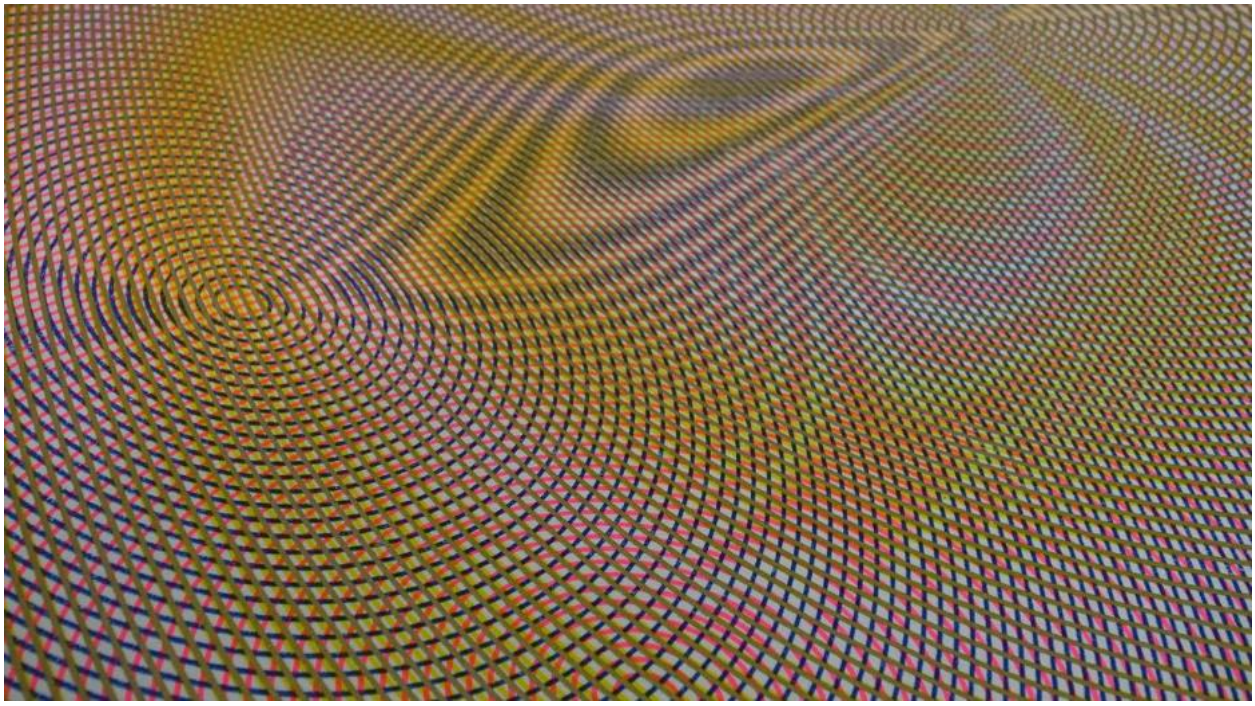
- The Jarawa population is **estimated to be around 400-500 individuals**.
- The government has taken steps to ensure that the tribe's **territory** remains protected from external threats, although challenges like illegal intrusion continue to exist.

New moiré superconductor

Syllabus: GS-3; Science & Technology

Context

- This article highlights exciting research into moiré materials, specifically focusing on the study of twisted bilayer tungsten diselenide ($tWSe_2$) and its superconducting properties.



More to know

- Moiré materials are created by stacking two layers of a material, like graphene or $tWSe_2$, and then slightly rotating one layer.
- This twist induces a unique moiré pattern that results in exotic electronic behaviors that are not present in the individual layers alone.

Key points from the study

- **Moiré Materials and Their Properties**:
  - Moiré materials exhibit unusual quantum properties due to the twist between layers.
  - In this case, the researchers explored **$tWSe_2$,** a semiconductor, and how it behaves when the two layers are twisted by a small angle (3.65º).
  - This creates a moiré pattern, which leads to new electronic behaviors and the formation of flat bands in the electronic structure of the material.
- **Flat Bands and Superconductivity**:
  - Flat bands occur when the energy levels of electrons are nearly constant, causing them to move slowly with little variation in energy.
  - These **"heavy" electrons can interact more strongly with each other, forming Cooper pairs,** which is essential for superconductivity.
  - The slow-moving electrons are less prone to scattering, which allows them to move without resistance, thus enabling superconductivity.

- **Superconductivity in $tWSe_2$**:
  - The material exhibits superconductivity when the electronic states are "**half-filled,**" meaning that the available energy states are partially occupied.
  - This configuration is crucial for the formation of Cooper pairs.
  - The superconducting state in $tWSe_2$ has a transition temperature of around –272.93ºC, similar to high-temperature superconductors.
  - This is much colder than conventional superconductors, which typically transition at around –250ºC.
  - The material remains superconducting even under conditions that would destabilize other moiré materials, such as temperature cycling.
- **Distinct from Graphene-Based Superconductors**:
  - Unlike graphene-based moiré materials, where superconductivity is driven by **electron-lattice interactions** and flat bands, $tWSe_2$ relies on electron-electron interactions and half-band filling for its superconducting properties.
  - This difference suggests that $tWSe_2$ may be more stable in its superconducting state compared to graphene-based systems, which typically require higher temperatures for superconductivity.
- **Implications for Future Research**:
  - This study opens new pathways for exploring superconductivity in semiconductor-based materials, which could lead to the development of novel materials with tailored electronic properties for use in advanced quantum technologies.
  - Understanding the unique behavior of twisted semiconductor materials like $tWSe_2$ could provide valuable insights into quantum materials and applications, including more stable superconductors and other electronic innovations.

The stigma of HIV and the birth of biomedical waste regulations: a story of tragedy and reform

Syllabus: GS-3; Environmental Concern

Context

The story of biomedical waste management reminds us that progress often emerges from the depths of crisis: the stigma, fear, and tragedy surrounding HIV/AIDS indirectly gave rise to a cleaner, safer healthcare environment.

Syringe Tide of 1987

- **Event**: Medical waste, including used syringes, blood vials, and body tissues, washed ashore on U.S. beaches (Jersey Shore and NYC) in August 1987.
- **Impacts**:
  - Public health crisis due to the potential spread of diseases.
  - Economic loss of $7.7 billion due to halted tourism.
  - Intensified public fear amidst the ongoing HIV/AIDS epidemic.
- **Legislative Response**:
  - Introduction of the **Medical Waste Tracking Act (1988)**, marking the first formal categorization and regulation of hospital waste in the U.S.
  - Stricter protocols for collection, transport, and disposal of biomedical waste were established.

HIV/AIDS Epidemic and Biomedical Waste

- Discovery of HIV in 1983 heightened fears about infectious waste.
- Syringes became a symbol of public anxiety due to the stigma surrounding HIV transmission.
- The global public health response to HIV catalyzed reforms in healthcare waste management.

India's Journey in Biomedical Waste Management

1. **Early Efforts**:
   - **Environmental Protection Act (1986)**: First environmental law enacted in India but did not cover biomedical waste.
   - HIV discovered in India the same year, highlighting gaps in healthcare waste management.
2. **Legislative Developments**:
   - **Hazardous Waste Rules (1989)**: Did not address biomedical waste specifically.
   - **Dr. B.L. Wadehra vs. Union of India (1996)**: Supreme Court criticized waste management in Delhi, pushing for reforms.
   - **Biomedical Waste Management Rules (1998)**: Recognized hospital waste as hazardous, empowered pollution control boards, and mandated segregation and treatment protocols.
3. **Key Amendments**:
   - **2016 Rules**:
     - Reduced waste categories to four for easier segregation.

        - Mandated barcoding and tracking of waste.
        - Set disposal timelines for medical facilities.
    - **2020 Revisions**:
        - Updated to incorporate advancements in waste management technology.

HIV Epidemic's Role in India's Waste Management

- The global HIV/AIDS response underscored the importance of occupational safety and environmental protection in healthcare.
- Public fear linked to HIV/AIDS drove awareness of the risks posed by mishandled biomedical waste.

Challenges in India

- **Rural and Urban Divide**: Urban hospitals have better waste management facilities compared to resource-limited rural areas.
- **Compliance Gaps**: Despite stringent rules, lapses in segregation and disposal persist.
- **Occupational Hazards**: Healthcare workers remain at risk of infections due to improper handling of waste.

Way Forward

1. **Strengthen Implementation**:
    - Ensure strict adherence to existing rules.
    - Regular inspections by pollution control boards.
2. **Capacity Building**:
    - Training healthcare workers on safe waste handling practices.
3. **Technological Integration**:
    - Use of modern waste treatment technologies like autoclaving and plasma pyrolysis.
4. **Public Awareness**:
    - Campaigns to educate citizens on biomedical waste hazards.
5. **Research and Development**:
    - Explore sustainable waste management solutions as suggested by institutions like IIT Bombay.

Conclusion

- The evolution of biomedical waste management, both globally and in India, highlights the role of crises in driving policy reform. From the U.S. Syringe Tide to India's journey post-HIV discovery, lessons from history emphasize the need for continuous vigilance and innovation in managing healthcare waste.
- As healthcare systems expand, sustainable and equitable waste management will remain critical for public health and environmental safety.