DAILY CURRENT AFFAIRS 02-10-2024

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Mahakaleshwar Temple

Syllabus: GS-1: Indian Art and Culture

Context:

- *A boundary wall near the Mahakal Temple in Ujjain, Madhya Pradesh, collapsed due to heavy rainfall, resulting in the death of two people.*

About Mahakaleshwar Temple:

- **Dedication***: Hindu temple dedicated to Lord Shiva.*
- **Location***: Situated in Ujjain, Madhya Pradesh, on the banks of the holy Shipra River.*
- **Jyotirlinga***: It is one of the twelve* **Jyotirlingas** *of Lord Shiva, considered highly sacred.*
- **Historical Reference***: The temple dates back to the 6th century BC, although its exact period of establishment is uncertain. It was reconstructed in its current form in the 18th century AD.*
- **Significance***: Known as one of the seven* **Mukti Sthals** *(sacred places of liberation) in India.*

Architectural Highlights:

- **Structure***: Five-storied temple with the main shrine located underground.*
- **Design Influences***: Combines Chalukya, Maratha, and Bhumija architectural styles.*

- **Courtyard***: Spacious, adorned with fine sculptures and strong stone foundations.*
- **Pillars***: The upper structure is supported by strong pillars and plaster.*
- **Sanctum***: Features impressive lingam sculptures of Mahakaleshwar, with images of deities such as Ganesh (west), Parvati (north), and Karttikeya (east).*
- **Water Tank***: The temple houses a tank constructed in the* **Sarvatobhadra** *style.*

Global Innovation Index

Syllabus: GS-3: IPR – Innovation.

Context:

- *Prime Minister Shri Narendra Modi has hailed India rising* **to 39th position among 133** *global economies in the Global Innovation Index 2024.*

Global Innovation and Economic Development

- **Innovation's Role in Global Economy***: Innovation, research, technology, and entrepreneurship are central to global economic development.*
- **Global Innovation Index (GII)***: Published by the World Intellectual Property Organization (WIPO), GII measures the innovation ecosystem in over 130 economies.*
- **Thematic Focus 2024***: The 2024 GII is focused on* **social entrepreneurship** *and its role in fostering social and economic prosperity.*

India's Position in the Global Innovation Index 2024

- **India's Ranking***: India ranked* **39th** *globally in GII 2024.*
- **Innovation as Strategic Necessity***: Innovation is crucial for India, driving growth in its* **knowledge-based economy***.*
- **Comparison with Peers***: India is outpacing* **Vietnam (44th)** *and* **Philippines (53rd)** *but still trails China (11th).*

Key Pillars of GII 2024

The GII 2024 is based on **81 indicators** *grouped into the following seven pillars:*

1. **Institutions**
2. **Human Capital and Research**

3. **Infrastructure**
4. **Market Sophistication**
5. **Business Sophistication**
6. **Knowledge and Technology Outputs**
7. **Creative Outputs**

Top Performers:

- **Global Leaders**: **Switzerland, Sweden, and the United States** *excel due to strong R&D investments and top-tier educational institutions.*
- **Middle-Income Leader**: **China (11th)** *is the only middle-income economy in the top 30.*

India's Key Strengths in GII 2024

- **Market Sophistication**: *India has a robust start-up ecosystem and strong access to venture capital.*
- **Human Capital and Research**: *Strong educational institutions like* **IITs and IIMs** *contribute to India's progress in the* **STEM fields**.
- **Knowledge and Technology Outputs**: *India leads in* **ICT services exports**, *maintaining a competitive edge in the technology outsourcing sector.*
- **Creative Industries**: *India excels in media and entertainment, competing globally with countries like* **South Korea**.

Comparative Insights: India vs Global Peers

1. China (11th) vs India (39th)

- **R&D Investment**: *China spends* **2.4% of GDP** *on R&D, compared to India's* **0.65%**.
- **High-Tech Manufacturing**: *China leads in* **electronics and AI**, *while India relies more on* **software exports**.

2. Vietnam (44th) vs India (39th)

- **Human Capital**: *Vietnam is rapidly growing in* **STEM education** *and* **high-tech manufacturing**. *India retains an edge in* **software development**.

3. Brazil (50th) vs India (39th)

- **Innovation Investment**: *Brazil shows growth in* **green technologies**, *but lags behind India in* **market sophistication** *and* **venture capital access**.
- **Knowledge Outputs**: *India leads in* **scientific research** *and* **software output**, *areas where Brazil is still developing.*

Major Innovation Boosters in India

- **Start-up India Initiative**: *Focuses on connecting start-ups with investors and growing the innovation ecosystem.*
- **Digital India Program**: *Enhanced* **digital infrastructure** *and* **e-governance** *have improved access to technology.*
- **Make in India**: *Boosted* **high-tech manufacturing**, *positioning India as a growing hub for electronics and automobiles.*

Challenges for India's Innovation Ecosystem

- **Low R&D Investment**: *India's spending on R&D is significantly lower than global peers like* **China** *and* **South Korea**.
- **Infrastructure Disparity**: *Innovation hubs like* **Bangalore** *thrive, but rural areas still lack adequate infrastructure.*
- **Weak Intellectual Property (IP) Laws**: *India lags behind in global IP protection, limiting its innovation potential.*

Policy Recommendations

- **Increase R&D Spending**: *India needs to invest more in* **high-tech research** *to remain competitive with* **China** *and* **South Korea**.
- **Strengthen IP Laws**: *Improving* **intellectual property protections** *will spur more* **patents** *and* **innovation**.
- **Promote Regional Innovation**: *Bridging the urban-rural innovation gap by investing in rural* **innovation hubs**.

Conclusion

- **Leadership in Key Sectors**: *India is expected to continue excelling in* **ICT services**, **creative industries**, *and* **high-tech manufacturing**.
- **Closing Gaps**: *To maintain this trajectory, India must address its gaps in* **R&D investment**, **infrastructure parity**, *and* **IP protection**.

- **Public-Private Partnerships (PPP)***: Encouraging* **PPP** *in R&D and promoting* **social entrepreneurship** *can further strengthen India's position on the global innovation ladder.*

Chikungunya

Syllabus: GS-3: General Science – Diseases.

Context:

- **Current Outbreak***: The chikungunya outbreak in Pune and nearby areas has been linked to the Indian Ocean lineage of the chikungunya virus, as per research from the National Institute of Virology (NIV).*

About Chikungunya

- **Definition***: Chikungunya is a viral disease caused by the chikungunya virus (CHIKV) and transmitted to humans by infected mosquitoes.*
- **Origin of Name***: The term "chikungunya" comes from the Makonde language of Africa, meaning "bent over in pain," referring to the posture caused by severe joint pain.*

Transmission

- **Mosquito Vectors***: The virus is spread by two main species of mosquitoes:*
  - *Aedes aegypti (also transmits dengue and Zika viruses)*
  - *Aedes albopictus*
- **Non-Human Transmission***: It is* **not** *transmitted from person to person.*
- **Historical Background***: The disease was first described during a 1952 outbreak in southern Tanzania. It has since been reported in over 40 countries across Asia, Africa, Europe, and the Americas.*

Symptoms

- **Incubation Period***: Symptoms typically appear 4 to 8 days after a mosquito bite but can range from 2 to 12 days.*
- **Common Symptoms***:*
  - *Sudden onset of fever*
  - *Severe joint pain (particularly in hands, feet, knees, and back)*

- *Muscle pain*
- *Headache*
- *Nausea*
- *Fatigue*
- *Skin rash*

- **Complications***: While serious complications are rare, they can include persistent joint pain and, in older individuals, may lead to more severe cases or even death.*

Treatment

- **No Specific Cure***: Currently, there is no approved vaccine or antiviral treatment for chikungunya.*
- **Symptom Management***: Treatment focuses on relieving symptoms, such as:*
  - *Rest*
  - *Hydration*
  - *Use of pain-relieving medications (e.g., paracetamol)*

Cadaver Donation Need, Rules and Challenges

Syllabus: GS-3: General Science – Medical science

Context:

- **CPI (M) leader Sitaram Yechury**, *who passed away on September 12, donated his body to the All-India Institute of Medical Sciences (AIIMS),* **promoting the importance of cadaver donation in India.**
- *Body donation, though not common in India, is a crucial contribution to medical science and training.*

What are Cadavers Used For?

- **Medical Training***:*
  - *Cadavers help medical students understand human anatomy and practice surgical skills.*
  - *They provide a more realistic training experience compared to dummies.*

- **Medical Research***:*
    - *Used in the development of new medical devices.*
    - *Cadavers are essential for studying the physiological impacts of diseases.*

Who Can Donate Their Body?

- **Eligibility***:*
    - *Anyone over 18 years can consent to donate their body.*
    - *If not registered before death, the next of kin can still donate the body.*
- **Restrictions***:*
    - *Bodies of those who die from infectious diseases like tuberculosis, HIV, or sepsis may not be accepted.*
    - *Bodies involved in medico-legal cases or those of organ donors may also be refused.*

How to Donate One's Body?

- **No Central Organization***:*
    - *Unlike organ donation, body donation is managed directly by medical colleges.*
    - *Individuals must contact the anatomy department of a medical college hospital and sign the necessary forms.*
- **After Death Procedure***:*
    - *The next of kin must inform the concerned medical institution for body donation processing.*

Shortage of Cadavers in India

- **Current Situation***:*
    - *There is a significant shortage of donated cadavers in India.*
    - *Undergraduate medical colleges require one cadaver for every 10 students.*
- **Cadaver Donation Statistics***:*
    - *AIIMS Delhi received 70 cadavers in the last two years, meeting its needs for a batch of 132 students.*
    - *Safdarjung Hospital and Vardhaman Mahavir Medical College (VMMC) received only 24 cadavers in five years.*

- *Ram Manohar Lohia Hospital and Atal Bihari Vajpayee Institute of Medical Sciences (ABVIMS) have received only 18 cadavers since 2019.*

- **National Capital vs Other Regions***:*
  - *The situation in Delhi is better than in other parts of India, where the shortage is more severe.*

How Do Medical Colleges Manage the Shortage?

- **Use of Unclaimed Bodies***:*
  - *Medical colleges rely on unclaimed bodies, as per provisions of the Anatomy Act in various states.*
  - *Relatives have 48 hours or a "least practicable delay" to claim a deceased body before it is used for science.*
- **Increase in Demand***:*
  - *The rise in medical institutes and the number of students has led to a sharp increase in the demand for cadavers.*

Conclusion

- *The need for cadaver donation in India is critical due to the growing demand in medical education.*
- *More awareness and participation in body donation can help address the shortages and improve medical training and research.*

How Mars Atmosphere Went Missing

Syllabus: GS-3: Science and Technology – Space.

Context:

- *How Mars' atmosphere went missing: New study offers clues*

Mars: From a Watery Past to a Dry Desert

- **Current State of Mars***:*
  - *Mars is now a cold and barren desert.*
  - *Increasing evidence suggests that water once flowed on the Martian surface.*

- *A thick atmosphere likely existed to prevent the water from freezing.*

- **Disappearance of Water (3.5 billion Years Ago)***:*
  - *The carbon dioxide-rich atmosphere dramatically thinned.*
  - *The disappearance of water is a key question for scientists studying Mars.*

New Study on Mars' Atmosphere

- **Study Published in Science Advances***:*
  - *Date: September 24 (year not specified).*
  - *Researchers: Geologists Joshua Murray and Oliver Jagoutz from MIT.*
  - *Hypothesis: Water on Mars reacted with surface rocks, leading to atmospheric carbon dioxide being drawn out and converted into methane.*

Role of Smectite Clay in Carbon Storage

- **Research on Earth***:*
  - **Smectite***: A type of clay material, known to trap carbon effectively.*
  - *Smectite contains folds that can store carbon for billions of years.*
  - *On Earth, smectite can cool the planet by drawing atmospheric carbon dioxide over millions of years.*
- **Discovery on Mars***:*
  - *Smectite clay was identified on the Martian surface.*
  - *Unlike Earth, where smectite is formed through tectonic activity, Mars has no such activity.*

Interaction Between Water and Olivine on Mars

- **Research Findings***:*
  - *Water reacted with* **olivine***, a ferrous rock found on Mars' surface.*
  - *Computer simulations suggested:*
    - *Over a billion years, oxygen from water bound to iron in olivine.*
    - *This reaction freed hydrogen, which combined with carbon dioxide to form methane.*

- *Olivine gradually transformed into smectite, which absorbed the methane.*

Implications for Mars Exploration

- **Potential Utility of Methane on Mars***:*
  - *Methane trapped in Martian smectite could be a valuable resource for future missions.*
  - *Researchers suggest methane may be used as an energy source for future colonization of Mars.*