DAILY CURRENT AFFAIRS 19-03-2025

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Chhareda Panchayat Water Conservation Model

Syllabus: GS-1: Geography - Water Conservation

Context:

- The Chhareda panchayat in Dausa district, Rajasthan, has emerged as a model for **water conservation** through farm pond initiatives.
- Led by **IIT-Kharagpur alumnus Vipra Goyal**, the initiative has resulted in the construction of **250 farm ponds**, addressing groundwater depletion and water scarcity.

Key Features of the Water Conservation Model

- **Focus:** Construction of farm ponds to **harvest rainwater** and reduce dependence on deep, contaminated groundwater.
- **Objective:** Ensure **sustainable water management** and **enhance agricultural productivity** in a water-stressed region.

How Farm Ponds are Addressing Rajasthan's Water Crisis

- **Rainwater Harvesting**
  - Farm ponds **store rainwater**, reducing the reliance on **overexploited and contaminated** groundwater sources.
- **Year-Round Water Supply**
  - Ensures water availability for both **kharif and rabi** crops, securing farmers' livelihoods.
- **Groundwater Conservation**
  - The initiative has **conserved around 30 crore litres** of groundwater annually.
- **Increased Farmer Income**
  - Farmers have shifted from **subsistence farming to cash crop production**.
  - Collective household incomes have increased by **₹5 crore**.
- **Reduced Water Pollution**
  - Avoids the use of groundwater contaminated with **arsenic and fluoride**, ensuring safer irrigation.
- **Sustainable Agriculture**
  - Provides a **climate-resilient** and **long-term solution** for water conservation in arid regions.

- **Cost-Free for Farmers**
    - Farm ponds are constructed using **CSR funds and government schemes**, ensuring no financial burden on farmers.

Significance of the Model

- Serves as a **replicable model** for other drought-prone regions.
- Aligns with **water conservation goals** under government initiatives like **Jal Shakti Abhiyan**.
- Strengthens **rural economy and food security** by ensuring sustainable agricultural practices.

This model showcases how **community-driven efforts** and **public-private partnerships** can play a crucial role in **water conservation and rural development**.

Evaluating the UN's Effectiveness in Conflict Resolution and Peacekeeping

Syllabus: GS-2: International Relations – UNO and related topics.

Context:

- The United Nations (UN) was established to maintain global peace and security.
- It employs diplomatic conflict resolution and, when necessary, armed intervention.
- Despite its mandate, the UN has had mixed success, with notable failures in Rwanda, Bosnia, Ukraine, and West Asia.
- Institutional limitations, particularly in the UN Security Council (UNSC), often prevent decisive action.

Legal Framework for Conflict Resolution in the UN Charter

Chapter VI – Peaceful Settlement of Disputes

- Encourages diplomacy, mediation, and negotiations.
- Aims to resolve conflicts without military intervention.

Chapter VII – Use of Force for Global Security

- Empowers the UNSC to authorize military action when peace is breached.
- Member states must contribute military or police forces to UN peacekeeping missions.

Chapter VIII – Regional Peace Enforcement

- Supports regional organizations in peace efforts.
- Requires Security Council approval for military interventions.

Success Stories: UN's Role in Peacekeeping

Key Successful Missions

- **Cambodia (UNTAC, 1992-93)** – Oversaw elections and disarmament of factions.
- **Mozambique (ONUMOZ, 1992-94)** – Monitored ceasefire and supported peace agreements.
- **Sierra Leone (UNAMSIL, 1999-2005)** – Helped disarm 75,000 combatants and stabilized the region.
- **Angola (UNAVEM, 1989-97)** – Assisted in peace agreements and post-war reconstruction.
- **Timor-Leste (UNTAET, 1999-2002)** – Supervised transition to independence.
- **Liberia (UNMIL, 2003-2018)** – Disarmed warring factions and ensured democratic governance.
- **Kosovo (UNMIK, 1999-present)** – Established a temporary administration and maintained peace.

Lessons from Successes

- Political will and international support are crucial.
- Timely deployment of peacekeepers prevents further violence.
- Effective disarmament and post-war reconstruction contribute to long-term stability.

Major Failures: UN as a Passive Observer

Rwanda Genocide (1994)

- Nearly 1 million Tutsi civilians massacred in 100 days.
- UN peacekeepers lacked authorization to intervene, rendering them ineffective.

Bosnia (1995) – Srebrenica Massacre

- The UN declared Srebrenica a "safe zone."
- Failed to prevent the massacre of 8,000 Bosniak Muslims by Serbian forces.

Key Lessons

- The UN has the legal mandate to protect civilians but often lacks the political will and operational authority.

- Bureaucratic delays and lack of decisive action can lead to humanitarian disasters.

Recent Conflicts: UN's Bystander Status

Russia-Ukraine War (2022-present)

- Over 100,000 UN peacekeepers exist globally, yet none were deployed to Ukraine.
- Russia's veto in the UNSC blocked any meaningful intervention.

Israel-Gaza Conflict (Ongoing)

- Despite civilian casualties, UN forces have not been deployed.
- Historical success in missions like Cyprus and Timor-Leste shows that even small UN deployments (6,000–9,000 personnel) could stabilize the situation.

Missed Opportunities

- Had UN peacekeeping forces been deployed, humanitarian crises could have been mitigated.
- The Security Council's political deadlock prevents timely intervention.

Challenges in the UN Security Council

Veto Power Problem

- The five permanent members (P5) – U.S., U.K., France, Russia, and China – hold veto power.
- Example:
    - Russia vetoed UN resolutions on Ukraine.
    - The U.S. has vetoed resolutions related to Israel.
- This paralyzes UN action in humanitarian crises.

Lack of Global South Representation

- Countries like India and South Africa, despite major contributions to UN peacekeeping, lack permanent representation in the UNSC.

Proposed Reforms

- Expand the UNSC's permanent membership to include India and South Africa.
- Introduce a majority-based voting system to prevent one-nation veto blocks.
- Create emergency mechanisms to override vetoes in cases of genocide or humanitarian crises.

The Future of UN Peacekeeping: Reforms Needed

Deploy Peacekeeping Forces Proactively

- UN forces should be sent before conflicts escalate rather than after.

Strengthen Mandates for Civilian Protection

- Missions like Kosovo and Timor-Leste show that small but decisive UN forces can prevent humanitarian disasters.

Make the Security Council More Representative

- Reform the UNSC to prevent deadlock in humanitarian crises.

Increase Peacekeeping Fund Allocation

- Ensuring well-equipped and operationally effective peacekeeping missions.

Conclusion

- The UN's institutional limitations, particularly within the Security Council, have often rendered it ineffective in preventing and resolving conflicts.
- Structural reforms, including UNSC expansion, veto reform, and proactive peacekeeping, are crucial.
- Without decisive changes, the UN risks losing its credibility as a global peacekeeping body.

Subacute Sclerosing Panencephalitis

Syllabus: GS-3: General Science – Diseases.

Context:

- **Recent Outbreaks & Concerns:**
  - Measles outbreak in Texas and New Mexico has led to nearly 300 cases, primarily among unvaccinated children.
  - Experts warn of potential rise in SSPE cases following measles resurgence.
- **India-Specific Concerns:**
  - SSPE remains a public health concern in **Lucknow and Uttar Pradesh** due to **low measles vaccination coverage**.
  - The persistence of the disease highlights gaps in India's immunization programs.

About Subacute Sclerosing Panencephalitis (SSPE)

- A rare, progressive, and usually fatal **neurodegenerative disorder** caused by a **persistent measles virus infection** in the brain.
- Occurs several years after a person has recovered from measles, due to **mutated or defective measles virus strains** persisting in the nervous system.

Epidemiology & Prevalence

- Reported **worldwide**, but rare in Western countries due to high measles vaccination coverage.
- More common in **developing nations** where measles immunization is low.
- **Males are more affected** than females.
- Primarily affects **children and adolescents (5-15 years)**.

Cause of SSPE

- The normal measles virus does not typically cause brain damage.
- SSPE occurs due to:
  - **Abnormal immune response** to measles virus.
  - **Mutated or variant strains** of the measles virus persisting in the brain.
  - **Delayed measles virus clearance**, leading to chronic inflammation and neurological damage.

Symptoms of SSPE

- **Early Stage:**
  - **Cognitive decline** (poor school performance, forgetfulness).
  - **Behavioral issues** (temper outbursts, hallucinations).
  - **Sleep disturbances** (sleeplessness).
- **Progressive Stage:**
  - **Motor dysfunction** (sudden muscular jerks, abnormal muscle movements).
  - **Seizures** and loss of speech function.
- **Advanced Stage:**
  - **Severe rigidity** of muscles.
  - **Swallowing difficulties**, leading to choking and pneumonia.
  - **Blindness** in some cases.
- **Final Stage:**
  - **Irregular body temperature, blood pressure, and pulse**.

- **Coma and death** due to progressive brain deterioration.

Diagnosis

- **Clinical symptoms** and history of measles infection.
- **EEG (Electroencephalogram):** Shows characteristic brain wave patterns.
- **MRI Scans:** Detects brain inflammation.
- **CSF (Cerebrospinal Fluid) Analysis:** Shows elevated measles antibodies.

Treatment & Management

- **No cure** for SSPE; treatment is symptomatic.
- **Antiviral drugs** and **immunomodulatory therapy** may slow progression.
- **Supportive care:**
  - Anti-seizure medications.
  - Physiotherapy for motor symptoms.
  - Nutritional and respiratory support.

Public Health Implications & Prevention

- **High SSPE mortality rate** underscores the need for **early measles vaccination**.
- **Measles-Rubella (MR) vaccine** under India's **Universal Immunization Programme (UIP)** is crucial to prevent measles and SSPE.
- **WHO's Measles & Rubella Initiative:** Aims for **95% vaccination coverage** to eliminate measles.
- **Challenges in India:**
  - Vaccine hesitancy and misinformation.
  - Gaps in rural immunization outreach.
  - Need for stronger disease surveillance and reporting.

Way Forward for India

- **Strengthening Immunization:**
  - Ensuring **100% MR vaccine coverage**.
  - Conducting **catch-up vaccination drives** in high-risk areas.
- **Public Awareness Campaigns:**
  - Educating about **measles complications** like SSPE.
  - Combating **vaccine misinformation**.

- **Surveillance & Early Detection:**
    - Enhancing **disease tracking** for early SSPE diagnosis.
    - Strengthening **rural healthcare systems**.

Conclusion

- SSPE is a **preventable but fatal** disease with **no cure**.
- The **only effective solution** is **universal measles vaccination**.
- **Policy intervention & public health initiatives** are crucial to eliminate measles and prevent SSPE in India.

Supersolid Light

Syllabus: GS-3: Science and Technology – Recent Discoveries in Physics.

Context:

Scientists have successfully "frozen" light, demonstrating that it can exist as a supersolid—a rare state of matter combining solid-like structure with frictionless flow.

Supersolid Light – A Breakthrough in Quantum Physics

What is Supersolid Light?

- A **rare quantum state** where light exhibits both:
    - **Solid-like structure** (rigid spatial arrangement).
    - **Superfluid properties** (frictionless flow).
- Previously, supersolidity was observed only in **Bose-Einstein Condensates (BECs)**—a state formed when bosons are cooled to nearly absolute zero.

How is Supersolid Light Formed?

- **Platform Used:**
    - Scientists used **gallium arsenide (GaAs)** semiconductor structures with **microscopic ridges**.
- **Creation Process:**
    - A **laser beam** was used to generate **polaritons** (hybrid light-matter particles).
- **Key Observation:**

- At high photon counts, **satellite condensates** emerged, showing **symmetric energy and opposite wavenumbers**, confirming supersolidity.

Key Characteristics of Supersolid Light

- **Solid-like lattice** structure in spatial patterns.
- **Frictionless flow**, similar to a superfluid.
- Exhibits **quantum coherence** and **long-range order** near absolute zero temperatures.
- Simultaneous **symmetry breaking** and **superfluid behavior**—a unique feature in quantum physics.

Significance of the Discovery

Advancements in Quantum Computing

- Can improve **qubit stability**, leading to more reliable quantum processors.
- Helps in **reducing decoherence**, a major challenge in quantum computing.

Innovation in Optical and Photonic Devices

- Potential applications in **photonic circuits** for high-speed, low-power computing.
- Could lead to **next-generation optical technologies** with enhanced precision.

Fundamental Quantum Research

- Opens new avenues for studying **quantum phase transitions** and **exotic states of matter**.
- Helps scientists understand **quantum coherence and symmetry breaking** in a new medium.

Precision in Quantum Control

- Allows for **high-precision manipulation** of quantum states of light.
- Could revolutionize **quantum sensors** for ultra-precise measurements.

Potential Applications

- **Quantum Computing:** More robust qubits and stable quantum circuits.
- **Advanced Optical Technologies:** High-speed optical processing and low-energy photonic devices.
- **Quantum Sensing:** Ultra-precise measurement tools for scientific research.

Conclusion

The discovery of **supersolid light** bridges the gap between solid and superfluid quantum states, paving the way for breakthroughs in **quantum physics, computing, and advanced**

optics. It holds transformative potential for **next-generation technology** and **fundamental physics research**.

Hyperloop Technology

Syllabus: GS-3: Science and Technology – Transportation and Communication.

Context:

India's Hyperloop technology will be developed at Integral Coach Factory (ICF), Chennai, as announced by Railway Minister.

Hyperloop Technology Overview

Aspect	Details
Definition	Ultra-high-speed transportation system using magnetic levitation (maglev) and near-vacuum tubes.
Speed	Can reach up to 1,220 km/h.
Working Mechanism	- Uses low-pressure tubes with built-in vacuums to reduce air resistance. - Magnetic levitation allows pods to hover, reducing friction. - Electromagnetic propulsion drives the pod forward.
Key Features	- Energy-efficient with low emissions. - Faster than air travel on shorter routes. - Reduces road congestion and noise pollution.
Origin	- Concept proposed by Elon Musk in 2013 through the **Hyperloop Alpha white paper**. - Developed as open-source technology for global research.

Hyperloop Development in India

Aspect	Details
Institutions Involved	- **IIT Madras** – Testing and research. - **Integral Coach Factory (ICF), Chennai** – Development of electronics and technical components.
Ministry Involved	**Ministry of Railways**
Key Test Facility	**IIT Madras** – Longest Hyperloop test facility in Asia, showing promising results.
Aim	- Develop an **indigenous Hyperloop system**. - Position India as a **global leader** in futuristic transport technology.
Companies Involved	- **IIT Madras Avishkar Hyperloop Team** – Leading the project. - **ICF Chennai** – Engineering and technical development.