

21 May 2020: PIB Summary & Analysis

1. Ecologically Sensitive Area of Western Ghats

Context:

States express desire to expedite early notification of Ecologically Sensitive Area of Western Ghats.

Details:

- To conserve and protect the biodiversity of the Western Ghats while allowing for sustainable and inclusive development of the region, the Government of India had constituted a High Level Working Group under the Chairmanship of Dr. Kasturirangan.
- The Committee had recommended that identified geographical areas falling in the six States of Kerala, Karnataka, Goa, Maharashtra, Gujarat and Tamil Nadu may be declared as Ecologically Sensitive Areas (ESA).
- A draft notification was issued in October 2018 mentioning the areas to be notified in the ESA.

Ecologically Sensitive Areas:

- In the ESA, all kinds of mining activities, thermal power plants and highly polluting industries are not allowed.
- They are notified by the Ministry of Environment, Forests and Climate Change.
- **Objectives of declaring areas as ESA:**
 - To manage and regulate the activities around these areas with the intention of creating some kinds of 'shock absorbers'.
 - To provide for a transition zone between the highly protected and relatively less protected areas.
 - To give effect to Section 3(2)(v) of the Environment Protection Act, 1986 which restricts the operation of industries or processes to be carried out in certain areas or to maintain certain safeguards to operate industries.
 - In order to make it a mandate on the states.
- They are significant in order to minimise the impact of urbanisation and other developmental activities in these sensitive areas.
- They also decrease forest depletion and man-animal conflicts.

To know more about the [Western Ghats](#) and their ecological significance, click on the linked article.

2. Pradhan Mantri Ujjwala Yojana (PMUY)

Context:

6.8 Crore free LPG cylinders distributed among the PMUY beneficiaries so far.

To know more about the [Pradhan Mantri Ujjwala Yojana](#), click on the linked article.

3. Alzheimer's disease

Context:

IIT Guwahati discovers new ways to prevent memory loss due to Alzheimer's.

Details:

- Researchers at IIT Guwahati have come up with unique ideas that can help prevent or reduce short-term memory losses associated with Alzheimer's disease.
- They studied the neurochemical principles of Alzheimer's, and explored new ways to prevent accumulation of neurotoxic molecules in the brain that are associated with short-term memory loss.
- The team reports interesting methods such as application of low-voltage electric field, and the use of 'trojan peptides' to arrest aggregation of neurotoxic molecules in the brain.
- A defining hallmark of Alzheimer's is the accumulation of amyloid beta peptides in the brain. The researchers seek methods to reduce the accumulation of these peptides, in order to arrest the progression of Alzheimer's.
- Scientists found that application of a low-voltage, safe electrical field can reduce the formation and accumulation of toxic neurodegenerative molecules that cause short-term memory loss in Alzheimer's disease.
 - They found that external electric/magnetic field modulates the structure of these peptide molecules, thereby preventing aggregation.
- They also explored the possibility of using 'Trojan peptides' to arrest aggregation of these neurotoxic molecules.
 - The idea of using 'Trojan peptide' comes from mythological "Trojan Horse" used as subterfuge by the Greeks in the battle of Troy.
 - The researchers have designed Trojan peptides by adopting a similar approach of 'deceit' to impede the aggregation of the amyloid peptide, arrest the formation of toxic fibrillar assemblies, and reduce poisoning of nerve cells that leads to memory loss.
- **Significance of the research:**
 - The development of a cure for Alzheimer's disease assumes importance for India as it has the third-highest number of Alzheimer's patients in the world, after China and US, with more than four million people falling prey to the memory loss associated with it.
 - While current treatments only alleviate some of the symptoms of the disease, there is no disruptive therapeutic approach yet that can treat the underlying causes of Alzheimer's.

To know more about Alzheimer's disease, check [CNA dated Feb 19, 2019](#).

4. Crop residue burning

Context:

Alternative dwarfing genes in wheat can eliminate rice crop residue burning.

Background:

- In India, close to twenty-three million tonnes of leftover rice residues are annually burnt by farmers to get rid of the straw and prepare their fields for sowing wheat, which is the next crop, resulting in air pollution.
- Also, dry environments pose a challenge for the germination of wheat varieties with short coleoptile.

- The burning of leftover rice crop residue has serious implications for the environment, soil, and human health.

Alternate dwarfing genes in wheat:

- To overcome the problems caused by the burning of rice crop residue, scientists from the Agharkar Research Institute (ARI-Pune), an autonomous institute of the Department of Science and Technology, have mapped two alternative dwarfing genes Rht14 and Rht18 in wheat.
- These genes are associated with better seedling vigour and longer coleoptiles (sheath protecting the young shoot tip).
- The scientists have mapped the dwarfing genes on chromosome 6A in durum wheat, and DNA-based markers were developed for a better selection of these genes in wheat breeding lines.
- The DNA-based markers will help wheat breeders to precisely select wheat lines carrying these alternative dwarfing genes from a massive pool of wheat breeding lines.
- These DNA based markers are being used at ARI for marker-assisted transfer of these genes in Indian wheat varieties, so as to make them suitable for sowing under rice stubble-retained conditions and dry environments.
- Wheat breeding lines with these alternative dwarfing genes are presently at an advanced stage.
- Wheat lines with these alternative dwarfing genes, apart from reducing crop residue burning, can allow deeper sowing of wheat seeds to avail advantage of residual moisture in the soil under dry environments.
- The presently available semi-dwarf wheat varieties, which were explored during the Green Revolution, carry conventional Rht1 dwarfing alleles (variant form of a given gene) and produce optimum yields under high-fertility irrigated conditions.
- However, they are not well adapted for deeper sowing conditions in dry environments due to shorter coleoptiles, and low early vigour often results into reduced seedling emergence.
- Moreover, crop stands of Rht1 wheat also remain poor where previous crop residues pose a barrier for seedling emergence due to the short coleoptiles.
- Since rice crop residue burning has adverse effects, there is a need to include alternative dwarfing genes in wheat improvement programs.
- Also, only two dwarfing alleles of Rht1 are predominant in Indian wheat varieties; therefore, there is a need to diversify the genetic base of dwarfing genes considering diverse wheat growing zones in India.
- **Benefits of the improved wheat lines:**
 - The improved wheat lines which are being developed at ARI will help reducing stubble burning incidences under the rice-wheat cropping system.
 - These lines will also allow deeper sowing of wheat seeds to avail advantage of residual moisture in the soil, therefore, saving valuable water resources and reduce the cost of cultivation to farmers.

5. Textiles Committee

Context:

Textiles Committee comes up with fully indigenous Design and Make in India PPE Testing Equipment.

About the Textiles Committee:

- The Textiles Committee is a statutory body established in 1963 through an Act of Parliament and is under the administrative control of the Ministry of Textiles, Government of India.

- It has been formed to ensure the quality of textiles and textile machinery both for internal consumption and export purpose.
- The Committee is tasked with the functions of establishing laboratories for the testing of textiles and textile machinery and providing for their inspection and examination, besides other functions which flow from the main objective of ensuring quality of textiles products and textiles machinery.

6. Quantum Entanglement

Context:

Certifying Quantum Entanglement: A step towards Quantum Security.

Details:

- Scientists from S. N. Bose National Centre for Basic Sciences (SNBNCBS), Kolkata, an autonomous institute of the Department of Science and Technology have developed a novel protocol to find out whether a pair of electrons is in an entangled state so that they can be safely used as resources for facilitating quantum information processing tasks.
 - The protocol has been developed through theoretical and experimental analysis.
- **Quantum entanglement** is one of the peculiarities of quantum mechanics, which makes phenomena such as quantum teleportation and super-dense coding possible.
- It is the physical phenomenon that occurs when a pair or group of particles is generated, interact, in a way such that the quantum state of each particle of the pair or group cannot be described independently of the state of the others.
- Entangled states are key resources to facilitate many quantum information processing tasks and quantum cryptographic protocols.
- However, entanglement is fragile and is easily lost during the transit of photons through the environment.
- Hence, it is extremely important to know whether a pair of photons is entangled, in order to use them as resource.
- Verification of entanglement requires the use of measurement devices, but such devices may be hacked or compromised by eavesdroppers.
- **Device-independent self-testing (DIST)** is a method that can be used in order to overcome such a possibility.
 - This method enables the verification of entanglement in an unknown quantum state of two photons without having direct access to the state, or complete trust in the measurement devices.
 - The theory relies on the application of the quantum uncertainty principle while implementing full device independence is a difficult task.
 - In several practical situations, one of the parties may be fully trusted, whereas, the other may not be trusted like in the case of server-client relationship in banking transactions.
 - For such situations, quantum information theory enables one-sided DIST (1sDIST).
- In the protocol published, the theoretical idea is based on applying the fine-grained uncertainty relation to perform quantum steering.
- This idea has been successfully implemented experimentally by his team in collaboration with a group in Beijing Computational Science Research Centre, and Key Laboratory of Quantum Information, Hefei.
- The experiment uses an all-optical set-up in which entangled pairs of photons are created by laser light on Beta barium borate (BBO) crystals, a nonlinear optical crystal, used as laser crystal.
- The team used Bob as the trusted party and Alice as untrusted, to verify that the pair of photons they share is entangled.

- In a single run of their experiment, one photon goes to Alice's lab (bottom left), and another to Bob's lab (top right).
- They implemented several optical operations using beam-splitters, phase-shifters, and quantum gate operations before the photons were detected.
- Using the detection statistics, the team not only certified the presence of entanglement but also determined the magnitude of entanglement in the photon pairs with minimum error.
- The team concluded that the entangled pairs of photons generated by the laser and BBO crystals can be reliably used to perform secure communication tasks.

