Prelim Bits 29-02-2024 | UPSC Daily Current Affairs

PAN tropical investigation of bio-Geo-chemistry and Ecological Adaptation (PANGEA)

Scientists across the globe convened in Cameroon to initiate a knowledge-sharing initiative to guide Project PANGEA.

- **Funding -** National Aeronautics and Space Administration (NASA).
- **Aim** - To understand the combined effects of climate and land-use change in tropical forests within and between continents.
- **Objectives** -
    1. To examine similarities and differences in forest composition, structure and biogeochemical cycling across tropical regions.
    2. To evaluate the vulnerability and resilience of tropical forest ecosystems to global change.
    3. To guide decision making to support societal responses to climate change mitigation and adaptation and biodiversity conservation.

Tropical Forests
• Tropical forests are located between the Tropics of Cancer and Capricorn. • It is also known as the Tropical Rainforests, since they receive rainfall throughout the year. • It constitutes only 6% of the world's land surface but harbors 66-80% of all known species. • **Significance -** 1. Crucial for Earth's climate, biodiversity and carbon storage. 2. Act as significant water and heat pumps, regulating regional and global climate systems. 3. Contribute to over 30% of terrestrial net primary productivity, and store between 25 - 40% of total terrestrial biomass. • **Threats -** 1. Deforestation and degradation. 2. 2/3rd of global forest cover loss occurs predominantly in the tropics and sub-tropics.

Quick Facts

Arctic-Boreal Vulnerability Experiment (ABoVE)
• **Launched -** In 2015. • It is a NASA Terrestrial Ecology Program field campaign conducted in Alaska and Western Canada. • ABoVE is a large-scale study of environmental change and its implications for social-ecological systems.
Large-Scale Biosphere-Atmosphere Experiment in Amazonia (LBA)

• **Launched -** In 1990s
• LBA is an international research effort led by Brazil to investigate the human influences on the Amazon rainforest Amazon.

Boreal Ecosystem-Atmosphere Study (BOREAS)

• **Conducted -** From 1994-1996.
• The primary goals of BOREAS were to find:
1. How the boreal forest interacts with the atmosphere (via the transfer of gases and energy).
2. How much carbon is stored in the forest ecosystem.
3. How climate change will affect the forest.
4. How changes in the forest affects weather and climate.

References

1. Down To Earth | Study to unravel mysteries of tropical forests
2. Tropical Forest Scoping | PANGEA

Obelisks

Rod-shaped fragments of RNA called "obelisks" were discovered in gut and mouth bacteria for the first time.

- It is a new form of life ***lying between viruses and viroids*** on the scale of simplicity.
- Like viroids, obelisks have a circular single-stranded RNA genome and no protein coat but, like viruses, their genomes contain genes that are predicted to code for proteins.
- Even though they are smaller than viruses, they can still transmit instructions to cells.

Viruses, prions and viroids are ***non-living organisms*** *that require a living cellular host in order to reproduce.*

- All obelisks encode a single major protein known as ***obulin.***
- Obelisks may cause neither harm nor benefit to their microbial host, or to humans.
- The discovery was made possible using data obtained using a powerful technique called *next-generation sequencing (NGS).*
- The researchers linked one particular obelisk to the bacterial species ***Streptococcus sanguinis,*** commonly found in the human mouth.

Important terms

• **Virus** - A microscopic, non-cellular structure that consists of a nucleic acid molecule covered by a protein coat. It is an intracellular parasite.
• **Virion** - The active, infectious form of a virus outside the host cell. It has both nucleic acid as well as protein layers and is an extracellular parasite.
• **Prion** - A type of protein (has no genetic material) that can cause disease in animals and humans by triggering normally healthy proteins in the brain to fold abnormally.
• **Viroids** - Small, single-stranded, circular RNA that do not encode any protein.
• **Virusoids** - Single stranded (ss) RNAs that require other helper viruses to establish an infection.

Viruses	Viroids

• **Discovered -** 1898 • **Composed of** - Nucleic acid (DNA or RNA) core that serves as the genetic material. • **Surrounded by** - A protein coat, and, in some cases, a lipid (fat) layer outside that coat. • **Size -** Larger in than viroids • **Host -** It infects both plants and animals. • **Example -** Tobacco mosaic virus, Hepatitis-C.	• **Discovered -** 1971 • **Composed of** - Viroids circular single stranded RNA. • **Surrounded by** - Did not contain the lipid layer or the protein coat found in viruses. • **Size -** Smaller than viruses. • **Host -** Only plants are known to be infected by viroids. • **Example -** Potato spindle tuber viroid.

References

1. The Hindu – Obelisks join viruses, viroids as 3rd unusual life form
2. The Conservation – A new virus-like entity has just been discovered
3. Vice – Scientists discovered strange 'entities' called 'obelisks'

Panda Diplomacy

China is renewing its panda diplomacy project as it is planning to loan the San Diego Zoo a pair of giant pandas.

- **Panda diplomacy -** The Chinese government gifts or loans pandas endemic to the country to other countries as a symbol of friendship or soft diplomacy, hence leading to the phrase panda diplomacy.
- **Loaning Pandas -** China Wildlife Conservation Authority signed agreements with San Diego and Madrid, for loaning pandas, and is also in talks with zoos in Washington D.C. and Vienna, Austria for the same.
- **Tang Dynasty -** Panda diplomacy essentially picked up in the mid-to-late 20th century, however it existed as early as during the *Tang Dynasty* that ruled between *7th and 10th century*.

  In 2023, Chinese President Xi Jinping similarly described pandas as envoys of friendship between the Chinese and American peoples.

- **Modern diplomacy -** China has gifted pandas to countries like *the U.S., the U.K., France, and Japan*, and 1972 is often believed to be the start of modern panda diplomacy.
- China *stopped gifting pandas in early 1980s*, and instead started loaning them at a fee of around $1 million per year.

  Panda deals with Canada, France, and Australia coincided with these countries' uranium deals and contracts with China.

Giant Pandas

• **Scientific name -** *Ailuropoda melanoleuca*.
• **Habitat -** Temperate forests high in the mountains of southwest China.
• **Diet -** Feed entirely on bamboo.
• Giant Panda is the logo of WWF since its founding in 1961.
• **IUCN Status -** Vulnerable

References

1. The Hindu – What is China's panda diplomacy?
2. The Indian Express – China signs panda conservation pact with US zoo
3. BBC – A brief history of 'panda diplomacy'

BioTRIG

A new waste management technology that allows pyrolysis at a community to help rural Indians cut indoor air pollution, improve soil health, and generate clean power, introduced.

Pyrolysis

• The term 'pyrolysis' has Greek roots and can be roughly translated as "fire separating".
• Pyrolysis is the thermal decomposition of materials at elevated temperatures (400-500 degree Celsius) in an inert atmosphere.
• It is the heating of an organic material, such as biomass, in the absence of oxygen.
• It involves a change in chemical composition and is most commonly used in the treatment of organic materials.
• One of the most important applications of this process is in the production of ethylene and other important carbon compounds from coal and petroleum.

- **BioTRIG -** It is a community level pyrolysis system that runs on villagers' waster.
- BioTRIG can provide multiple benefits to the Below Poverty Level (BPL) rural communities.
- The project also envisions using clean-burning bio-oil to replace dirty cooking fuels in homes and using bio char to store carbon, while improving soil fertility.

References

1. Down To Earth – New waste management technology
2. ARS USDA – What Is Pyrolysis?

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