



Survival of Rainforests Around 50 Million Years Ago

For Prelims: Survival of Rainforests Around 50 Million Years Ago, Equatorial (Tropical) Rainforests, [Climate Change](#), Paleontology.

For Mains: Survival of Rainforests Around 50 Million Years Ago, Conservation.

[Source: PIB](#)

Why in News?

Recently, a team of Scientists of **Birbal Sahni Institute of Palaeosciences (BSIP)** has revealed the **Equatorial (Tropical) Rainforests'** climate of around 50 million years ago (during the Early Eocene Climate Optimum (EECO)), which survived when the earth was globally warm.

- The research **utilized innovative techniques**, employing **Plant Proxies** to quantify **terrestrial equatorial climate data** from the past. These methods helped uncover mechanisms that enabled ancient rainforests to withstand adverse conditions.

What are Plant Proxies?

- In the context of **environmental science or Paleontology (the study of the history of life on Earth as based on fossils)**, "plant proxies" refer to indirect evidence or **indicators that scientists use to understand past environmental conditions**, particularly related to plant life.
- These proxies serve as substitutes or stand-ins for direct evidence that might not be **available or easily accessible**.
- **For Example**, Pollen grains are highly resistant and can be preserved in sediments for thousands or even millions of years. By studying the types and abundance of pollen in sediment cores or layers, **scientists can infer the types of plants that existed in a particular region during a specific period**.
- These plant proxies help scientists reconstruct ancient ecosystems, understand long-term environmental changes, and track shifts in climate and vegetation over geological timescales.

What are the Key Highlights of the Study?

- **Equatorial Rainforest Resilience:**
 - Despite global warmth and soaring atmospheric carbon dioxide levels approximately 50 million years ago, equatorial rainforests not only survived but thrived.
 - It was earlier known that the **Earth was around 13°C warmer** than present and carbon dioxide concentration was **more than 1000 ppmv during this time**.
 - This drastically affected the survival of mid- and high latitude forests due to changes in the

hydrological cycle, but the **equatorial forests survived successfully.**

▪ **High Rainfall's Role:**

- The study highlights significantly **high rainfall as a crucial factor enabling the survival and thriving** of equatorial rainforests.
- This elevated rainfall likely **enhanced plant water use efficiency**, allowing the flora to function in extreme warmth and high carbon dioxide levels.

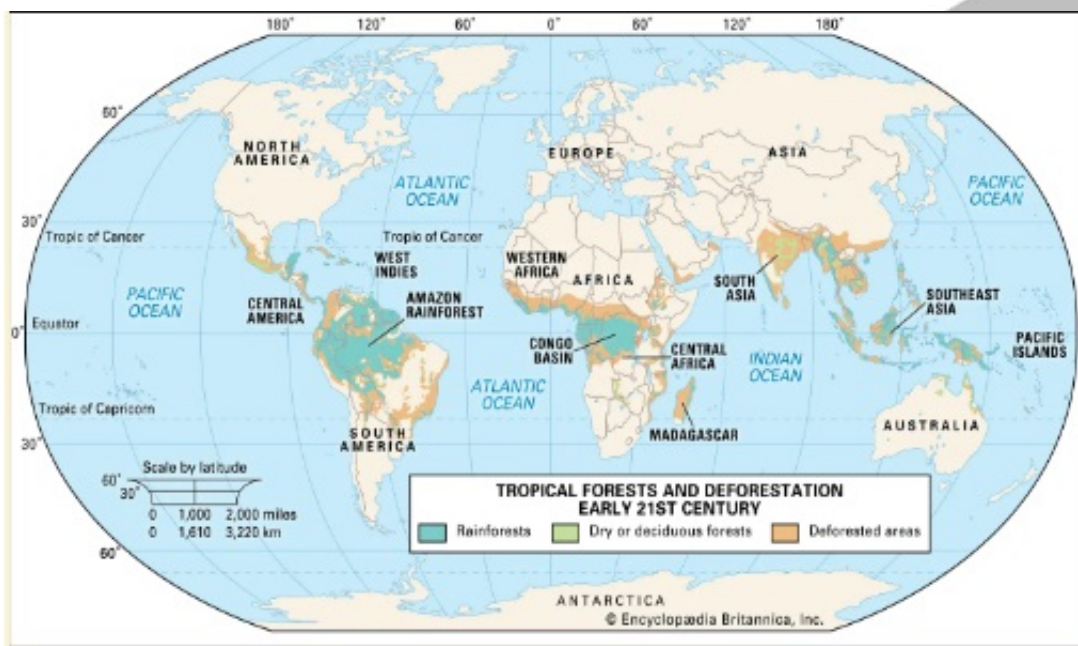
▪ **Implications of This Study:**

- Understanding the climate dynamics and resilience of equatorial rainforests during warm periods like the EECO holds significance for future climate predictions and provides insights into the survival strategies of tropical ecosystems under extreme climatic conditions.

What are Equatorial Rainforests?

▪ **About:**

- Equatorial rainforests are lush, biodiverse forests found near the **equator in tropical regions.**
- These forests typically lie **within 10 degrees latitude north or south of the equator** and are characterized by **high temperatures and heavy rainfall** throughout the year.



▪ **Key Features:**

- **Climate:** They experience a **hot and humid climate** with temperatures consistently high year-round, usually averaging **around 25-27°C (77-81°F)**. **Rainfall is abundant**, often exceeding 2,000 millimeters (80 inches) annually, leading to the term "rainforest."
- **Biodiversity:** Equatorial rainforests are **among the most diverse ecosystems** on Earth, housing an incredibly rich variety of plant and animal species.
 - These forests contain a myriad of **species of trees, plants, insects, birds, mammals, and other organisms**, many of which are endemic to these regions.
- **Flora and Fauna:** The vegetation in equatorial rainforests is **characterized by tall trees forming a dense canopy** that shades the forest floor, creating a multi-layered ecosystem.
 - A variety of plant species, including epiphytes (plants growing on other plants), lianas (climbing vines), and numerous species of trees, contribute to the rich biodiversity.
- **Importance:** Equatorial rainforests play a **crucial role in regulating the Earth's climate** and carbon cycle. They absorb carbon **dioxide through photosynthesis and act as carbon sinks**, helping mitigate climate change. Additionally, they provide habitat for countless species, support indigenous communities, and are centers of medicinal plant

resources.

- **Threats:** Unfortunately, these rainforests face significant threats from deforestation, **logging, agriculture, mining**, and other human activities.
 - The loss of equatorial rainforests not only endangers the vast array of species that **call these forests home but also contributes to climate change** and the disruption of global ecosystems.

UPSC Civil Services Examination, Previous Year Question (PYQ)

Q. Which of the following is/are unique characteristic/ characteristics of equatorial forests? (2013)

1. Presence of tall, closely set trees with crowns forming a continuous canopy
2. Coexistence of a large number of species
3. Presence of numerous varieties of epiphytes

Select the correct answer using the codes given below:

- (a) 1 only
- (b) 2 and 3 only
- (c) 1 and 3 only
- (d) 1, 2 and 3

Ans: (d)

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