Current Affairs 24-10-2025

Credit - Drishti Ias

Australia’s Northern Rainforests Become Carbon Source

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Source: DTE

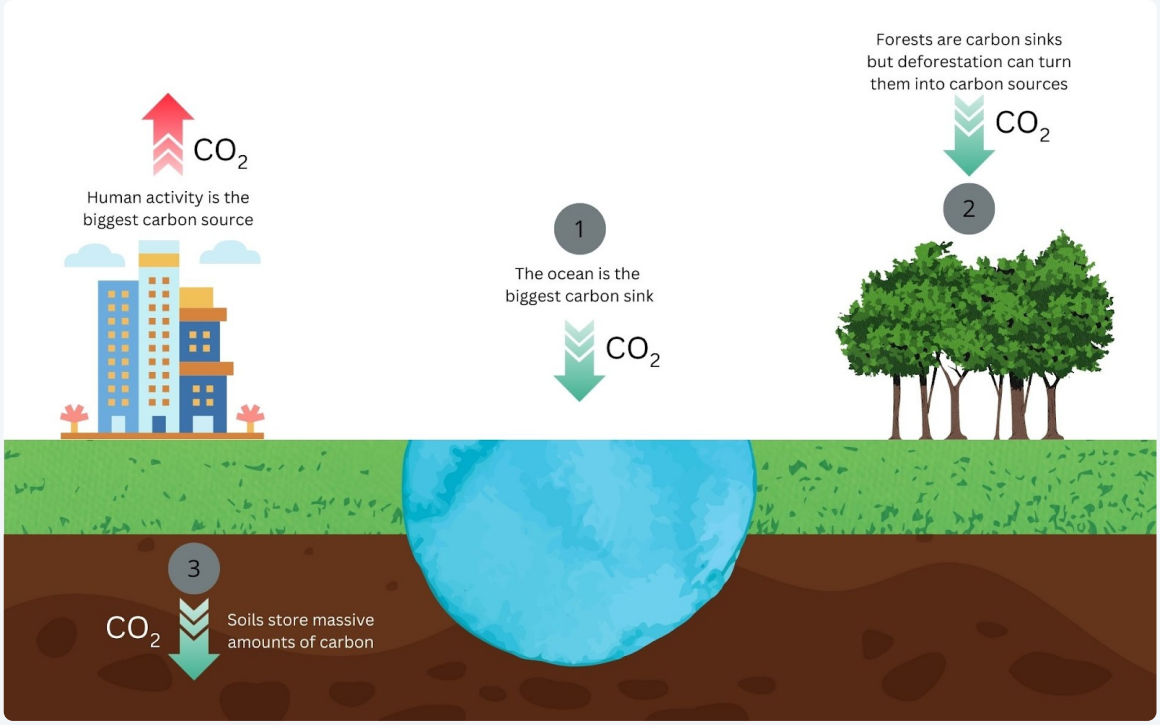
Why in News?

A **study** published in **Nature** has found that the **tropical forests** in **northeastern Australia** are the first globally to shift from being a **carbon sink** to a **net carbon source** .

- This reversal is driven mainly by **increased tree mortality due to climate stressors, including cyclones** , which can reduce carbon storage for **up to 6 years.**
- Key climate extremes causing this include **rising temperatures, atmospheric dryness, and drought conditions.** This highlights how climate change can threaten global carbon budgets.

What is a Carbon Sink?

- **About:** A **carbon sink** is anything that **absorbs more carbon** from the atmosphere than it releases.
  - It acts like a **natural or artificial reservoir** that soaks up and stores **carbon dioxide (CO_2)** , a primary **greenhouse gas** , thereby **mitigating climate change** .
- **Key Examples:**
  - **Forests:** Through **photosynthesis** , trees and plants **absorb CO_2** and store the carbon in their **wood, roots, leaves, and soil** .
  - **Oceans:** The **ocean** is the **largest active carbon sink** . It **absorbs CO_2** directly from the air, and **marine organisms** (like **phytoplankton**) use it for photosynthesis.
  - **Soil & Peatlands: Soils** contain vast amounts of **carbon** stored in **organic matter** from decomposed plants and animals.



What is a Carbon Source?

- **About:** The opposite of a sink is a **carbon source** . This is anything that **releases more carbon** into the atmosphere than it absorbs.
- **Key Examples:**
  - **Natural Carbon Sources**
    - **Respiration** : **Animals, plants, and microorganisms** release **CO_2** during **cellular respiration** .
    - **Volcanic Eruptions** : Emit large amounts of **CO_2** and **methane** from beneath the **Earth's crust** .
    - **Wildfires** : Burning of **vegetation** releases stored **carbon** into the **atmosphere** .
    - **Ocean Release** : Warmer **oceans** release dissolved **CO_2** back into the **air** .
    - **Soil Decomposition** : **Microbial activity** in **soil** releases **carbon** as **organic matter** breaks down.
  - **Human-Induced (Anthropogenic) Carbon Sources**
    - **Fossil Fuel Combustion** : Burning **coal, oil, and natural gas** for **electricity, transport, and industry** .
    - **Deforestation and Land-Use Change** : Reduces **carbon absorption** and releases stored **carbon** from **vegetation** .
    - **Industrial Processes** : **Cement production, steel manufacturing, and chemical industries** emit **CO_2** .
    - **Agriculture** : **Livestock** produce **methane (CH_4)** ; **paddy fields** and **fertilizers** add **nitrous oxide (N_2O)** .
    - **Waste Management** : **Landfills** and **waste incineration** release **methane** and **carbon dioxide.**

What are the Consequences of Forests Turning

into a Carbon Source and Measures Needed for its Mitigation?

Consequences	Measures Needed
Vicious Feedback Loop: Climate change damages forests, causing tree death and carbon release, which further **intensifies climate change** via more fires and droughts.	**Aggressive Global Emission Cuts:** Prioritize **deep, rapid, and sustained reductions in fossil fuel emissions** and strictly implement enhanced carbon budgets under the Paris Agreement.
Social and Cultural Impacts: Degradation **threatens the livelihoods, food, medicine, and culture of Indigenous communities** , risking displacement and conflict.	**Proactive Forest Management:** Implement large-scale strategies like **assisted species migration, controlled burns for fuel reduction,** and integrated pest management to break the cycle of dieback.
Ecosystem Collapse: Biodiversity loss and extinction risk as forest degradation and a changing climate make areas **unsuitable for native species.**	**Climate-Adaptive Policies:** Invest in water-efficient irrigation, promote **drought-resistant crops, diversify rural economies,** and strengthen public health systems.
Impacts on Human Systems: Endangers water security, agriculture, and food production ; causes economic losses and increases public health risks.	**Empowerment of Local Communities:** Integrate **Indigenous knowledge** into forest governance, secure land tenure rights, and ensure their active participation in sustainable management.

Conclusion

The shift of **forests** from **carbon sinks** to **sources** signals a critical **climate tipping point** , creating a **vicious feedback loop** that accelerates **global warming** , demanding urgent **emission cuts** , **forest management** , and **community action** .\

Drishti Mains Question:

Q. What are carbon sinks and carbon sources? Examine the consequences of the transformation of forest ecosystems from sinks to sources and suggest a framework for its mitigation.

Frequently Asked Questions (FAQs)

1. What is a carbon sink?
A carbon sink absorbs more CO_2 from the atmosphere than it releases, helping mitigate climate change. Examples include forests, oceans, and soils.

2. What is a carbon source?
A carbon source releases more CO_2 into the atmosphere than it absorbs, contributing to climate change. Examples include fossil fuel burning, wildfires, and deforestation.

3. What are the primary causes of the forest transition from sink to source?
Increased tree mortality due to rising temperatures, droughts, atmospheric dryness (VPD), and cyclones.

[Watch Video on YouTube: ▶ **https://www.youtube.com/embed/jLEU98F5TZA**]

UPSC Civil Services Examination, Previous Year Questions (PYQs)

Prelims

Q1. Consider the following agricultural practices: (2012)

1. Contour bunding
2. Relay cropping
3. Zero tillage

In the context of global climate change, which of the above helps/help in carbon sequestration/storage in the soil?

(a) 1 and 2 only

(b) 3 only

(c) 1, 2 and 3

(d) None of them

Ans: (b)

Q2. In the context of mitigating the impending global warming due to anthropogenic emissions of carbon dioxide, which of the following can be the potential sites for carbon sequestration? (2017)

1. Abandoned and uneconomic coal seams
2. Depleted oil and gas reservoirs
3. Subterranean deep saline formations

Select the correct answer using the code given below:

(a) 1 and 2 only

(b) 3 only

(c) 1 and 3 only

(d) 1, 2 and 3

Ans: (d)

EPF New Withdrawal Rules 2025

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Source: TH

Why in News?

The **Central Board of Trustees (CBT)** of the **Employees Provident Fund Organisation (EPFO)** approved new guidelines for **partial and premature withdrawal of Provident Fund (PF) funds** , aiming to enhance the “ease of living” for subscribers.

What are the EPF New Withdrawal Provisions 2025?

- **Simplified Rules:** 13 complex withdrawal provisions merged into **three categories** – essential needs (illness, education, marriage), housing, and special circumstances.
- **Employer Contribution:** Members can now withdraw from **both employee and employer contributions** .
- **Minimum Balance Rule:** Members must maintain **at least 25% of their contribution balance at all times** , ensuring a financial cushion and long-term security.
- **Premature Withdrawal During Unemployment: 75% of PF can be withdrawn immediately after leaving a job.**
  - Full 100% withdrawal allowed if unemployed for 12 months (previously 2 months).
  - The final pension **amount** can be withdrawn **only after 36 months** , instead of 2 months earlier.
    - The change aims to **help members accumulate a sufficient pension corpus** by discouraging early full withdrawals, as **about 50% of members had less than Rs 20,000** at final settlement.
- **Flexibility:** Withdrawals for marriage, house purchase, education, illness, or emergencies can now be made **earlier and more frequently** .

EPFO Withdrawal Rules: What Changed

Detail	Explanation
Immediate Withdrawal Limit	75% of the PF amount can be withdrawn after job loss
Full Withdrawal Eligibility	100% after 12 months of continued unemployment
Extended Withdrawal Period for the Unemployed	From 2 months → 12 months for premature PF settlement
Pension Withdrawal (Service of 10 years + needed to avail pension)	Increased from 2 months → 36 months
Pension Withdrawal Categories	Reduced from 13 → 3 — essential needs, housing, and special circumstances
Minimum Balance Rule	Members must maintain 25% of contribution balance at all times

What is an Employees Provident Fund (EPF)?

- **About:** EPF is a **social security and retirement savings scheme** for salaried employees in India. It is administered by the **Employees' Provident Fund Organisation (EPFO)** under the **Ministry of Labour and Employment** and is governed by the **Employees' Provident Funds &**
  - The PF account benefits are extended to all the establishments which employ 20 or more persons. **Miscellaneous Provisions Act, 1952.**
- **Membership: All employees of eligible establishments can become members from the date of joining.**
  - Membership provides access to **Provident Fund (PF)** savings, **Pension benefits, and Insurance benefits.**
  - Members must **submit a nomination** at the time of joining.
- **Contribution Structure:** Employers and employees both contribute around 12% of wages in contribution accounts.
  - Further, the employers also contribute towards administration of the benefits under the EPF & MP Act.
  - Funds earn interest declared annually by the Government of India.
- **Benefits:** EPF provides long-term savings for retirement while allowing partial withdrawals for housing, education, marriage, illness, and special circumstances.
  - It ensures financial security for employees and their families in case of resignation, retirement, or death.
  - Members can also access online services such as e-passbook, PF account transfer, and claims.

Employees Provident Fund Organisation (EPFO)

- EPFO is a statutory body under the Employees' Provident Funds & Miscellaneous Provisions Act, 1952.
- It is governed by the tripartite **Central Board of Trustees (CBT)** , comprising government, employer, and employee representatives, chaired by the Union Labour Minister.
- **EPFO Administers Three Schemes:**
  - **Employees' Provident Fund (EPF), 1952** , which provides retirement savings.
  - **Employees' Pension Scheme (EPS), 1995** , which offers pension after 58 years of age for employees with a minimum of 10 years of service.
  - **Employees' Deposit Linked Insurance (EDLI), 1976** , which provides insurance benefits.

Frequently Asked Questions (FAQs)

1. What is the Employees' Provident Fund (EPF)?
EPF is a social security and retirement savings scheme for salaried employees in India, administered by EPFO under the Ministry of Labour and Employment.

2. Who can become a member of EPF?
All employees in establishments with 20 or more workers are eligible from the date of joining, providing access to PF savings, pension, and insurance benefits.

3. What schemes are administered by EPFO?
EPFO administers three schemes: Employees' Provident Fund (EPF), Employees' Pension Scheme (EPS), and Employees' Deposit Linked Insurance (EDLI).

UPSC Civil Services Examination, Previous Year Questions (PYQs)

Prelims

Q. With reference to casual workers employed in India, consider the following statements:

1. All casual workers are entitled for Employees Provident Fund Coverage.

2. All casual workers are entitled for regular working hours and overtime payment.

3. The government can by a notification specify that an establishment or industry shall pay wages only through its bank account.

Which of the above statements are correct?

(a) 1 and 2 only

(b) 2 and 3 only

(c) 1 and 3 only

(d) 1, 2 and 3

Ans: D

‘Atomic Stencils’ Enable Precision Design of Nanoparticles

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Source: TH

Researchers have developed an **atomic stenciling** technique to precisely **apply polymer patches** onto microscopic **gold nanoparticles** , allowing unprecedented **control over their structure.**

- **Process** : The process has **two key steps** :
  - **Atomic Stenciling (The Masking):** The researchers use iodide atoms as an "atomic stencil" or mask. These atoms are engineered to selectively bond and stick only to specific, flat crystal faces of the gold nanoparticle.
  - **Polymer Painting (The Patching):** A polymer solution is then introduced. The polymer material only bonds to the unmasked, exposed gold surfaces, forming a precise patch exactly where intended.
    - The **patches** so formed are so **uniform** that the **nanoparticles** could spontaneously **self-assemble** into highly ordered **3D crystals (superlattices)** , representing a major milestone in **nanomaterials science** that was previously largely theoretical.
- **Benefits** : The method allows for **atomic-level control** over the **patch's size, shape, and location** , enabling the creation of over **20 distinct types** of **patterned nanoparticles** (e.g., **corner patches** , **face patches** , **web designs**).
- **Applications:** This **control** is a crucial step toward creating **metamaterials** with **properties not found in nature** .
  - Potential applications include **targeted drug delivery** , **ultra-efficient catalysts** , **advanced electronics** , and **smart materials** .

Stenciling is a technique for applying a **design** or **pattern** to a **surface** by passing **ink** , **paint** , or another **medium** through a **cut-out template (the stencil)** .

- The key principle is that the **stencil** acts as a **barrier** , blocking the **medium** from reaching the **surface** everywhere except the open, **cut-out areas** , which form the **design** .

Read More: Nanotechnology

Global Forest Resources Assessment 2025

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Source:PIB

India has secured the **9th position globally** in terms of total forest area, as per the latest **Global Forest Resources Assessment (GFRA) 2025** released by the **Food and Agriculture Organization (FAO).** India also retained its **3rd position worldwide in annual forest area gain** .

- **Top countries by forest area are Russia (832.6 million ha), Brazil (486 million ha) and Canada (368.8 million ha).**
  - India’s forest area stands at **72.7 million hectares** .
- **Global Forest Resources Assessment (GFRA) :** The **GFRA, conducted every 5 years by the FAO** , assesses global forest resources based on official national data.
  - This data is vital for policymaking, international conventions (like those on climate change and biodiversity), and promoting sustainable forest management globally.
- **India's Key Initiatives Related to Forest Conservation:**
  - **Key Forest Legislations in India:**
    - **Forest (Conservation) Act, 1980:** It restricts the diversion of forest land for non-forest purposes and ensures central government approval for such use to prevent large-scale deforestation.
    - **Wildlife (Protection) Act, 1972:** It provides legal protection to wildlife species and their habitats and establishes National Parks, Wildlife Sanctuaries, and Conservation Reserves.
    - **National Forest Policy, 1988:** It sets the goal of bringing 33% of India’s total land area under forest and tree cover and promotes participatory forest management involving local communities.
    - **Forest Rights Act, 2006:** It recognizes the rights of traditional forest dwellers and tribal communities and empowers them to manage, conserve, and protect forest resources sustainably.
  - **Other Key Initiatives:**
    - **National Mission for a Green India (GIM): GIM is part of the National Action Plan on Climate Change (NAPCC)** aiming to enhance ecosystem services and carbon sequestration.
    - **Compensatory Afforestation Fund Management and Planning Authority (CAMPA): CAMPA** utilizes funds from diverted forest land for compensatory plantation.
    - **Ek Ped Maa Ke Naam Initiative: Ek Ped Maa Ke Naam** Initiative is a national campaign encouraging citizens to plant a tree in honour of their mothers.

Read More: India State of the Forest Report 2023