CARBON SINK - GEOGRAPHY

NEWS: The study titled *Low latency carbon budget analysis* reveals a large decline of the land carbon sink in 2023.

WHAT'S IN THE NEWS?

The Amazon, the world's largest tropical forest, is often described as the Earth's lungs due to its significant role in absorbing CO2**. Unfortunately, deforestation for agricultural land and logging is severely impairing the Amazon's ability to function as a carbon sink**. Researchers warn that the damage could be so severe that the Amazon might become a carbon source as early as the next decade, exacerbating global warming.

A Carbon Sink is a **natural or man-made reservoir** that accumulates and stores a carbon-containing chemical compound indefinitely. A carbon sink is anything that absorbs more carbon from the atmosphere than it emits. **Carbon sequestration** is the process by which **carbon sinks remove carbon dioxide (CO2) from the atmosphere.** Carbon is an element that is required for all life on Earth. Carbon, in the form of carbon dioxide, is even present in the air we breathe. It is also stored in the **ocean, rocks, fossil fuels, and plants**. In this article, we will discuss **Carbon Sink** which will be helpful for UPSC exam preparation.

What is a Carbon Sink?

- A carbon sink is any natural or man-made reservoir that accumulates and stores some carbon-containing chemical compound for an indefinite period of time, lowering CO2 concentrations in the atmosphere.
- The two most important carbon sinks on a global scale are **vegetation and the ocean.**
- Since the passage of the **Kyoto Protocol**, which encourages the use of CO2 sinks as a form of carbon offset, public awareness of their importance has grown.
- **Soil is a critical carbon storage medium.** Due to intensive farming, much of the organic carbon retained in agricultural areas has been depleted.
- **"Blue carbon"** refers to carbon fixed by **ocean ecosystems**. The majority of ocean plant life is made up of mangroves, salt marshes, and seagrasses, which store large amounts of carbon.
- Numerous efforts are being made to improve **natural sequestration** in soils and oceans.
- Furthermore, a variety of artificial sequestration initiatives, such as new building materials, carbon capture and storage, and geological sequestration, are underway.

Carbon Cycle

- Carbon is required for all life on Earth. The amount of carbon on Earth has never changed, but its location is constantly shifting as it flows between the atmosphere and Earth's organisms as it is released or absorbed.
- The carbon cycle is a perfectly balanced process that has existed for thousands of years.

- A carbon sink absorbs CO2 from the atmosphere. The world's largest carbon sinks are the **ocean, soil, and forests.**
- Carbon dioxide is emitted into the atmosphere by a carbon source. Carbon sources include the use of fossil fuels such as gas, coal, and oil, as well as deforestation and volcanic eruptions.
- Increased human activity is currently upsetting the balance. More carbon is being released into the atmosphere than the Earth's natural carbon sinks can absorb.
- Because we continue to rely on fossil fuels for energy, billions of tonnes of carbon are released into the atmosphere each year, hence carbon sinks have never been more important.

Natural Carbon Sinks

Forests

- Green plants play an important role in regulating CO2 levels.
- Photosynthesis occurs in the cells of microscopic organisms and in the leaves of plants. It converts carbon dioxide and water into glucose (carbon sugar) using solar radiation energy.
- Once processed, sugar is further converted and used in a variety of other molecules, including fats, proteins, starch, and enzymes.
- Once this is completed, the photosynthesis process releases oxygen, which is required by plants and animals.
- It is widely assumed that photosynthesis is responsible for approximately half of all carbon extracted from the atmosphere.

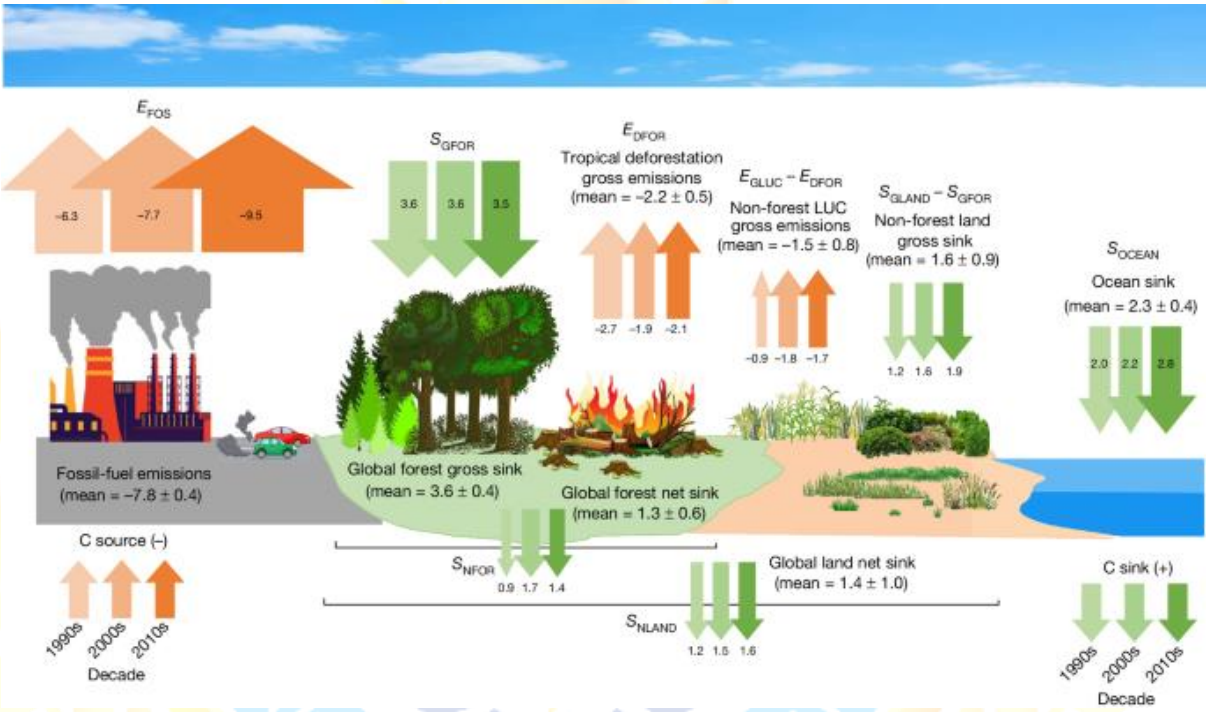
Soil

- Carbon is the primary component of organic matter that contributes to fertile agricultural soil. It also aids in the retention of water in the soil.
- Plants are the primary source of CO2 transfer to soil.
- Not all of the CO2 absorbed by plants for photosynthesis is required for food.
- The excess percolates down through their roots and feeds soil organisms.
- Carbon is also captured in soil from the roots and leaves of dying plants.
- Every year, the Earth's soil absorbs about a quarter of all human emissions, with a large portion of this stored in peatland or permafrost.

Oceans

- The oceans are the world's workhorse for absorbing and storing carbon.
- Since the Industrial Revolution, when we began burning fossil fuels for energy, the ocean has absorbed roughly a quarter of the carbon dioxide released into the atmosphere.

- Photosynthesis, along with other biological processes, helps to sequester CO2 and other carbon compounds.
- The ocean is one of the most important carbon sinks because of phytoplankton.
- These microscopic marine algae and bacteria play a significant role in the global carbon cycle, absorbing roughly the same amount of carbon as all land plants and trees combined.
- However, plastic pollution in our ocean means that plankton are eating microplastics, which affects the rate at which they trap carbon in our ocean.



Source: https://www.downtoearth.org.in/climate-change/carbon-sink-broken-last-year-trees-and-land-barely-absorbed-any-co2