



Carbon Sequestration

For Prelims: Carbon Sequestration

For Mains: Carbon Sequestration, Environmental Pollution & Degradation

Why in News?

According to a recent study conducted in Maharashtra and Odisha, soil carbon sequestration may help fight [climate change](#).

- Studying is aligned with [Sustainable Development Goal](#) 13 (SDG 13: Climate Action) which is on taking urgent action to combat climate change and its impacts.
- The study revealed how the right combination of fertiliser, biochar, and irrigation could potentially increase soil carbon by as much as 300% and help mitigate climate change.

What is Carbon Sequestration?

- **About:**
 - Carbon sequestration is the **long-term storage of carbon in plants, soils, geologic formations, and the ocean**.
 - Carbon sequestration occurs both naturally and as a result of anthropogenic activities and typically refers to the storage of carbon.
- **Types:**
 - **Terrestrial Carbon Sequestration:**
 - Terrestrial carbon sequestration is the **process through which CO₂ from the atmosphere is absorbed by trees and plants** through photosynthesis and stored as carbon in soils and biomass (tree trunks, branches, foliage, and roots)
 - **Geologic Carbon Sequestration:**
 - **CO₂ can be stored, including oil reservoirs, gas reservoirs, unmineable coal seams**, saline formations and shale formations with high organic content.
 - **Ocean Carbon Sequestration:**
 - **Oceans absorb, release and store large amounts of CO₂** from the atmosphere. This can be done in two ways- enhancing productivity of ocean biological systems through Iron fertilization, and injecting CO₂ into the deep ocean.
 - The dumping of iron stimulates phytoplankton production, which in turn leads to enhanced photosynthesis from these microorganisms, helping in CO₂ absorption.

What are the Different Methods of Carbon Sequestration?

- **Natural Carbon Sequestration:**
 - It is the **process by which nature has achieved a balance of carbon dioxide in our atmosphere** suitable for sustaining life. Animals expel carbon dioxide, as do plants during the night.
 - Nature provided trees, the oceans, earth and the animals themselves as carbon sinks, or

sponges. All organic life on this planet is carbon based and when plants and animals die, much of the carbon goes back into the ground where it has little impact on contributing to global warming.

▪ **Artificial Carbon Sequestration:**

- Artificial carbon sequestration refers to a **number of processes whereby carbon emissions are captured at the point of production** (e.g., Factory Chimneys) and then buried.
- One proposed method is ocean sequestration whereby carbon dioxide is injected deep into the ocean, forming lakes of CO₂. In theory, the CO₂ will stay down deep due to the pressure and temperature of the surrounding water, gradually dissolving into that water over time.
 - Another example is geological sequestration where **the carbon dioxide is pumped into underground chambers** such as old oil reservoirs, aquifers and coal seams that are unable to be mined.

Why is Carbon Sequestration a viable Option for Agriculture?

- **Climate Friendly:** Carbon Farming (Carbon Sequestration) involves practices that are known to improve the rate at which CO₂ is removed from the atmosphere and **converted to plant material and soil organic matter**.
 - It **promises a bold new agricultural business model** — one that fights climate change, creates jobs, and saves farms that might otherwise be unprofitable.
 - In essence, a climate solution, and increased income generation opportunity and ensuring a food security net for the population.
- **Optimising Carbon Capture:** It is a **whole farm approach to optimising carbon capture on working landscapes** by implementing practices that are known to improve the rate at which CO₂ is removed from the atmosphere and stored in plant material and/or soil organic matter.
 - It can incentivise our farmers to introduce regenerative practices in their agricultural processes, helping them shift their focus from improving yields to functioning ecosystems and sequestering carbon that can be sold or traded in carbon markets.
- **Farmer Friendly:** It not only improves the health of soil but can also result in improved quality, organic and chemical-free food (farm-to-fork models) along with boosted/secondary income from **carbon credits** for the marginalised farmers.

UPSC Civil Services Examination, Previous Year Questions (PYQs)

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)

Q3. What is/are the advantage/advantages of zero tillage in agriculture? (2020)

1. Sowing of wheat is possible without burning the residue of previous crop.
2. Without the need for nursery of rice saplings, direct planting of paddy seeds in the wet soil is possible.
3. Carbon sequestration in the soil is possible.

Select the correct answer using the code given below:

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

Ans: (d)

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