Carbon Farming: An Overview

Carbon Farming:

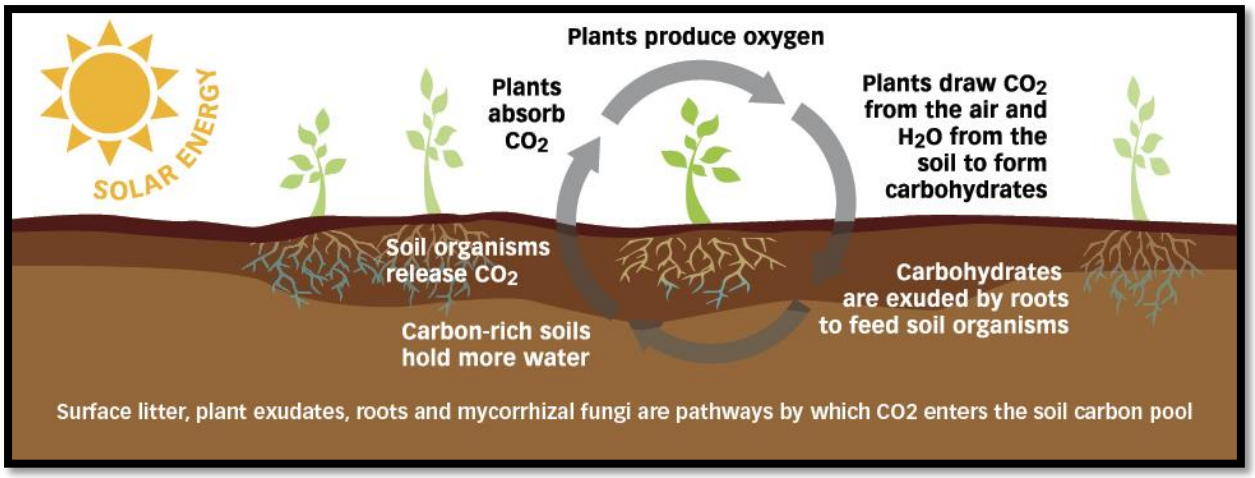
- Carbon farming (also known as carbon sequestration) is a system of agricultural management that helps the land store more carbon and reduce the amount of GHG that it releases into the atmosphere.
- It involves practices that are known to improve the rate at which CO_2 is removed from the atmosphere and converted to plant material and soil organic matter.
- Carbon farming is successful when carbon gains resulting from enhanced land management or conservation practices exceed carbon losses.

Agriculture and Carbon Emissions:

- Agriculture covers more than half of Earth's terrestrial surface and contributes roughly one-third of global GHG emissions.
- Agricultural emissions in India are primarily from the livestock sector (54.6%) and the use of nitrogenous fertilisers (19%).

Methods for Carbon Farming:

- Forest Management: Healthy forests absorb and hold CO_2 emissions produced from other sources. Carbon offsets can be created by:
    - Avoiding deforestation
    - Permanent land conservation
    - Reforestation and replanting activities
    - Improved forest management
- Grasslands Conservation: It includes maintaining native plant life through permanent land conservation and avoiding conversion of grasslands for commercial development or intensive agriculture.
- Mixed Farming: A climate-friendly strategy of raising livestock and crops together.
    - Rotating cows among pastures allows grasses to recover from grazing and the animals' manure and the impacts of their grazing regenerate carbon in soils.
- Using Cover Crops: These crops are planted to cover the soil rather than for the purpose of being harvested. They are planted after the harvest of the main crop.
    - They return more carbon to the soil and sustain soil microbes that play key roles in carbon storage.
- Reduction of Soil Tillage: Tillage is normally used to loosen and aerate the soil and to remove initial weeds.
    - However, tillage increases carbon mineralization (decomposition of chemical compounds in organic matter) leading to CO_2 emissions from the soil.
    - Reducing the soil disturbance is a useful tool to protect soil organic matter.
- Wetland Restoration: Wetland soil is an important natural carbon pool or sink as the wetlands conserve about 14.5% of the soil carbon found in the world.



Carbon Faming & Regenerative Agriculture

Significance of Carbon Farming:

- Multidimensional Benefits: Increasing Soil Organic Carbon (SOC) through various methods can improve soil health, agricultural yield, food security, water quality, and reduce the need for chemicals.
- It would not just address carbon mitigation but also improve other planetary boundaries in peril such as fresh water, biodiversity, land use and nitrogen use.
- Offsets Carbon Emissions: An international initiative called "4 per 1000," showed that increasing soil carbon worldwide by just 0.4% yearly could offset that year's new growth in CO2 emissions from fossil fuel emissions.
- The '4 per 1,000' initiative was launched by the France government at the COP21 Paris climate summit in 2015.
- The aim of the initiative is to demonstrate that agriculture, and in particular agricultural soils, can play a crucial role where food security and climate change are concerned.
- Acts as an Intermediate Mitigation Strategy: Increasing soil carbon offers a range of co-benefits along with buying the time before other technologies can help the world transition to a zero-carbon lifestyle.
- Helps Restoring Carbon Cycle: Worldwide, soils are estimated to contain about 10 times the amount of carbon in the atmosphere; far more than what is found in normal vegetation.
- Carbon farming is seen as a way to help restore balance within the carbon cycle.
- It also helps soil build a resilience to drought and increases agricultural productivity in a natural way

Challenge Associated:

- Requires Participation at a Larger Level: For the overall framework of carbon farming to be successful, it would have to include sound policies, public-private partnerships, accurate quantification methodologies and supportive financing to efficiently implement the idea.
- It requires to be done at a scale where measurable carbon capture can be achieved along with maintaining healthy soils that absorb and store carbon.

- Limited Benefit: The areas with long growing seasons, sufficient rainfall and substantial irrigation make viable opportunities for carbon farming.
- However, carbon farming, likely, is more of a challenge for farmers in hot and dry areas of the country.
- Moreover, many farmers may not be able to afford the cost of implementing environmentally beneficial measures without some sort of financial assistance.

Way Forward:

- Direct Incentives for Farmers: The land sector is key for reaching a climate-neutral economy, because it can capture CO_2 from the atmosphere.
- However, to encourage the agriculture and forestry sectors, it is necessary to create direct incentives for the adoption of climate-friendly practices, as currently there is no targeted policy tool to significantly incentivise the increase and protection of carbon sinks.
- Carbon Credits and Carbon Banks: The farmers can be rewarded through globally tradable carbon credits and 'carbon banks' can also be created that would buy and sell carbon credits from farmers.
- These credits could then be sold to corporations needing to offset their emissions.
- Paying farmers to restore carbon-depleted soils offers a great opportunity for a natural climate solution and to stabilize global warming below 2°C.
- Organic-Carbon Rich Fertilisers: Fertilisers such as compost and solid manure with wide C:N (carbon:nitrogen) ratios will have a slow carbon turnover compared to other materials. They should be part of the farming system.
- Biofuel over Fossil Fuels: Nearly all biofuel systems (mainly biodiesel and bioethanol) produce fewer GHG emissions than fossil fuels.
- Using biofuel as a replacement for fossil fuels is an opportunity for farmers to diversify income, reduce costs, and assist in reducing global GHG emissions – mainly carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O).

References:

1. https://www.indiancarbon.org/carbon-farming/what-is-carbon-farming/
2. https://en.wikipedia.org/wiki/Carbon_farming
3. https://resource.cecsb.org/rethink-food/carbon-farming/