



Mains Practice Question

Q. What is 'carbon mineralisation' and how does it help in the fight against climate change? Which are other significant carbon capture and storage methods? (150 words)

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Approach

- Write in brief about the 'Carbon mineralisation'.
- Elaborate how it help in the fight against the climate change.
- Write other significant carbon capture and storage methods available.

Introduction

- '**Mineralisation**' is the decomposition of the chemical compounds in organic matter, by which the nutrients in those compounds are released in soluble inorganic forms that may be available to plants.
- The mineralisation of carbon compounds is the fundamental energy-producing process for heterotrophic organisms. The process may result in production of CO₂ or CH₄ (depending on oxygen availability) in secondary production, which is subsequently mineralised, and in residual compounds, which tend to be increasingly resistant to decomposition.
- This iterative cascade provides some opportunities for directly manipulating the rate of carbon mineralisation by (i) maintenance of the food web; (ii) selective control of specific functional groups; and (iii) relocation of the organic resources.

Body

It helps in the fight against climate change in following way:-

- Increasing soil carbon offers a range of co-benefits and this would buy us time before other technologies can help us transition to a zero-carbon lifestyle.
- Significant carbon pools on earth are found in the earth's crust, oceans, atmosphere and land-based ecosystems. Soils contain roughly 2,344 Gt (1 gigatonne = 1 billion tonnes) of organic carbon, making this the largest terrestrial pool.
- Increasing Soil Organic Carbon (SOC) through various methods can improve soil health, agricultural yield, food security, water quality, and reduce the need for chemicals.
- Changing agricultural practices to make them more sustainable would not just address carbon mitigation but also improve other planetary boundaries in peril such as fresh water, biodiversity, land use and nitrogen use.

Carbon sequestration is the process of capture and long-term storage of atmospheric carbon dioxide to mitigate global warming and to avoid dangerous impacts of climate change. The **Carbon Capture And Storage (CCS)** chain consists of three parts; capturing the carbon dioxide, transporting the carbon dioxide, and securely storing the carbon dioxide emissions, underground in depleted oil and gas fields or deep saline aquifer formations.

Some of the important methods (Natural/Man-made) are as follow-

- **Forests as sink** - Afforestation / Reforestation / Plantation / Agro forestry: Trees are natural sequesters of carbon, they take carbon from atmosphere, utilize it in the process of photosynthesis as well as they store it in the form of biomass or wood.
- **Wetland restoration:** Wetland soil is an important natural carbon pool or sink. Wetlands conserve 14.5 % of the soil carbon found in world. But only 6 % of the world's land is composed of wetland
- **Oceans as sink:** Oceans absorb CO₂ from the atmosphere because the concentration of CO₂ in the atmosphere is greater than that in the oceans. This difference in partial pressure of CO₂ results in the gas being absorbed into the world's oceans.
- **Subterranean injection or Geological sequestration:** Carbon dioxide can be injected into depleted oil and gas reservoirs and other geological features, or can be injected into the deep ocean, this is known as subterranean injection.

Conclusion

- The IPCC Special Report, Carbon Dioxide Capture and Storage, concluded that 'available evidence suggests that, it is likely that there is a technical potential of at least about 2,000 Gt CO₂ of storage capacity in geological formations'. This is a large number indicating the potential of CCS to be a significant CO₂ mitigation strategy.
- Carbon Sequestration can assist significantly in maintaining the natural carbon cycle. Therefore, requirement is that we need to implement this practice properly. There is a need to go for natural sequestration first, thus conservation of existing forests and more and more reforestation is required. Later on this mechanism can be installed in every thermal power plant. So that carbon emission can be managed at its point source.

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