

Soils to Sequester Carbon

What is the issue?

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The ability of soils to sequester carbon should be given a serious focus by policymakers in the context of climate change actions.

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What is carbon sequestration?

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- It is the process by which carbon dioxide is removed from the Earth's atmosphere and then stored in liquid or solid form. \n
- It could involve both natural and artificial processes to remove and store carbon.

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- Significant carbon pools on earth are found in the earth's crust, oceans, atmosphere and land-based ecosystems.
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- The prime purpose of artificially doing this is to mitigate or delay global warming and avoid extreme climate change. \n

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What is the need for focussing on soils?

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- Agricultural Practices After the changes undertaken as part of the Green Revolution, crop yields increased for several decades. \n
- But parallelly there has also been a dramatic increase in the use of chemicals as pesticides, herbicides and fertilizers. \n
- The resultant degraded soils are getting to be a prime reason for undermined agricultural yields in many places now. \n
- Industrial changes to agriculture have led to a range of adverse effects including: \n
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 - \n i. loss of biodiversity
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 - $\scriptstyle \rm ii.$ elimination of beneficial microbes and insects $_{\n}$
 - $\scriptstyle \mathrm{iii.}\ reduction$ in yield
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 - $\operatorname{iv.}$ contamination of water bodies and soils
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- v. increasing toxicity, etc
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- Global Warming - Currently, the world is on a path to be about 3° C warmer than pre-Industrial times.

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- This is despite adhering to 2015 Paris climate deal commitments. $\ensuremath{\sc n}$
- Atmospheric concentrations of carbon dioxide have crossed limits and oceans are already turning acidic.
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- But, policies are largely focussed on reducing greenhouse gas (GHG) emissions from electricity sector, transport and industry. \n
- The policy shortfalls call for a renewed focus in understanding how soils can serve as carbon sinks to address the increasing pressures. \n

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How effective are soils as carbon sinks?

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- SOC Soil organic carbon (SOC) comes from plants, animals, microbes, leaves and wood, mostly found in the first metre or so. \n
- Soils contain around 2,300 Gt (1 gigatonne = 1 billion tonnes) of organic carbon, making this the largest terrestrial carbon pool. n
- **Benefits** Increasing SOC through various methods can improve soil health. \n
- It can contribute to <u>agricultural yield</u>, food security, water <u>quality</u>, and also reduce the need for <u>chemicals</u>.
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- It helps address <u>carbon mitigation</u> and also improve conditions of fresh water, biodiversity, land use and nitrogen use. n
- Moreover, carbon sequestration in soils has the potential to $\underline{offset\ GHG}$ $\underline{emissions}$ from fossil fuels by up to 15% annually. \n
- Utilising this option would thus offer the breathing time before other technologies can help transiting to a zero-carbon lifestyle. \n

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How is it achieved?

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• There are many conditions and processes that determine changes to SOC content.

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• These include temperature, rainfall, vegetation, soil management and landuse change.

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- \bullet Thus, increasing Soil Organic Carbon involves adopting sustainable agricultural practices to keep these factors in balance. \n
- The approaches to increase SOC include:

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- i. reducing soil erosion n
- ii. no-till-farming

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- iii. use of cover crops n
- iv. nutrient management n
- v. applying manure and sludge \n
- vi. water harvesting and conservation $\normalized{\label{eq:vi}}_n$
- vii. agroforestry practices, etc n

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Factors controlling soil C sequestration



[Climate, Altitude, Soli properties (texture, mineralogy, mine reserve), Landscape position]

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What should the government do?

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• India does have a large number of successful **sustainable agricultural practices.**

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- The knowledge of farmers who have successfully experimented with these methods must be considered in research and policy. \n
- State-level policy makers should identify the kinds of support needed by farmers with small holdings to transition from existing practices. \n
- There is also a need for revising the existing fertiliser subsidy policy and promoting organic fertilizers. \n
- The ability of soils to sequester carbon is thus a win-win strategy for farmers, people and for climate change. \n

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Source: The Hindu

