

# Enhancing Soil Health

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# Actionable Area

Work for improving soil health as a threat to the soils is detrimental for global food security and negatively impacts our climate, water systems, and biodiversity.

## Issues

- Soil, a finite, fragile resource, is fundamental to food systems and “an estimated 95% of our food is directly or indirectly produced on our soils.” Soils supply the essential nutrients, water, oxygen and root support that our food-producing plants need to grow and flourish.
- Microbes in the soil are responsible for soil health, fertility and carbon reserve. Healthy soils maintain a diverse community of soil organisms that help control plant disease, insect and weed pests, form beneficial symbiotic associations with plant roots, recycle essential plant nutrients, improve soil structure with positive effects for soil water and nutrient holding capacity, and ultimately improve crop production.
- The heightened intensification in agriculture after the green revolution has led to the deteriorating health of soils in India, as indicated by many scientific studies. Many of today’s soil and crop management systems have now become unsustainable and are degrading the ecosystem. Soils are increasingly facing salinisation and acidification due to inadequate agricultural practices.
- Due to the injudicious use of fertilisers there have been nitrogen deposition on the soils, which have led to a low response to synthetic fertilisers and lower nitrogen uptake efficiency. It has also resulted in contamination of ground and surface water, soil and water acidification, micronutrient deficiency, low soil organic carbon, accumulation of heavy metals and metalloids through various forms of emissions.

## Soil erosion in India results in:



**7.2 million tonnes** of annual loss in output of main crops



**4% - 6.3%** of loss in annual agricultural production of the country



**1 to 1.7 %** of loss in terms of the replacement cost of the GDP



**74 million tonnes** of loss in major nutrients per year

- Soil erosion results in an annual loss in output of main crops in India to the tune of 7.2 million tonnes, which is around 4- 6.3% of annual agricultural production of the country and ranges to a loss in terms of replacement cost from 1 to 1.7% of the GDP.

## Status

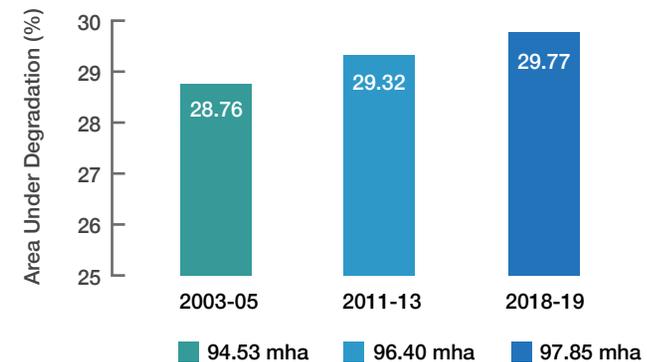
### Government Initiatives

- Improving soil health has been one of the main agendas of the governments and development sector players. Both central and state government has come up with programs and schemes to improve the soil health and reduce the instances of soil erosion.
- These schemes include Integrated Watershed Management Programme (IWMP), National Watershed Development Project for Rainfed Areas, Drought Prone Areas Programme (DPAP) and Desert Development Programme (DDP).
- The National Mission for Sustainable Agriculture (NMSA) has soil health management as a sub-scheme for promoting soil test-based balanced and integrated nutrient management. In 2015, a National Mission on Soil Health Card was launched to provide soil test-based fertiliser recommendations to all farmers in the country.
- Formation of dedicated research institutions focused on soil: Indian Institute of Soil Science; National Bureau of Soil Survey & Land Use Planning; Central Soil Salinity Research Institute; Indian Institute of Soil and Water Conservation.

## Vision 2030

- Farmers/farming systems move from exploitation of soils to recycling nutrients and organic material, leading to enhancing productive and adaptive capacities for sustainable ecological and food systems.

### Desertification / Land Degradation Status of India



Source: Desertification and Land Degradation Atlas released Space Applications Centre (SAC), ISRO, June 2021

# Pathways

## POLICY



**Adopt five forms of sustainable agricultural farming practices encouraged by FAO** – agroecology, agroforestry, zero tillage, conservation agriculture and organic farming – to preserve and improve soil quality and set targets to increase the area under these practices. Targets for hotspot areas (saline, acidic, contaminated soils) to be treated with urgency.

**Make nature-based agroecological solutions a part of policy and programs and support them.** Set targets for soil carbon sequestration to reduce carbon footprint and global warming.

**Manage land degradation neutrality.**

**Integrate soil management policies with land-use policies,** so that good quality soil is not lost to non-agricultural use.

**Develop the policy framework** to support the creation of a favourable ecosystem around soil health management by bringing various stakeholders and different government initiatives on a single platform. This could be in the form of a lab to farm initiative.

**Interlink Swachh Bharat Mission's focus on garbage collection and compost making to soil management initiatives through waste management.**

**Policymakers/ researchers need to acknowledge the bio-dynamic nature of soils and recognise farmers' knowledge and location-specific understanding of soils and their knowledge in practice.**

**Assess the efficacy of ongoing soil reclamation programmes and soil health schemes to give successful policy prescriptions.**

**Assess the costs of soil health degradation at a national/ regional scale and release a 'State of the Soil Health Report' every five years on the 'State of the Forest' report.**

**Incentivise the creation of local soil testing infrastructure to encourage testing by farmers.** The use of Geographical Information Systems (GIS), Remote Sensing, Internet of Things (IoT), Artificial Intelligence (AI) and Machine Learning (ML) could be a game-changer for ensuring soil health by providing information and enabling the adoption of local level remedial measures.

# Pathways

## IMPLEMENTATION



**Facilitate efficient nutrient management** towards improving soil health.

**Systematise compost making** in every gram panchayat by allocating land.

**Promote regenerative agriculture practices** and encourage conservation tillage that leaves at least 30 % of the soil surface covered with crop residue after planting. This will help in carbon sequestration and reduction in CO2 emissions.

**Encourage farmers to manage crop residues better** and change cropping patterns by providing them incentives/price/procurement support/increased public funding.

**Leverage watershed programmes** and Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) to work on soil and water conservation, water harvesting, drought-proofing including afforestation, land development etc.

**Treat catchments landscape-based** and extend the tree cover outside forests through agroforestry as these practices can help reduce soil erosion.

**Strengthen local NGOs with technical know-how** and the right information. Farmer Producer Organisations (FPOs) may play a critical role in soil health management as they have a big role in promoting natural farming.

**The Government should develop a trained cadre of community resource persons (CRPs)** through Green Colleges to support soil health/ nature-based solutions/ agroecology/ Zero Budget Natural Farming (ZBNF)/ biochar etc. Promoting peer to peer learning and extension models such as farmer field schools is critical.

# Pathways



**Build a science-based vision on soils with clear policy objectives** and supportive instruments and initiate courses in sustainable farming practices.

**Have better monitoring of land degradation** for conservation of soil resources and improving soil health. Researchers need to develop evidence-based knowledge documents on the linkage between soil health and human health. Develop the broader parameters for collecting data around soil health monitoring.

**Establish a property-specific benchmark** for soil health to better monitor the progress.

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