

## Farm scale soil information is key component for Soil health management

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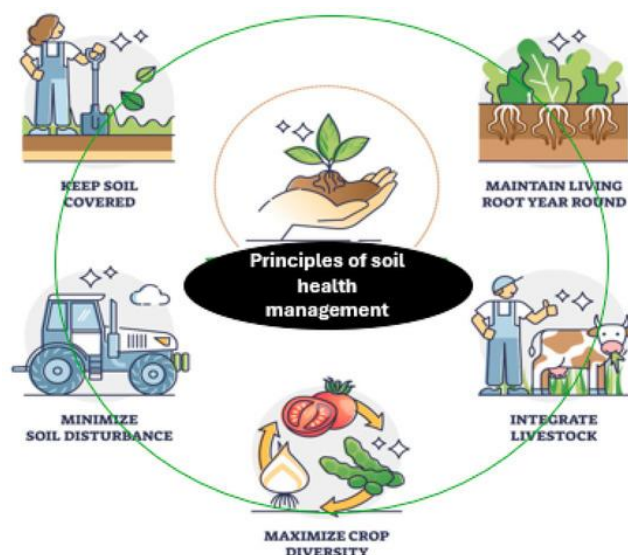
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### Introduction

Sustainable agriculture and environmental management depend on soil health. It includes all of the physical, chemical, and biological characteristics that make soil an essential living environment. This intricate interaction of soil characteristics promotes plant development, controls water, filters pollutants, and cycles nutrients—all of which are critical for sustaining resilient and profitable agricultural systems.

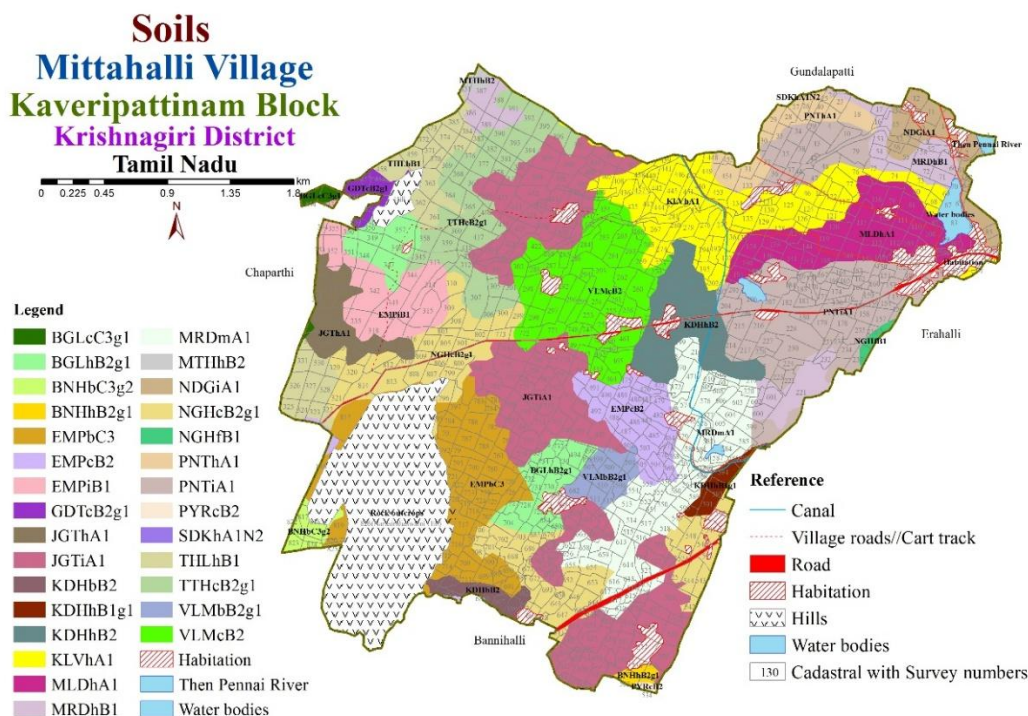
Sustainable agricultural practices depend on healthy soil because it promotes ecosystem services and farm productivity. Crop productivity and environmental sustainability both benefit greatly from sustainable agricultural practices such as crop rotation, cover crops, and conservation tillage. By increasing soil biodiversity, nutrient cycling, and organic matter, these techniques can strengthen agroecosystem resilience. Maintaining crop yields, improving crop resistance to climate change, and long-term soil multifunctionality all depend on healthy soil (Kabato *et al.*, 2025).



A farm-scale soil survey is a high-intensity cadastral map that includes survey numbers of farmers and the distribution of soil both horizontally (soil map) and vertically (soil profile study). The most recent remote sensing imagery, such as QuickBird and Cartosat, is

used to create major landforms, along with a DEM (Digital Elevation Model), which helps identify various landforms and replicates soil characteristics. Large-scale maps (e.g., 1:8,000 to 1:10,000) of soil types, their properties (texture, depth, slope, etc.), and their boundaries are used in scientific land use planning, agricultural management, conservation, and engineering to determine appropriateness and constraints for different purposes.

The most thorough level of soil categorization is a soil series, which defines a particular soil body used for mapping and land management by combining soils with similar horizons (layers) in the same sequence and with similar attributes. The foundation for understanding soil performance for agricultural output is the soil series, which is based on location and attributes such as colour, texture, thickness, and structure. The soil series map of Mittahalli village in Kaveripattinam block of Tamil Nadu is given in Figure 1.

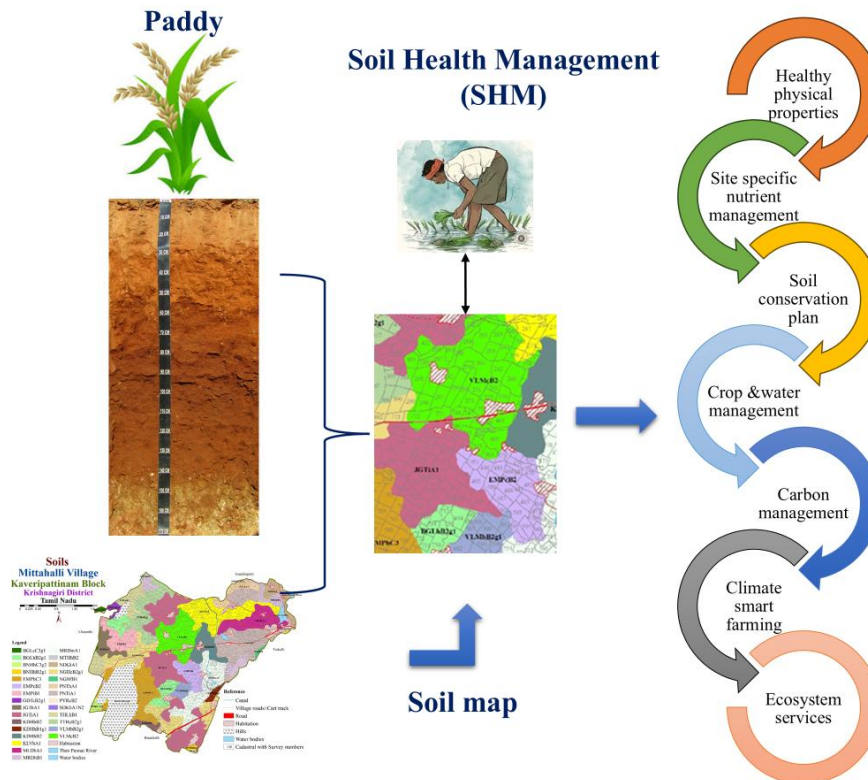


**Fig.1** Soil map of the Mittahalli village

A detailed soil survey map (farm scale) helps by providing precise information on soil types, texture, depth, slope, drainage, and nutrient content, enabling better land use planning, optimizing crop selection, efficient water/fertilizer use, erosion control, and reducing risks for agriculture, construction, and environmental management (Srinivasan *et al.*, 2025).

Farm-scale soil surveys are highly useful for providing quantitative information on the spatial distribution of soil properties and their potential. Detailed soil maps that provide more information on soil properties and their spatial distribution are necessary for modern land evaluation, land suitability analysis, land resource management, land use planning, and other

environmental modelling. Detailed farm scale soil information is highly useful for sustainable soil health management (Fig. 2).



**Fig. 2** Soil health management based on farm scale soil map

## Conclusions

Natural systems are supported by healthy soil, as demonstrated by increased crop output and a sustainable ecosystem. However, increased human activity and the quickening effects of climate change make it harder to maintain soil health. These factors pose serious risks to soil resilience, function, and structure, which in turn affect crop output. Farmers and planners can use farm-scale soil maps to manage sustainable soil health.

## Reference

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