



Food and Agriculture  
Organization of the  
United Nations



# Soil mapping for resilient agrifood systems

In Central America and sub-Saharan Africa, the Soil Mapping for Resilient Agrifood Systems (SoilFER) project stands out as a unique framework aimed at unearthing valuable information from soils to guide policymaking and fertilizer recommendations both at national and field scale.

**Donor:** US Department of State

**Budget:** USD 30 million

**Implementation period:**  
May 2023 – May 2027

**Target countries:**

Ghana, Guatemala, Honduras,  
Kenya, Zambia

This project directly addresses the fertilizer crisis driven by supply-chain shocks and current conflicts. This crisis is set to persist, affecting global agricultural production and food security, particularly in regions heavily dependent on imported inputs, such as Africa. Faced with the challenges posed by climate change, soil degradation and the misuse of inputs, SoilFER uses a holistic approach, from soil sampling in the field to advanced laboratory analysis and comprehensive soil information systems and decision support tools, including tailored fertilizer recommendations. To ensure the accuracy and effectiveness of these recommendations, field trials will be established to validate the proposed fertilizer strategies.

The project's emphasis on strengthening capacities as well as empowering stakeholders with full ownership and control over the data and tools underscore its long-term ambition to sustainably equip both participating governmental institutions and farmers. By providing farmers with digital solutions based on the variability of soils, SoilFER promotes the efficient use of fertilizers, sustainable farming practices and the selection of major and opportunity crops as part of VACS\*, positively impacting soil health, agricultural livelihoods and enhancing the resilience of agrifood systems in the five beneficiary countries.

\* The Vision for Adapted Crops and Soils (VACS):

<https://www.state.gov/the-vision-for-adapted-crops-and-soils/>

©FAO/Matteo Sala



**Nutrient-depleted soils**

**Nutrient-overloaded soils**





# From the ground up

the SoilFER process



Validation of fertilizer recommendations

**Field trials**

Fertilizer management,  
Major and opportunity crops,  
Sustainable Soil Management



**Decision support tools**



National Soil Information System

**Soil data management**



Laboratory Information Management System (LIMS)

Fertilizer testing,  
Wet and dry chemistry



**Soil Laboratories**

**Soil sampling**



Field data collection tool





# Connecting and fostering collaboration between **three core stakeholders**

## **National governments**



**National governments** are provided with robust, rigorous, and responsive framework for integrated soil nutrient management at local, subnational, and national scales.

**National high resolution digital soil maps** (soil nutrient, nutrient budget, soil property maps, soil threats, crop suitability map) and Integrated National Soil Information Systems

**Capacity Development Programme for governmental staff** (soil data management, digital soil mapping, soil organic carbon sequestration modelling, training sessions on using NSIS & FERSIS applications)

## **Farmers**



**Farmers** are empowered with web-based applications, high-resolution nutrient maps and enhanced capacity on sustainable soil management.

**Global Soil Doctors Programme**  
a farmer-to-farmer training initiative

**One tool for all farming needs** (fertilizer recommendations, fertilizer prescription maps, real-time vegetation index, access to field data, crop suitability, weather conditions)

**Communication, awareness raising and advice services** on sustainable soil management practices

## **Laboratories**



**Laboratories** are strengthened by the implementation of Laboratory Information Management Systems, the modernization of their facilities, and staff capacities development through training.

**Laboratory Information Management System** (Central sample and analysis management and stock management; chemicals & supplies)

**Modernization of national laboratories & capacity development** (training on wet & dry chemistry, safety, procurement, QA/QC; provision of equipment for soil and fertilizer analysis and spectral and calibration libraries/services)



Guatemala Honduras

Ghana

Kenya

Zambia

### A four-year project with multiple objectives:

**Short term:** Provide farmers with tools and resources to facilitate data-driven decision-making at the farm level.

**Medium term:** Advocate for sustainable management practices to enable farmers in preserving and enhancing soil health and fertility through sustainable soil management.

**Long term** (beyond the project lifetime): Cultivate a sense of ownership and self-sustainability among governments and local stakeholders. The ultimate aim is to establish sustainable soil-crop systems that benefits governments, farmers, and their communities.

# Expected results

1

Improved understanding, databases and maps of soil resources at national and field scale

2

Digital tools and solutions for improved natural resource and fertilizer management

3

Governmental institutions are strengthened and empowered in state-of-the-art soil analysis and data management

4

Farmer capacities are raised for improved fertilizer use, crop selection and sustainable soil management

© Adobe Stock

©FAO/Matteo Sala

©FAO, 2024  
CC9430EN/1/02\_24

Thanks to the financial support of



Some rights reserved. This work is available under a CC BY-NC-SA 3.0 IGO licence