

# Leveraging Soil Information Systems for Input Subsidy Delivery in Africa

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This note, prepared for the Impact Program's learning, provides a brief overview of how soil information systems (SIS) can improve the effectiveness of input subsidy programs. It showcases recent experiences in SSA countries in implementing SIS, highlighting key lessons on what has worked and not worked, and how SIS should be designed and implemented.

## Context

Input subsidy programs have long been a cornerstone of agricultural policy in SSA, aimed at improving farmers' access to fertilizers and other essential inputs. These programs seek to boost productivity, enhance food security, and reduce poverty among smallholder farmers. However, traditional subsidy delivery mechanisms—often reliant on manual targeting, universal approaches, paper-based records, and fragmented data—have struggled with inefficiencies, poor targeting, limited transparency, and leakage. These challenges undermine the effectiveness of subsidies, resulting in suboptimal resource allocation and limited impact on agricultural productivity.

Soil Information Systems (SIS) offer an innovative solution to these challenges by providing location-specific soil data that can guide subsidy allocation and fertilizer recommendations. By integrating SIS into subsidy delivery, governments can move from generalized/blanket approaches to evidence-based targeting, ensuring that farmers receive the right inputs for their specific soil conditions (i.e., precision farming). This not only improves efficiency and cost-effectiveness but also promotes sustainable land management and climate resilience. Reforming subsidy delivery through SIS enhances transparency, reduces leakages, and strengthens accountability—paving the way for smarter, data-driven agricultural support that maximizes the impact of public investments in agriculture.

## What are Soil Information Systems?

Soil Information Systems (SIS) are online infrastructures designed to collect, store, analyze and share soil data, including measured properties, maps, reports, and images. They combine field sampling, laboratory analysis and geospatial technologies to produce detailed soil datasets that inform agricultural and land management decisions.

In input subsidy programs, SIS function as digital platforms that aggregate soil information from diverse sources, harmonize data standards, and provide decision support for targeting and monitoring subsidies. By enabling stakeholders to access up-to-date, location-specific soil data, SIS facilitates a service provision to farmers for evidence-based decisions on input allocation, precision fertilizer use, and sustainable land management, ultimately supporting food security, soil health, and climate resilience.

## Recent Experience and Lessons Learned

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SIS development in Africa is nascent but growing. Out of 55 countries, fewer than ten have national SIS, and only five offer online access. While coverage remains limited, recent initiatives such as the Africa Soil Information Service (AfSIS) and Soils4Africa are expanding the reach and quality of soil data across the continent. Several African countries have developed national soil information systems to improve fertilizer use and crop productivity.

**Ethiopia's** EthioSIS and **Kenya's** KENSIS lead the way in using detailed soil fertility maps to guide site-specific fertilizer recommendations. By integrating geospatial technologies and targeted soil sampling, these systems help farmers optimize inputs, reduce blanket fertilizer application, lower costs, and boost yields through improved nutrient management. Farmers achieved yield increases of 20-40% for staple crops such as maize and wheat.

Other countries are using soil data to improve input subsidy programs. **Malawi** is piloting SIS integration to optimize fertilizer distribution and increase maize yields, while **Zambia** utilizes soil information in its e-voucher system to target fertilizer blends for smallholder farmers. By applying SIS insights, these countries deliver site-specific fertilizer blends that boost yields and minimize waste. Their experience shows that integrating soil data into subsidy schemes enhances targeting and efficiency, ensuring farmers receive inputs tailored to local conditions for greater productivity and return on investment.

Other efforts connect SIS to climate-smart agriculture (CSA) and land restoration. **Ghana** is developing SIS for CSA, particularly in cocoa-growing regions, emphasizing soil fertility mapping and erosion risk assessments to promote sustainable practices. **Senegal** is creating soil data platforms for the Sahel, focusing on soil health monitoring and erosion control to support climate-smart farming and agroforestry.

## Design and Implementation Considerations

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Key design features and critical elements for effective SIS include:

- **Invest in reliable digital infrastructure:** Ensure stable internet, secure and scalable IT systems to support access and long-term sustainability.
- **Establish clear governance, ownership and sustainable funding:** Create inclusive governance with defined roles and legal frameworks, embedding SIS in national and regional plans for long-term funding, and integration into policy agendas.
- **Standardize and harmonize data protocols:** Develop and adopt common standards for data collection, management, and sharing to enable interoperability across national, regional, and continental platforms.
- **Build technical capacity and user-centric platforms:** Provide ongoing training, upgrade equipment, enhance expertise in digital soil mapping and data science, and design accessible, multilingual, mobile-friendly platforms for all users.

- **Promote stakeholder engagement and data contribution:** Involve government, private sector, research institutions, and communities from the start, foster collaboration and data sharing, and recognize and reward organizations that contribute data.
- **Integrate with agricultural systems and monitor progress:** Link SIS to input subsidy programs and broader agricultural information systems, track progress and outcomes with clear indicators aligned to agricultural and environmental goals.
- **Prioritize transparency and open data:** Ensure data and processes are accessible and auditable to build trust and support informed decision-making.

SIS in SSA can face challenges to unlocking the full potential of SIS for agricultural productivity and efficient subsidy delivery, including **inadequate infrastructure**—unreliable internet, limited facilities, and poor connectivity—which undermine access and user confidence. **Sustainability risks** can stem from insufficient funding, unclear ownership, and limited policy support, while technical capacity gaps exist from inadequate equipment, shortages of skilled personnel and challenges retaining technical staff. **The lack of supportive policies, legal frameworks, and inclusive governance** restricts integration into national and regional agendas and hampers effective data sharing, resulting in fragmented information. **Physical soil data is often scarce**, variable in quality, and controlled by private companies or research organizations with little incentive to collaborate.

## Potential Impact and Next Steps

At the upcoming Impact Program regional learning events, participants will gain insights into the latest developments, investment costs and staffing needs for effective SIS, country experiences and technical deep dives into soil information systems. Expected outcomes include a clear understanding of evidence-based soil information systems, practical strategies for design and implementation, and concrete action plans for integrating soil information systems into input subsidy programs.



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