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Data for Soil Health and Innovation Challenge Kenya 2025

Background

Agriculture is a significant sector in Kenya's economy; it is the cornerstone, contributing 33% to the GDP and employing over 70% of the rural population. However, the sector faces significant challenges, including declining soil health, limited access to reliable data, and the increasing impacts of climate change. The recent African Fertilizer and Soil Health Summit in Nairobi, led by the Government of Kenya, has underscored the urgent need to address soil degradation and improve agricultural productivity across the continent.

Despite progress in increasing fertilizer use to 55kg per hectare by 2018, surpassing the Sub-Saharan African average of 17kg per hectare, Kenya still grapples with degraded soils and suboptimal agricultural practices. The Summit highlighted that only about 20% of Kenya's land is considered arable, and at least 13% of the land has acidic soil. This problem extends beyond Kenya's borders, with 65% of agricultural land across Africa degraded due to increasing soil acidity from fertilizer overuse.

The Nairobi Declaration on Soil Health, a landmark agreement resulting from the Summit, outlines a comprehensive plan for improving agricultural productivity and ensuring sustainable food security in Africa. It endorses the Fertilizer and Soil Health Action Plan and the Soil Initiative for Africa Framework as key guiding documents, aiming to harness multi-stakeholder partnerships and investments to drive policies, finance, research and development, markets, and capacity building for fertilizer and sustainable soil health management in Africa.

Considering these developments and challenges, the ***Data4SoilHealth and Innovation Challenge*** aims to leverage data-driven technologies and multi-stakeholder collaborations to address critical soil health issues in Kenya. This initiative seeks to harness the power of digital technologies such as data analytics, artificial intelligence, and cross-sector partnerships to develop scalable solutions for enhancing soil health management and agricultural productivity.

Objectives

Both the **Data Challenge and the Innovation Challenge** seek to highlight possible solutions around integrating data from multiple sources, thus enabling a holistic understanding and management of soil health. It aims to promote collaboration among key stakeholders and foster the development of innovative tools and models that can significantly enhance decision-making processes for farmers, policymakers, and other decision-makers. Ultimately, this initiative aims to improve soil health management practices, boost agricultural yields, and contribute to the overall sustainability of Kenya's agricultural sector.

Expected Outcomes

- **Raise Awareness and Identify Scalable Solutions:** Discover and promote scalable and sustainable data-driven and soil health solutions.

- **Engage Stakeholders for Long-term Partnerships**: Bring together stakeholders from academia, research institutions, agribusinesses, and technology developers to collaborate on innovative solutions and strengthen partnerships between AgTech companies, donor institutions, and government entities
- **Develop Analytical Products**: Utilize open and proprietary repositories and platforms to develop analytical products aimed at improving soil health management. These products should generate actionable insights for farmers, policymakers, and other decision-makers.
- **Develop Decision-Making Tools**: Create tools and models to aid farmers and policymakers in making informed decisions about soil health and management. Integrate AI to provide extension advisory services and other innovative solutions for soil health challenges.
- **Leverage AI and AI-Ready Data Access:** Utilize AI and generative AI applications to enhance the analysis and interpretation of soil health data, enabling more precise and effective soil management strategies.

Stakeholders and Partnerships – Roles of each in the program

- **Government-** The government plays a crucial role in shaping policies around data usage and soil health management. By developing and implementing supportive policies, the government ensures a conducive environment for innovation and sustainable agricultural practices. Their involvement also includes regulatory oversight, facilitating funding, and creating frameworks that promote the adoption of data-driven agricultural solutions
- **Agtechs –** Agtech companies are at the forefront of providing scalable, innovative solutions leveraging cutting-edge technologies to address key challenges in agriculture, from soil health management to crop monitoring. Their role includes continuous innovation, product development, and collaboration with other stakeholders to integrate and scale their solutions effectively.
- **Data providers** – Providing diverse datasets essential for innovative solutions to improve soil health and agricultural productivity. These providers offer data under various partnership modalities, including open access and proprietary arrangements. Their contributions ensure a robust data foundation for developing actionable insights and effective tools for stakeholders.
- **Donor Institutions** – Donor institutions provide critical grant funding, support in partnership development, and technical assistance to Agtech companies, research institutions, and academia participating in the event. Their financial contributions enable the execution of innovative projects and the scaling of successful solutions. Additionally, donor institutions facilitate collaborations between different stakeholders, ensuring a holistic approach to problem-solving and the achievement of shared goals
- **Researchers and Academics -** Researchers and academics from various institutions contribute their expertise in soil health and related fields. Conducting in-depth studies and providing scientific insights that inform the development of innovative agricultural practices and technologies. Their research helps in understanding the complexities of soil health, identifying effective interventions, and validating the impact of new solutions. By partnering with other stakeholders, they ensure that academic research translates into practical, field-ready applications.

- **Agricultural practitioners –** Agricultural practitioners, including farmers, offer invaluable practical insights and serve as a testing ground for new solutions. Their firsthand experience and knowledge of local agricultural conditions provide critical feedback that helps refine and adapt technologies to real-world scenarios. By participating in pilot projects and trials, farmers help demonstrate the effectiveness of innovative solutions, paving the way for broader adoption and impact across the agricultural sector.

Data Challenge

The Data4SoilHealth Challenge is designed to foster innovation in data-driven solutions for soil health management while promoting collaboration among key stakeholders in the agricultural sector. The primary objectives are to develop scalable Use Cases (data products and services) and decision-making tools for soil health management in Kenya, leveraging diverse datasets and analytical platforms to generate actionable insights for policymakers, farmers, and other stakeholders. The challenge aims to promote the use of advanced technologies such as AI and machine learning in addressing soil health challenges, with a focus on creating innovative solutions for optimizing fertilizer use while mitigating soil degradation. Additionally, it seeks to enhance knowledge sharing and capacity building across the agricultural sector, aligning with the goals outlined in the Nairobi Declaration on Soil Health.

Data Challenge Focus Areas

- **Precision Agriculture and Location-Specific Soil Management**: Participants will develop Use Cases or models that utilize precision agriculture techniques to provide site-specific soil management recommendations. This includes the use of sensors, satellite imagery, and advanced data analytics to optimize soil health interventions at a micro- and farm-level.
- **Soil Carbon Measurement, Reporting, and Verification (MRV)**: Cqhallengers will design systems for accurate measurement, reporting, and verification of soil carbon levels. These solutions should support carbon sequestration initiatives and provide data for potential carbon credit schemes.
- **Optimized Fertilizer Distribution and Supply Chain Management**: Participants will develop data-driven models to enhance fertilizer distribution networks and supply chain efficiency. This focus area aims to help fertilizer companies and SMEs optimize inventory management, reduce waste, and ensure timely delivery of appropriate fertilizers to farmers based on local soil needs and market demands.
- **Generative AI Applications for Soil Health**: Participants will explore the use of generative AI to simulate soil health scenarios and predict the outcomes of different soil management practices. They will develop AI-driven models that can generate recommendations for improving soil health based on historical and real-time data.

- **Policy Impact Assessment and Decision Support Tools**: Challengers will create analytical tools that enable policymakers to assess the potential impacts of different soil health and agricultural policies. These solutions should integrate various data sources to model policy outcomes, support evidence-based decision-making, and facilitate the development of targeted interventions for improving soil health at regional and national levels.

Implementation Process and Timeline

The Data4SoilHealth Challenge will convene a consortium of organizations, including their data scientists and domain experts, to collaborate on developing scalable data products and decision-making tools. The process will involve a comprehensive **data sharing** mechanism, where participating organizations will contribute relevant datasets to a secure platform for analysis. A suite of **analytical tools and platforms** will be provided to facilitate data processing, visualization, and modeling. Domain experts from various fields will provide guidance and **mentorship** throughout the challenge. Teams will work in **iterative sprints** to develop and refine their solutions, with promising innovations **evaluated** for their potential impact and scalability. The most effective solutions will be selected for further development and **acceleration**.

- **Website and Metadata Launch (March 7, 2025)**: The challenge will kick off with a comprehensive ***metadata*** launch, providing potential participants with an overview of available datasets, problem statements, and expected outcomes.
- **Call for Applications (March 14, 2025)**: A global call for applications will be issued, inviting innovators, startups, research institutions, and universities to submit their ideas. Applicants must submit ***brief proposals*** outlining their understanding of the problem, proposed solution concept, potential impact, and implementation strategy.
- **Call for Mentors (March 14, 2025):** A call for mentors, inviting experienced professionals from agriculture, data science, AI, business development, and environmental science to guide and support the teams in the challenge. Mentors will provide expert advice, help integrate and analyze datasets, refine solution concepts, share industry best practices, and connect teams with relevant networks. This ***mentorship*** will run from **April to May 2025**, coinciding with the data access and development sprint phases, ensuring that teams receive continuous support to enhance the feasibility and scalability of their innovative solutions.
- **Shortlisting and Team Selection (April 10)**: A panel of experts will evaluate the applications based on ***innovation, feasibility, scalability, and potential impact***. The ***top 10 teams*** will be shortlisted to proceed to the next phase.

- **Development Sprint - Data Access, Mentorship (April 14 – May 14, 2025):** Selected teams will be granted access to relevant datasets from various sources, including soil sample data, satellite imagery, weather data, and crop yield information. They will also receive ***mentorship*** from industry experts, researchers, and agricultural professionals to refine their solutions. Teams will work intensively on developing their ***solutions***, integrating various data sources, and applying advanced analytics and AI techniques to address the challenge focus areas.
- **In-Person Pitch Event (June 5 – 6, 2025):** The challenge will culminate in a ***high-profile event*** in Kenya, where the top 10 teams will present their solutions to a panel of judges, investors, and stakeholders.
- **Funding and Acceleration (June 2025 onwards)**: Successful teams will receive further funding and enter an ***acceleration*** program supported by the World Bank and partners, aimed at scaling their solutions for broader implementation.

Participants

Data providers - Organizations and institutions that contribute relevant datasets for use in the challenge. These providers play a crucial role in supplying soil samples, satellite imagery, weather data, crop yield information, and other pertinent data sources. Their expertise in data management, curation, and sharing protocols ensures that challenge teams have access to high-quality, well-documented datasets essential for developing innovative solutions.

Challenge Teams - Groups of individuals from one or more organizations (public, private sector, and universities) who take part in the challenge. These teams bring together diverse skills such as data analysis, programming, machine learning, and domain knowledge in agriculture and soil science. Their role is to leverage the provided datasets and their collective expertise to develop innovative, data-driven solutions addressing the challenge's focus areas, combining technical skills with creative problem-solving to generate impactful outcomes for soil health management in Kenya.

Mentors - Domain experts, business development specialists, and experienced data professionals who support the teams during their sprint. These mentors provide guidance and support to the challenge teams throughout the process, offering valuable insights, technical advice, and industry perspectives. Their role extends beyond mere technical guidance, as they help teams refine their ideas, overcome obstacles, and prepare for the final pitch event, significantly enhancing the quality and potential impact of the solutions developed during the challenge.

Value Proposition

The Data4SoilHealth Challenge offers a unique opportunity to address critical soil health issues in Kenya through innovative, data-driven solutions. By bringing together diverse stakeholders and leveraging advanced technologies, the challenge aims to create a lasting impact on agricultural productivity and sustainability. Successful solutions have the potential to revolutionize soil management practices, optimize resource use, and contribute to food security and economic growth in Kenya.

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Innovation Challenge

The SoilHealth4Kenya Innovation Challenge aims to inspire agri-tech innovators to develop scalable solutions for soil health management in Kenya, fostering collaboration among key agricultural stakeholders. We seek digital and non-digital technologies (DATs) that enable smallholder farmers to overcome constraints and improve yields, incomes, nutrition, and climate resilience. Innovations range from mobile apps and digital identities to solar applications, portable devices, and carbon farming and sequestration methods, all aimed at enhancing agri-food outcomes efficiently.
Participants can present minimum viable products (MVPs) and receive comprehensive support, including mentorship, technical validation, market access, and real-world testing. By joining, innovators will collaborate with stakeholders, gain industry insights, and access resources to scale their solutions.

Challenge statement: How can we develop innovative, data-driven solutions to monitor, manage, and improve soil health for sustainable agriculture in Kenya?

Soil Health Challenge Focus Areas

Soil Testing and Advisory Services: Participants will showcase their solutions on soil testing and customized advisory services tailored to serve small holder farmers who have had challenges in accessing these services. These tools will include but not limited to, portable soil testing kits, mobile advisory apps, remote sensing technologies and soil health monitoring systems.

Precision Agriculture: Participants will showcase solutions focused on precision agriculture supporting soil management and improving productivity by optimizing resources and reducing harsh environmental impacts that can or have easily been adopted by small holder farmers. These technologies include GPS-guided equipment, variable rate technology, drone-based soil analysis and pest detection, automated irrigation systems and more.

Enhancement of Soil Carbon Sequestration: Participants will present solutions focused on soil carbon storage and reduction of greenhouse gas emissions. These solutions go towards promoting sustainable soil health management while mitigating climate change impact and they include carbon farming and biochar production and use.

Bio-fertilizer including lime and acidity: Participants will showcase solutions designed to provide sustainable alternatives to chemical fertilizers as well as lime and acidity management. The focus is on creating scalable and impactful bio-fertilizer practices in Kenya and the solutions would include organic fertilizer production, microbial inoculants, composting solutions and nutrient recycling systems.

Urban Food Systems – Urban food systems – Participants will showcase solutions that enhance climate-smart agriculture in urban and peri-urban areas, integrating data-driven technologies to optimize resource use, reduce emissions, and improve productivity. Innovations may include controlled-environment farming, IoT-based monitoring, traceability systems, and sustainable urban agri-business models that support food security and economic resilience.

Soil Health Implementation Timeline

- **Call for Applications (March 14, 2025)**: A global call for applications will be issued, inviting innovators, startups and research institutions to submit their ideas. This will be in the form of proposals which include the business viability of the solutions.
- **Shortlisting and Notification of Qualifying Agtechs (April 10, 2025)**: The mentors will support in shortlisting suitable Agtechs who will move into the second phase of pitching based on a pre-determined criterion.
- **Bootcamp/Mentorship (April 14 – May 14, 2025):** A series of workshops will be made available to the shortlisted Agtechs who will go into the one-month mentorship program.
- **In-Person Pitch Event (June 5 – 6, 2025):** The challenge will culminate in a ***high-profile event*** in Kenya, where the top 10 teams will present their solutions to a panel of judges, investors, and stakeholders.
- **Funding and Acceleration (June 2025 onwards)**: Successful teams will receive further funding and/or enter an ***acceleration*** program supported by the World Bank and partners, aimed at scaling their solutions for broader implementation.

EVALUATION CRITERIA

The submitted applications will be scored according to the following criteria:

- **Potential for impact:** solutions that address or ameliorate the challenge theme in a significant and meaningful way
- **Potential for scale**: solutions that can scale to impact a large number of farmers, or significantly improve the conditions of the agricultural landscape
- **Business model**: applicants have demonstrated or provided a roadmap for developing a viable and sustainable business model for generating revenues and growing
- **Inclusion:** solutions that are easy to adopt and affordable in a Sub-Saharan African context, including accessible to smallholder farmers
- **Partnership potential**: Is there potential for meaningful partnerships with other organizations and DATs to amplify your reach and impact?

ELIGIBILITY CRITERIA

Applicants for the Innovation challenge must meet the following eligibility criteria:

- Be legally incorporated in respective country(s) of operation before 30th September 2022 (operating for >2 years)
- Must have a publicly available product, with real users (minimum 2,000) or customers and generating revenue
- Product must address one of the four challenge themes: Soil Testing and Advisory Services, Precision Agriculture, Enhancement of Soil Carbon Sequestration Bio-fertilizer including lime and acidity in an innovative way

Why you should participate

If successfully shortlisted, you will:

- Gain access to expert mentorship and industry networks
- Work with real-world datasets to develop AI-driven and data-powered solutions
- Receive funding and acceleration support to scale your innovation
- Showcase your solution at a high-profile pitch event attended by investors, policymakers, and global partners

For the Innovation Challenge, select winner(s) will receive the **Thryve Award**, and will be accepted into the Thryve Accelerator Program specifically designed to accelerate growth in the agricultural market. The well-rounded program is led by subject matter experts, and combines full-day focused workshops, personalized mentorship, and dedicated business operations in a field-and-forum approach.

For more information on the Thryve Accelerator Program, contact thryve@yara.com.

Conclusion

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By bringing together diverse stakeholders and leveraging advanced data analytics, the Data4SoilHealth Knowledge and Innovation Challenge aims to address the pressing issues of soil degradation and agricultural productivity in Kenya. This initiative aligns with the broader goals outlined in the Nairobi Declaration on Soil Health and can create a lasting impact on the agricultural sector, contributing to improved food security and economic stability in the region.

Sponsors

Ministry of Agriculture and Livestock Development

Thryve Innovation CoLab

Data Partners

KALRO Kenya Agricultural & Livestock Research Organization

SoilHive A Varda soil platform

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