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## Soils, Science and Community Action (SoilSCAN) to reduce land degradation in East Africa

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East African farming communities face complex challenges regarding food and feed productivity. Primary production systems are under stress, nutritional choices are changing and the relationship between development and agriculture is undergoing profound transformation. In the face of severe threat of soil erosion, East African agro-pastoral systems are now at a tipping point and there has never been a greater urgency for evidence-led sustainable land management interventions to reverse degradation of natural resources that support food and water security. A key barrier, however, is a lack of high spatial resolution soil health data wherein collecting such information is beyond conventional research means. This research tests whether bridging this data gap can be achieved through a coordinated citizen science programme. Accessible and portable technology is currently available in the form of hand-held soil scanners that can enable farmers to become citizen scientists empowered to collect data to establish research data bases that support critical landscape decisions. The aim of the work was to test the potential for using soil scanners as a tool for mapping whole community soil health characteristics, using soil organic matter as an indicator, down to farm-scale; a resolution that is beyond that achievable in conventional research, with the ultimate objective to deliver information that empowers stakeholders to create a sustainable community landscape plan.

Key outcomes included:

(1) A training document for the usage of the soil scanner that includes a list of potential problems and their solutions. Moreover, a training session was organised in the Tanzanian partner institution to build capacity for the continuation of the project, wherein local researchers were trained in the application of the 'Agrocares' soil scanner to support continuing community engagement.

(2) Local farmers being provided an opportunity to circumvent traditional power and knowledge inequities. During the introductory meeting and field measurements, we noticed the development of locally-embedded scientific interests and skills that foster stronger community ownership and engagement in action research.

(3) A high resolution soil organic matter and nutrient status dataset in small-catchment and community setting. The citizen science data contributes to soil process and hydrological understanding of East African landscapes, which besides direct contribution to the scientific understanding, also supports co-design of effective management solutions to the soil erosion and land degradation challenges.

The inclusion of 'big data' digital data training and sharing platforms and has the potential to create more robust and better informed collective decision-making, as well as identifying key data gaps. Further it can expand the utility and applicability of existing techniques and data sets beyond the reach of conventional research. Challenges and opportunities for wider use of soil scanning technology by community groups are evaluated.