Objectives of the project

The project aims to build, test, operate and transfer land-, soil- and crop-information hubs in national agricultural research organizations to enhance the effectiveness of national Agricultural Knowledge and Innovation Systems (AKIS) and contribute to rural transformation and Climate Smart Agriculture (CSA) in East Africa.

Smallholder farming on hill slopes in Rwanda. By terracing the terrain, soil erosion is largely reduced.

Background

In East Africa climate change leads to a drastic reduction of the quality and resilience of the land, increased greenhouse gas emissions and food and nutrition insecurity for the growing urban and rural population. CSA can mitigate the impacts of climate change focusing on three aspects of agricultural production:
- ✓ sustainable intensification,
- ✓ increasing resilience against climate change, and
- ✓ contributing to climate change mitigation through reduced carbon emissions from land use and sequestration of carbon in soils.

Governments in Ethiopia, Kenya and Rwanda included CSA in their national policies. They together with the EU, the Netherlands' Ministry of Foreign Affairs, and other donors, have invested in various Land, Soil and Crop Information Services (LSC-IS), carried out by their National Agricultural Research Centers (NARCs).

Currently, the LSC information is however often not used effectively in decision-making, because it is not available in an organised and accessible form and is not seen as 'owned' by national organisations. Therefore, stakeholders at national and local levels, including smallholder farmers, are not well equipped to evaluate their policies, plans, investments, and farming practices and improve and transform these in a climate smart manner. This project starts, therefore, with the safe assumption that LSC information can help to improve the efficacy of CSA related policies, plans and practices.

The theory of change to achieve the objectives

The expected impact of this LSC-IS initiative is a contribution to an increased agricultural productivity and farm income especially for small-scale farmers (male and female) based on climate resilient and sustainable food production in Ethiopia, Kenya, and Rwanda. To be able to get 'closer' to this desired change the LSC-IS project team believes that we need to work together with partners and stakeholders so that by the end of the project we i) have roadmaps for the design of an enhanced AKIS (AKIS 2.0) that reduce the gap between research and practice, ii) have created national multi-stakeholder partnerships, to constantly improve access to data and information necessary for climate smarter production, and iii) have dynamic LSC hubs that are actively used for policy development and decision making for CSA at national and local levels.

During the LSC-IS project, we test different strategies for hub design, gather lessons learnt in Ethiopia, Kenya, and Rwanda, and ensure that the NARCs can actively operate the LSC-hubs. This means that LCS-hub users become familiar with data and services provided by the hubs. The LSC-hubs will particularly facilitate the provision and application of LSC data in CSA related policy and decision making by stakeholders.

The LSC-IS initiative links research and innovation to practice, linking the latest advances in data and information management to the needs of particularly small-scale farmers related to climate smart agriculture. Our activities (referred to as 'our action' in the Theory of Change (ToC)) align with both EU and national priorities regarding agriculture and food systems. It includes multi-stakeholder approaches and develop partnerships to enhance the national AKIS in Ethiopia, Kenya, and Rwanda. The action is linked up with existing projects in the countries to create synergies and avoid overlaps. It includes a strong focus on capacity development of both NARCs and the providers of land, soil, and crop information services, as well as of the information user's community to ensure a sustained pull for such services. The project will translate 'institutional embedding' into concrete activities to ensure sustainability of the action, characterised by viable business plans. We are applying participatory approaches to engage users and ensure relevance, which means that we follow a gender equal and youth inclusive approach in all project activities.

In this way we work towards our ultimate project outcome:
LSC hubs have evolved and expanded towards dynamic national Agricultural Knowledge and Innovation Systems which contribute to the continuous monitoring of the status quo of food system performance and food system governance and support rural transformation and the development towards a climate smart agricultural sector in Ethiopia, Kenya, and Rwanda and, eventually, in East Africa.

The figure (next page) presents our ToC visually. The ToC is a Living Document, we regularly update it based on our project findings and outputs, e.g., in the context of the needs assessments in Work Package (WP) 2.
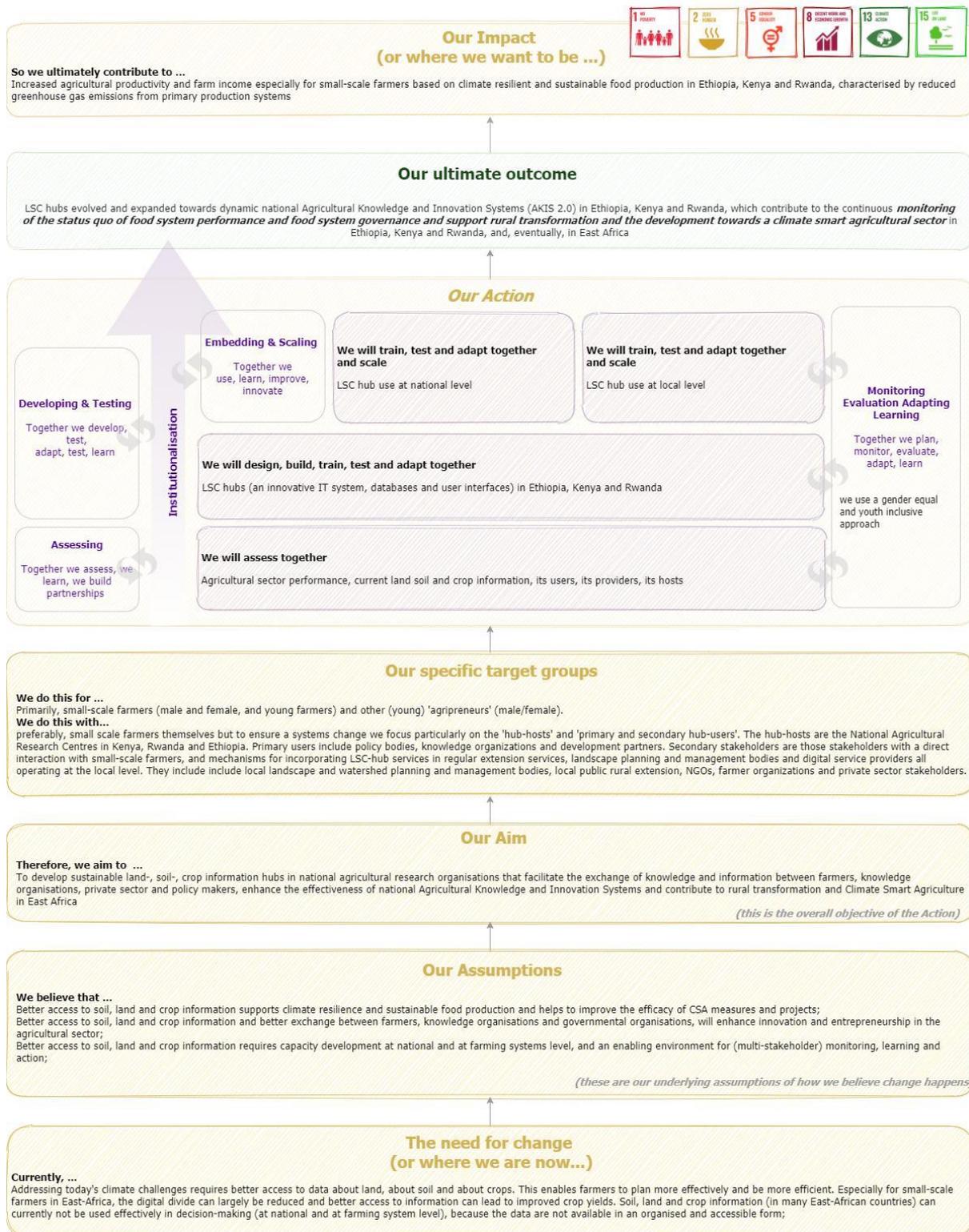
Outputs
Our outputs are organised under work packages.
- ✓ **Work package 1** provides the annual workplans and provides support for Participatory Monitoring Evaluation Adaption and Learning (PMEAL) and therefore a specific PMEAL plan, complemented by a communication strategy and communication material, is prepared.
- ✓ **Work package 2** outputs include institutional assessments and sets of user requirements that define the data and services that will be provided by the hubs, guide the design of the LSC-hubs and capacity needs assessments of hub hosts as a basis for capacity building activities.
- ✓ **Work package 3** develops the actual LSC data hubs in the three countries, provide data and GIS layers and links to existing sources of LSC data. WP3 also prepares curricula and training materials to train staff, as well as long-term plans for institutional embedding in the hub host organizations.
- ✓ **Work package 4** ensures that national stakeholders are aware and able to use information from the LSC- hubs and to provide input in design of the hubs. WP4 also provides definition of an upscaling approach and describes how LSC-hub services will be used in business processes of national stakeholders. WP4 will also provide business plans, financial strategies and partnerships at national level that will secure long- term access to the hubs.
- ✓ **Work package 5** ensures that local LSC-hub users including farmers are made aware of and trained in the use of the hubs and are able to provide their input to the design of the hubs. WP5 also describes the use of hubs for farm- and catchment planning and management. WP5 particularly focuses on translating local level applications of LSC-hub services into hub sustainability plans.

Primary users of the project's services include policy bodies, knowledge organizations and development partners on a national level. Secondary users are local landscape and watershed planning and management bodies, local public rural extension, NGOs, private sector, farmer organizations. The ultimate beneficiaries of the project are male and female small-scale farmers (including young as well as experienced farmers).

Theory of Change
DeSIRA
Land Soil Crop Information Hubs
to support rural transformation and Climate Smart Agriculture in Ethiopia, Kenya and Rwanda

Our Impact
(or where we want to be ...)

So we ultimately contribute to ...
Increased agricultural productivity and farm income especially for small-scale farmers based on climate resilient and sustainable food production in Ethiopia, Kenya and Rwanda, characterised by reduced greenhouse gas emissions from primary production systems

Our ultimate outcome

LSC hubs evolved and expanded towards dynamic national Agricultural Knowledge and Innovation Systems (AKIS 2.0) in Ethiopia, Kenya and Rwanda, which contribute to the continuous *monitoring of the status quo of food system performance and food system governance and support rural transformation and the development towards a climate smart agricultural sector* in Ethiopia, Kenya and Rwanda, and, eventually, in East Africa

Our Action

Developing & Testing
Together we develop, test, adapt, test, learn

Assessing
Together we assess, we learn, we build partnerships

Institutionalisation

Embedding & Scaling
Together we use, learn, improve, innovate

We will train, test and adapt together and scale
LSC hub use at national level

We will train, test and adapt together and scale
LSC hub use at local level

Monitoring Evaluation Adapting Learning
Together we plan, monitor, evaluate, adapt, learn

we use a gender equal and youth inclusive approach

We will design, build, train, test and adapt together
LSC hubs (an innovative IT system, databases and user interfaces) in Ethiopia, Kenya and Rwanda

We will assess together
Agricultural sector performance, current land soil and crop information, its users, its providers, its hosts

Our specific target groups

We do this for ...
Primarily, small-scale farmers (male and female, and young farmers) and other (young) 'agripreneurs' (male/female).
We do this with...
preferably, small scale farmers themselves but to ensure a systems change we focus particularly on the 'hub-hosts' and 'primary and secondary hub-users'. The hub-hosts are the National Agricultural Research Centres in Kenya, Rwanda and Ethiopia. Primary users include policy bodies, knowledge organizations and development partners. Secondary stakeholders are those stakeholders with a direct interaction with small-scale farmers, and mechanisms for incorporating LSC-hub services in regular extension services, landscape planning and management bodies and digital service providers all operating at the local level. They include include local landscape and watershed planning and management bodies, local public rural extension, NGOs, farmer organizations and private sector stakeholders.

Our Aim

Therefore, we aim to ...
To develop sustainable land-, soil-, crop information hubs in national agricultural research organisations that facilitate the exchange of knowledge and information between farmers, knowledge organisations, private sector and policy makers, enhance the effectiveness of national Agricultural Knowledge and Innovation Systems and contribute to rural transformation and Climate Smart Agriculture in East Africa

(this is the overall objective of the Action)

Our Assumptions

We believe that ...
Better access to soil, land and crop information supports climate resilience and sustainable food production and helps to improve the efficacy of CSA measures and projects;
Better access to soil, land and crop information and better exchange between farmers, knowledge organisations and governmental organisations, will enhance innovation and entrepreneurship in the agricultural sector;
Better access to soil, land and crop information requires capacity development at national and at farming systems level, and an enabling environment for (multi-stakeholder) monitoring, learning and action;

(these are our underlying assumptions of how we believe change happens)

The need for change
(or where we are now...)

Currently, ...
Addressing today's climate challenges requires better access to data about land, about soil and about crops. This enables farmers to plan more effectively and be more efficient. Especially for small-scale farmers in East-Africa, the digital divide can largely be reduced and better access to information can lead to improved crop yields. Soil, land and crop information (in many East-African countries) can currently not be used effectively in decision-making (at national and at farming system level), because the data are not available in an organised and accessible form;

Potential risks

During the initial stages, we closely monitored the COVID-situation and limited physical meetings, local and international travel, increased online communication and focus the development of training plans towards engaging local partners, blended learning, and online training tools. Local data sources turned out to be generally of poor quality and not freely accessible, requiring us to apply a flexible approach and using open data. To mitigate this, we are following an agile, participatory approach and iterative system development.

Main activities

To achieve above outputs our LSC-IS Team is 'assessing', 'developing and testing', 'embedding and scaling' and 'monitoring and learning' in the following work packages.

- ✓ **Work package 1- Facilitation:** particularly focuses on creating a conducive learning environment for the implementing teams, on facilitating multi-stakeholder learning and including effective communication to keep stakeholders and general public informed and engaged about performance and progress of the Action. Work package 1 also safeguards the application of a participatory and an inclusive approach.
- ✓ **Work Package 2- Needs assessment:** prepared agricultural sector assessments and stakeholder overviews at national and local levels and information-needs assessments of users at national, regional, and local level, as well as an assessment of the capacity of the hub host. These provided the requirements for the design of the hubs.
- ✓ **Work Package 3- LSC-hub development:** designs, builds, and will test innovative SDI system, databases of land, soil, crop and other data, and user interfaces of the hubs in Ethiopia, Kenya and Rwanda, and train staff in the operation and maintenance.
- ✓ **Work Package 4- LSC-hub use at national level:** will introduce and train national level users in the use of the hubs engage them in testing and collect feedback, demonstrate the use of LSC-information in CSA related agricultural policy, planning and agricultural extension systems, and implement and adapt sustainability and financial strategies of the LSC-hubs.
- ✓ **Work Package 5- LSC-hub use at local level:** will introduce and train local stakeholders (including farmers) in using the hubs and engage them in testing and collecting feedback, demonstrate the use of LSC-information for climate smart farm- and watershed management, and include local level use of LSC-hub services in LSC-hub sustainability plans. Specific attention will be paid to ensure the embedding of the information hubs and optimize their role in supporting policy change, hence, to increase the sustainability of the action.

Results achieved to date (30th June 2023)

From early 2021 till September 2023 the project developed its management structure, project webpage (lsc-hubs.org), monitoring dashboard, communication strategy and M&E framework built on the ToC. Together with the NARCs we defined soil fertility management and soil and water conservation as key use cases to be informed by the LSC-IS hubs.

WP2: 'Needs assessment' developed and implemented the consultative process for the demand and capacity assessment of potential LSC-hub users, and the capacity assessments of the hub hosts. Two pilot districts were selected in each country. In each country one national and two district level workshops were held, followed by key informant interviews. A total of 558 persons from 43 stakeholder groups (farmers and farmers organisations, knowledge organisations, private sector, NGOs and development partners and government) participated in the activities.

WP3: 'LSC-hub development' prepared a systematic procedure and template for NARS and other data providers to describe metadata. Over 240 data-layers were brought together in each country. The Deutsches Zentrum für Luft- und Raumfahrt (German Aerospace Centre, DLR) is preparing new

remote-sensing based map-layers, with which existing maps can be updated. The hub architectural design including catalogue service for Findable, Accessible, Interoperable, Reusable (FAIR) data management was prepared for the Kenya Agriculture & Livestock Research Organization (KALRO). This concept will be adapted for Ethiopia and Rwanda. A detailed assessment was made of KALRO training requirements for managing the LSC-hub. This is being translated into training and investment plan to be implemented during the remainder of the project. Upscaling has started by presenting the LSC-IS concept in regional events for national agricultural research organisations in Central and Eastern Africa.

Synergies with other projects are being sought. These include Ag Data hub (AICCRA project) in Ethiopia and Kenya and the Rwanda Soil Information System (RwaSIS) and Agroforestry Rwanda.

The project actively works with the Ethiopian Institute for Agricultural Research (EIAR), KALRO and the Rwanda Agricultural and Animal Resources Development Board (RAB) as anticipated hub hosts. Several other data providing organisations participated in WP2 are expected to collaborate. Some 230 representatives from 36 institutions user groups participated in the workshops. Most of them were very positive about LSC-hubs and are looking forward to contributing to their further development.

Implementing organizations

This DeSIRA project is managed via a delegated cooperation with the Netherlands Ministry of Foreign Affairs and is co-managed by the consortium partners Wageningen University & Research (WUR) and ISRIC (International Soil Reference and Information Centre)-World Soil Information. The International Livestock Research Institute (ILRI), initially through the Climate Change Agriculture and Food Security program (CCAFS) of the Consultative Group for International Agricultural Research (CGIAR) forms the third consortium partner.

Organization

WUR and ISRIC co-manage Work package 1. ILRI manages Work package 2 and Work package 4. ISRIC manages Work package 3. WUR manages Work package 5.

Partners of the project

The NARCs in the countries, the Ethiopian Institute for Agricultural Research (EIAR), the Kenya Agriculture & Livestock Research Organization (KALRO), and the Rwanda Agricultural and Animal Resources Development Board (RAB), are co-developers of the LSC-hubs as well as beneficiaries as their capacity is being built and strengthened through the LSC-IS Action. In addition, the Association for Strengthening Agricultural Research in Eastern and Central Africa (ASARECA), the World Agroforestry Centre (ICRAF), the International Union for Conservation of Nature (IUCN) and DLR are involved to provide specific input in the process.

Other main stakeholders

Primary users of the project's services include policy bodies, knowledge organizations and development partners. Secondary users are local landscape and watershed planning and management bodies, local public rural extension, NGOs, private sector, farmer organizations and to a lesser extent some trained and digitally connected farmers themselves. The ultimate beneficiaries of the project are male and female small-scale farmers (including young as well as experienced farmers), and other users and producers of knowledge and information.

Location

Ethiopia, Kenya, Rwanda

Funding and co-funding

EU	€ 5,300,000
Netherlands Ministry of Foreign Affairs	€ 1,400,000
ISRIC	€ 200,000
Total budget	€ 6,900,000

Government of the Netherlands

Duration

4 years, from January 2021 to (and including) December 2024.

Website

lsc-hubs.org

Updated on 18/09/2023