

### Objectives of the project

The project aims to contribute to the pastoralist households' transition towards climate-smart agropastoral systems in sub-Saharan Africa (Ethiopia and Kenya) by understanding the dynamics of and interlinkages between tropical upland forest cover and semi-arid lowland landscapes, and the multifunctionality of agropastoral landscapes, through a system-wide view of food and nutrition security, diversified livelihoods and ecosystem sustainability leading to improvements.



*Cattle grazing in LUMO conservation area in Taita Taveta County in Kenya front of the humid highlands of Taita Hills. Photograph credits: Petri Pellikka, 2018.*

### Background

During recent years, pastures have been transformed to croplands, while the number of livestock has remained unchanged leading to less land being available for animals. The carrying capacity of pastures has decreased to a level that cannot withstand the current land use and climate pressure which subsequently leads to land degradation. Incremental adjustments in pastoralist systems currently carried out with livestock-based livelihoods is not adequate to cope with future challenges. Mechanisms that contribute to the transformational adaptation in pastoralist systems in response to climate change need to be explored, identified, analyzed and implemented. Pastoralists in East Africa are increasingly pursuing non-pastoral income and livelihood strategies to buffer against climate change impacts. Diversification of livelihood and adoption of mixed strategies combining livestock management with alternative income earning sources, such as beekeeping, is a promising option for sustainable pastoralism in Africa. However, the UNEP (United Nations Environment Programme) and GRID Arendal Gap Analysis indicates a significant lack of knowledge e.g. on alternative livelihoods and therefore recommends specific attention to be given to countries where data and information are lacking, through e.g. frequent analysis of remotely sensed data, and locally ground-truthed data.

### The theory of change to achieve the objectives

Our intervention is based on a holistic approach where we are creating the possibilities for multidisciplinary research and capacity building with partners and stakeholders from various disciplines and expertise e.g. from biogeochemistry and hydrology to crop scientists and agricultural extension workers.

The project addresses significant knowledge gaps in impact of land cover change to carbon stocks, pollination service in sub-Saharan Africa pastoral areas, rangeland mobility, how pastoralist women and youth cope in changing environment and diversification of livelihoods. The project develops protocols for mitigation and adaptation to climate change and transforming pastoral lands and livelihoods through options for diversification. ESSA facilitates active and broad cooperation and participation of scientific and development partners, and especially the pastoral communities who are the key



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beneficiaries, in co-creation of innovative solutions for monitoring environmental change and for adoption of livelihood options that contribute to sustainable management on arid and semi-arid ecosystems. Technical support and training are provided to local organizations to establish demonstration sites for e.g. apiaries and plant-based product development in the pastoral and agropastoral communities. ESSA builds the resilience of pastoralists to mitigate and adapt to climate change through diversification of livelihoods that help increase carbon stocks in dry lowlands and in upland moist landscapes through agroforestry and increase of tree cover to support ecosystem services, such as water provision, biodiversity and carbon sequestration. The project is also developing methods to assess points of change when the carrying capacity of the environment is reached using remote sensing and modelling in Earth science.

In addition to the above-mentioned knowledge gaps, we carry out basic research e.g. on land cover changes, carbon sequestration, greenhouse gas fluxes and hydrology, and model the environmental change. Socioeconomic studies assess the conditions for the potential of transformation of existing pastoral livelihood activities to apiculture and non-timber product to promote diversified livelihoods and climate-smart landscape framework. Agriculture specialists in the project are simultaneously testing in the field to demonstrate the feasibility and appropriateness of beekeeping and plant-based product approaches for livelihood diversification. They build capacity of communities and extension workers on these practices.

The transformation potential and socio-economic thresholds of studied livelihoods is investigated through participatory methods with communities considering gender issues and balance. The capacity of partners and stakeholders is improved through hands-on-training on methods and technologies by sharing best practices. The governmental organisations of the consortium are strengthened in various domains through field training to academic training. North-south cooperation is reinforced too. Both practical and scientific results and outcomes will be disseminated through respective media and a central portal of knowledge, while the results are shared with the respective ministries of Ethiopia, Kenya and Finland.

**The main expected outcomes are:**

- ✓ 1) Increased scientific knowledge of climate-smart agropastoral systems and enhanced on-the ground capacity of National Agricultural Knowledge and Innovation Systems (AKIS),
- ✓ 2) Sustainable livelihood transformation framework from pastoralism to integrated agropastoralism,
- ✓ 3) Enhanced potential of income diversification to support transition towards climate-smart agropastoral systems among pastoralist households in Ethiopia and Kenya, and
- ✓ 4) Improved quality and availability of Earth observation and environmental sensing methods for environmental change and landscape degradation assessment and for monitoring improvements and climate-smart agropastoral system transition in pastoral areas.

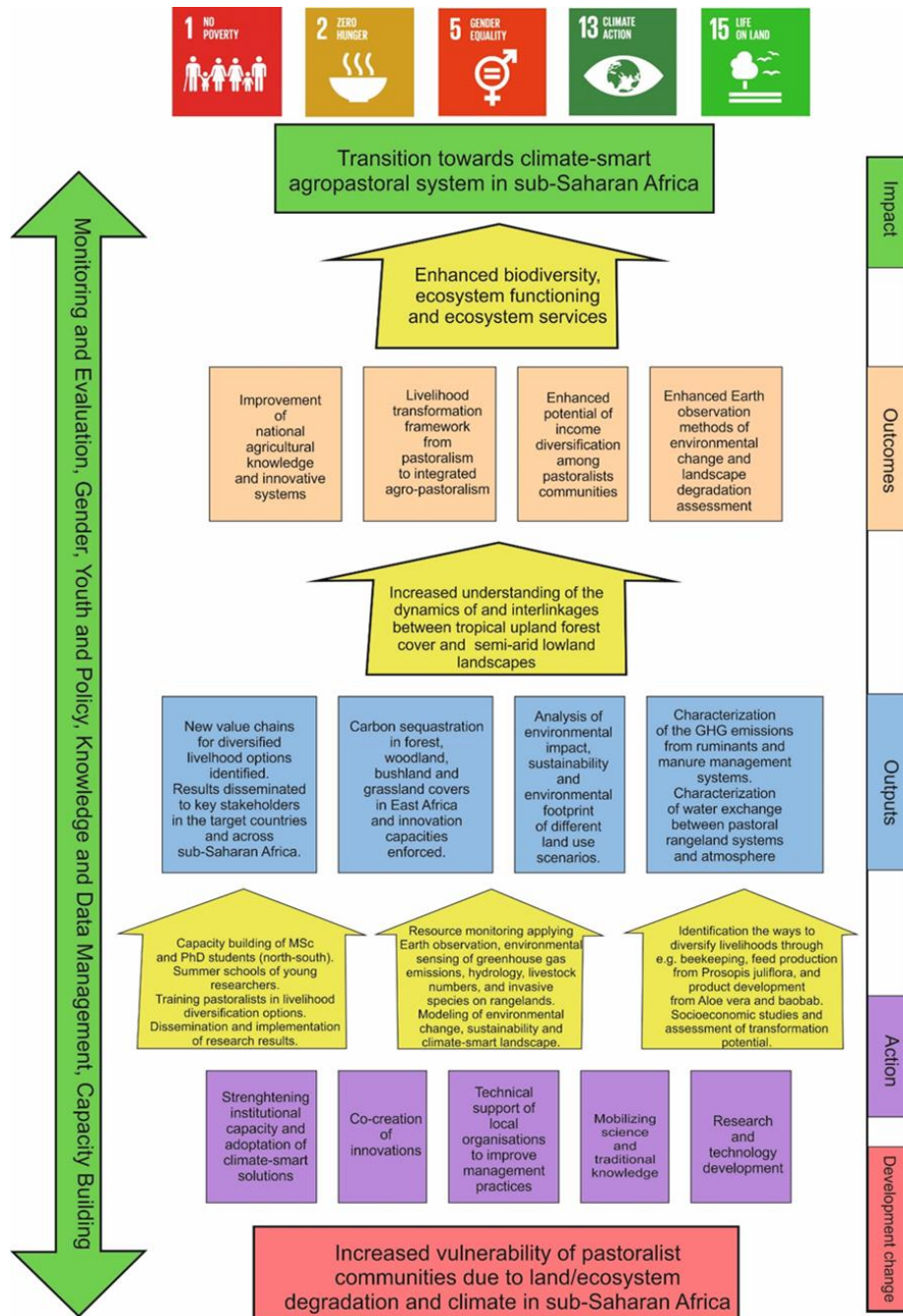


Figure 1. ESSA project impact pathway.

**Main activities**

The main activities of the project are the following:

Collect of data on ecosystems dynamics, on-field trials, modelling, remote sensing analysis are being carried out to obtain these outputs: 1) Greenhouse gas emissions from ruminants, and manure management systems characterized in Kenya and Ethiopia, 2) Hydrological ecosystem services and water exchange between pastoral rangeland systems and the atmosphere characterized, 3) Completed carbon sequestration assessment in forest, woodland, bushland and grassland covers in Eastern Africa, 4) Delivered remote sensing products & methods for points of change assessment and



local scientific evidence for environmental footprints of semi-arid and arid lands, 5) Produced analyses of environmental impact, sustainability and environmental footprint of different land use scenarios.

Participatory workshops, surveys on livelihoods and value chains are being carried out to obtain these outputs: 1) Produced analyses of potentials of livelihood diversification; 2) New value chains for diversified livelihood options identified, implemented and validated in semi-arid and arid lands.

Capacity building amongst a cohort of pastoralists, young researchers (MSc, PhD, postdocs) is being implemented, and maintenance of national research, governance and innovation capacities are reinforced.

The Results of the project are disseminated through media and workshops to key stakeholders and used to formulate policies in the two focus countries and across sub-Saharan Africa for sustainable arid and semi-arid land management.

### **Results achieved to date (December 2022)**

- ✓ **Household Baseline Survey:** A situation analysis was conducted on 750 households in Yabelo, Ethiopia, and Taita Taveta County, Kenya. This survey focused on pastoral and agropastoral livelihoods, vulnerability, and assets.
- ✓ **High-Frequency Survey:** A high-frequency survey was conducted to monitor seasonal dynamics in livelihoods and environmental pressures.
- ✓ **Beekeeping and Plant-Based Product Development:** Field research and training on beekeeping and plant-based product development were initiated. A total of 545 wooden beehives, 20 clay pot hives for stingless bees, and 21 shades for stingless beehives were manufactured and distributed to beneficiaries in Taita Taveta County, Kenya.
- ✓ **Product Development:** Two products were developed from Baobab fruit pulp and *Prosopis juliflora* pods. Additionally, the development of a third product from Aloe vera gel is currently underway.
- ✓ **GHG Emissions and Water Quality Studies:** Ongoing studies were conducted to measure and characterize greenhouse gas (GHG) emissions from bomas (a boma is a cattle or animal enclosure) and water pans. The contamination of water bodies in Kapiti Plains and Taita Taveta County in Kenya was also measured. A comprehensive database with a year-long dataset on GHG emissions and physical-chemical water quality parameters was completed.
- ✓ **Carbon Sequestration Assessment:** Four eddy covariance towers were installed in different landscapes to assess carbon sequestration. This aimed to understand the impact of pastoral and agropastoral practices on this phenomenon.
- ✓ **Earth Observation Research:** The first results on improved Earth Observation methods and techniques were published.
- ✓ **Scientific Publications:** ESSA published nine scientific articles in international peer-reviewed journals.

These activities and results reflect the efforts made in 2022 towards scientific data collection, capacity-building, sustainable livelihood diversification, and environmental research in the mentioned regions of Ethiopia and Kenya.

### **Organization**

The project is built around eight key components and implemented by a consortium of the lead applicant, the University of Helsinki, and eight co-applicants (international research centres, universities, and national agricultural and livestock research organizations). The University of Helsinki hosts a full-time coordination team for project administration and management. The project has a



Steering Committee consisting of eight members from the project consortium (one from each organization), one international technical expert, and two representatives of the Ministry of Agriculture (one from Ethiopia and one from Kenya). The Steering Committee oversees regular project management activities and is responsible for the coherent delivery of the project outputs to achieve the project objectives, and assessing progress made. The consortium implements the project in close cooperation with 30 associate organizations as partners representing a wide variety of ministries, government agencies, universities, NGOs and community-based groups. These associate organizations participate in e.g. consultation of intervention design, project meetings, training events, field testing, dissemination of results and communicating the best practices for the wider audience in the target countries.

### **Implementing organization**

University of Helsinki

### **Co-applicants**

- ✓ International Livestock Research Institute (ILRI),
- ✓ International Centre of Insect Physiology and Ecology (*icipe*),
- ✓ IHE-Delft Institute for Water Education,
- ✓ University of Nairobi,
- ✓ Addis Ababa University,
- ✓ Kenya Agricultural and Livestock Research Organisation (KALRO),
- ✓ Ethiopian Agricultural Research Council Secretariat (EARCS),
- ✓ Regional Center for Mapping the Resources for Development (RCMRD).

### **Partners of the project**

- ✓ Geospatial Information Institute,
- ✓ Ethiopia, Kenya Water Towers Agency,
- ✓ HOLETA Bee Research Centre (HBRC),
- ✓ Action for Development (AFD),
- ✓ Ministry of Water, Irrigation and Energy of Ethiopia,
- ✓ Basins Development Authority (BDA),
- ✓ Ministry of Agriculture of Ethiopia,
- ✓ Wondo Genet Agricultural Research Centre,
- ✓ Yabello Pastoral and Dryland Agriculture Research Centre (YPDARC),
- ✓ Sekota Dryland Agriculture Research Centre (SDARC),
- ✓ Taita Taveta University (TTU),
- ✓ Maruru Self Help Group,
- ✓ Jibidische Ufaulu Self Help Group,
- ✓ Iyale Angamiza Jangwa Self Help Group,
- ✓ Mbughu Self Help Group,
- ✓ Msisinenyi Self Help Group,
- ✓ Nguvu Kazi Cooperative Society LTD,
- ✓ Nyuki ni Asali Self Help Group,
- ✓ Taita Environmental Initiative,
- ✓ Tsavo Beekeepers Association,
- ✓ Unison Self Help Group,
- ✓ Jomo Kenyatta University of Agriculture and Technology,
- ✓ County Government of Taita Taveta,
- ✓ Kenya Forest Service,
- ✓ Ministry of Agriculture,

- ✓ Livestock, Fisheries and Cooperatives of Kenya,
- ✓ Ministry of Water & Sanitation and Irrigation of Kenya,
- ✓ Directorate of Resource Surveys and Remote Sensing (DRSRS),
- ✓ Oromia Agricultural Research Institute (OARI),
- ✓ Eastern Arc Mountain Ranges,
- ✓ Kenya Forestry Research Institute.

### Other main stakeholders

Pastoral and agro-pastoral households (especially women and young people) and their professional organizations in the intervention areas in Ethiopia and Kenya.

### Location

Ethiopia – Wondo Genet, Sidama Region and Yebelo in Oromia Region; Kenya – Kajiado County, Machakos County, Makueni County, and Taita Taveta County

### Funding and co-funding

EU (100%)	€ 5,000,000
Total budget	€ 5,000,000

### Duration

four (4) years, December 2020 – December 2024

### Website

[essa-project-aau.org](http://essa-project-aau.org)

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