CGIAR Research Initiative on Livestock and Climate

Report of training of research team for the baseline study of livestock and climate PRM physical impact assessment

Irene Nganga
International Livestock Research Institute

December 2022

INITIATIVE ON
Livestock and Climate

Editing, design and layout—ILRI Editorial and Publishing Services, Addis Ababa, Ethiopia.

Cover photo: Grazing livestock in Gafarsa, Garbatula in Isiolo County, Kenya (credit: Irene Nganga/ILRI)

Citation: Nganga, I. 2022. *Report of training of research team for the baseline study of livestock and climate PRM physical impact assessment*. Nairobi, Kenya: ILRI.

Contents

Acknowledgements

This work was conducted as part of the CGIAR Initiative on Livestock & Climate and the project One Health for Humans, Environment, Animals and Livelihoods. We would like to thank the Swiss Development Cooperation and all funders who supported this research through their contributions to the CGIAR Trust Fund. CGIAR is a global research partnership for a food-secure future dedicated to transforming food, land, and water systems in a climate crisis.

1. Introduction

The International Livestock Research Institute (ILRI) organized field training for a group of representatives from organizations where a rangeland biophysical baseline will be conducted. The baseline study is supported by the Livestock and Climate Initiative in partnership with the One Health HEAL project for implementing a Participatory Rangeland Management (PRM) physical impact assessment. This training was conducted the week of 12–15 December 2022 in Garbatulla Ward, Isiolo County in Kenya. The 12 participants included those who will lead or participate in baseline assessments in Kenya, Tunisia, and Tanzania.

2. Background

The Livestock and Climate Initiative aims to have the livestock sector adapt to climate change while reducing its impact on the global climate system. Pastoral systems in drylands need to strengthen their resilience and other livestock systems need to reduce deforestation and GHG emissions. This Initiative will partner with public and private actors to develop and deliver actionable innovations that measurably help producers, businesses, and governments adapt livestock agri-food systems to climate change and reduce greenhouse gas emissions thereby contributing to all five CGIAR Action Area outcomes.

At the livestock production system-level Work Package 3, we support pastoralists and farmers to adopt improved governance, management and restoration practices that build the resilience of their systems to climate stresses and crises by offsetting greenhouse gas emissions, reducing conflicts over resources, and enhancing capacities to manage climatic risk, particularly in pastoral systems. We assume that an approach beginning with governance arrangements ensures all land users are enabled to implement improved land management at the production level, reducing pressure on forests and grazing lands. This work contributes to the Livestock and Climate outcome so that by 2024, pastoralists and farmers will have adopted improved governance, management, and restoration practices on 500,000 hectares of land used for livestock production, with at least a 25% increase in women's participation in decision-making processes.

The rangeland baseline master protocol was designed by Dr. Jason Sircely of ILRI and the One Health Units for Humans, Environment, Animals and Livelihoods to provide guidance on the physical impact assessment studies to be undertaken in Kenya, Tanzania, Ethiopia, Tunisia, and later scaled out to other countries. Following approval by the ILRI Institutional Research Ethics Committee, the protocol was ready for implementation.

3. Overview

Day 1 in the field. The 12 participants met with 15 community members from the Gafarsa rangeland unit in the dheeda (informal traditional institutions with pastoral leaders, elders, and pastoralist community representatives). The discussions began with introductions from both teams. Dr. Sircely then explained to the community the work we would undertake and its importance to science and the community. He then shared the site selection criteria to guide the process. The idea was to engage the community and community leaders in the selection of three or more appropriate areas following the site selection criteria outlined in the rangeland baseline master protocol.

Communities' direct selection of 'general areas' for monitoring in communal rangelands. First, community members were asked to indicate the pasture type likely to be most responsive to improved management and most important for livelihoods. They selected a specific single pasture type (e.g., wet and growing season grazing areas, dry and dormant season grazing areas, and all-season grazing areas). Within this grazing type, the community was asked to indicate three general areas (at minimum), inside of which three monitoring locations will be placed (where feasible, more than three general areas are recommended). Dr. Sircely explained that general areas are selected according to the specific criteria agree to by community sources. A general area meets these criteria: (i) an area of particular importance as a livestock feed source; (ii) somewhat degraded but not persistently or stably degraded, and not in good condition; and (iii) high potential to regenerate productive forage and browse.

Degradation varies among rangelands and degradation types include major erosion, gullies, exotic invasions, bare soil expansion, woody encroachment, and poor forage composition. All three general areas must have the same type of degradation, usually the main type of degradation in local rangelands. Finally, in all three general areas, vegetation, soils, and hydrology should be somewhat homogeneous, although some variability is unavoidable. Inside each general area, one monitoring location is identified. A monitoring location must represent its larger general area in terms of soil type, soil hydrology, and vegetation, especially woody plant cover.

Community members discussed and agreed on five possible general areas where the baseline study could be done. The two teams (training participants and a few elders representing the community) went out for site visits to each general area for the elders to select precisely where the monitoring site was to be placed inside its general area. The same criteria were again used to select the exact monitoring location based on its importance for livestock feed, moderate degradation, and rangeland condition (not heavily degraded, and not in good condition), and high recoverability potential according to community sources. While the representative selection of monitoring sites is generally recommended due to limited replication, monitoring sites may be located randomly inside general areas that are very large and very homogeneous.

Three monitoring locations were selected from the initial list of five suggested by the community on the previous day.

Day 2. The training participants along with two dheeda elders learned about the spatial arrangement of the monitoring sites. In each of the three or more general areas selected by the community, one monitoring site was created. A monitoring site consists of two areas: a monitoring area of 2 ha (250 x 80 m), and a trial area of 2 ha (250 x 80 m). The monitoring area and the trial area are separated by at least 30 m, up to a maximum of 100 m (in rare cases, more than 30 m may be unavoidable). If necessary, the monitoring and trial areas can be smaller than 250 x 80 m, but the minimum size is 165 x 60 m.

The 2-ha monitoring area is used primarily for (i) monitoring rangeland condition outcomes from system-level changes in management, and (ii) serves as a control area for action research restoration trials. The 2-ha trial area serves as the treatment area for a restoration trial, which is applied within the entire trial area. To test more than one restoration treatment, it is necessary to create a full second trial area of 2 ha identical to the first, but some modifications to size and spatial arrangement may be required.

Each of the three monitoring locations has three LandPKS plots (50 x 50 m) in the monitoring area and three LandPKS plots in the trial area (Figure LP2) with plots arraigned in three research blocks distributed up and downslope. A typical rangeland, with three monitoring locations and six LandPKS plots per monitoring site, will have nine monitoring plots, and nine trial treatment plots.

Assignment of the monitoring and trial areas was done jointly by the research participants with the community. At this stage, the roles of researchers and partners are to ensure that the monitoring and trial areas are comparable at baseline and account for any unique site conditions or confounding variables that may compromise the trial results.

The community's role at this stage is to ensure that the trial treatment area can be feasibly protected where needed. Protection needs vary among trial protocols and the location or proximity of the trial area does not greatly increase or decrease grazing inside the monitoring area.

GPS points for each monitoring site, monitoring area, trial area and subplot were taken.

Day 3 and 4 were dedicated to measurement. These included LandPKS measurements on vegetation cover, vegetation height, bare soil, land use, grazing and browsing intensity, the ordinal cover of specific invasive, problematic and highly beneficial species, the ordinal cover of photosynthetic soil crusts, lichen and algae, the ordinal density of large trees and producers' perception of land health and links to livestock health. For soils, the measurements were for soil carbon, bulk density, and other soil properties. Other measurements included forage and browse quality, grass and herb transects and shrub and tree density.

Participants were trained to apply a subplot nested design where subplots were placed and bush-fenced inside the LandPKS plots in the monitoring area, which are also the controls for action research trials. In the trial area LandPKS plots were used to measure the effects of trial restoration treatments where the subplots are unfenced. Participants got to apply these instructions by watching others demonstrate them and by doing it themselves.

3.1 Soil sampling

Participants learned to conduct soil sampling measurements. It was explained that within each 50 x 50 m LandPKS plot in the monitoring area, two 2 x 2 m subplots are placed. In the monitoring area, each subplot was bush-fenced for a total size of 3 x 3 m. One subplot begins at 10 m north and 10 m west of the centre of the LandPKS plot, and another at 10 m south and 10 m east. The design was the same in the trial area, except the subplots were not fenced. In the corner of each of the NE and SW quadrats, a heavy hoe is used to cut directly downward into the soil, making a clean, vertical wall roughly 25 cm deep. Bulk density cores are taken by hammering a 5 cm diameter steel bulk density ring horizontally into the vertical wall. For each LandPKS plot, two sample bags are needed, for two depths, 0–10 cm, and 10–20 cm.

In the NE quadrat corner of the first subplot, two cores were taken at depths of 0–5 and 5-10 cm and combined in one sample bag (labelled 0–10 cm with the LandPKS plot ID. Two more core samples were taken at depths of 10–15 and 15–20 cm and combined in another bag labelled 10–20 cm with the LandPKS plot ID. The same process was repeated for the corner of the SW quadrat, with the samples placed into the same bags for the correct depth (0–10 cm and 10–20 cm) from the first quadrat. After samples were taken, the loose soil was backfilled into the hole. After sampling, the soil sample bags were opened and kept in a dry, well-ventilated area to allow them to dry quickly. Once air-dried, the soil samples can be transported to a laboratory for analysis.

3.2 Plant and diversity composition

Participants were taken through plant the diversity and composition process. The focus here was on the botanists in the training group as the exercise requires an experienced botanist, and at least one pastoralist, at minimum. Plant diversity and composition are recorded in both the monitoring and trial areas in the centre of the LandPKS plots and the 2 x 2 m subplots. Plant diversity and community composition will be characterized using the tools provided in the LDSF framework, the Field Guide for which provides instruction: http://landscapeportal.org/documents/2477/download. These measures are conducted in a circular area within a radius of 5.65 m (100 m^2) in the centre of each LandPKS plot. This comprises (i) characterization of trees and shrubs (page 11 in the LDSF Field Guide), and (ii) characterization of grasses (page 13 in the LDSF Field Guide). Functional plant community composition will be characterized in the 2 x 2 m subplots using separate datasheets for forage and browse.

4. Concluding remarks

Participants asked questions and received guidance and clarification from the group trainer, Dr. Sircely. The training ended and participants were encouraged to reach out for further verification when needed. The baseline study continued with the Kenyan consultant leading the measurements for the remaining monitoring locations in the Gafarsa rangeland unit. A week later, the baseline study was to continue in another rangeland unit in Cherab Ward in Isiolo County. Plans were to be established on when to roll out the work in Baringo, Marsabit and Tanzania in 2023.

5. List of participants

Name of participants	Organization
Jason Sircely	ILRI
Irene Nganga	ILRI
Malit Wako	ILRI
Adan Bulle	ILRI
Sawsan Hassan	ICARDA
Mouldi Gamoun	ICARDA
Lutta Alphayo	ICRAF
John Musembi	ICRAF
Daniel Ouma	Consultant
Birikaa Olesikilal	Government of Tanzania
Joshua Okoth	RECONCILE
Alvin Mbeche	RECONCILE

CGIAR

INITIATIVE ON

Livestock and Climate

ILRI INTERNATIONAL LIVESTOCK RESEARCH INSTITUTE

CGIAR

Alliance Bioversity & CIAT

ICARDA Science for resilient livelihoods in dry areas