Smallholder Market-Led Project/Climate Smart Agriculture for Resilient Livelihoods (SMLP/CSARL)

Monitoring Innovations using the Land Degradation Surveillance Framework (LDSF) and Strengthening National Capacity and Embedding Approaches into Chiefdom Planning

Overview and Progress

August 2019

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Background

- Agricultural & rangelands in the country are affected by livestock grazing, burning and firewood collection.
- These activities result in widespread land degradation through overgrazing and accelerated soil erosion rates
- Degradation of agricultural and rangelands has consequences for the resilience of ecosystems & their productivity.

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Background Continues

- Furthermore land degradation negatively impact water resources and supply.

- Hence, sustainable land management is of critical importance, including sustainable agricultural and livestock production.

Background Continues

- The Land Degradation Surveillance Framework (LDSF) will be applied for landscape level assessment and studies of land degradation, soil carbon dynamics, vegetation changes, soil fertility and soil hydrological properties.

- The LDSF by International Centre for Research on Agro-forestry (ICRAF) has been implemented in more than 30 countries in Sub-Saharan Africa (Eswatini & Lesotho) and has been used for continental level assessment of soil properties and land degradation.

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Land Degradation Surveillance Framework Scope

LDSF Scope in Summary

- The GEF funded Climate Smart Agriculture Resilient Livelihoods (CSARL) Project, is integrated within SMLP

- The integration aims to strengthen climate resilience, ecosystem health surveillance and monitoring, as well as sustainable natural resources management. Ultimately resulting to the identification of land degradation hot-spots.

- Hence the LDSF is in a process of establishing a National Land Degradation and Ecosystem Health Surveillance system to improve monitoring of agricultural and rangelands.

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LDSF Scope in Summary …Continues

- The National Surveillance Framework will be developed into a Dashboard system that will be tailored to the needs of different stakeholders.

- The dashboard will assist in reports to such United Nations Conventions as United Nations Framework Convention on Climate Change (UNFCC), Convention on Biological Diversity (CBD) and United Nations Convention to Combat Desertification (UNCCD)

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LDSF Work-Packages

- **Work Package 1**:

Development of curricula and in-service training materials for Training of Trainers

- Stakeholders collaboration is critical
- Curricula will be developed focusing on in-service training for agricultural and rangelands managements (engaging Ministry of Agriculture - MoA and University of Eswatini - UNESWA)
- The curricula will cover topics related to assessment & monitoring of indicators of agricultural & rangeland health using the LDSF

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LDSF Work-Packages…Continues

Work package 2:

Establishment of a national agricultural land and rangeland monitoring and evaluation system based on LDSF (2018 to 2019)

- Thirteen (13) LDSF sites have been identified around the country
- Site selection was conducted jointly by ICRAF and ESWADE/MoA, using existing data from Eswatini as well as models developed at the ICRAF Geo-Science Laboratory.
- The LDSF will be applied to assess land degradation, soil carbon dynamics, vegetation changes, soil fertility and soil hydrological properties.

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Measurement at a LDSF Site

The following attributes are collected at a LDSF Site :

i. Land-use
ii. Rangeland Health
iii. Position – coordinates
iv. Slope
v. Composite soil samples
vi. Woody cover rating
vii. Trees & shrub rating
viii. Visible erosion

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LDSF Work-packages Continues

Work package 3:

Development of remote sensing and GIS capacity to assess and monitor agricultural land and rangelands health

- Capacity development will be a core activity throughout the proposed project, starting with the curricula development outlined in work package 1.
- Advanced remote sensing analytical capacity will be developed among agriculture and rangeland experts from SMLP and MoA

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LDSF Work-Packages Continues

Work package 4:

National assessment of agricultural land and rangeland health for spatially explicit targeting of interventions (e.g. restoration) (2018 to 2019)

- This component of the proposed project will apply the LDSF baselines in combination with **predictive maps** to inform SMLP/CSARL activities and management interventions
- A system for monitoring of rangeland health will be developed using remote sensing based predictive models, allowing for the tracking of agricultural land and rangeland performance over time.
- The maps generated will be hosted on the open source Landscape Portal for secure storage and easy sharing between partners. **Stakeholders, Policy Makers, Researchers, Students & Public will be required to sign-up to the portal and be allocated user credentials.**
- Interactive tools will also be developed as part of this work package to allow SMLP and MoA staff to explore indicators of rangelands health and maps

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Land Degradation Surveillance Framework

Site Design

LDSF Sampling Design

- LDSF sites are 100km² (10 km by 10 km) in size
- The basic sampling unit is called a cluster
- Within each cluster 16 plots (2.5 km by 2.5 km) are created
- Plots are randomized to minimize any local biases that may arise from convenience sampling

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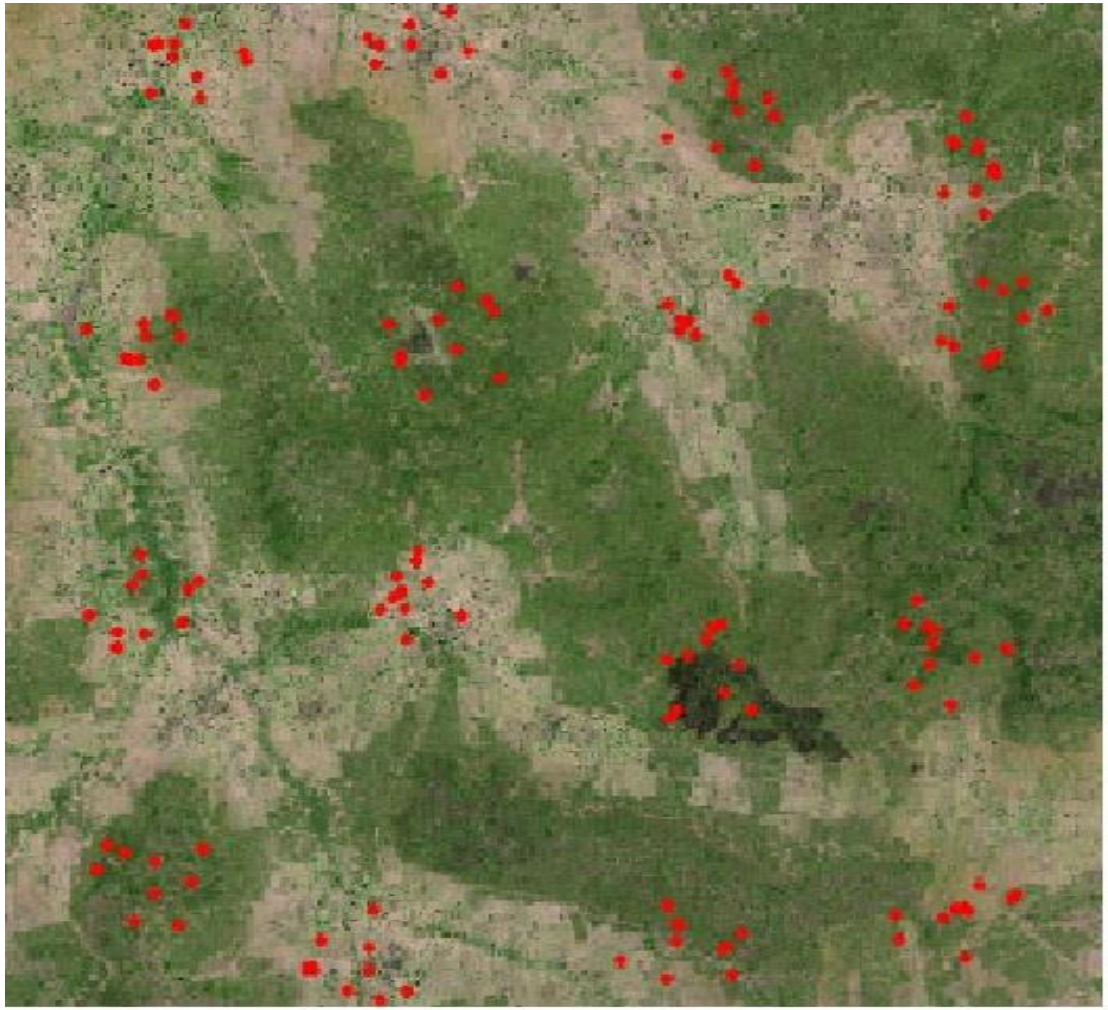
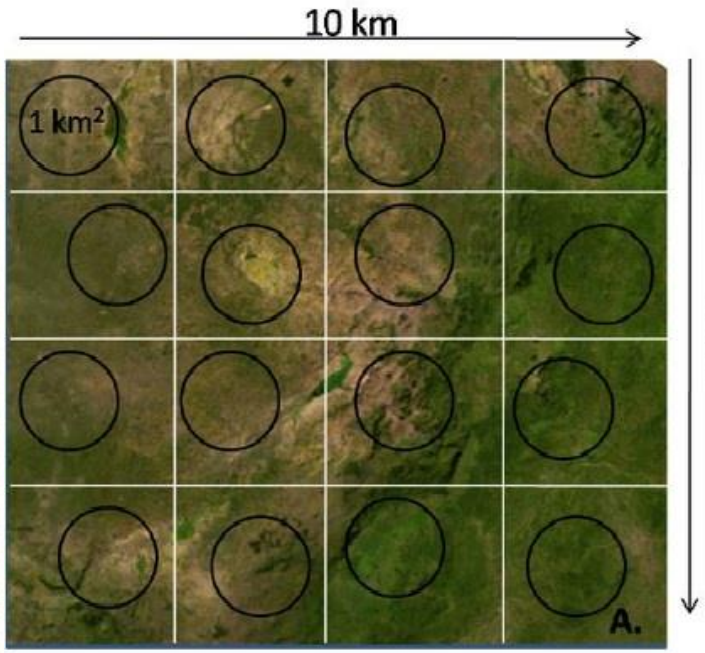
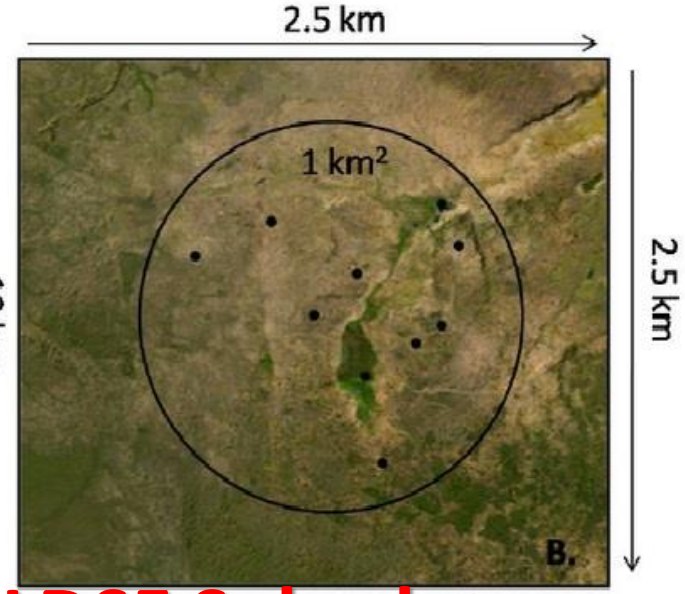
LDSF Site



LDSF Clusters



LDSF Plots



LDSF Sub-plot

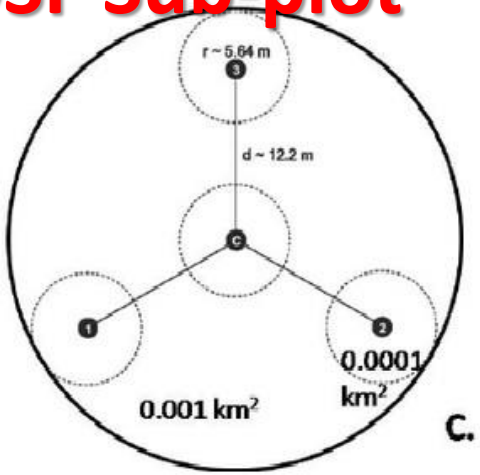
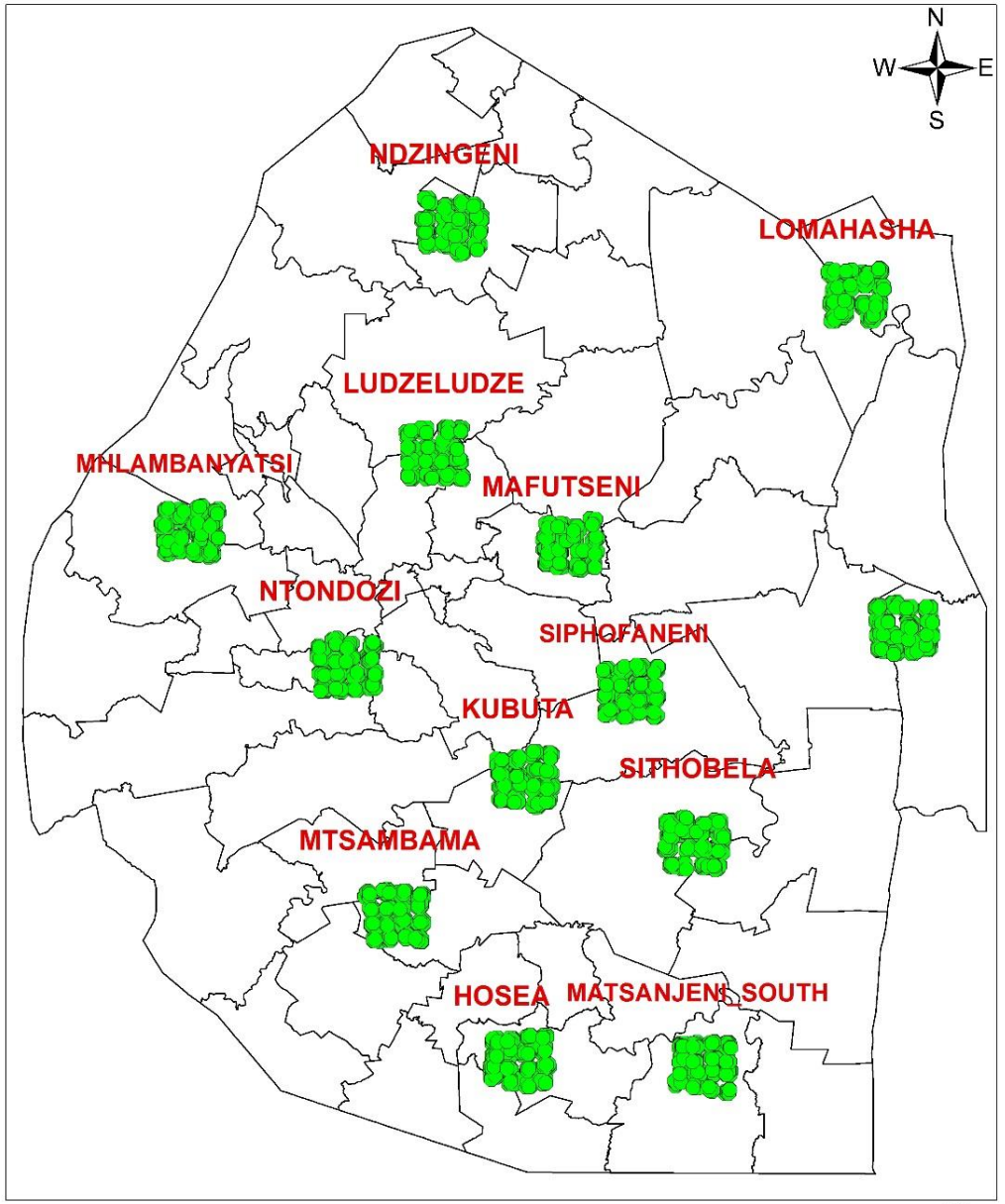


Figure One. LDSF hierarchical sampling design. *Graphic A) demonstrates the 100 km² grid divided into 16 clusters. B) illustrates the 1 km² clusters with 10 - 0.001 km² plots. C) illustrates how the plots are laid out with 4-subplots. This is called a nested sampling design because of the different spatial scales at which sampling is taken place.*

Eswatini LDSF Sites



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LDSF Indicators

I. Soil condition (soil carbon stocks, pH and other key functional properties)

II. Soil hydrological characteristics - primarily infiltration rates

III. Land degradation risk factors such as soil erosion and root-depth restrictions (compaction)

IV. Tree densities and woody biomass

V. Herbaceous layer density and condition. This will include data on grassland condition (e.g. annual to perennial ratios, distribution and species composition).

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Land Degradation Surveillance Framework

Dashboard

Background

- It is a project funded by the Global Environment Facility (GEF) and International Fund for Agricultural Development (IFAD), through Earth Observation project
- The project main goal is to create a Framework for Assessment and Monitoring of Ecosystem health and Rangelands
- The International Centre for Agro-forestry is the Implementing Organisation.
- In Southern Africa the project is implemented in Eswatini and Lesotho

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LDSF Dashboard Methodology

SHARED

❖Stakeholder Approach to Risk-informed & Evidence-Based Decision-making

SHARED:

- SHARED is a methodological approach to shape and embed evidence into inclusive negotiation and decision making processes

- A comprehensive framework tailored to specific decision needs, it brings together processes

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AIMS

- The aims of the Dashboard are the following :

  i. Provide Stakeholder access to high quality data

  ii. Provide Stakeholders with diagnostic evidence on ecosystem health

  iii. Determine Household resilience with regards to effects of damaged ecosystems health

  iv. Train Stakeholders to utilise data & evidence to formulate programme interventions and investments

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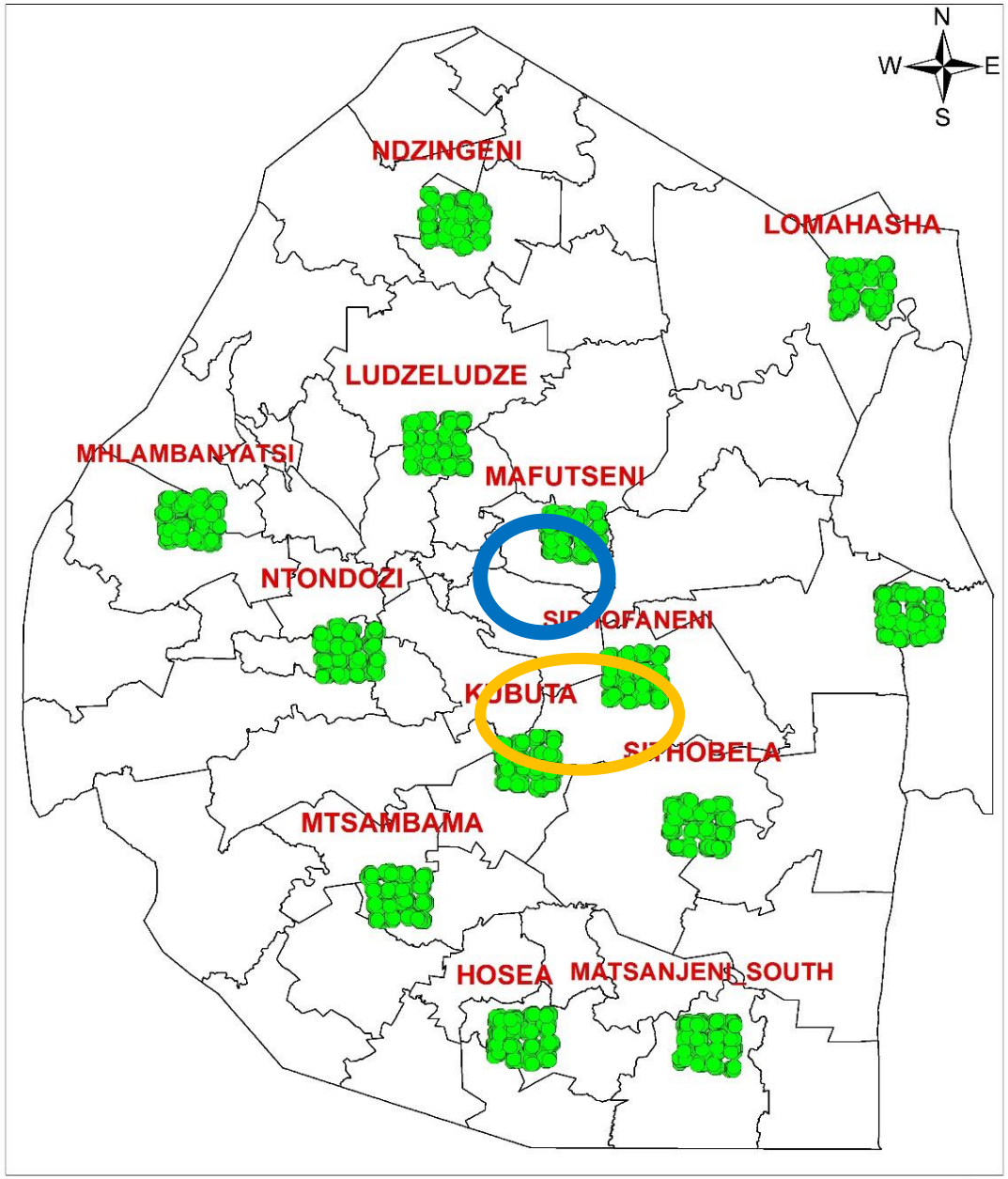
Land Degradation Surveillance Framework –

Progress to Date

Eswatini LDSF Sites



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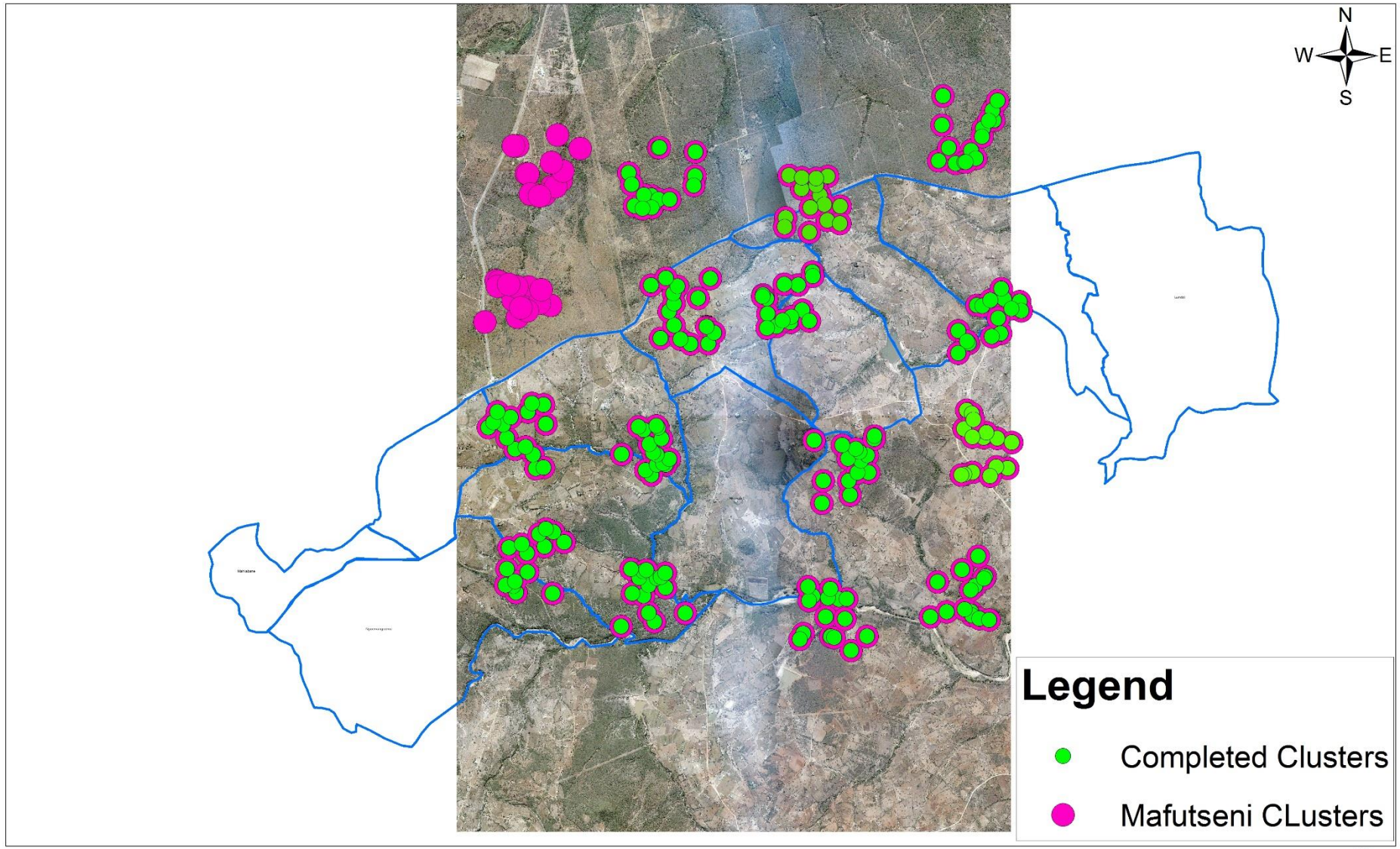
Data Collection

Output 1.5 National capacity to establish, implement and promote policies and programmes to meet Swaziland Convention targets: and share lessons nationally and regionally		
Activities	**Status**	**Comments**
1.5.1. Procurement and installation of Land Degradation Surveillance System - Data collection equipment	▪ Data Collection Ongoing ▪ Thirteen (13) clusters out of sixteen (16) clusters have been completed at Mafutseni ▪ Five clusters have been completed at Siphofaneni	▪ Remaining clusters are located on private farm (Umbuluzi Chickens). ▪ Permission is yet to be granted
	▪ Procurement of fieldwork tools is ongoing	▪ The Data Collectors are now working in two teams

Mafutseni LDSF Clusters - Data Collection Progress



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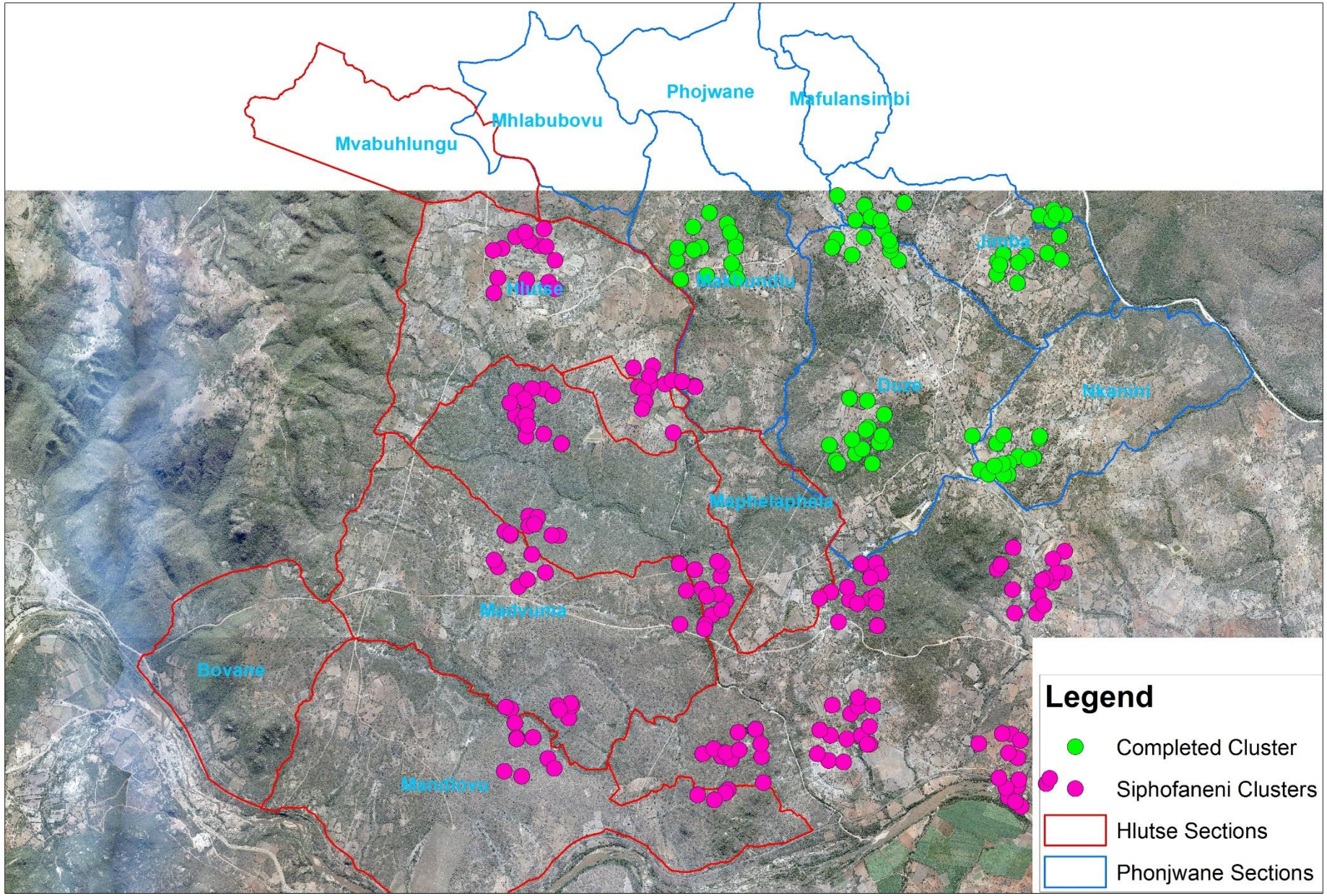
Siphofaneni LDSF Site - Progress



LDSF Sustainability

Sustainability of LDSF Dashboard

To address sustainability of LDSF the following steps are undertaken

i. Lobby for a LDSF budget line within the MoA budget
ii. Collaborate with the Ministry of Information Communication & Technology to establish a portal to host the LDSF
iii. Local soil testing and analysis – these will allow the country to conduct its own
iv. Training – It's a critical component for Officers. This will ensure that LDSF Approach is repeated at various Chiefdom in the country

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