Bringing Together Scientific Research and Citizen Science

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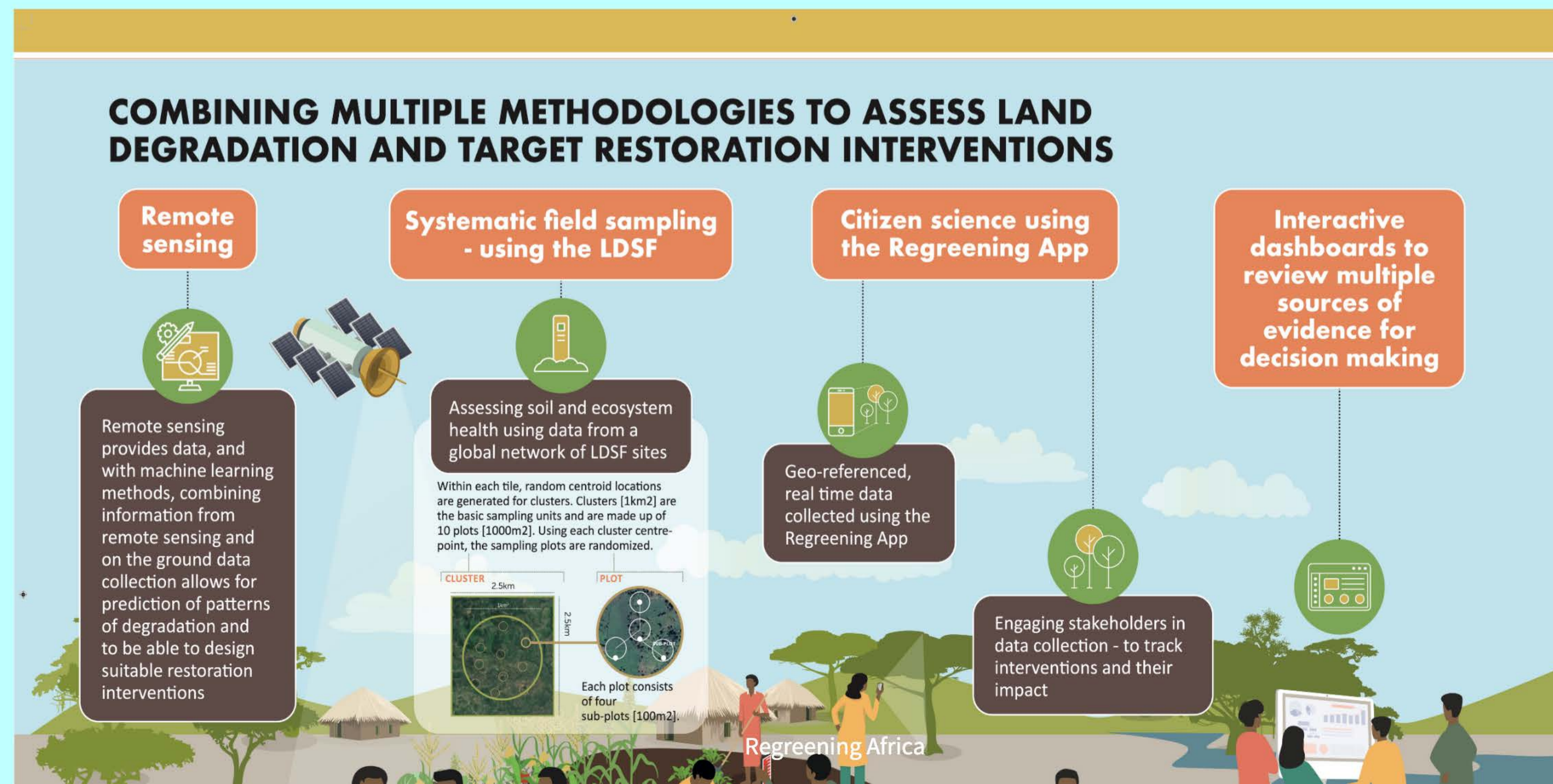

Regreening Africa

We are combining scientific research and citizen science to:

💡 **Enhance the participation of farmers and other stakeholders in land restoration, including monitoring**

ⓘ **Scale data collection and deepen our understanding of the effectiveness of restoration inerventions**

COMBINING MULTIPLE METHODOLOGIES TO ASSESS LAND DEGRADATION AND TARGET RESTORATION INTERVENTIONS

Remote sensing

Remote sensing provides data, and with machine learning methods, combining information from remote sensing and on the ground data collection allows for prediction of patterns of degradation and to be able to design suitable restoration interventions

Systematic field sampling - using the LDSF

Assessing soil and ecosystem health using data from a global network of LDSF sites

Within each tile, random centroid locations are generated for clusters. Clusters [1km2] are the basic sampling units and are made up of 10 plots [1000m2]. Using each cluster centre-point, the sampling plots are randomized.

CLUSTER 2.5km   PLOT

Each plot consists of four sub-plots [100m2].

Citizen science using the Regreening App

Geo-referenced, real time data collected using the Regreening App

Engaging stakeholders in data collection - to track interventions and their impact

Interactive dashboards to review multiple sources of evidence for decision making

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Why combine?

💡 Benefits of systematic monitoring:

- Consistently compare between sites/locations
- Track changes over time
- Build robust predictive models
- Assess multiple aspects of land health

ⓘ Benefits of citizen science:

- Close the learning loop
- Encourage participation and co-learning
- Help scale data collection
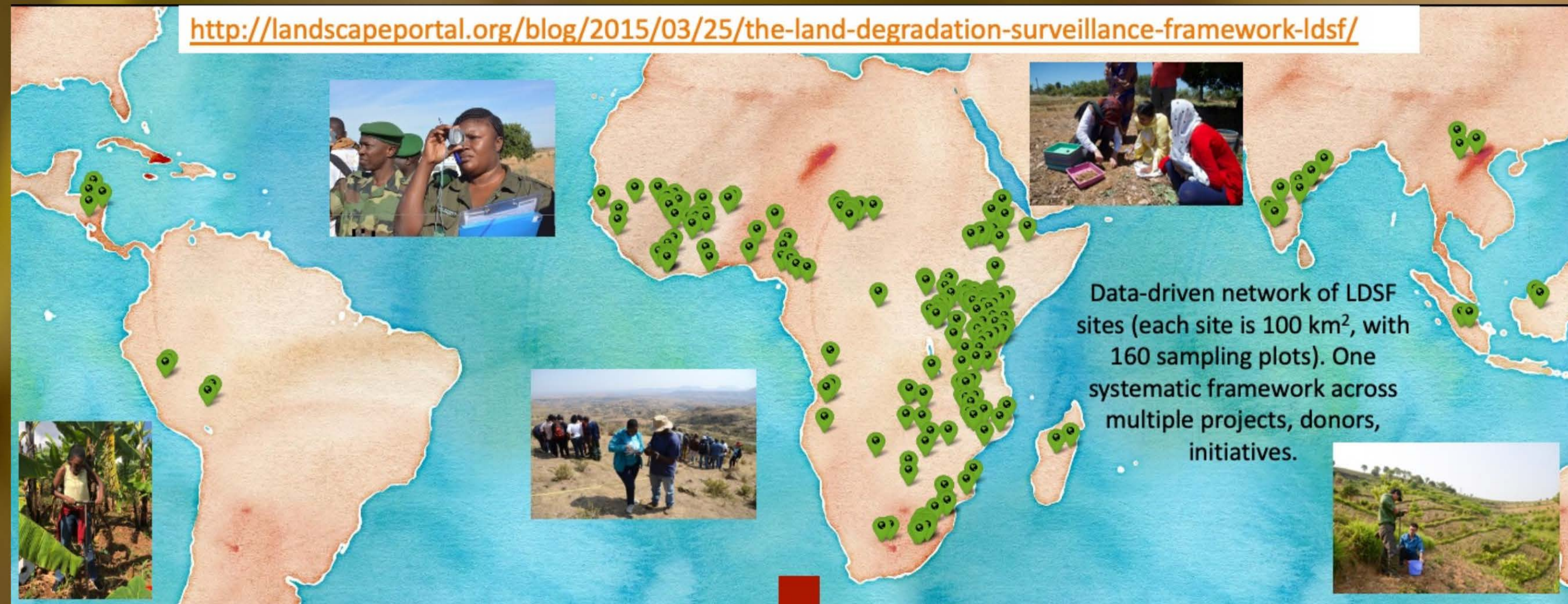- Important source of data for scientists

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The Land Degradation Surveillance Framework (LDSF)

http://landscapeportal.org/blog/2015/03/25/the-land-degradation-surveillance-framework-ldsf/

Data-driven network of LDSF sites (each site is 100 km^2, with 160 sampling plots). One systematic framework across multiple projects, donors, initiatives.

- Consistent assessment and monitoring of land health across diverse landscapes

Example: Assessment and mapping of soil organic carbon (SOC) in Rwanda
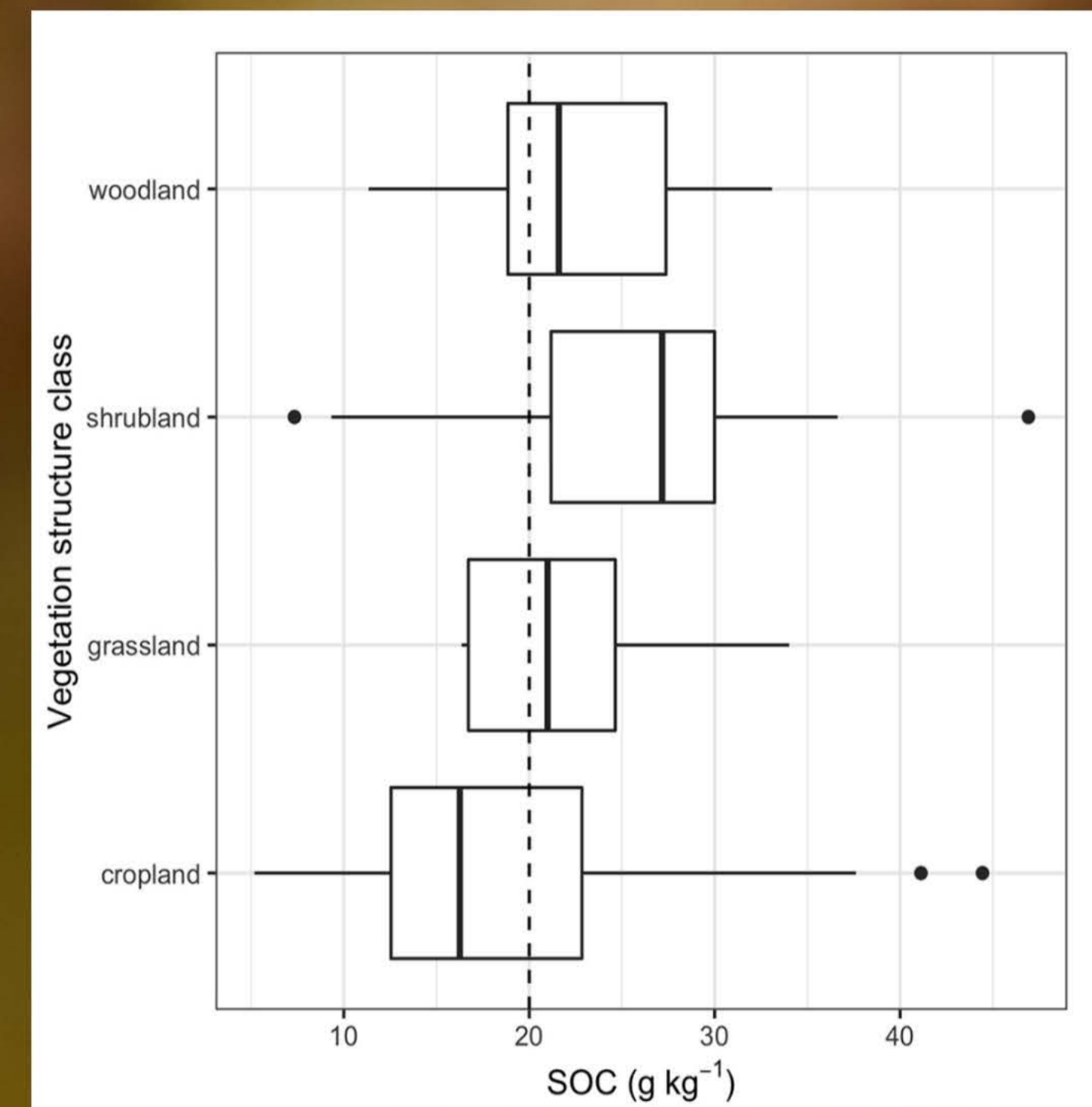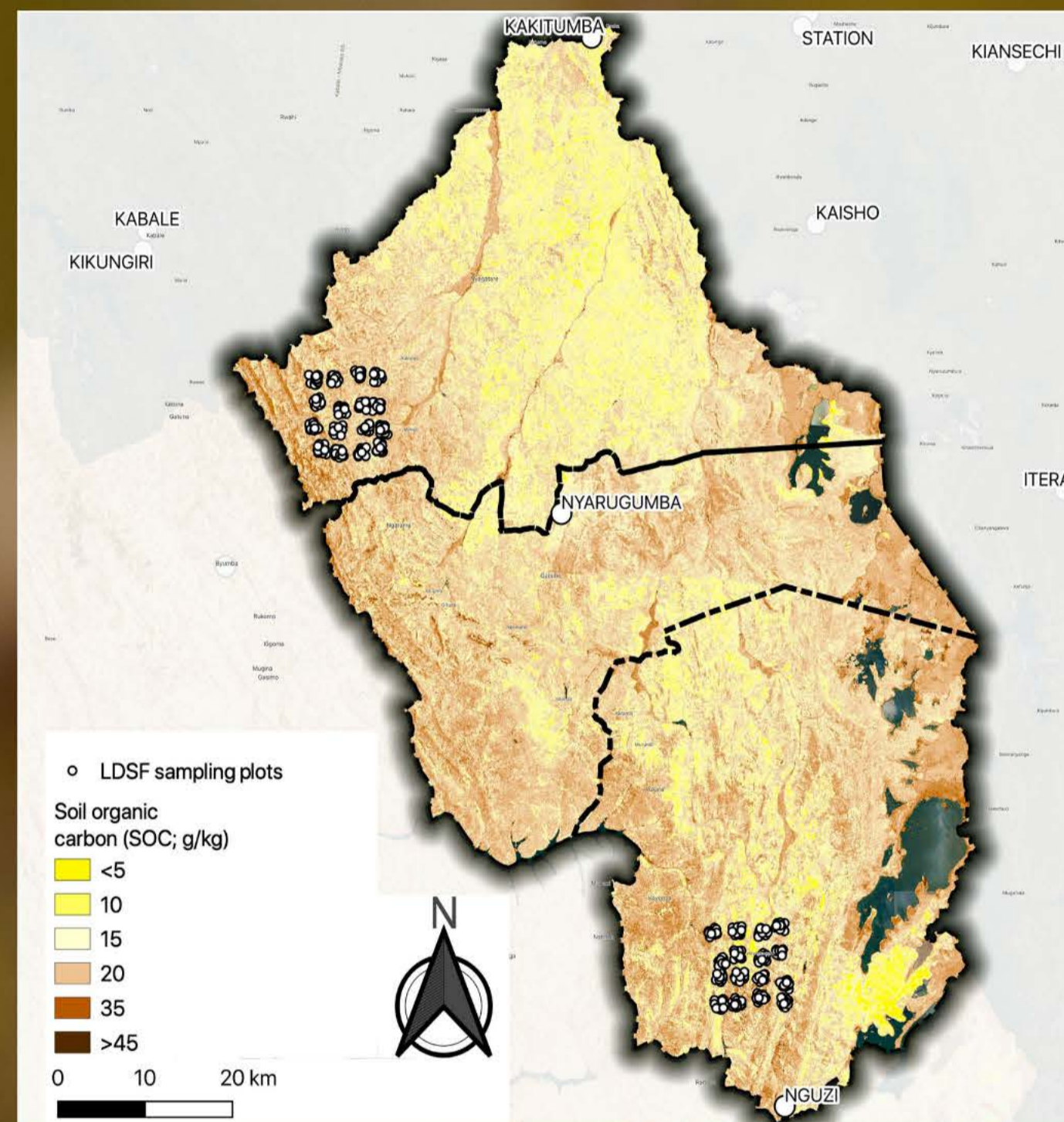
Winowiecki, L.A., Bargués-Tobella, A., Mukuralinda, A., Mujawamariya, P., Ntawuhiganayo, E.B., Mugayi, A.B., Chomba, S., Vågen, T.-G., 2021. Assessing soil and land health across two landscapes in eastern Rwanda to inform restoration activities. SOIL 7, 767–783. https://doi.org/10/gnpt9v

>> Citizen science is often defined as

public participation in scientific research

Source: https://citizenscience.org

The Regreening Africa App

THE REGREENING AFRICA APP

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The Regreening Africa App is a mobile-based android application that allows users to collect data at farm level on a range of land restoration practices that allows for robust landscape level monitoring.

Features of the Regreening Africa App

TREE PLANTING MODULE
Tree planting

- Record details of farmers and regreened plot
- Chatacterise species composition and assess tree planting practices
- Track tree growth
- Field boundary recorded
- Number of trees planted
- Date(s) planted
- Location of trees planted
- Survival of trees

FARMER MANAGED NATURAL REGENERATION (FMNR) MODULE
FMNR

- Record details of farmers and regreened plots
- Characterise dominant species composition
- Assess FMNR practices

NURSERY MODULE
Nursery

- Ensuring that farmers have access to quality planting materials and a wide range of species for tree planting
- Record nursery information and location
- Record nursery practices
- Record nursery production

TRAINING MODULE
Training

- Record training details
- Record gender participation in training sessions

Why do we need it?

The Regreening Africa App links land restoration activities implemented by farmers and pastoralists to large global initiatives, providing evidence that can positively inform these efforts, whilst simultaneously assessing their effectiveness on the ground.
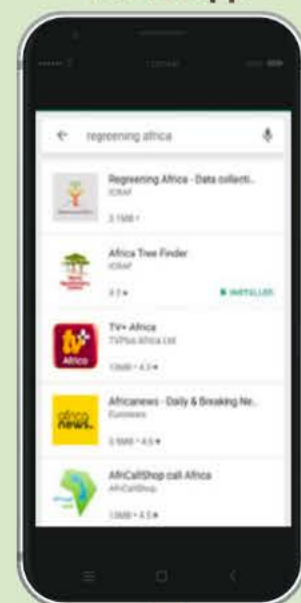
Locate App   Install App   Start up App   Open survey forms
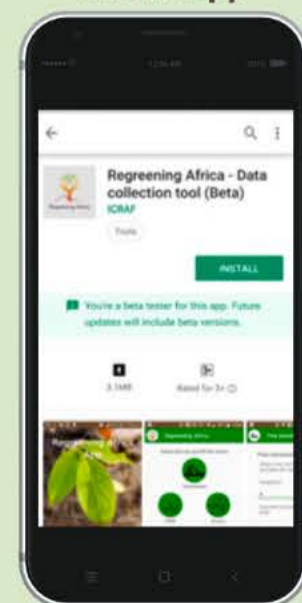
What is unique about the Regreening Africa app?

The App is a data collection and monitoring tool. The information collected can be integrated into various types of analytics and combined with information on land health and other thematic data.

The App enables stakeholders including farmers to record and track their land restoration practices. The locations of their activities are geo-referenced and species diversity and growth are recorded in real-time.

Data collected through the App is freely and instantly available to the users and various outputs from the synthesis of the data, such as critical land health indicators, are then shared with the public through the Regreening Africa Dashboard.

The App is continually updated and the design and interface amended, based on farmers, extension agents and project implementing teams to add requested data and ensure the design and functionality match the user needs.

The Regreening App was developed in close consultation with stakeholders, with continual interaction between the World Agroforestry development team and users.
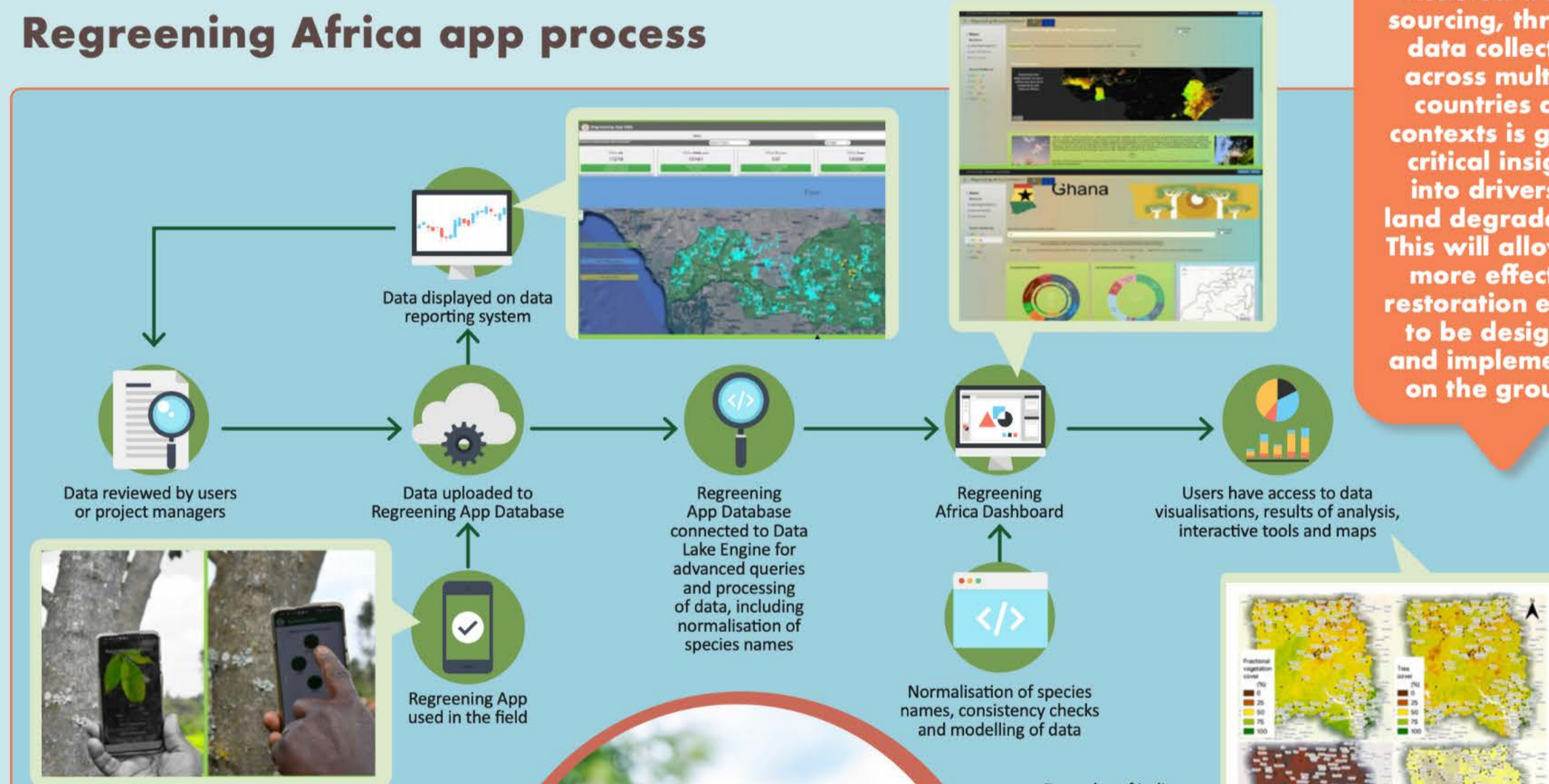
Project implementors are able to use the data for **real-time decision support in project implementation and monitoring**.

Data collected using the App is combined with **spatial assessment of land health and can be applied in soil carbon monitoring**, relating directly to climate neutrality goals or restoration targets.
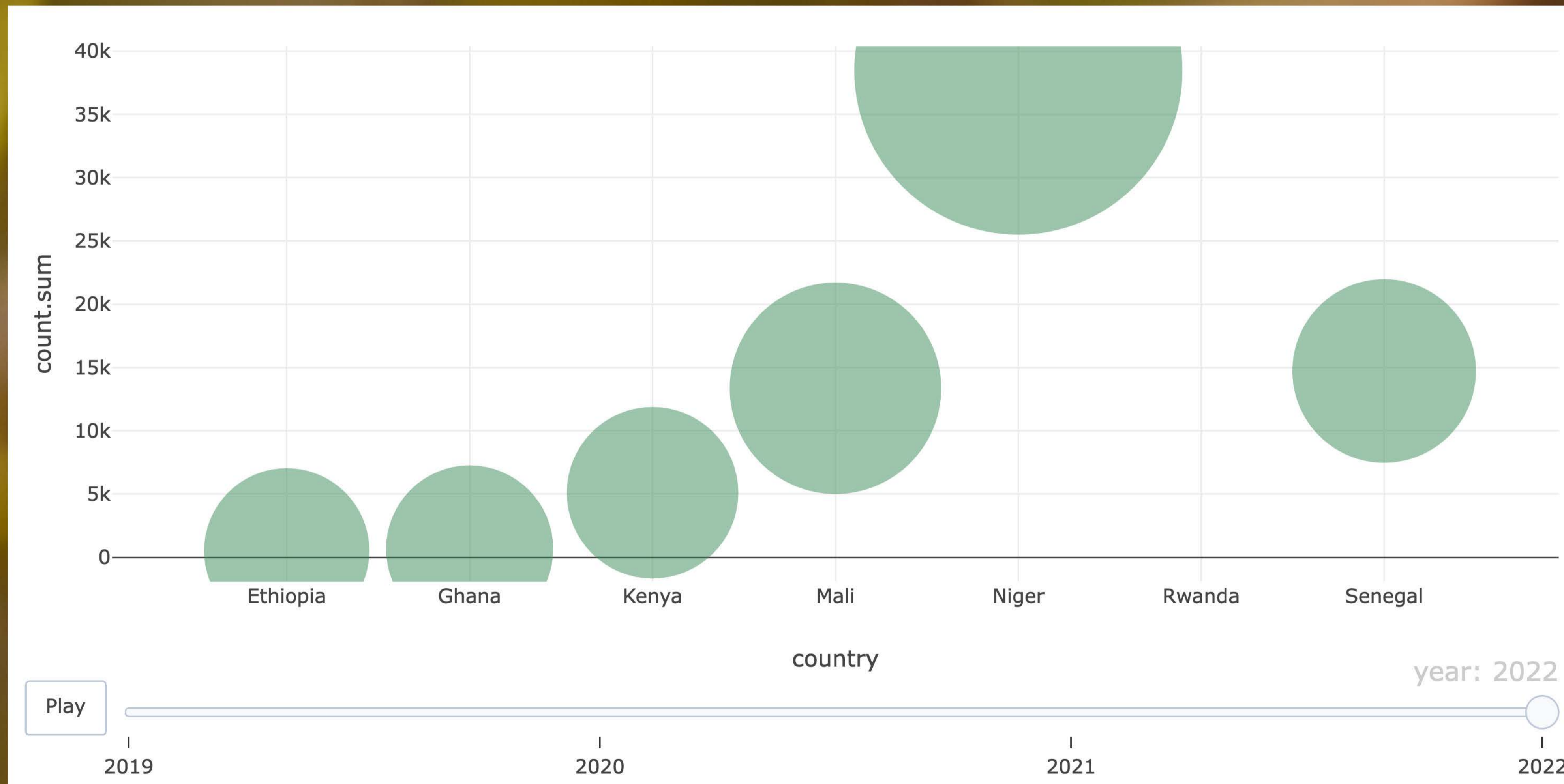
Regreening Africa app process

Ghana

Data reviewed by users or project managers

Data uploaded to Regreening App Database

Regreening App Database connected to Data Lake Engine for advanced queries and processing of data, including normalisation of species names

Regreening Africa Dashboard

Users have access to data visualisations, results of analysis, interactive tools and maps

Data displayed on data reporting system

Regreening App used in the field

Normalisation of species names, consistency checks and modelling of data

Examples of indicator maps for northern Ghana, the maps are generated for each country at 30 m spatial resolution to assess spatial variations and changes over time

Assisted crowd sourcing, through data collection across multiple countries and contexts is giving critical insights into drivers of land degradation. This will allow for more effective restoration efforts to be designed and implemented on the ground.

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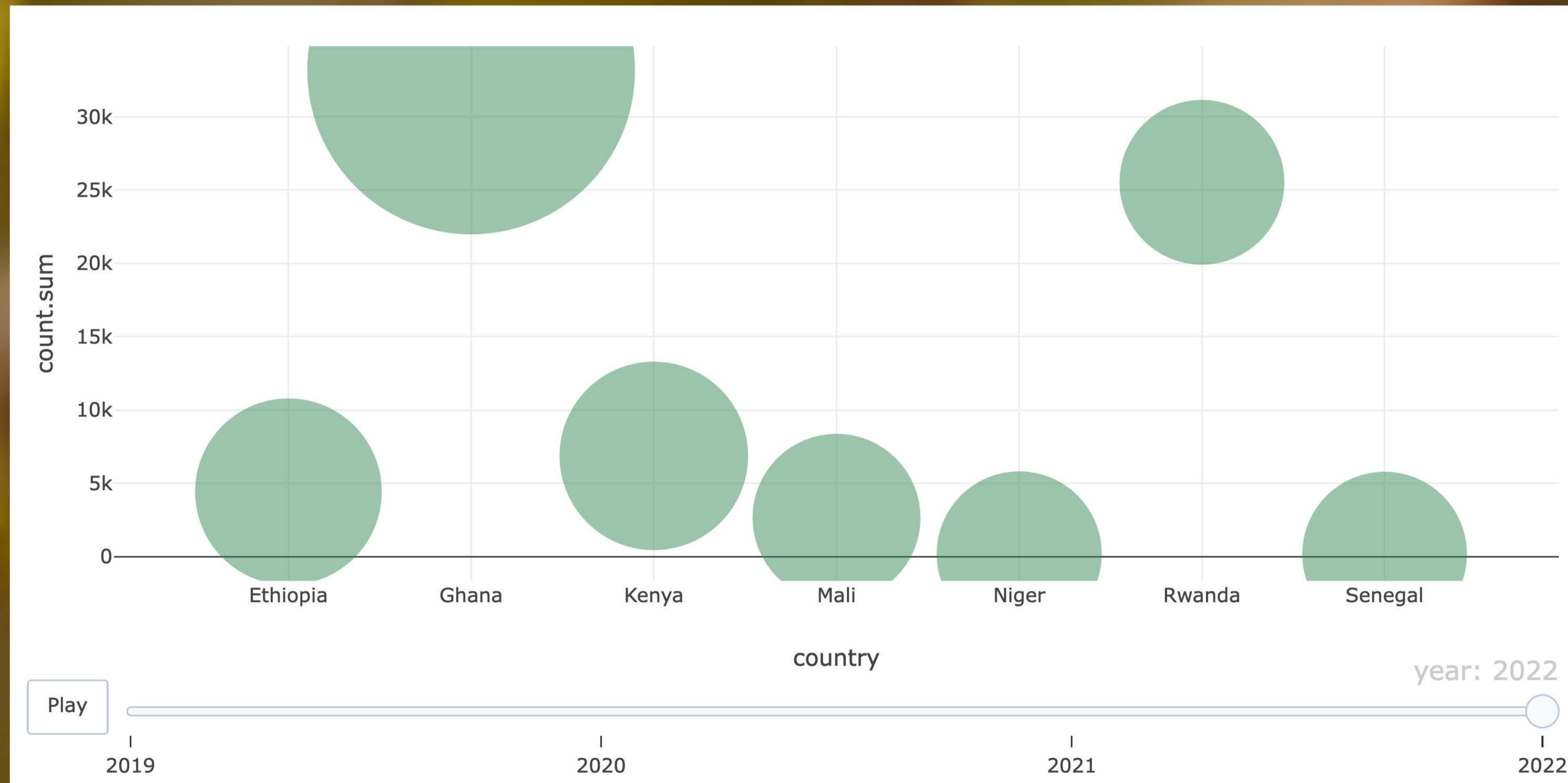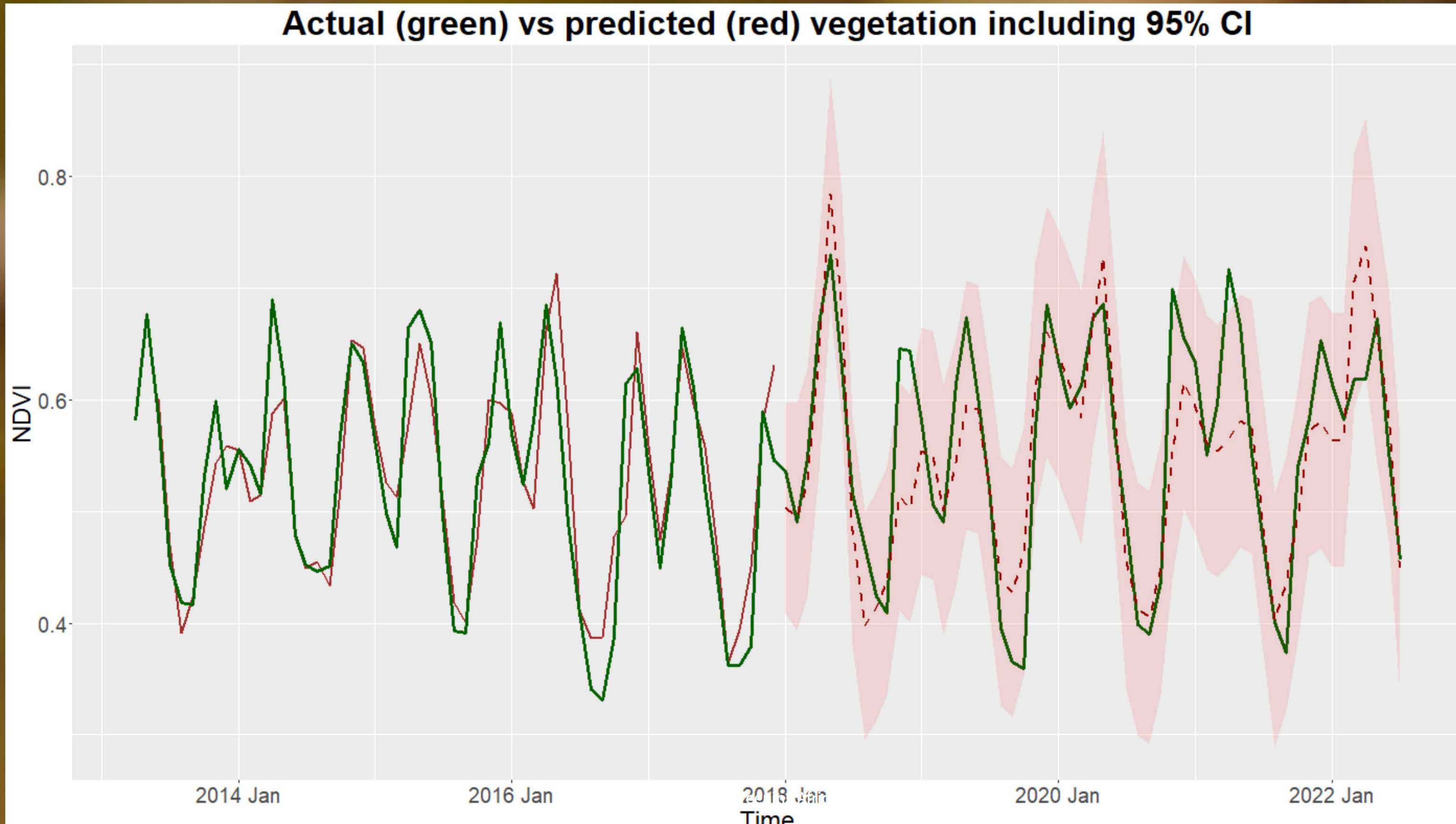# The Regreening Africa App

Farmer Managed Natural Regeneration (FMNR)
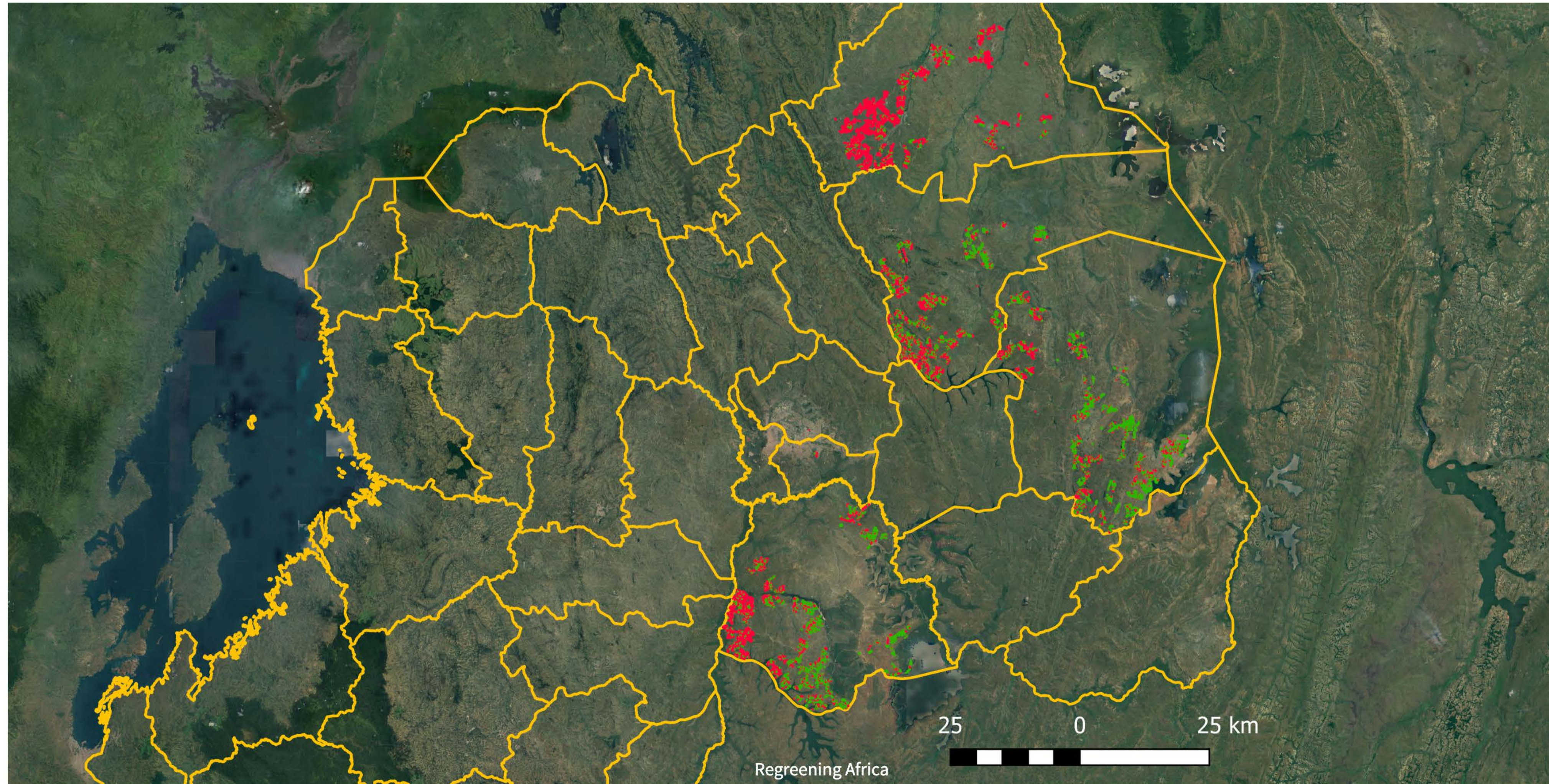
The Regreening Africa App

Tree planting

Assessing land restoration with data from the Regreening Africa App

Actual (green) vs predicted (red) vegetation including 95% CI

Assessing land restoration with data from the Regreening Africa App

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Bringing it all together...
The Regreening Africa dashboard
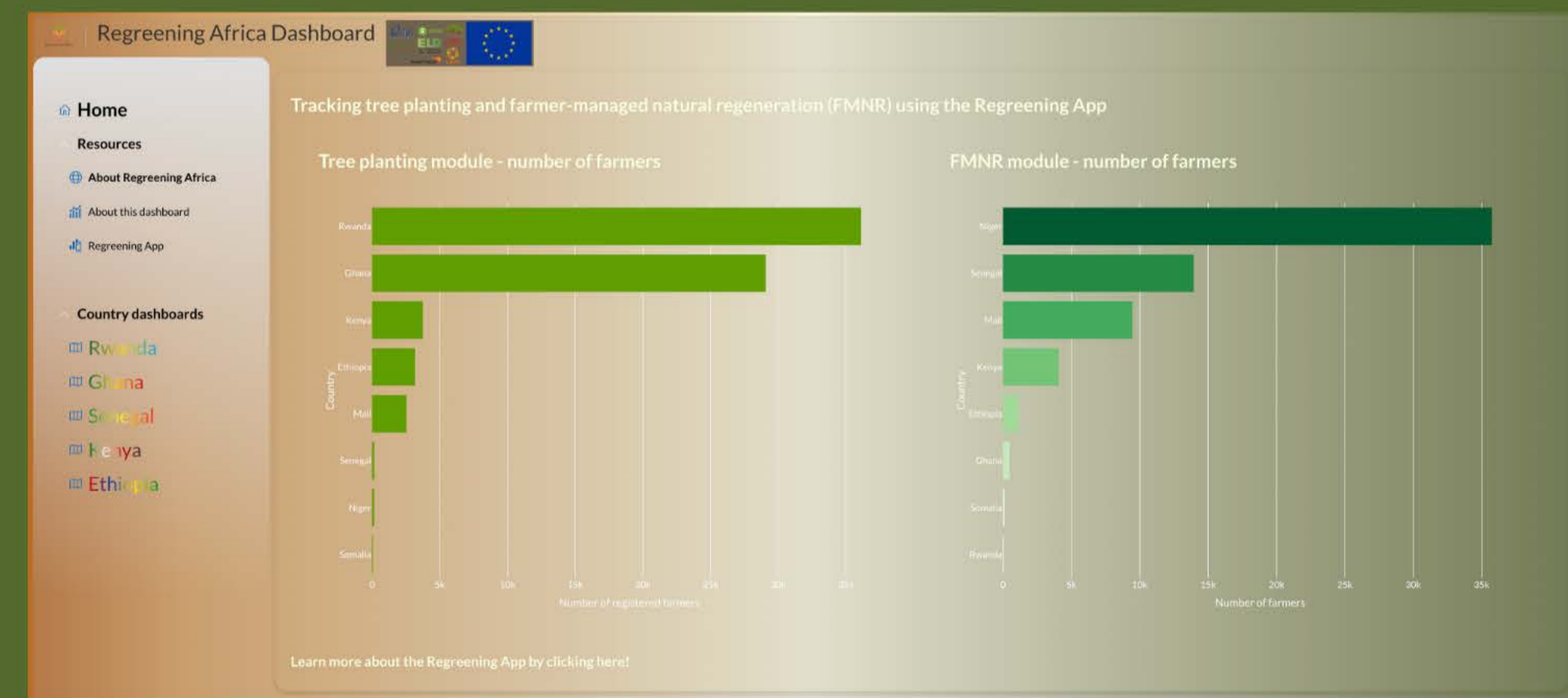
https://dashboards.icraf.org/app/ra_dashboard

Bringing it all together…

The Regreening Africa dashboard

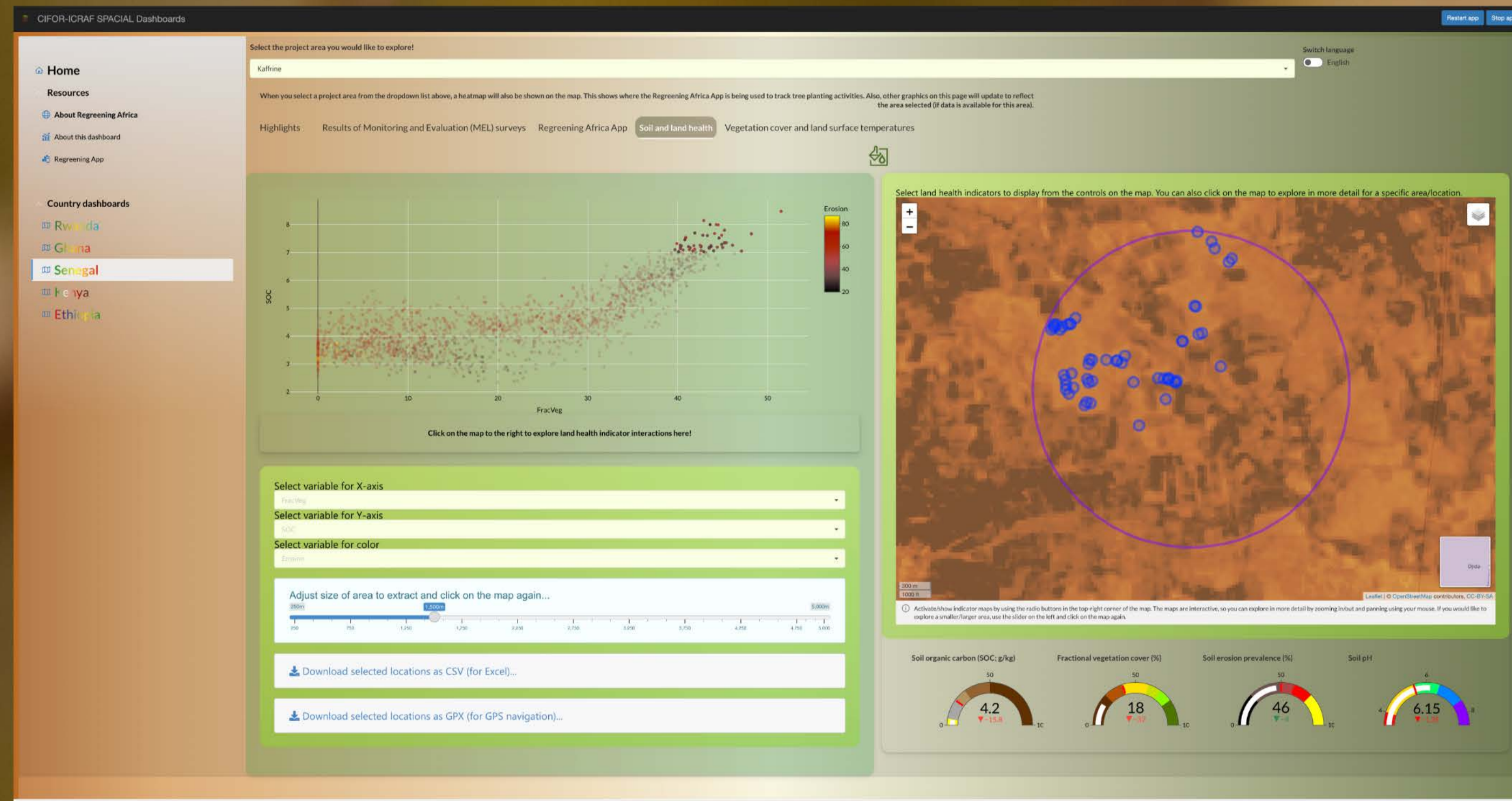**Almost 159,000 farmers registered since 2019**

- ~85,000 farmers registered with the tree planting module

- ~74,000 farmers registered with the FMNR module

Interactively exploring land health indicators

Example: Senegal

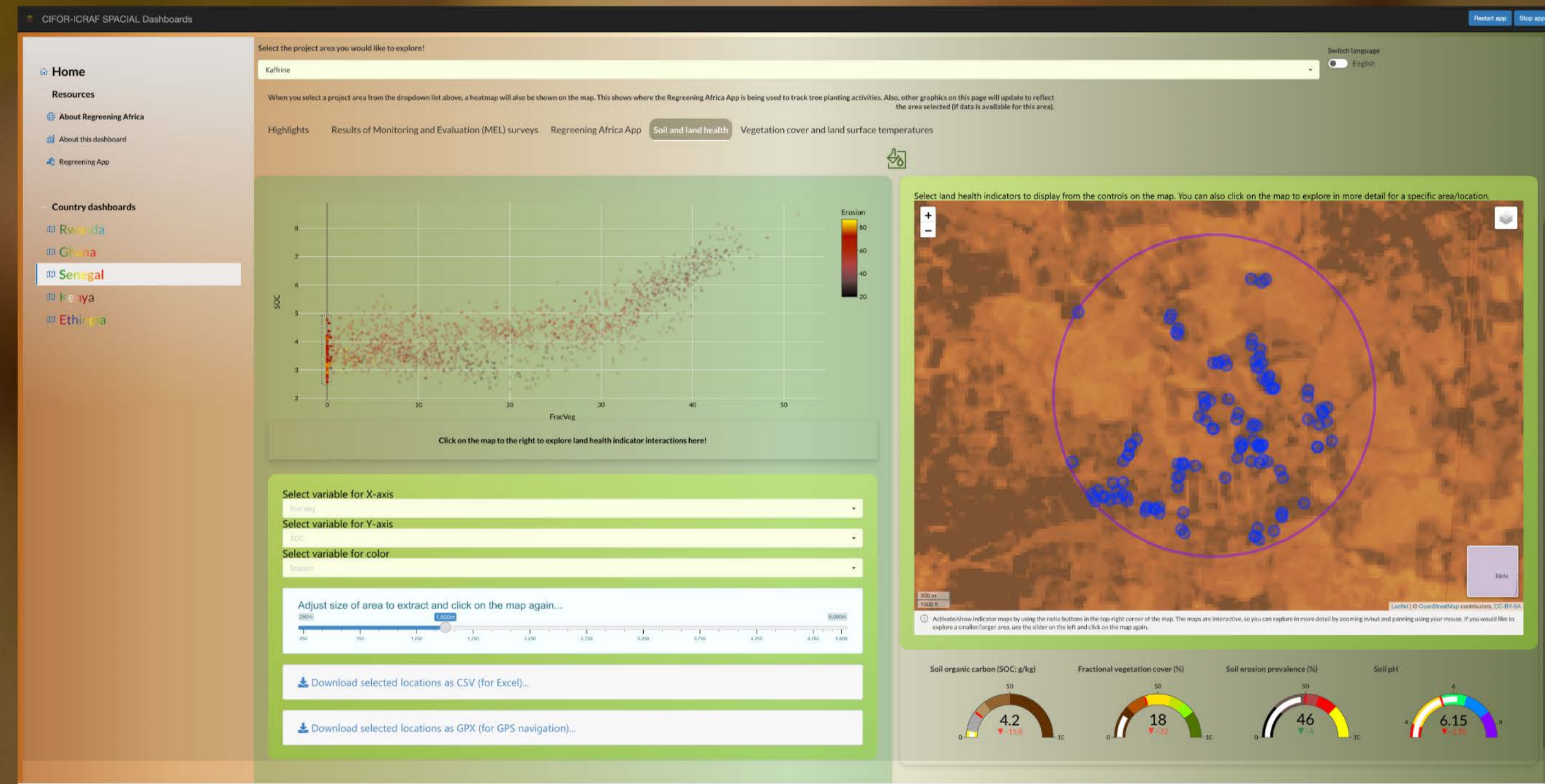Identifying opportunities for land restoration...

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Interactively exploring land health indicators

Example: Senegal

⚠️ **Identifying areas with severe constraints…**

Thank you!

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