Regreening Africa Insights Series #9

CITIZEN SCIENCE AND SCALING THE USE OF THE REGREENING APP

Regreening Africa

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ELD The Economics of Land Degradation

As a large scale, multi-country, multi-stakeholder restoration initiative, Regreening Africa offers a unique opportunity to generate actionable lessons on the cost-effectiveness and impact of local, national and global restoration efforts. As part of the Regreening Africa Insights Series, this brief shares key learnings and insights into the success of the Regreening App through citizen science and stakeholder engagement.

Suggested citation: Regreening Africa. 2022. Citizen science and scaling the use of the Regreening App. Insights Series volume 1. World Agroforestry, Nairobi, Kenya.

Acknowledgements: The Regreening App has been pioneered and developed through the Regreening Africa Programme. We would like to thank the immense efforts and contribution of the Land Degradation Dynamics Component of the programme, in particular Tor-Gunnar Vågen (Principal Scientist and Head of CIFOR-ICRAF SPACIAL – Spatial Data Science and Applied Learning Lab), Muhammad Ahmad who has led the development and capacity building, Benard Onkware (SPACIAL unit) who was the lead developer for the app and data reporting system, Christine Magagu (CIFOR-ICRAF) who led national trainings on the app, and Leigh Winoweicki (CIFOR-ICRAF Soil and Land Health Global Research Lead). The app development and co-design would not have been possible without the extensive effort and expertise of the country implementation teams and the dedicated work of the field teams in collecting data and generating key evidence alongside the farmers and land users.

Photographs by Kelvin Trautman
Produced by KANDS Collective **hello@kandscollective.com**

KEY INSIGHTS

Stakeholder engagement has been the foundation of the Regreening App's success, from the co-design of the app, to training and continuous capacity building with country implementation teams. There has been extensive engagement to build capacity, including country-specific WhatsApp groups, user manuals developed in different languages, weekly exchange calls, real-time technical backstopping, and daily checks on field data collection.

Bringing together scientific research and citizen science enhances the participation of farmers and stakeholders in land restoration. Farmers are on the frontlines of landscape level changes, thus, engaging and integrating farmers, as critical actors in restoration, is key. Such cooperation also scales data collection and deepens the understanding of the effectiveness of restoration.

The Regreening App collects critical information and trends on practices at farm and community level. For example, it has helped locate where exotic tree species are replacing indigenous species, thus allowing farmers and intervention actors to collectively take actionable decisions on land restoration efforts based on real-time findings.

The Regreening App provides detailed evidence, down to farm level, which is critical for national reporting towards **land degradation neutrality, climate adaptation, and mitigation target tracking at national level**. The app continues to be co-designed and modified through stakeholder feedback and can be tailored depending on the context.

The Regreening App fills a unique gap of tracking restoration on the ground. Almost all current restoration trackings executed globally are by satellites, that doesn't allow for a clear understanding of changes and interventions on the ground having the most impact.

The Regreening App has been deliberately developed to work in an offline mode so as to be **functional in remote areas**. Data upload occurs when the field teams regain access to good cellular network.

Systematic monitoring approaches like the Land Degradation Surveillance Framework (LDSF) and the Regreening App enable us to comprehensively understand what works where and through real-time data and citizen-science guide successful restoration interventions.

Regreening Africa

Background

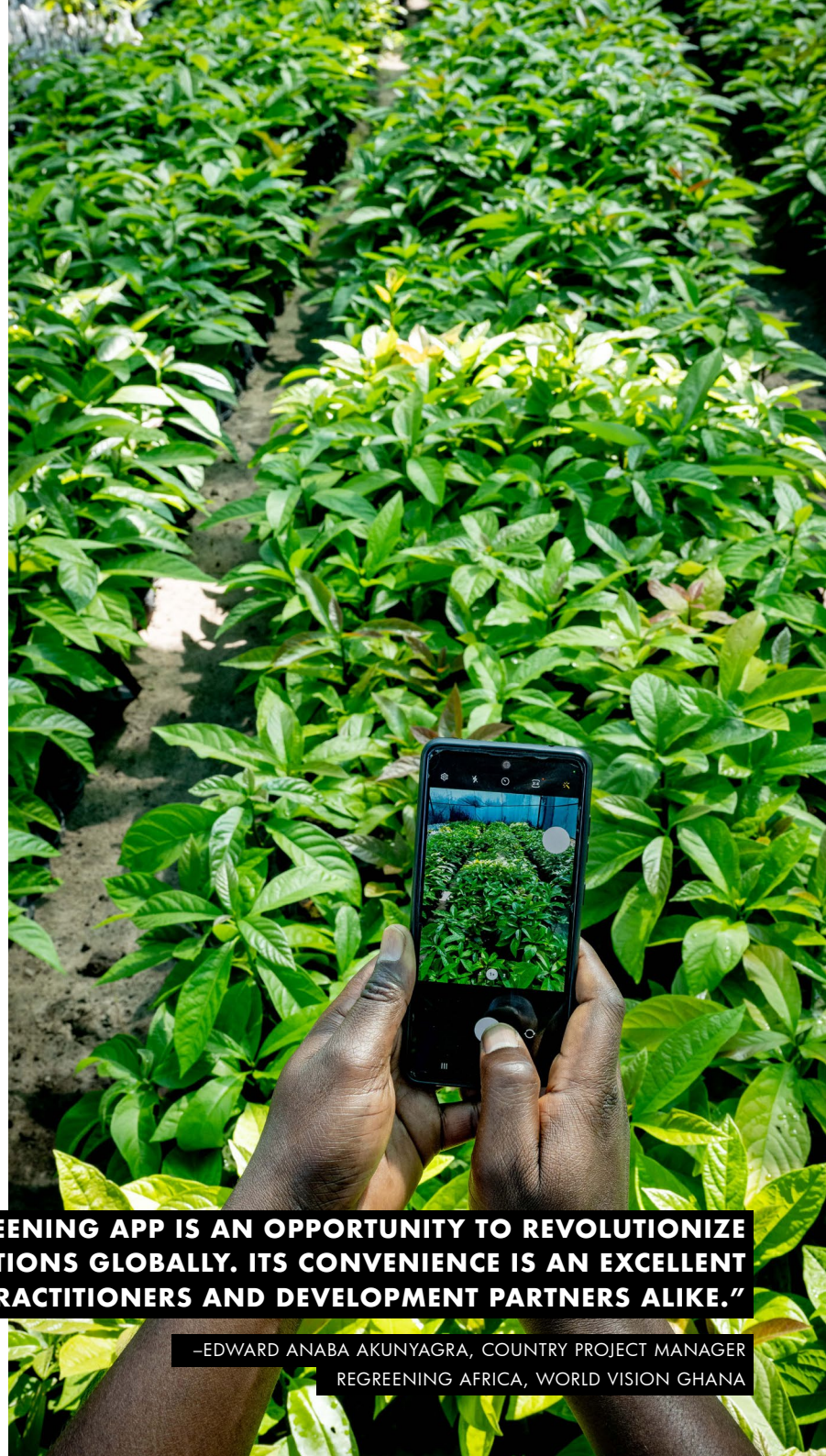
The Regreening App is a mobile-based Android application that allows users to **collect data at farm level on a range of land restoration practices**, enabling robust landscape level monitoring.

The app has 1500+ users since 2019. Citizen science data collection using the Regreening App has allowed us to scale data collection to over **180,000 farmers** to date.

Through the novel application of assisted crowd sourcing, the Regreening App fills a critical gap for **monitoring and tracking at scale**. By providing real-time evidence on where restoration is happening, especially through tree planting and farmer managed natural regeneration (FMNR) restoration practices at farm level, data from the app gives critical evidence on activities targeted for restoration, methods used and who the beneficiaries are.

Land restoration does not operate in a vacuum. It is a compilation of capacities, methods, stakeholder objectives and leveraging evidence-based and locally relevant interventions. The Regreening App helps generate data on implementation at farm level that makes monitoring easier and helps track restoration trends, thus identifying opportunities for land health improvement

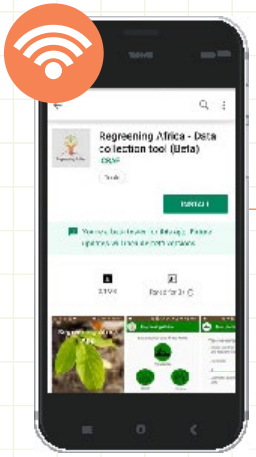
Furthermore, the development of the app has necessitated the creation of an extensive back-end infrastructure including a database to track multiple practices through the app's data collection. This allows for analysis to connect tree planting and FMNR in the same landscape or farmers, and for actionable evidence for implementation by NGO implementing teams through the back-end secure Data Reporting System (DRS).



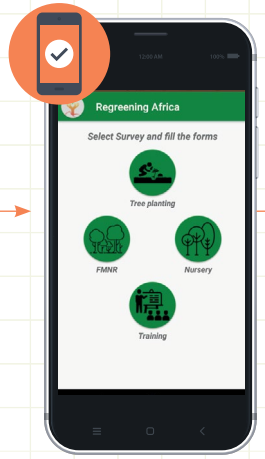
"THE USE OF THE REGREENING APP IS AN OPPORTUNITY TO REVOLUTIONIZE RESTORATION ACTIONS GLOBALLY. ITS CONVENIENCE IS AN EXCELLENT SCALING TOOL TO PRACTITIONERS AND DEVELOPMENT PARTNERS ALIKE."

–EDWARD ANABA AKUNYAGRA, COUNTRY PROJECT MANAGER
REGREENING AFRICA, WORLD VISION GHANA

The Regreening App process



User downloads and installs the Regreening App from the Google Play store.



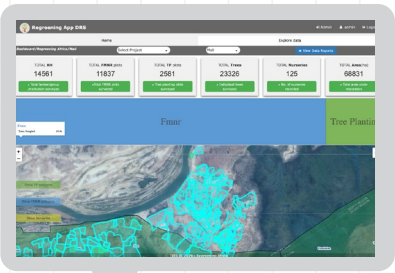
User opens the app, selects required module, collects and submits data from the field.

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.

Synthesised data sent to the Regreening Africa Dashboard.

An example of a country dashboard



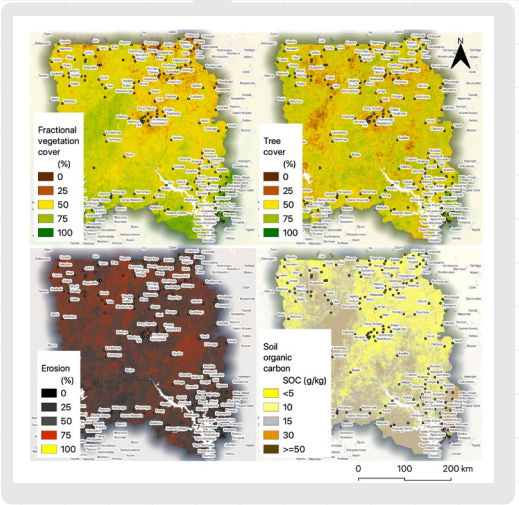
Users have access to data visualisations, results of analysis, interactive tools and maps.

Normalisation of species names, consistency checks and modelling of data.

Data displayed on data reporting system.

Data reviewed by users or project managers.

Data downloaded in real-time for review by project managers on the Data Reporting System (DRS), developed as part of Regreening Africa.



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

Regreening Africa

Regreening App features

FMNR MODULE

- Record the targeted households having adopted FMNR practices
- Record the number of hectares regreened through FMNR
- Map the FMNR plots
- Record tree species composition of the FMNR plot
- Record management practices
- Track growth of trees by recording height and circumference of each tree
- Geotag selected trees

TREE PLANTING MODULE

- Record the targeted households having adopted tree planting practices
- Record the number of hectares regreened by tree planting
- Map tree planting plots
- Identify the agroforestry systems established (objectives, disposition of the trees, density, tree species)
- Record and analyse management practices
- Evaluate the performances of planting practices
- Track growth of trees by recording height and circumference of each tree
- Geotag selected trees

NURSERY MODULE

- Record nurseries supported by Regreening Africa
- Record seedlings production (species composition, production capacity, seedlings quality)
- Geotag nurseries

TRAINING MODULE

- Document training carried out: number, location, topic, etc.
- Connect topic of trainings carried out in a given location to practices and issues identified that will guide the trainings
- Document participation in the trainings in terms of number and gender

FREQUENTLY ASKED QUESTIONS

Who has access to the data collected by the Regreening App? Project team members can log into the Data Reporting System (DRS) to view, download, analyse their data.

Where is the data stored? On ICRAF servers.

How is collected data reviewed and analysed? Project team members log into the DRS to interrogate these data. Cleaned/normalized data are aggregated and visualized on the decision dashboard.

Who are the main target users for the Regreening App? Anyone in restoration projects: development actors, governments, lead farmers, CBOs, international research institutes, corporations, universities – virtually anyone interested in tracking on-the-ground restoration and impact monitoring.

What training and capacity development is offered for app use? Regreening Africa has a number of online tutorials to assist in the use of the Regreening App. ICRAF and its partners also offer online and field training, and ICRAF maintains contact with country/fields teams for close support using WhatsApp groups.

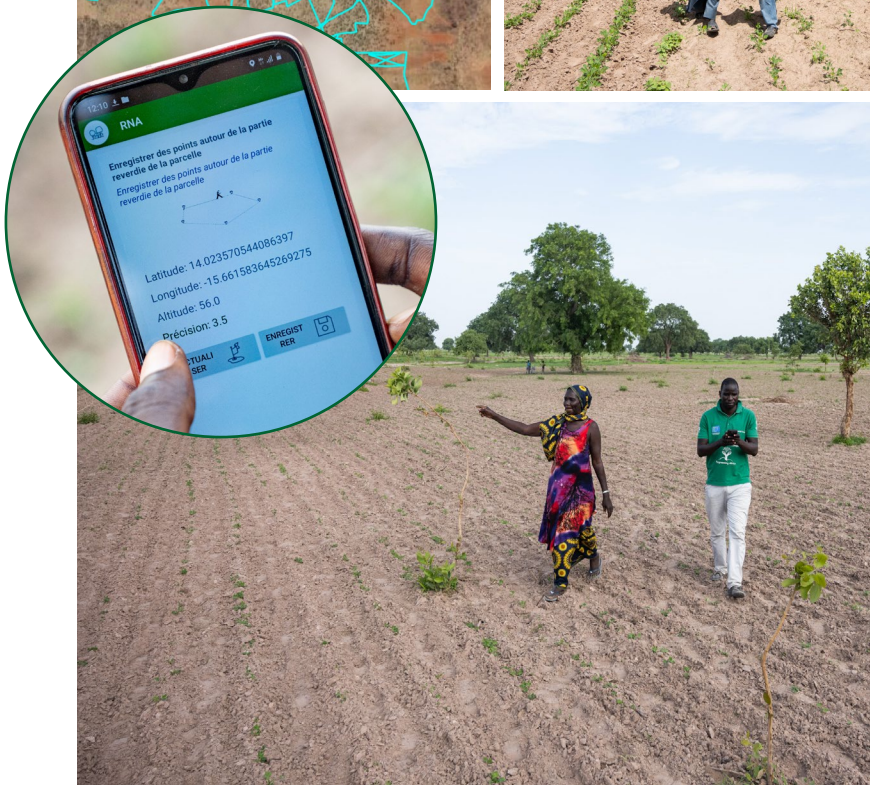
How customisable is the Regreening App in terms of new modules or themes to be added? V2 will be released shortly. It offers more robust database design, also making future adoption and scaling more streamlined, and will provide a new, more responsive interface. In addition, the Regreening team welcomes suggestion to improve the app.

What language is the Regreening App available in? French and English, with a Swahili and Kinyarwanda version coming soon.

A DETAILED UNDERSTANDING OF ACTIVITIES ON THE GROUND

Once the Regreening App is installed, users can record and track their land restoration practices by completing a comprehensive survey. The locations of their activities are geo-referenced and species diversity and growth are recorded in real-time.

While completing the survey on the app, users walk the boundary of fields with tree planting or FMNR interventions and submit the geo-tagged field polygons. These farm polygons (pictured left) can then be overlaid onto maps of land cover and land health allowing the assessment of the effectiveness of these interventions on multiple aspects of land health. Potential applications of these assessments include soil carbon monitoring, relating directly to climate neutrality goals. Biodiversity within farming systems can also be assessed and tracked. This process of mapping the boundaries of a farm has significantly empowered farmers with a clear idea of their land holding and has incentivised land management.



"BY HAVING USERS SUCH AS LEAD FARMERS AND EXTENSION AGENTS COLLECT DATA ON THEIR LAND RESTORATION ACTIVITIES, THEY BECOME AN INTEGRAL PART OF EFFORTS TO SCALE THE ASSESSMENT AND MONITRING OF IMPACTS OF LAND RESTORATION ACROSS A WIDE RANGE OF LANDSCAPES. ALSO, BY AGGREGATING AND SYNTHESISING THIS INFORMATION AND COMBINING IT WITH EVIDENCE FROM SYSTEMATIC SCIENCE-BASED ASSESSMENTS OF LAND HEALTH, WE CAN DRAMATICALLY IMPROVE OUR UNDERSTANDING OF WHAT INTERVENTIONS WORK BEST WHERE AND FOR WHOM."

–TOR-GUNNAR VÄGEN, PRINCIPAL SCIENTIST AND HEAD OF CIFOR-ICRAF SPACIAL

RECOGNITION AS A CONTRIBUTOR TO PEACE[1]

The Regreening App has been recognised as contributing to conflict reduction by New York City's prominent Cooper Hewitt Smithsonian Design Museum, and included in its exhibition "Designing Peace".

The exhibition explores the unique role that design can play in pursuing peace, and includes a variety of design responses from around the world that look at ways to create and sustain a more durable peace.

Cynthia E. Smith, curator of socially responsible design at Cooper Hewitt, explains:
"Resource scarcity can lead to conflict, which is also driven by social divisions, economic disparities, and environmental and political factors – problems all made more acute by global warming. Regreening Africa shows us how to look at an issue before conflict emerges and before these shared resources are no longer available. It builds economic stability, and that can contribute to peace."

The Regreening Africa installation. Photo: Matt Flynn, Smithsonian Institution

1. https://news.globallandscapesforum.org/57974/new-exhibition-features-regreening-africa-mobile-app/

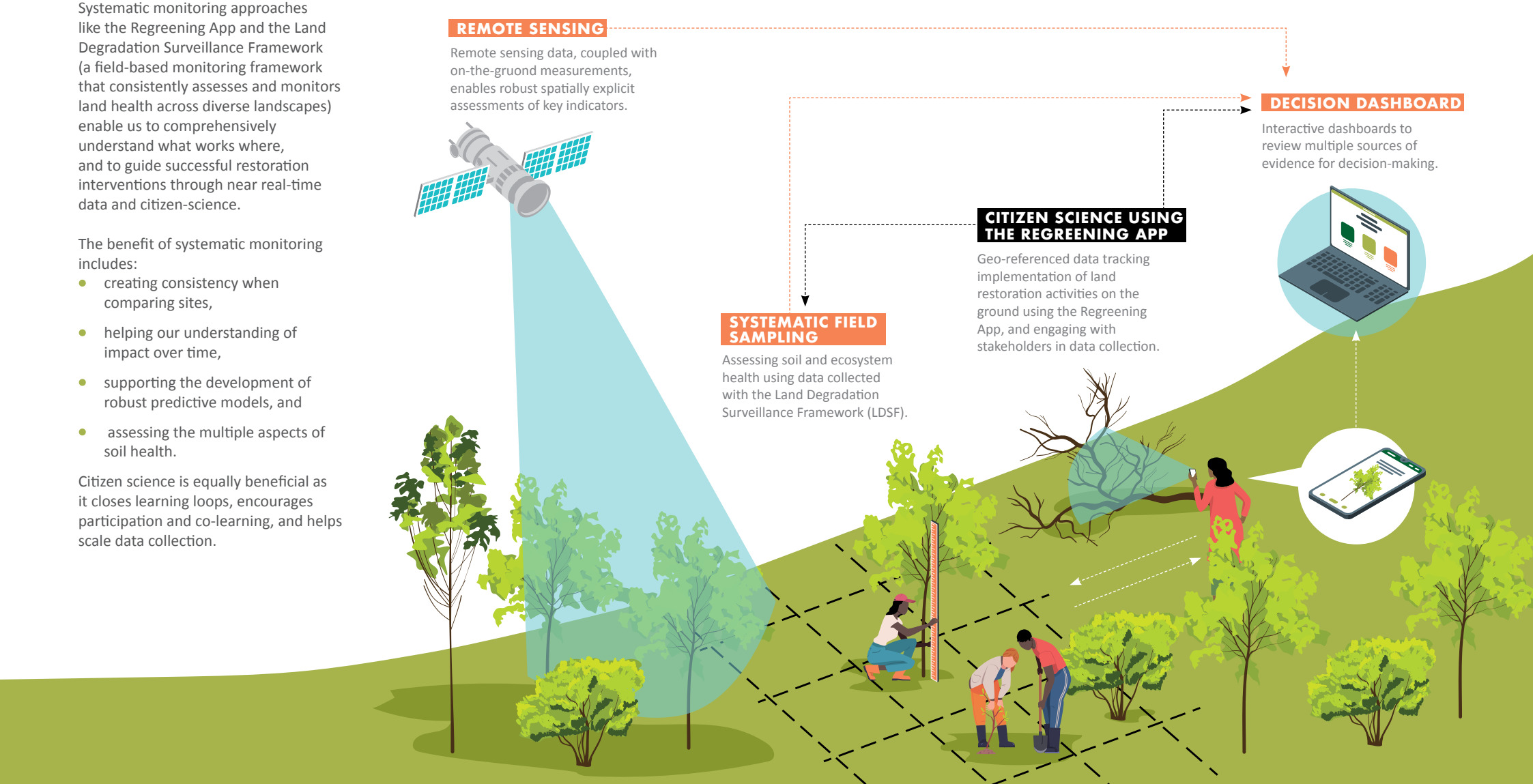
Linking data from the Regreening App into systematic landscape monitoring

Systematic monitoring approaches like the Regreening App and the Land Degradation Surveillance Framework (a field-based monitoring framework that consistently assesses and monitors land health across diverse landscapes) enable us to comprehensively understand what works where, and to guide successful restoration interventions through near real-time data and citizen-science.

The benefit of systematic monitoring includes:

- creating consistency when comparing sites,
- helping our understanding of impact over time,
- supporting the development of robust predictive models, and
- assessing the multiple aspects of soil health.

Citizen science is equally beneficial as it closes learning loops, encourages participation and co-learning, and helps scale data collection.



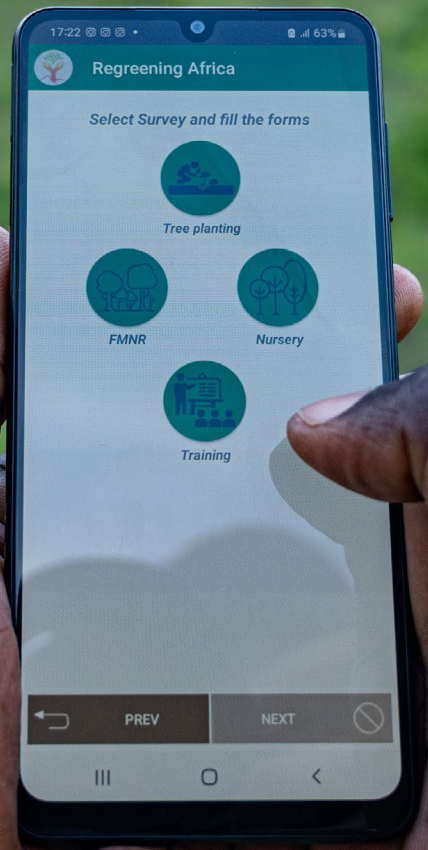
The value of the Regreening App

The app does not require a mobile network or WIFI while in the field. This is only required when uploading data to reporting systems.

The app is a data collection and monitoring tool. The information collected can be integrated into various 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, with species diversity and growth recorded in real time.

Project implementers are able to use the data from the app for **real-time decision support** in project implementation and monitoring.



The app's interface and design is continually updated, based on feedback from farmers, extension agents and project implementation teams. This ensures that the functionality matches the users' needs.

Data collected through the app is freely and instantly available to users. Synthesis of the data, such as land health indicators, are then shared with the public through the Regreening Africa Dashboard.

Data collected through the app is combined with spatial assessments of land health and can be applied in soil carbon monitoring. In this way, the app facilitates the **tracking of national climate change, restoration targets and land neutrality goals**.

The app was developed in close consultation with stakeholders, with continued interaction between the World Agroforestry team and app users.

CASE STUDY: RWANDA

Rwanda uses a decentralized system under which development programs are developed, implemented and monitored at local government levels. Their contributions are consolidated annually at district level before being reported to the central government through respective ministries.

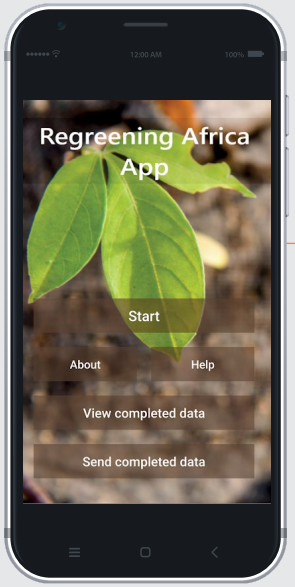
In Regreening Africa's activities in Rwanda, the Regreening App has ensured that **field data from farm and community level, as well as the land health surveillance data created, is readily available** within the Ministry of Environment's systems of uploading data.

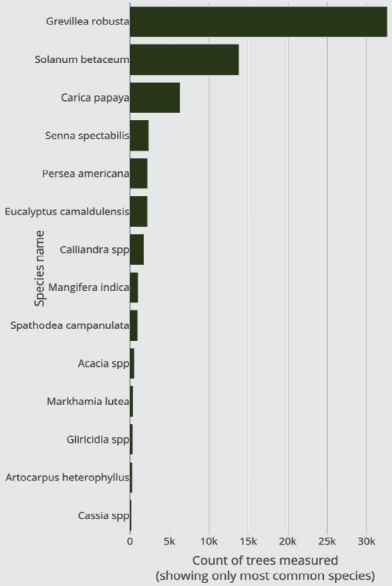
Intensive uptake and use of the Regreening App in Rwanda has allowed for clear evidence and trends. In particular, app users collecting data on tree species have provided critical evidence on how low species diversity is in Rwanda and on the dominance of exotic species.

This evidence has opened up **key dialogue for policy and implementation changes** around agroforestry practices, and has enabled Rwanda's National Agroforestry Task Force to proactively guide policy development across the country.

The ICRAF SPACIAL unit lead a training to World Vision staff in Rwanda to scale the use of the app for restoration monitoring. This stakeholder engagement is key for the continue design and evolution of the app.

FROM FIELD EVIDENCE TO POLICY DEVELOPMENT





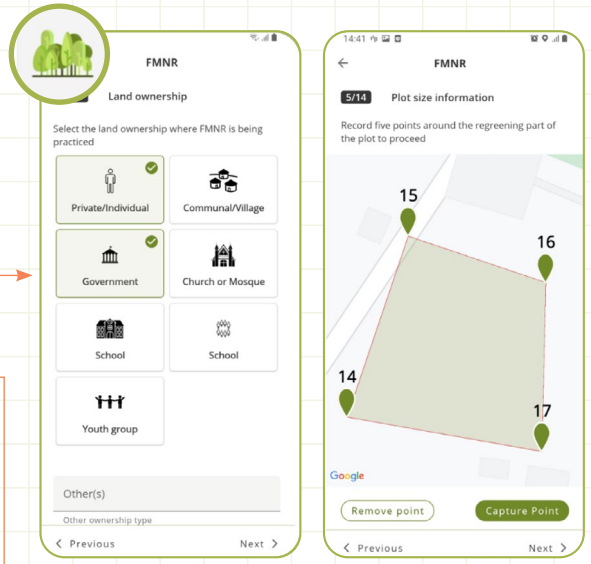
Regreening Africa

The future of the Regreening App

Building on the lessons learnt and stakeholder/user feedback from Version 1, Version 2 of the Regreening App will include:

- New, modern and more **responsive interface**.
- **Multiple languages supported** within the app itself.
- **User/project registration** (linked to the new Data Reporting System (DRS)).
- More **robust database design**, also making future adoption and scaling more streamlined.

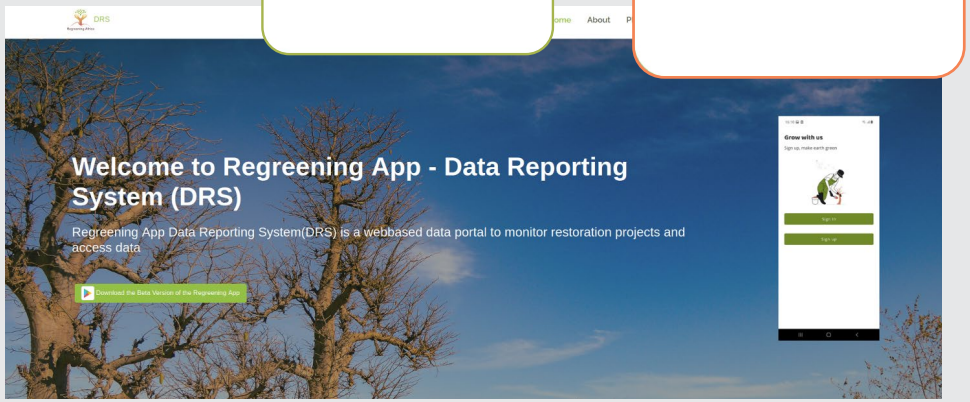
VERSION 2:



NEW DATA REPORTING SYSTEM (DRS):

The new DRS will include data from Version 1 of the app, and will showcase a user-friendly interface, including:

- A simple dashboard for project managers to keep track of data collection
- Tools to filter, manage and download data
- Basic analytics



To learn more about the Regreening App: https://regreeningafrica.org/in-the-news/the-regreening-africa-app/

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ABOUT REGREEENING AFRICA

Regreening Africa is an ambitious five and a half-year programme that seeks to reverse land degradation among 500,000 households, and across 1 million hectares in eight countries in Sub-Saharan Africa. By incorporating trees into croplands, communal lands and pastoral areas, regreening efforts make it possible to reclaim Africa's degraded landscapes with complimentary soil and water conservation.

As part of a larger global and regional effort to halt and reverse land degradation, the European Union-funded programme, Regreening Africa, aims to improve smallholder livelihoods, food security and resilience to climate change. It also seeks to catalyse an even larger scaling effort to restore tens of millions of hectares of degraded land across Africa.

With an initial phase over 2017-2023, this unique research in development is led by World Agroforestry (ICRAF) and implemented by a consortium of international NGOs. This includes World Vision, Catholic Relief Services, Cooperative for Assistance and Relief Everywhere, and Oxfam, as well as national NGO Sahel Eco. The eight countries that Regreening Africa is active in are Ethiopia, Kenya, Rwanda, Somalia, Ghana, Mali, Niger and Senegal, with a light touch in Burkina Faso.

Regreening Africa focuses on the incorporation of trees into many land-use types, including croplands, communal lands and pastoral areas, with complementary soil and water conservation and soil improvement practices. It leverages science and research to track the impact of implementation and enhance concurrent social inclusion and livelihood-enhancing efforts as well as creating a sustainable enabling policy environment for land restoration at national and sub-national levels.

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