Collaborative Platform for Scaling Land Restoration
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History of Collaborative Development and Inception of the Platform -

• Global Good Multi-stakeholder Workshop to address the barriers to scaling up land restoration, attended by the EverGreen Agriculture Partnership, World Vision, ICRAF, WRI, US Geological Survey, Esri, Vulcan, Washington State University and Intellectual Ventures

• Technical Working Group to develop a Scaling Platform, comprised of 4 thematic sub-groups

• Working Prototype Developed by Esri

• Technical Working Group to develop a data sharing and management framework, convened by KPMG

• Technical Working Group to develop integrated remote sensing approach, using multiple emerging technologies
Key Features of the Scaling Platform

Key features of the platform include:

a) **A system of record** – including a geographic inventory of all significant land restoration projects and initiatives, whether being implemented by Alliance member organizations, governments or unrelated entities; and project status;

b) **Monitoring and evaluation** – standardized indicators, tools and protocols support efficient, consistent and cost-effective monitoring of the progress of projects, and accurate measurement and evaluation of their impacts, while ensuring seamless contribution to relevant regional and global restoration and development targets; and

c) **Decision support** – the geographic distribution of bio-physical, socio-economic and land-use indicators can be analysed, summarized, and distributed to appropriate decision-makers and planners. This information will inform the design of appropriate policies and interventions that address the areas of greatest need and build effectively on existing capacity and successes.
Key Features of the Scaling Platform

Who is the Platform intended to benefit?

All stakeholders and actors involved in addressing or impacted by land degradation, including donors, governments, research and technical institutions, project developers, the private sector and small-scale farmers and pastoralists.

What are the key benefits to major stakeholders groups?

Different stakeholders benefit is different ways: donors and governments will have a clear picture of the project landscape, and be easily able to identify their return on existing investments, and ensure future plans build on existing capacity and successes; research and technical institutions will be able to analyse and connect future efforts with a multitude of projects across diverse contexts; project developers will be better able to collaborate and leverage resources; and small-scale farmers will benefit from increasingly large and impactful restoration efforts, and from the experiences and success of their peers across borders.
Challenges faced in developing Scaling Platform

• The collaborative nature of the Scaling Platform is its greatest strength, but also its greatest challenge. How has the Alliance Managed this?

• The platform is being developed in phases, and can be easily adapted, modified and expanded to meet new intelligence and the various needs of contributing organizations

• Addressing standardized indicators, and the collection, sharing and management of sensitive project data
Key data sharing principles

Adhering to appropriate data security, integrity and governance principles is key to the success of the Scaling Platform. The Alliance will develop and manage the Scaling Platform in accordance with the following key principles:

1. PURPOSE LIMITATION
   The platform serves the purpose of the initiative as agreed with participant organizations. The data collected will not be used for any other purpose.

2. IDENTIFICATION
   Data that is shared will not be displayed in a manner which identifies individuals.

3. CONTROL OF DATA
   Each participant organization will control the data that it shares, including live and legacy data.

4. CONTROL OF DATA WITHIN PLATFORM
   Each participant organization can control how their information is shared to the Alliance within the Scaling Platform.

5. ONLY AGGREGATE DATA DISPLAYED
   Only a visualization of high-level aggregated data will be displayed on the Scaling Platform.

6. ATTRIBUTION
   Each participant organization will be attributed to their data, unless they indicate otherwise.

7. ORGANIZATIONS RETAIN INTELLECTUAL PROPERTY RIGHTS
   The Alliance will not own any of the intellectual property rights to the data shared using the Scaling Platform.

8. SECURITY
   Security is a main focus of both the initiative and the Scaling Platform. The Scaling Platform will leverage the security inherent in ESRI’s ArcGIS platform, currently used by hundreds of thousands of governments, companies, and non-profits worldwide.

9. LIMITED USERS
   An organization will be able to control the users that will be given access to the data received by the Alliance through the ArcGIS platform.

10. UNDERLYING AGREEMENT AND POLICY
    The Alliance will prepare a formal governance document for review and approval by each organization to give effect to these principles.
Available Data Sharing Models

The Scaling Platform will enable participant organizations to choose from several data sharing models, to ensure their adopted approach aligns with the needs and interests of their existing technology partner(s) and their data sharing preferences and policies.

Sharing through existing ESRI ArcGIS instance, and maintain control
- Capture data with your organization’s own app, and upload this information into your own ArcGIS online account.
- Maintain, analyze and control your data within a completely secure environment.
- Share some high-level indicators with the Alliance ArcGIS platform, either by providing it in a spreadsheet, or by being a member of the Alliance ArcGIS platform working group.

Sharing through to the Alliance ArcGIS instance
- Capture data using your own app (or ours) and upload this information directly into the Alliance ArcGIS online account.
- Allow an authorized representative of the Alliance to maintain, analyze and control the data within the secure environment of the Alliance account, in accordance with pre-agreed terms.

Sharing through existing ESRI ArcGIS instance, and release to the Alliance
- Capture data with your own app, and upload this information into your own ArcGIS online account.
- Maintain, analyze and control your data within a completely secure environment.
- Allow the Alliance to access the data using the Alliance ArcGIS platform account administrator (with prior agreement) to extract some high-level indicators.
Platform Proof of Concept: Mobile Surveys
Remote Sensing

Why do we need remote sensing?

Collecting field data at the household level can be costly, inconsistent across projects, and its geographic scale is severely limited by the capacity of field staff.

Appropriate remote sensing tools and technologies

The platform is being developed to take advantage of several different technologies, each with advantages for particular applications, including Collect Earth and machine learning using artificial intelligence and NASA’s NextView high-resolution satellite imagery.

Seamless integration of project field data with remote sensing technologies

Field data is necessary for ensuring the accuracy of machine learning, as well as for various calculations, such as quantifying woody biomass and carbon sequestration. Because all field data is tagged to a specific GIS location, remote sensing can be seamlessly overlayed.
Remote Sensing – Satellite Data

- Sentinel-2 data at 10 m resolution is freely available and can be used for mapping tree cover.

- Commercial satellite data at 50 cm resolution is available via NASA and the NextView license from DigitalGlobe, with strong restrictions on its use – however, this data may be used for the scaling platform’s ‘back-end’ remote sensing analysis and calculations.

- Our NASA colleagues are producing mosaics of pansharpened NDVI including thousands of cloud-free high quality images.
Remote Sensing – Satellite Data

Multispectral (WV02, GE01, QB02)
Total: 196,293 Images
File Size Total: 43.97 TB

Panchromatic (WV01, WV02, GE01, QB02)
Total: 336,679 Images
File Size Total: 162.752 TB

Total Coverage
Total: 532,972 Images
File Size Total: 206.72 TB

*Data only from November-March (All product codes)
NCCS data footprints as of 12/07/2016
Remote Sensing – Woody Cover

- Can be calculated at a continental scale with freely available data at 10 m resolution, however, tree/shrub sizes cannot be distinguished.

- Can be separated in different size classes (e.g. tree vs. shrub cover) with 50 cm commercial data provided via NASA’s NextView licence, allowing for ultra-precise estimations. Methods and data can already be applied at a continental scale.

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Remote Sensing – Crown Size

• Can be calculated at the level of individual trees with 50 cm commercial data provided via NASA’s NextView licence

• Precise mapping of individuals down to ~ 5 m² crown size using artificial intelligence

• Methods and data are ready for use in some areas of the Sahel, and are being further developed to cover the region and other dryland areas.

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Remote Sensing – Woody Plant Density

• Can be calculated at the level of individual trees with 50 cm commercial data provided via NASA’s NextView licence, with precise mapping down to ~ 5 m² crown size using artificial intelligence

• Can be grouped in density classes (e.g. all woody plants per ha, large trees per ha, shrubs per ha, etc.)

• Methods and data are ready for use in some areas of the Sahel, and are being further developed to cover the region and other dryland areas
Remote Sensing – Woody Species

- Depending on the context, can be calculated with varying degrees of accuracy using several different methods. Using multispectral images, artificial intelligence can distinguish between major species by foliage. Using 50 cm commercial data provided via NASA’s NextView licence, artificial intelligence can distinguish major species by the tree canopy, either from shadow analysis or from 3D vertical modelling

- These technologies are currently under active development.

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Remote Sensing – Biomass & Carbon Stocks

• Can be calculated readily using IPCC methodologies
• Increasingly accurate and reliable methodologies are currently being developed and will be continually refined in the scaling platform. These new methodologies require high-resolution imagery and deep learning artificial intelligence, and require tree density, crown size, tree height and species data
• New methodologies require reliable field data collection for testing, calibration and verification.
Remote Sensing – 3D Vertical Modelling

• Several new methodologies using high-resolution imagery and artificial intelligence allow for individual tree heights to being reliably calculated.

• Using metadata from the satellite images, the exact time and angle at which the image was taken can be calculated, as well as the exact position of the sun. Accordingly, the height of trees can be calculated by measuring their shadows.

• By using stereo satellite images, taken from different angles, a 3D vertical model of the landscape can be generated, allowing various tree data to be calculated directly.
Emerging Remote Sensing Results

M. Brandt et al., 2018

Tree cover promoted in semi-arid Sahelian farms
Platform Proof of Concept: Dashboard

Trained Farmers
798,294
Last Month 0

Scaling Land Restoration Dashboard
Choose a Country: Africa, Between: 2/23/2019

Trees, Stumps, Saplings
13.802 Million
Under Active Management
Last update: a few seconds ago

Area Under Restoration
0.933 Million Ha
Last update: a few seconds ago

tCO2e
0.919 Million
Last update: 4 minutes ago
Platform Proof of Concept: Dashboard
Next Steps & The Way Forward

Current status

There are 3 main work streams involved in the development of the Scaling Platform –

1. The development of user-facing technology, including the cloud-based interactive maps and dashboards, and mobile apps for field-level data collection. Prototypes of each of these technologies have been developed by Esri and are currently being tested with data from several significant projects in East Africa;

2. The development of a framework for sharing and managing potentially sensitive project data. This process is being facilitated by KPMG Law, and a draft framework is currently being refined by a working group of NGO representatives; and

3. The development of methodologies and algorithms related to data capture and analysis through remote sensing technologies, and the related calculation of above-ground carbon. A working group comprised of prominent remote sensing scientists and technical focal points is currently working to adapt the most appropriate technologies and practices.
If you would like to join the ongoing discussion or contribute ideas or suggestions to the development of the Collaborative Scaling Platform, please contact platform@evergreening.org

Thank You!