CONSERVATION INTERNATIONAL

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Priceless Planet Coalition Project Framework

Restoring 100M Trees for Climate, Community, and Biodiversity

PRICELESS PLANET COALITION

Priceless Planet Coalition: Program Success Monitoring

Went Public at Climate Week 2022:

Tree Restoration Monitoring Framework

Field – Test Edition

The need: This framework was developed to provide efficient, effective, consistent monitoring of tree restoration sites and their co-benefits, across a global program using multiple restoration methods, blending field + remote sensing techniques.

Co-creation: Indicators co-developed with Mastercard and WRI during project design, led by CI. Protocol development coordinated by CI with 29 contributors from CI and WRI, drawing from best practices (PACTO, Landscale, CCB, GRO). Final version shaped by feedback from early PPC implementers.

Beyond CI: This monitoring framework is part of CI's participation in the Global Restoration Observatory (GRO) and the UN Decade on Ecological Restoration (2020-2030)

Global Restoration Observatory

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Framework Goals

- Address the restoration challenge to monitor progress that is time bound, cost effective, practical, attainable, verifiable and builds users confidence
- Build a global standard for tree restoration project monitoring
  - Framework shared with public and in relevant forums
  - Methods are applicable across restoration strategies, geographies, and ecosystems
- Complement the existing global, national, and landscape-level frameworks by giving practical, specific, and user friendly guidance
  - The level of effort to conduct monitoring is reasonable

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Framework Characteristics

What makes it unique?

- Only incentivized global comparative restoration data collection effort!
  - Applicable globally and across many tree restoration strategies (seeding, applied nucleation, ANR, etc.)
- Simpler! 14 required & 6 optional indicators
  - Fewer than most international monitoring protocols!
- More detailed instructions!
  - Includes protocols with standardized methods for HOW to collect data
- Longer than most tree-planting initiatives!
  - Each site monitored for 5 years after planting
- Mix of field and remote sensing (RS) data
  - All analyzed by the global monitoring team at CI and WRI
- Integrated Monitoring Platform (IMP) with on/offline field app to collect, organize, and display data

Framework Characteristics

Limitations:

- Only applicable to tree restoration projects
- Doesn't include indicators on every topic. For example, there are no indicators for erosion, connectivity, or adaptation
- Global analyses are constrained by quality of spatial datasets, and rely heavily on geospatial expertise

The Project Monitoring Framework

Metric Category	Indicator per intervention site
Forests: Tree density and diversity	Impact Indicator A: # of trees restored (survived and crowded in at year 5) 1. # of trees planted 1.1.1 disaggregated by species 1.2 # of trees naturally regenerating 1.2.1 disaggregated by species (Optional)1.3 # of trees grown in nurseries
Forests: Tree cover	Impact Indicator B: % attainment of target canopy cover 1.4 % change in tree crown canopy
Forests: Tree survival	1.5 % survival of planted trees 1.6 # of major disturbances observed
Carbon Benefits	2. Estimated # tons of CO_2 sequestered (by year 5)
Social/Community Benefits	3.1. # of socioeconomic restoration partners 3.1.1. # of Person-days of work created 3.2. # of ecosystem service restoration partners (Optional) 3.2.1 # people directly benefitting from improved freshwater quality or quantity
Management	4.1. # of hectares under restoration, by ecosystem type and restoration intervention 4.2. $ cost per tree grown by restoration intervention type
Biodiversity (all optional)	5.1. % change in species richness by class 5.2 Average % change in abundance by class 5.3 Wildlife Picture Index

Integrating Data from Multiple Sources

- From field data
- From Remote Sensing (RS) data
- From field and remote sensing (RS) data

MONITORING: WHEN DOES IT HAPPEN AND WHAT IS MEASURED

LOOK BACK PERIOD TO 2010

Data collected:

- Deforestation
- Disturbances

SITE ESTABLISHMENT

Data collected:

- Site boundary
- Site history and characteristics
- Targets

YEAR 0 (BASELINE)

Data collected:

- Trees restored
- Trees naturally regenerating
- Survival
- Landscape level control*
- Canopy cover
- Ecosystem service restoration partners
- Household surveys*
- Biodiversity*
- Freshwater*

YEAR 2.5

Data collected:

- Trees restored
- Trees naturally regenerating
- Survival
- Landscape level control*
- Biodiversity*
- Freshwater*

YEAR 5

Data collected:

- Trees restored
- Trees naturally regenerating
- Survival
- Landscape level control*
- Canopy cover
- Ecosystem service restoration partners
- Carbon
- Household surveys*
- Biodiversity*
- Freshwater*

Unit legend:

* indicates optional

Collected by project developers in the field

Collected by global monitoring team using remotely sensed data

Collected by both

MONTHLY MONITORING

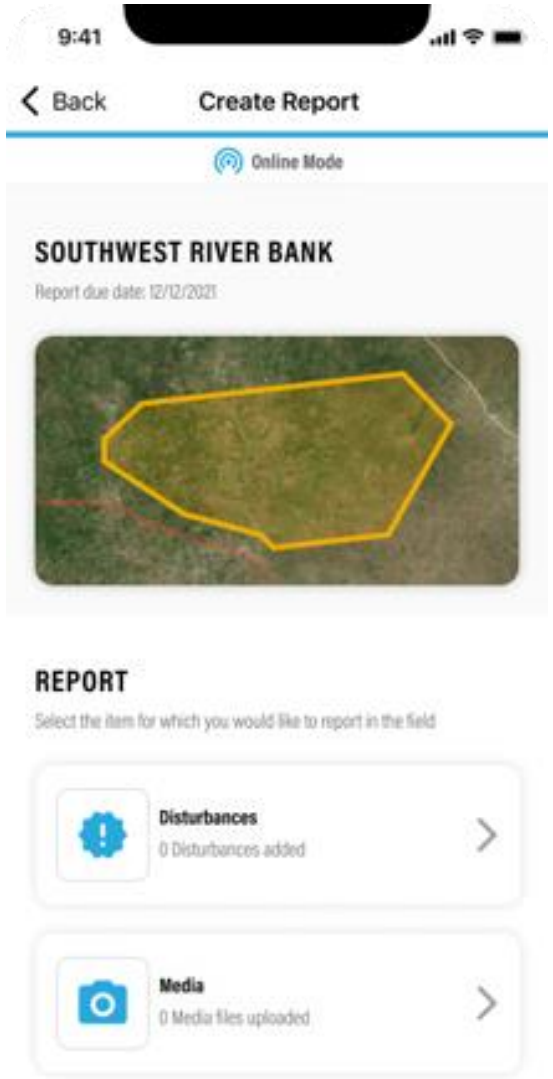
Data collected: Trees planted, seeds planted, trees grown in nurseries*, workdays, disturbances

ANNUAL MONITORING

Data collected: Socioeconomic restoration partners

Field Data Collection

From field data



- Data is collected on the integrated monitoring platform (IMP)
  - Available in desktop and app versions
- Some data is collected at the PROJECT level and some at the SITE level
- SITE level polygons are submitted for each restoration site, and become the foundation for analyses and data storage
  - All data is collected, analyzed, and stored at site level unless disaggregation by site is not possible or does not make sense
  - Tree monitoring module currently in Kobo
  - Optional household survey pending integration

Data Flows

Field

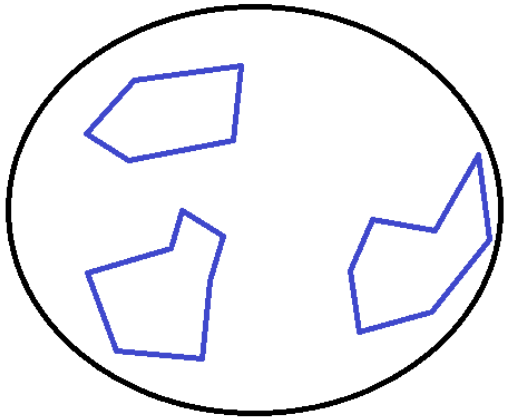
Project developers collect data in the field and upload to IMP → Quality control (QC) of data completed by monitoring coordinator or designated person (validate feature in IMP coming soon) → QC'd data is analyzed by the global monitoring team to calculate indicators → Results are shared back with project developers on IMP

Remote Sensing

Project developers provide site shapefiles → Remote sensing analyses are conducted by the global monitoring team using site shapefiles → Results are shared back with project developers on IMP

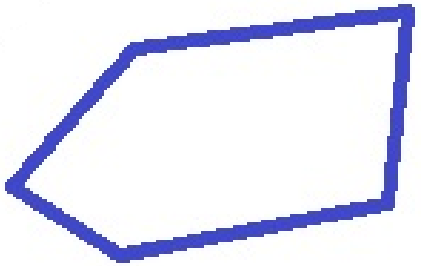
Project/Site/Strata/Monitoring Plot

Project



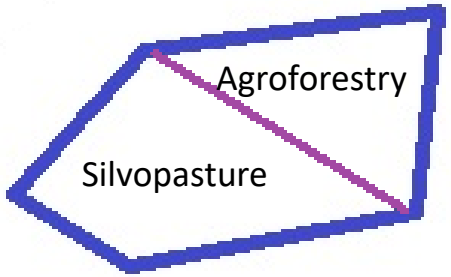
A PROJECT can be made up of 1 or multiple restoration SITES

Site



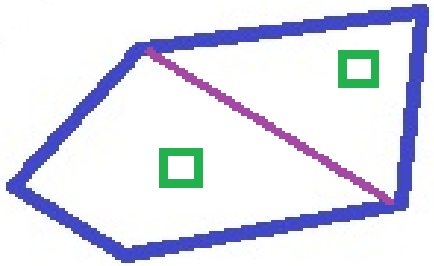
A SITE is a contiguous area of land that restoration activities occur on

Strata



A STRATA is a division within a SITE based on restoration strategy or landscape characteristics

Monitoring Plot



A MONITORING PLOT is a 30m x 30m (unless an exception) area where vegetation or control monitoring occur

Field Monitoring Intervals

1. Site Establishment

- When a site is first set up
- Collect data on site history, work created, and provide shapefile of site boundary

2. Monthly

- Ongoing through project lifecycle, first Friday of every month
- Collect data on trees in nurseries, trees planted, seeding, disturbances, and work days

3. Vegetation Monitoring

- Baseline, Y2.5, Y5 (more optional)
- Counting of trees in plots (restoration and control)

4. Annually

- Once each year through project lifecycle
- Collect data on number of people who received support from the PPC Program activities, disaggregated by direct and indirect, gender, age, and ethnicity

5. Additional Optional Monitoring

- Landscape level control units
- Household socioeconomic surveys
- Biodiversity
- Freshwater
- Impact Evaluations

Site Establishment

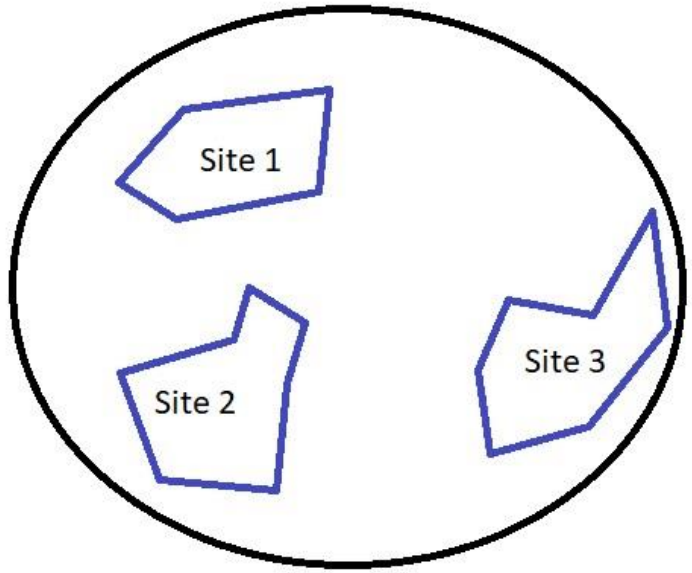
- Information is collected on EACH site within the restoration project
  - Site name
  - Description and history
  - Boundary
  - Restoration method(s)
  - Land tenure
  - Targets
  - Site details (soil condition, planting pattern, strata)
  - Invasives

Site Establishment

- Why do we collect this data?
  - Background information provides important context for the restoration site
  - Sets baselines
  - Site shapefiles become foundation for analysis and data storage
    - All remote sensing analyses use site shapefiles, and are used to calculate indicators:
      - A: # of trees restored at year 5
      - B: % attainment of target canopy cover
      - 1.4: % change in canopy cover
      - 2: Estimated tons of CO2 sequestered by year 5
      - 3.2: # of socioeconomic restoration partners
      - 4.1: # of hectares under restoration (by restoration intervention and ecosystem type)

Site Establishment

- A site is a contiguous area of land that is undergoing restoration
  - If an area is non-contiguous then it is automatically more than 1 site
    - 1 exception: if multiple areas are owned by the same landowner, have the same landscape characteristics (slope, soil condition, etc) and are within 100m of each other, they can be grouped into a single site
- Site boundaries are shared as shapefiles or kml files, accompanied by certain attributes



Country	Organization Name	Name of Site	Intervention Type
Brazil	CI Brazil	Site 1	Silvopasture
Brazil	CI Brazil	Site 1	Agroforestry
Brazil	CI Brazil	Site 2	Direct Seeding

**Provide in English if possible*

Monthly

Information collected at a PROJECT level

- Technical and public narratives
- Trees grown in nurseries (optional)
- Work days for project management and nursery operations (disaggregated by activity, paid/volunteer, gender, ethnicity and age)

Information collected at a SITE level

- Trees planted
- Seeds planted
- Disturbances
- Work days for planting, monitoring, and maintenance (disaggregated by activity, paid/volunteer, gender, ethnicity and age)

Work Day Data		
Disaggregation	**Uses/Reason to Have**	
Role	To understand what components of a restoration project take the most work. Complemented by the cost data	
Paid/unpaid	To understand if there is willingness to participate in restoration without financial incentives and to understand how much work we might be getting for 'free'	
Gender	Interest in understanding gender balance (or imbalance) overall and by different roles	To understand if benefits are equitable across gender, age and ethnicity
Age	Avoid child labor (important for safeguards) and monitor youth engagement	
Ethnicity	Desire to engage local communities and peoples.	

Monthly

Why do we collect this data?

- Allows calculation of indicators:
  - 1.1, 1.1.1: Number of trees planted (disaggregated by species)
  - 1.3 (optional): Number of trees grown in nurseries
  - 1.6: Number of disturbances observed
  - 3.1.1: Number of person days of work created
- Additional information shared (photos and narratives) make up the content for quarterly reports to donors and keeps global team up to date on what's happening in the project

Tree Monitoring

Why do we collect this data?

- Allows calculation of indicators:
  - A: # of trees restored (survived and crowded in) at year 5
  - 1.2, 1.2.1: # of trees naturally regenerating (disaggregated by species)
  - 1.5: % survival of planted trees
- Y0 sets baseline, Y2.5 demonstrates midline progress and allows time for corrections if trees are missing, and Y5 shows status at end of project

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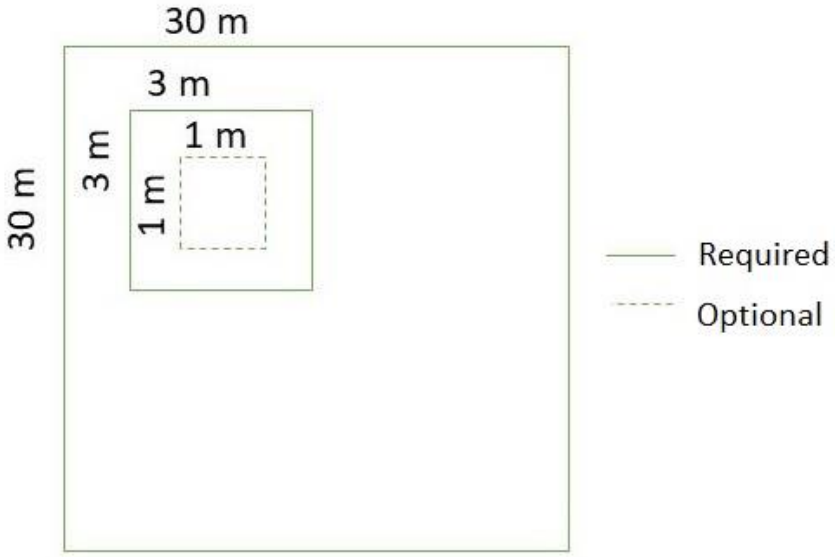
Tree Monitoring

- Sampling conducted at baseline (right after planting), Y2.5, Y5
- Number of plots determined by the size of the restoration site (see table)
- Monitoring of all methods including natural regeneration
- Up to half non-permanent plots
- Special provisions for very small sites or regions with very slow growing or sparse trees
- Same plot dimensions and data collected for control plots (protocol 2)

Restored Area (ha) = A	Number of Plots (minimum PPC standard)
A ≤ 50	1 per hectare
A > 50 ≤ 100	1 per ha for 1st 50, 1 per 2ha for 2nd 50
A > 100	1 per ha for 1st 50, 1 per 2ha for 2nd 50, 1 per 5ha for all over 100

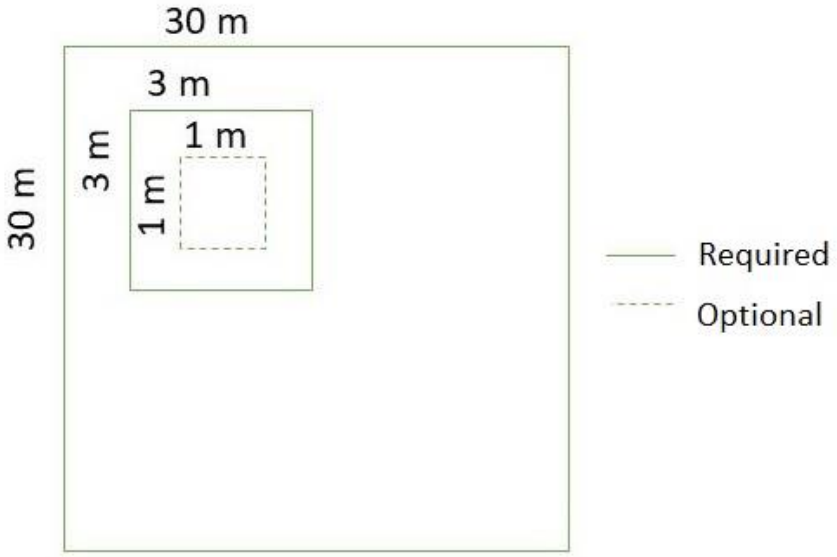
Does not include control plot monitoring

Tree Monitoring: Data Collected



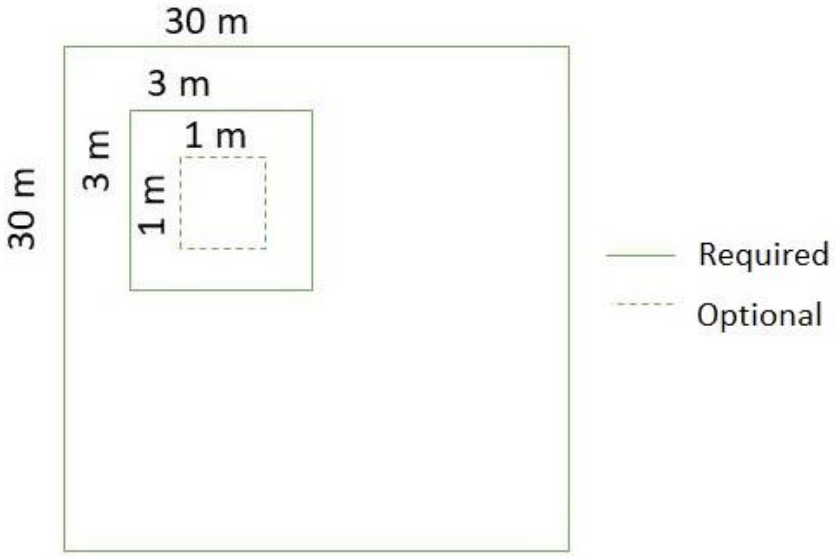
- 30m x 30m plot (re-locate empty plots up to twice in same HA)
  - GPS coordinates of each corner
  - Count of trees >10cm DBH – disaggregated by species and type (planted, naturally regenerated, etc)
  - 3 pictures
  - Background info: is the plot permanent or not, is it on a restoration or control site, what is the planting pattern, etc
  - Count of additional planted trees in permanent plots

Tree Monitoring: Data Collected



- 3m x 3m plot
  - GPS coordinates of centroid
  - Count of trees 1-9.9cm DBH – disaggregated by species and type (planted, naturally regenerated, etc)

Tree Monitoring



- OPTIONAL: 1m x 1m plot
  - Trees smaller than 1cm DBH

- Developers are NOT asked to collect:
- Count of trees across the entire restoration site
- DBH
- Height

Annually

Why do we collect this data?

- Allows calculation of indicators:
  - 3.1: # of socioeconomic restoration partners
- Provides insights into what ways restoration partners are influencing local peoples

Socioeconomic restoration partners are disaggregated by benefit category, direct/indirect, gender, age, and ethnicity

Socioeconomic Restoration Partners	
Disaggregation	**Uses/Reason to Have**
Benefit category	To understand in what way(s) people are impacted
Direct/indirect	To demonstrate benefits to drive motivations to engage in restoration. Disaggregated across direct and indirect to capture the full breath of influence
Gender	To understand if benefits are equitable across gender, age and ethnicity. Goal of greater than 50% women and indigenous people in PPC program
Age	
Ethnicity	

Additional Optional Monitoring

Suggested additional monitoring (can be integrated into project budgets):

- Landscape level control units (control plots within restoration sites are required minimum) - for assessing the additionality of the project
- Faunal biodiversity – if interested in wildlife, connectivity
- Household surveys - for deeper understanding of socioeconomic and ecosystem services impacts from the perspectives of local communities
- Freshwater – if project goals include improvements to water quality/quantity/disaster risk reduction
- Impact evaluations (likely too expensive to include in PPC budget) - scientifically rigorous way to demonstrate effectiveness and assess potential scalability of project

Why do we collect this data?

- Allows better insights into the co-benefits of restoration on local communities, biodiversity, freshwater and ecosystem services
- Strengthens the stories we can tell about the impacts of restoration projects
- Areas of interest for CI

Global Monitoring Team Analyses

Remote Sensing RS / GIS by global monitoring team

- Tree counting: using shapefiles and Collect Earth (satellite imagery and CEO to count individual trees above ~10cm DBH)
- Canopy cover measurement: using shapefiles and Brandt & Stolle dataset
- Carbon estimation measurement: using shapefiles and Trends.Earth and Cook-Patton data
- Ecosystem services evaluation: using shapefiles an global population dataset
- Restoration surface (ha) calculation: using shapefiles and WWF ecoregions map
- Look back period: using shapefiles and Global Forest Watch data

INTERNATIONAL JOURNAL OF REMOTE SENSING
2020, VOL. 42, NO. 5, 1713–1737
https://doi.org/10.1080/01431161.2020.1841324

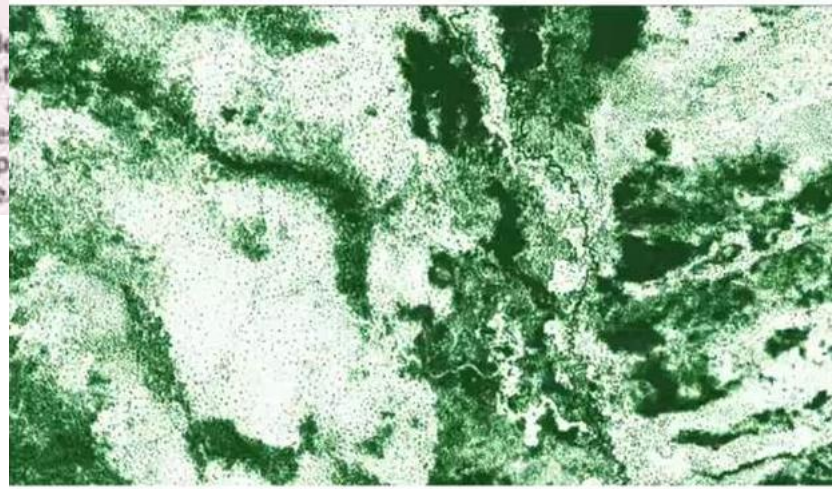
Taylor & Francis

A global method to identify trees outside of closed-canopy forests with medium-resolution satellite imagery

John Brandt and Fred Stolle

Forests Program, World Resources Institute, Washington, D.C., USA

ABSTRACT
Scattered trees outside of d
important for carbon sequest
taining ecosystem integrity,
mitigation. In contrast to tree
much is known about the sp
tered trees at a global scale



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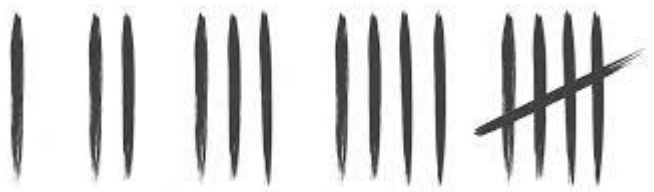
Global Monitoring Team Analyses

Calculations using Field Data

- Vegetation monitoring data to calculate # of trees present at baseline, Y2.5 and Y5. Also calculates survival of planted trees and # of trees naturally regenerating, # of trees restored
- Tally of # of trees planted, by site and species
- Tally of # of trees grown in nurseries
- Tally of # of socioeconomic restoration partners with disaggregation by benefit category, direct/indirect, gender, age, and ethnicity
- Tally of work days created with disaggregation by role, paid/unpaid, gender, age and ethnicity



What's done with all the data?

- Calculation of indicators for PPC
- Share back of results with project developers on IMP, CI and WRI
- Used to strengthen the global body of research for restoration
- Generate learnings about restoration on a global scale
- Improve design of future restoration projects

Quarterly Reporting

- Monthly data submitted on the first Friday of each month, and compiled
  - Q1 = January to March
  - Q2 = April to June
  - Q3 = July to September
  - Q4 = October to December

- Each quarter, some projects are 'spotlighted' with stories and pictures of those projects shared
- Work days and trees planted for all projects shared every quarter
  - Trees planted includes survival rates

PPC PROJECT SUMMARY

PPC tree restoration project update

An overview off all our projects, and their progress

Location	Title	Hectare Restoration Target	Tree restoration target	Trees planted to date	Person days worked

Implications for Site Selection, Budgeting, and Planning

- Need to access sites after planting
- More sites = more reports
- Need to budget for each piece of monitoring, including monthly reporting and vegetation monitoring at 3 intervals
- Need to think about control plot monitoring (or landscape level control units)
- Knowledge of species – to identify species, you may need to work with local experts, use apps or guides, etc
- Monitoring continues for 5 years after the planting year
    - For example, if a project plants in 2023, then monitoring extends to 2028
    - If a project plants in 2023 and 2024, then monitoring extends to 2028 for sites planted in 2023 and to 2029 for sites planted in 2024

Project Example

Your project has 5 sites of varying sizes. You have decided to do control *plot* monitoring instead of landscape level control units, and you're making all your monitoring plots *permanent*.

What does this mean for monthly reporting?

1 PROJECT level report *each month*
5 SITE level reports *each month*

What does this mean for vegetation monitoring?

Site ID	Size (HA)	Strata	# of restoration monitoring plots	# of control plots	# markers needed (5 per permanent plot)
Site 1	0.3	NA	1	0	5
Site 2	0.7	NA	1	1 (10m x 10m)	10
Site 3	5	NA	5	At least 1	30
Site 4	55	Agroforestry, silvopasture	52	At least 2	270
Site 5	340	NA	123	At least 1	620

Join us to do Research

Are there any other research questions that are of interest to you?

If yes, could we integrate research into your project?

Examples:

The CI freshwater team is collaborating with the Madagascar flagship project to explore the possibility of research on the impacts of watershed restoration on freshwater quality and quantity