Monitoring of forest restoration projects

Ricardo Viani – viani@cca.ufscar.br
LASPEF - UFSCar/Araras

Photo: Ricardo Viani – forest restoration site – Conservador das Águas, Extrema-MG

INTRODUCTION

Monitoring is:

“periodical measurement of environmental indicators in order to evaluate the ecological trajectory of the restoration site”

Attributes of a restored ecosystem (SER)

1 – Contains a characteristic assemblage of the species that occur in the reference ecosystem;

2 – Has natives species to the greatest practicable extent;

3 – Has all the functional groups necessary to devel

4 – Has a physical environment capable of su

5 – Functions normally for its ecological st

6 – Interacts with a larger ecological matr

7 – Has no potential threats to its health a
landscape or they were reduced as much as

8 – Is sufficiently resilient to endure the normal p

9 – Is self-sustaining to the same degree as its reference ecosystem.

1 – To monitore the restoration trajectory is not a simple and easy task!

2 – Early implemented areas are considered under restoration instead of restored.

Pictures of the sites being restored taken by the application of several ecological indicators

Restoration

Baseline

Δt

Degradation

Figure: Pedro Brancalion

INTRODUCTION

Ecological indicators?

Variables used to measure changes in an ecosystem process or phenomenon.

Diversity

Structure

Functioning

Easy to collect, integrative and able to predict ecosystem changes

Depends on the goals of the restoration project

ATLANTIC FOREST RESTORATION - FOREST RESTORATION MONITORING PROTOCOL

- What are its proposals?
- How is it organized?
- Next steps.

THE ATLANTIC FOREST RESTORATION PACT

April 7th, 2009: the Atlantic Forest Restoration Pact was launched;

Target: Restoration of 15 million hectares of degraded lands by 2050;

Around 200 public and private institutions are engaged

Website: http://www.pactomataatlantica.org.br

FOREST RESTORATION MONITORING PROTOCOL – ITS PURPOSES

- How can we evaluate and understand the results obtained by those restoration projects?

- Workshop (2011) with participation of more than 70 Pact members.

FOREST RESTORATION MONITORING PROTOCOL – ITS PURPOSES

- First version launched in August 2011;
- Protocol tested in the field by some of the Pact members (restoration companies and universities);
- New workshop (2013) to review and improve the protocol.

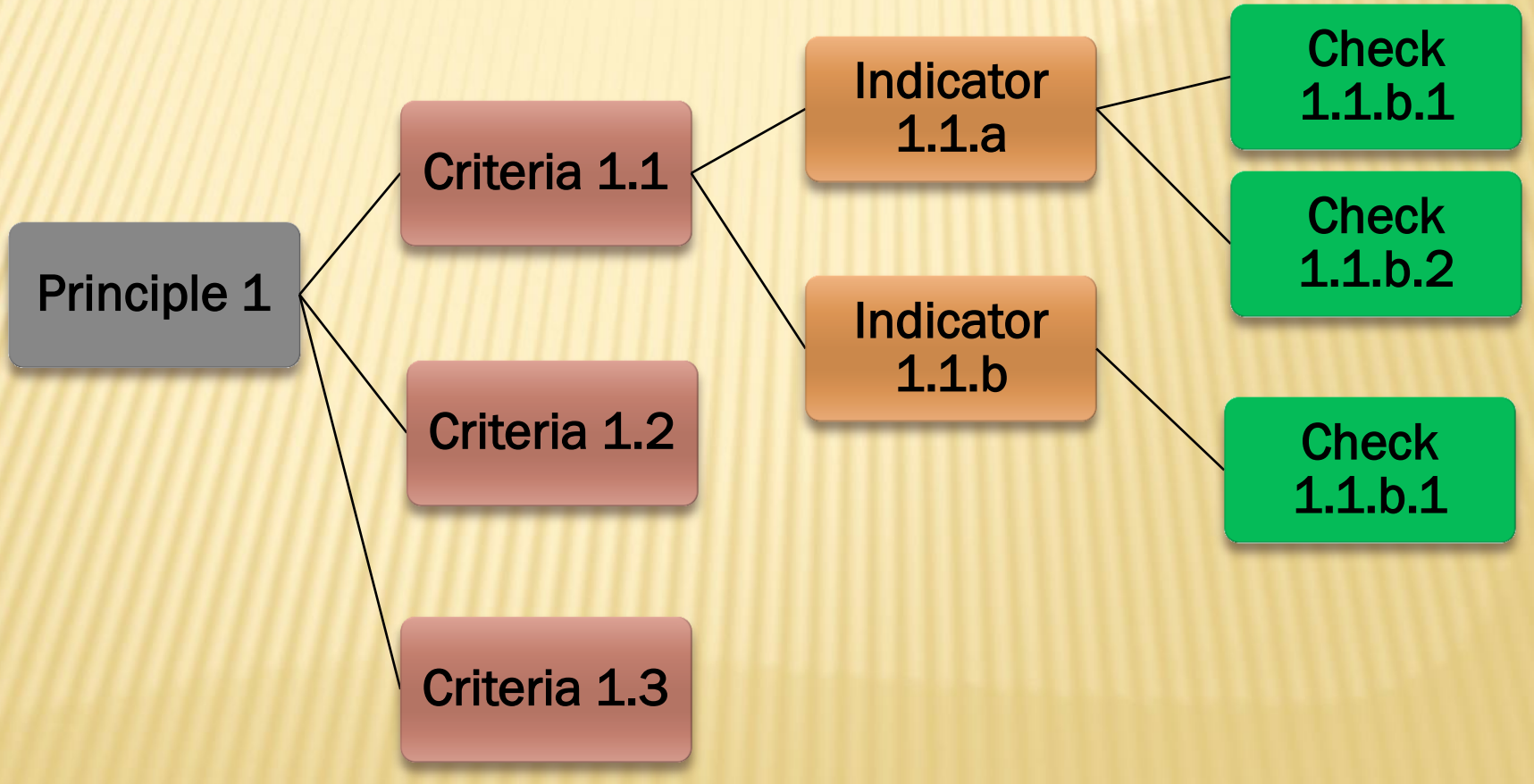
MAIN GOALS OF THE RESTORATION MONITORING PROTOCOL

- To gather information about the restoration;
- To identify bootlenecks, common needs and susscefull cases;
- To improve forest restoration projects;
- To create a database in order to further stablish reference values for ecological indicators;

FOREST RESTORATION MONITORING PROTOCOL – THE STRUCTURE

Based on hierarchical levels:

- Principles, Criteria, Indicators and Checks



FOREST RESTORATION MONITORING PROTOCOL – THE PRINCIPLES

Relation between the principles of the forest retoration monitoring protocol

ECOLOGICAL PRINCIPLE – PHASE I

Canopy development: the restoration site has to reach 70% of canopy cover. Evaluation of canopy cover and the factors limiting its development.

Structure
- Canopy cover
- Invasive grasses cover

Diversity
- Invasive tree species composition and density;
- Identification of main tree native filling species;

Edaphic
- Soil fertility;
- Soil conservation;
- Soil compaction;

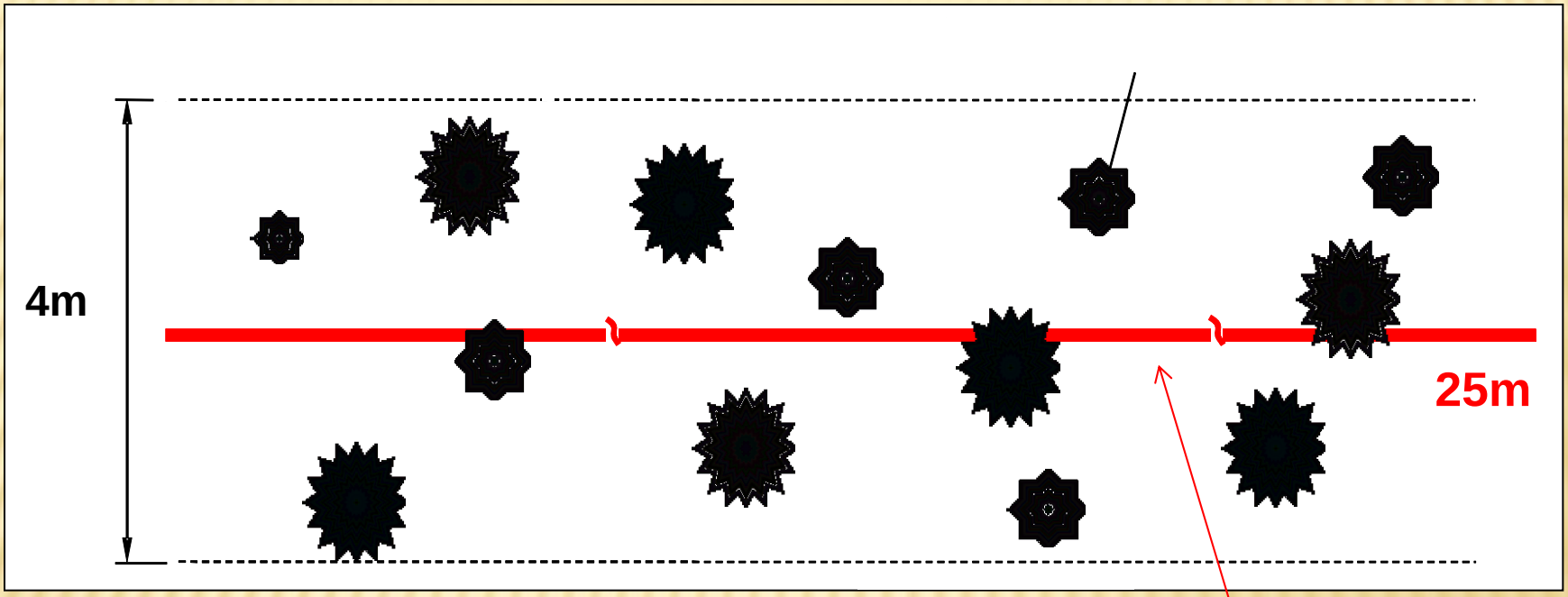
Degradation
- Fire;
- Cattle;
- Leafcutter ants, etc.

ECOLOGICAL PRINCIPLE – PHASE I

Example:

Item	Description
C.1. Structure	Vertical and horizontal distribuition of the tree comunity under restoration.
I.1.1. Canopy cover	Percentage of canopy cover measured by the projection of the tree canopies over the soil.
V.1.1.1. Percentage of the soil line covered by the projection of the tree canopies over the soil	Sum (m) of the portions of the sample line covered by the projection of the tree canopies divided by line length (m), multiplied by 100.

ECOLOGICAL PRINCIPLE – PHASE I



Sample plot for monitoring Phase I projetcs (<70% of canopy cover): evaluation of canopy cover and density of invasive trees.

ECOLOGICAL PRINCIPLE – PHASE II

Ecological trajetory: evaluation of structure and composition indicators related to ecosystem functioning

Estrutura

- Density (size classes: 1: > 50cm, <15cm CBH; 2: ≥ 15cm CBH)
- Basal area
- Canopy cover*

Composição

- Tree species richness
- Tree invasive species density and composition

ECOLOGICAL PRINCIPLE – PHASE II

Sampling intensity:

Project area (ha)	Number of plots
≤ 0,5	-
>0,5 e ≤ 1	5
> 1	5 + 1 by additional hectare*

***Limited to a maximum of 50 plots.**

Theses numbers will be further redefined once a database is created (use the sampling error instead of a number of samples)

SOCIO-ECONOMIC PRINCIPLE

- What are the financial mechanisms that support the project?
- Job and income generation are increasing the chance of success of restoration projects?

Money source

- Where does money come from?

Job and income generation

- Number of jobs created;
- Value of the program/project

Economic benefits to landowners

- Payment for environmental services (PES)
- Timber and non-timber products
- Fiscal incentives

MANAGEMENT PRINCIPLE

Are the restoration iniciative being documented?

Planning and documentation

Effective Communication

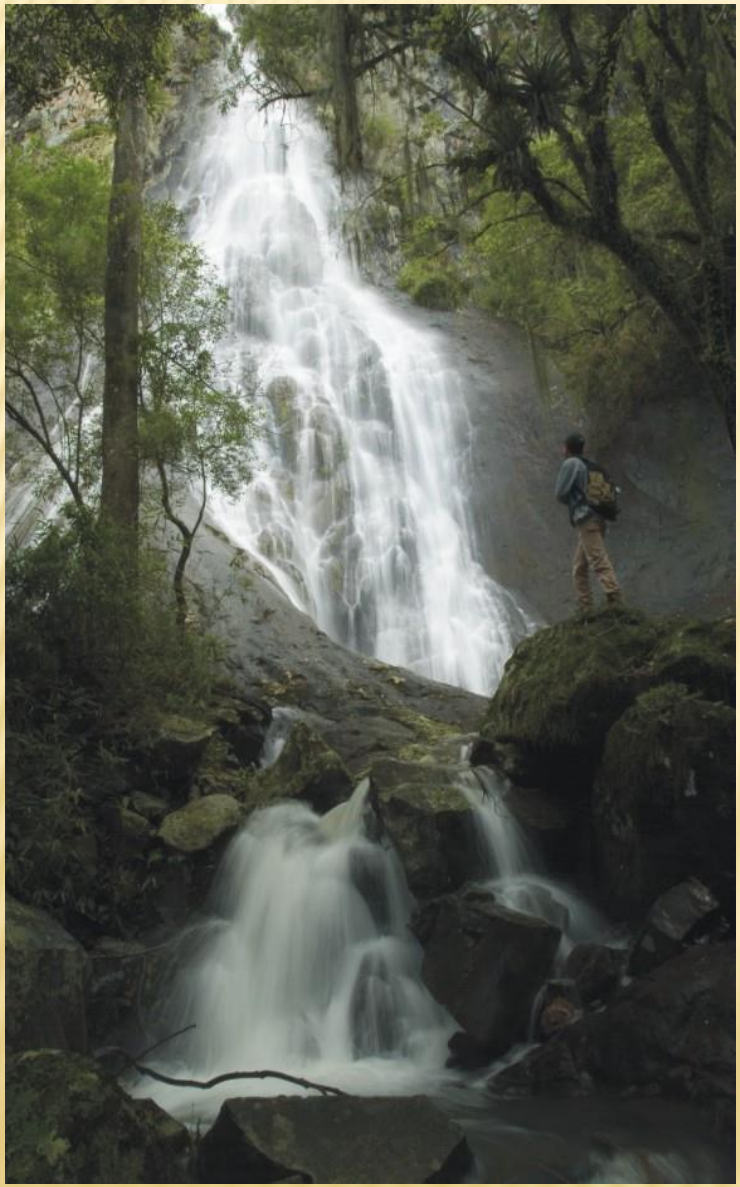
Formal partnership with landowners

Novel restoration tecniques

Own monitoring system

Restoration team

NEXT STEPS



- Publish the new version (www.pactomataatlantica.org.br);
- Training people to apply the protocol;
- Development of an smartphone/tablet app to direct collect and process data in the field .
- Create an web-based database to receive monitoring data by Pact members.
- Generate regional reference values for ecological indicators based on the upload of monitoring information in the database.

Thank you!

Gracias!

Obrigado!

Ricardo Viani – viani@cca.ufscar.br
http://blog.cca.ufscar.br/laspef/

PACTO
PELA RESTAURAÇÃO DA
MATA ATLÂNTICA

Laspef