

UnderplaNNet Workshop

Ecological Succession in Degraded Forests: implications for forests restoration

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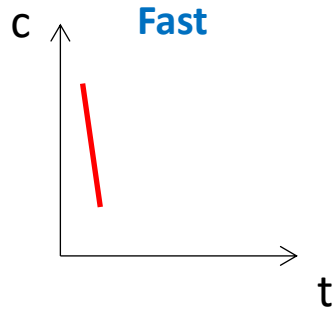
Tena, 2024



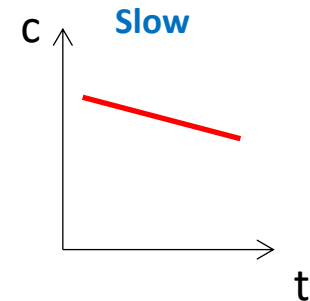
Secondary Forests

VS.

Degraded Forests



Forest change rate (relatively)



Yes

Change of land use

No

Yes

Self-recovery

Yes and/or No

Yes

Management potential

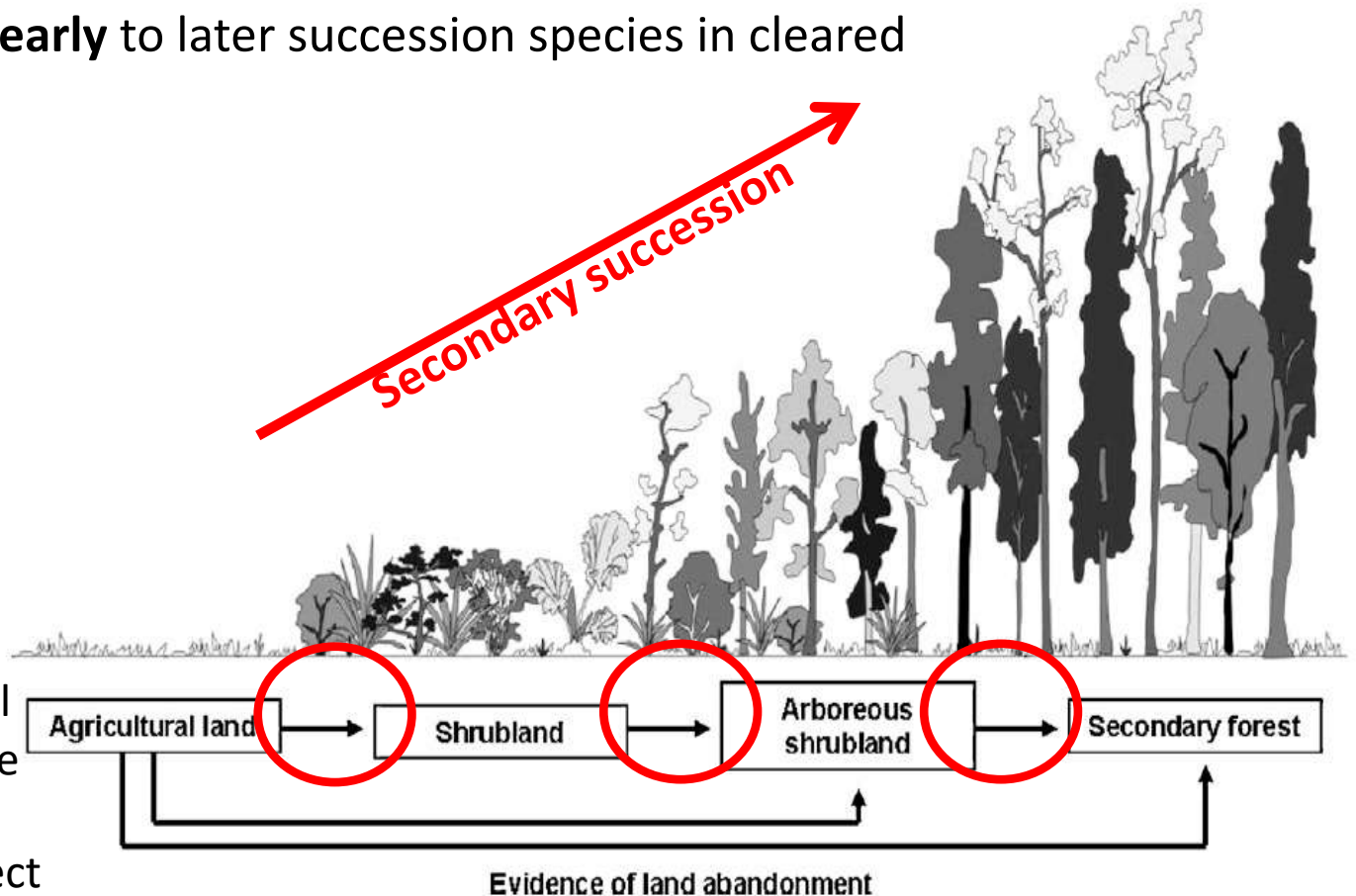
Yes



Secondary Forest Formation Process

They refer to the observed processes of vegetation change in the **dominance of early** to later succession species in cleared sites.

Succession GAP: In succession dynamics, recovery is not gradual due to these GAPs. The classic vision of restoration is to connect and guide it linearly or continuously.

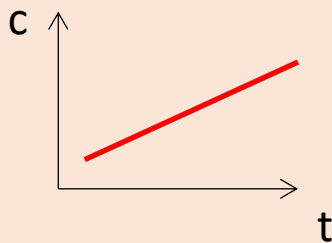


Secondary succession: Process

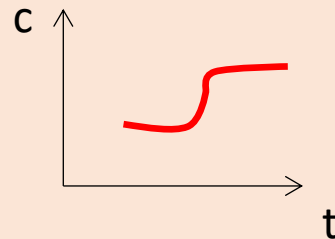
Early succession (initial colonization)

1. Source of plant regeneration: seed bank, seeds burned on the ground or recently dispersed
2. Remaining vegetation: seed dispersal, type of seed (weight, disperser such as birds)
3. Predation after dispersal: Ants, birds

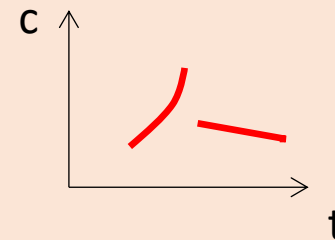
(a) Gradual



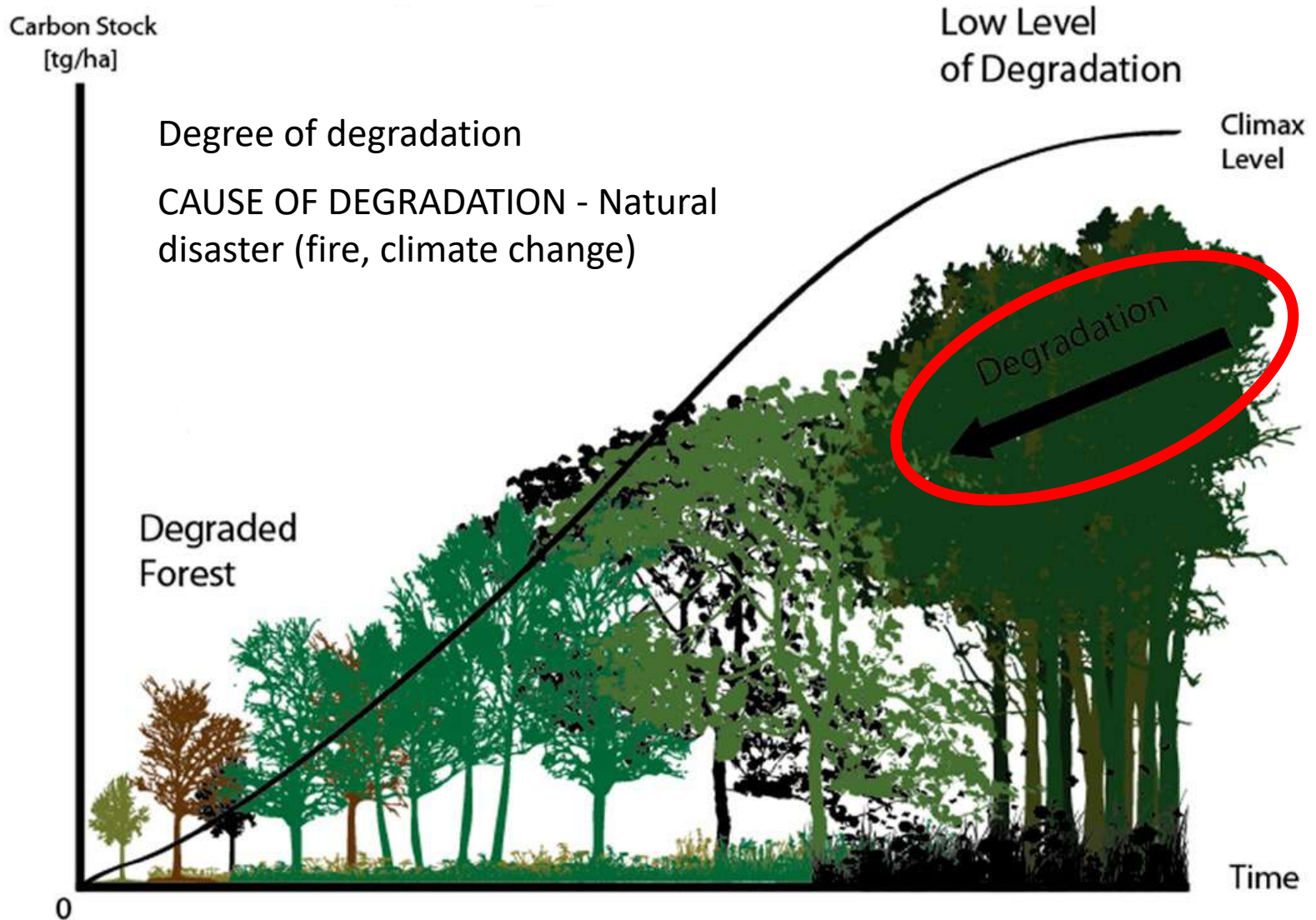
(b) threshold



(c) hysteresis



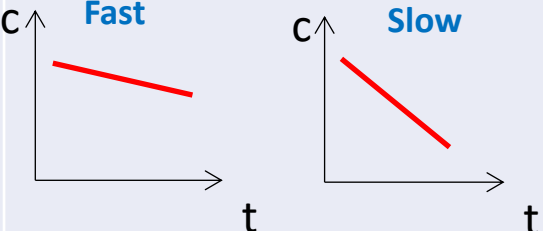
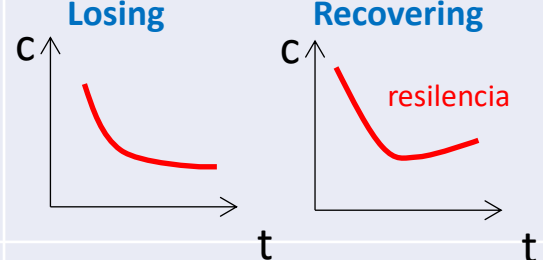
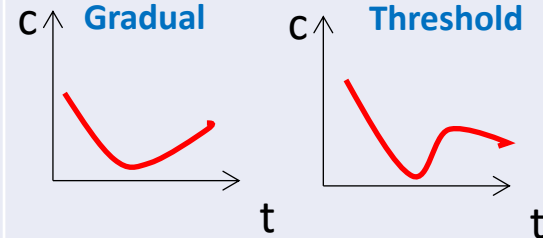
Degradation is a process



Deforestation

Fuente: Adaptado de Eckert et al. 2011

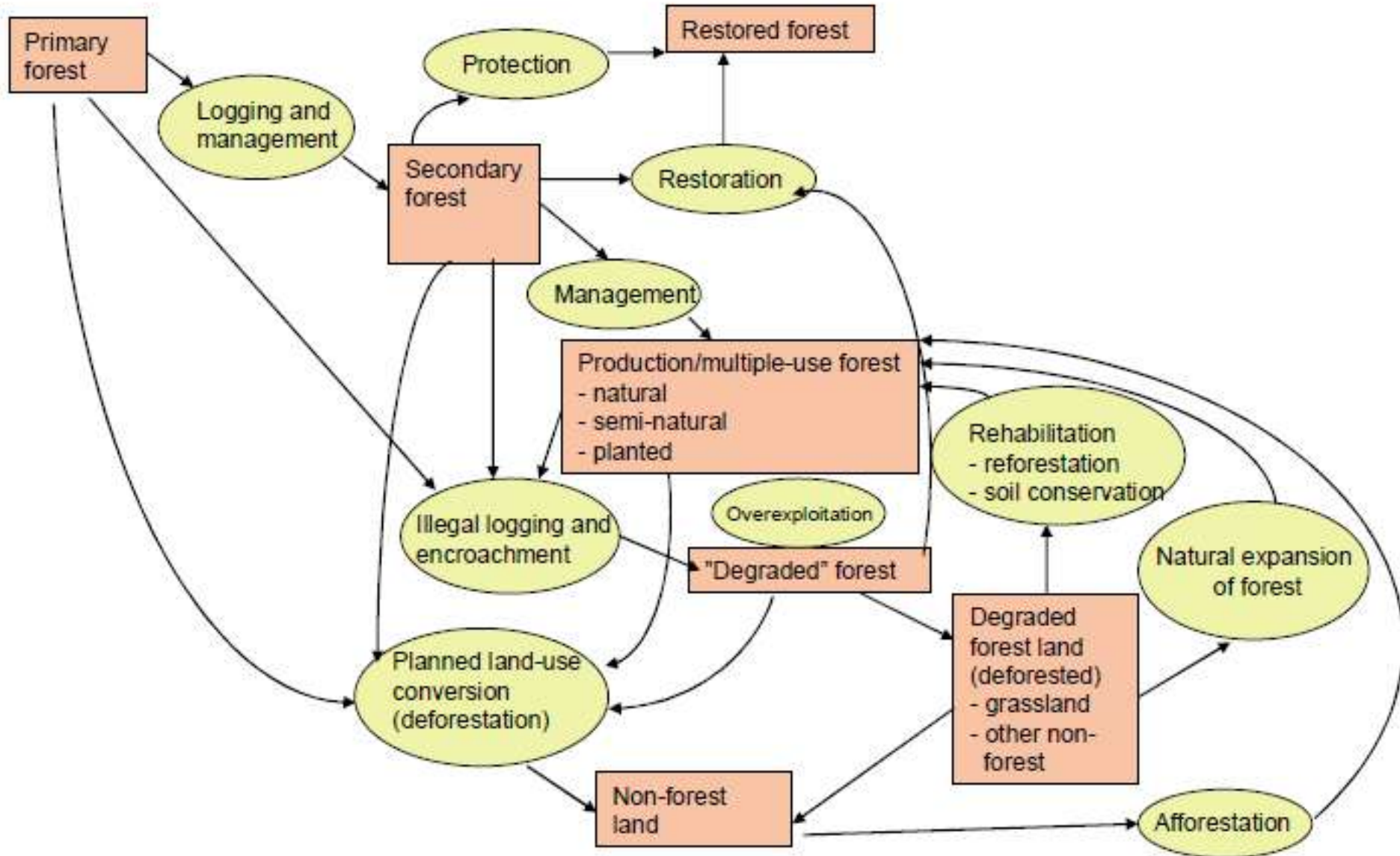
Different degradation pattern

Pattern	Pattern of change	Process
Degraded		Losing biomass and carbon annually due to human activity. Extraction and loss
Degraded, BUT STABLE		Low carbon, but small rate of forest loss or gain
Degraded, BUT ALREADY RECOVERING NATURALLY		Secondary succession

Type of secondary forest

Age

Characteristic	Young secondary forest	Old secondary forest
Stand basa area	Lowest	Intermediante
Distribution of tree stem diameters	Lowest coefficient of variation (CV)	Intermediate CV
Canopy structure	Even canopy, few gaps	Even canopy, small gaps common
Lianas/apiphytes	Absent	Rare
large logs	Present or absent	Usually absent
Very large tress	Usually absent except as obvious remmants	Usually absent



Assessing the Ecological Succession of Degraded Forest in Ikiam: Implications for Landscape Restoration

Deyci Peñafiel and Pablo Cuenca

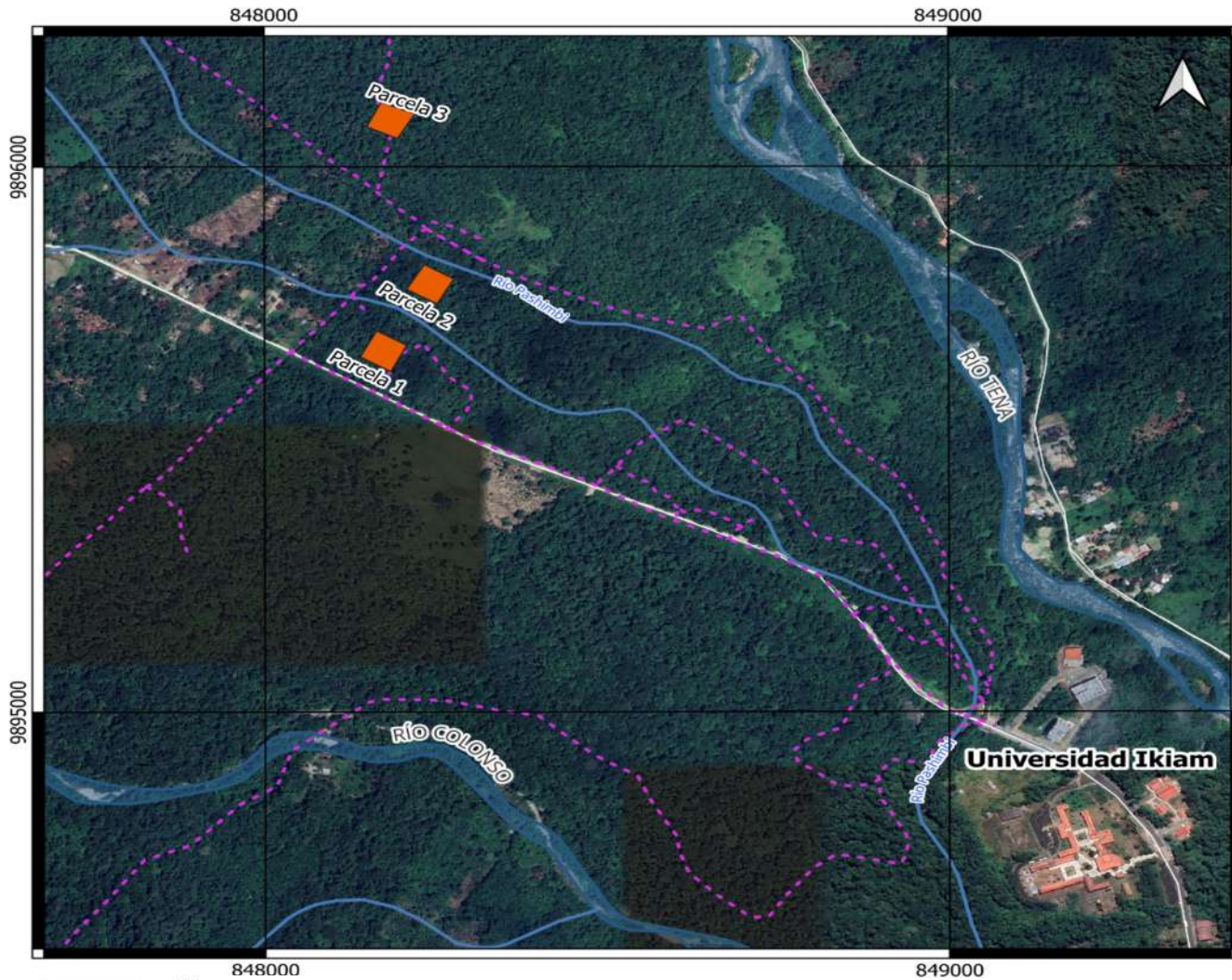
Objectives

Analyze the structure and floristic composition of the degraded forest at Ikiam University

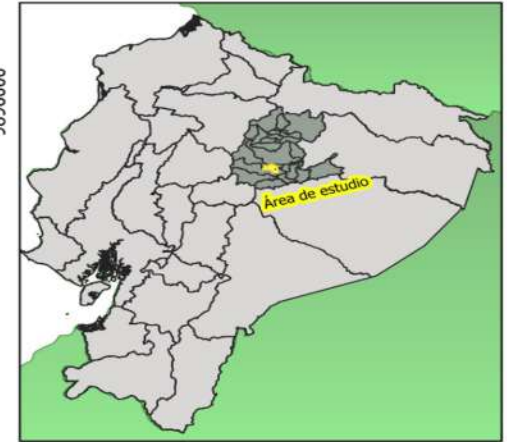
Evaluate the ecological succession and quantify the dynamics of natural regeneration of the degraded forest at Ikiam University.

Design a pilot proposal for ecological restoration based on the dynamics of natural regeneration of the degraded forest at Ikiam.





MUYUNA - NAPO - ECUADOR



LEYENDA

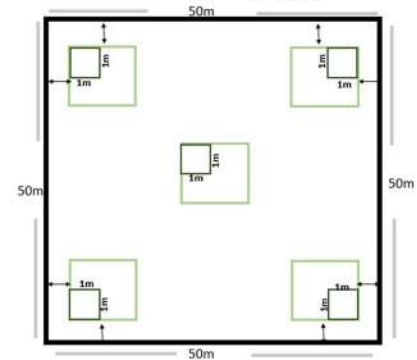
- Parcelas de monitoreo
- - - Senderos ikiam
- Ríos secundarios
- Ríos principales
- PARROQUIA SAN JUAN DE MUYUNA
- PARROQUIAS NAPO
- PROVINCIAS
- PAISES

0 100 200 m

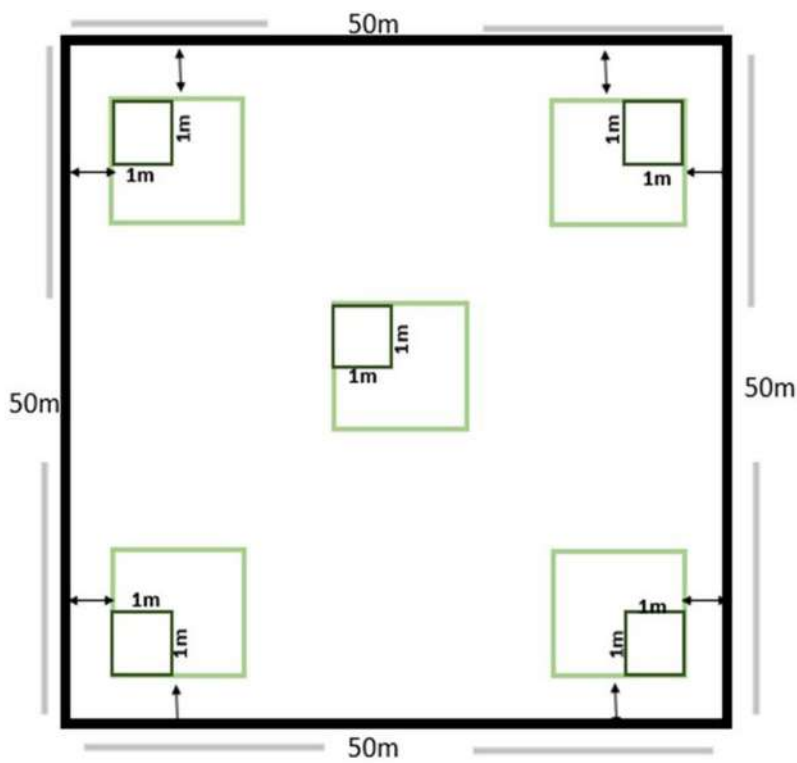


Peñañiel, 2024

Degraded Secondary Forest



Peñañiel Deyci and Cuenca Pablo. Assessing the Ecological Succession of Degraded Forest in Ikiam: Implications for Landscape Restoration. In preparation. To submit: Forest Ecology and Management Journal



Total height

DBH (1.30 m)

Taxonomic identification

Latizales 1.5 to 8 m height < 10 cm DBH

Nested plots size 5 x 5 m

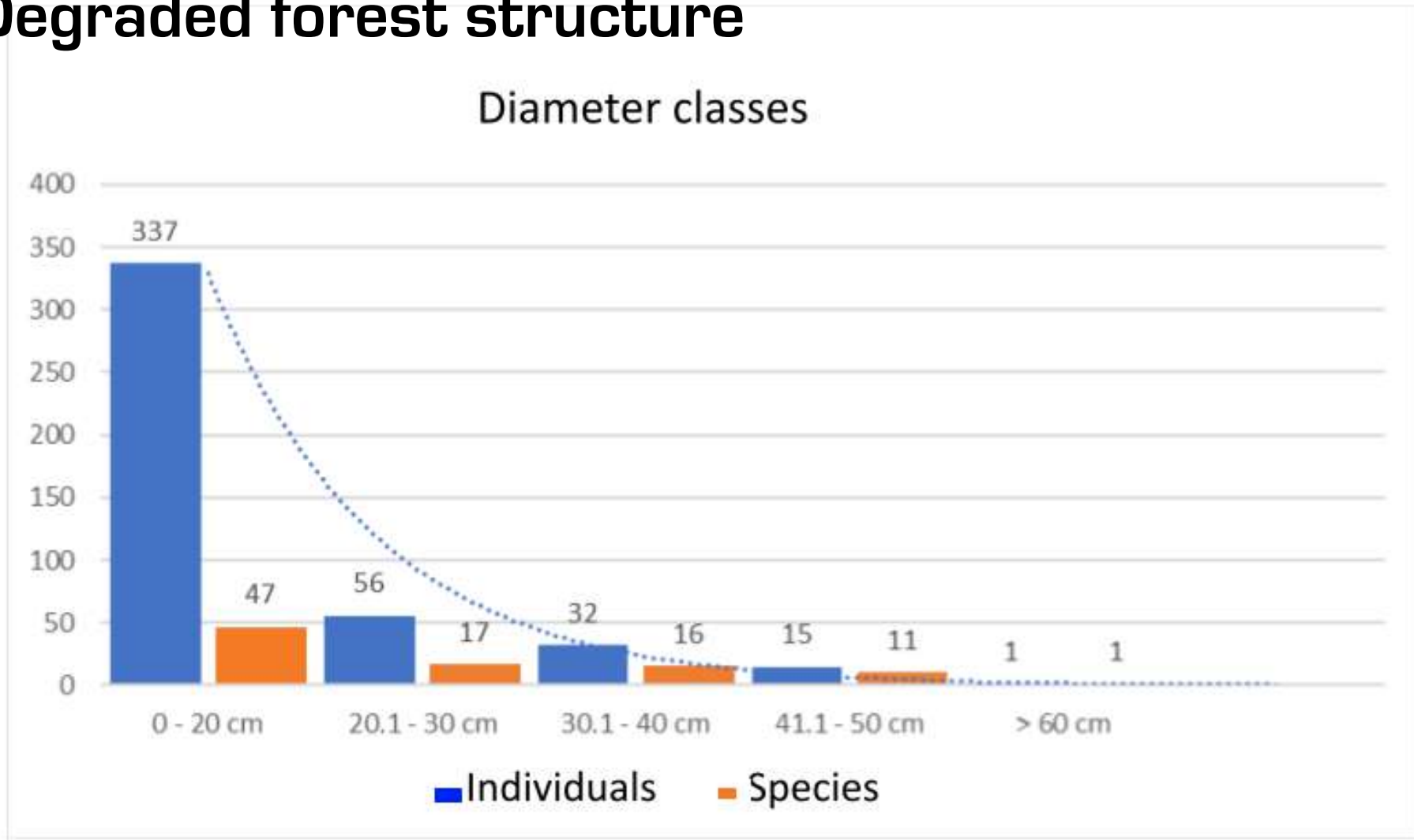
Latizales 1.5 a 8 m altura < 10 cm DAP

Parcelas anidadas tamaño de 5 x 5 m

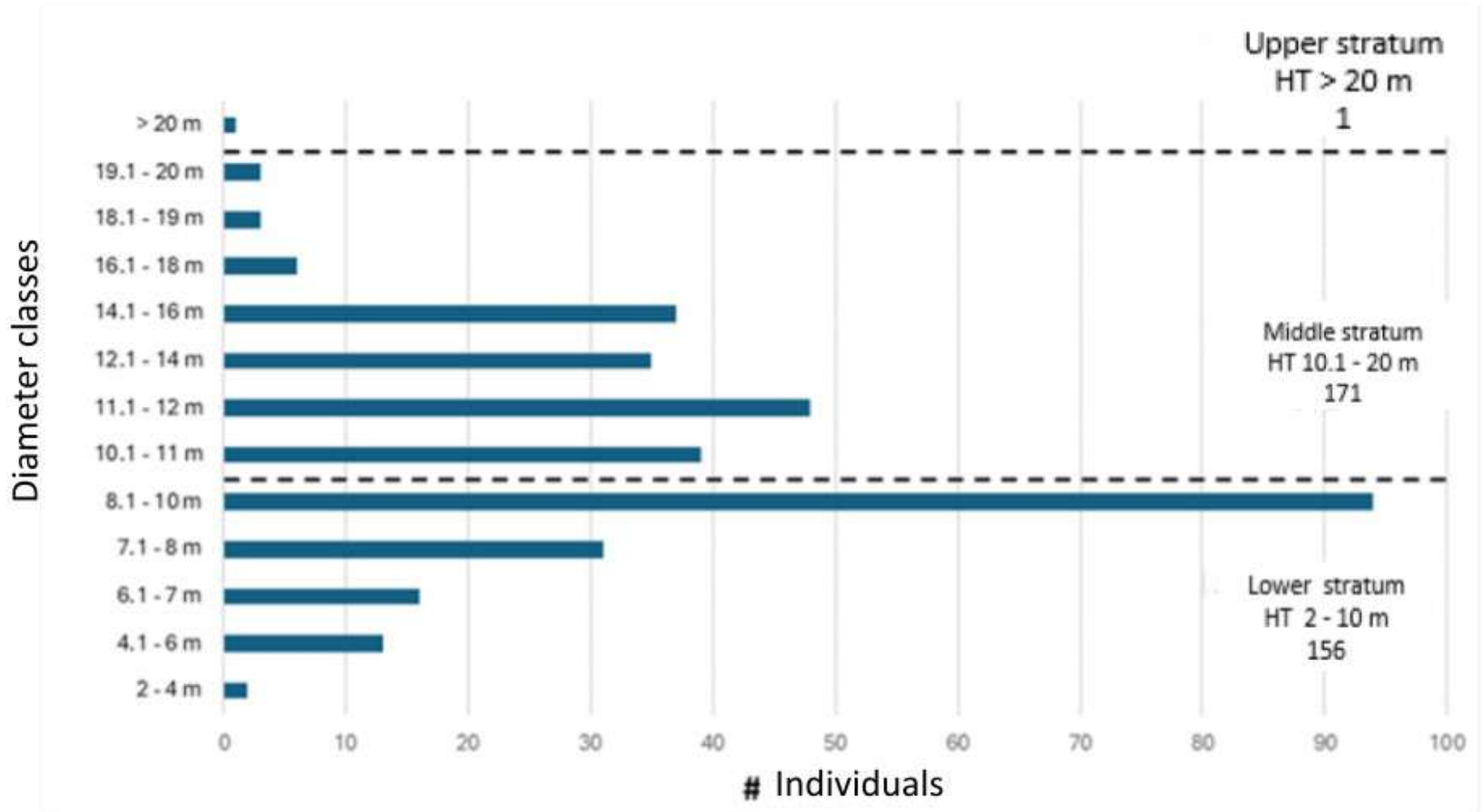


Results

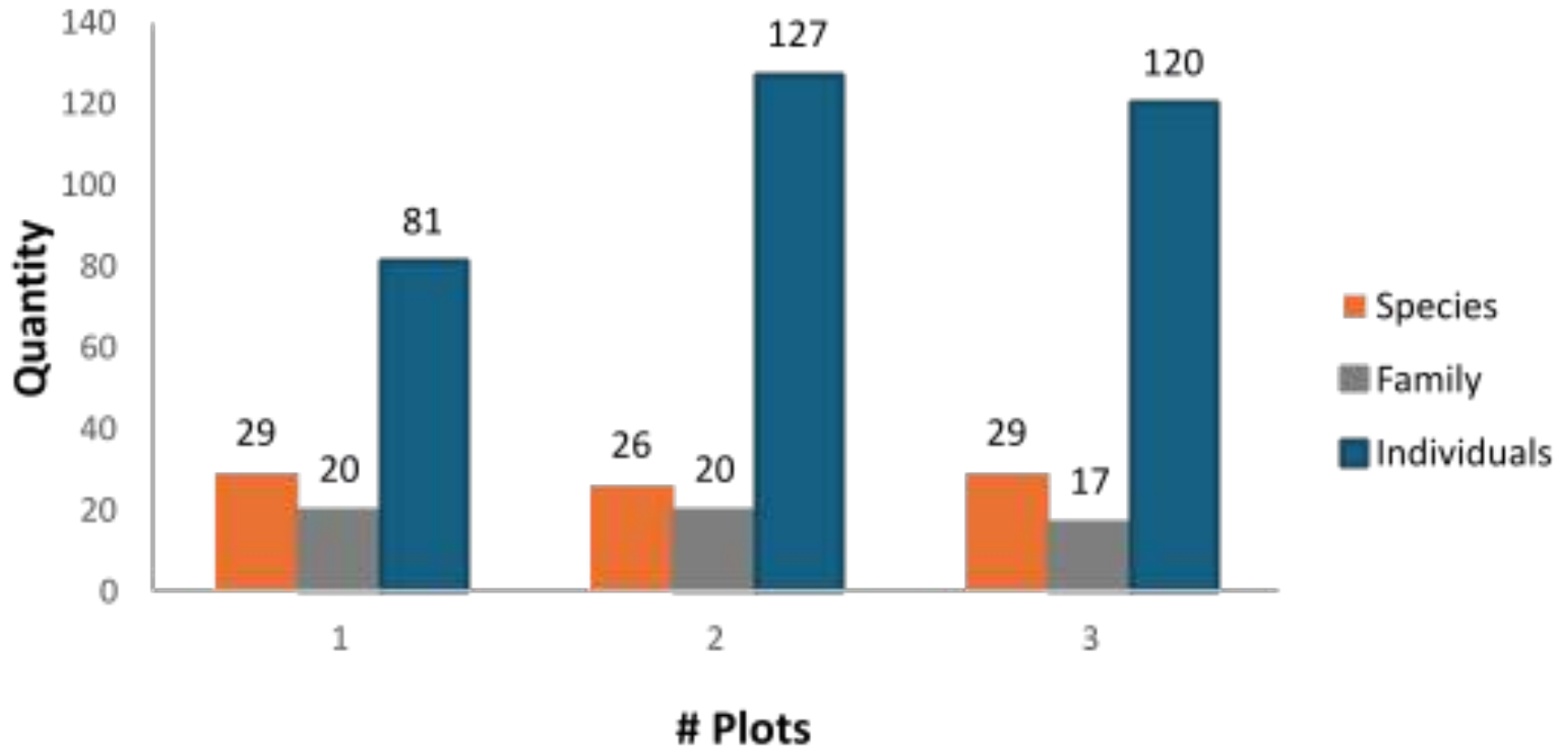
Degraded forest structure



Degraded forest structure



Degraded forest composition



Total individuals 328; Number of families 26; Number of species 42

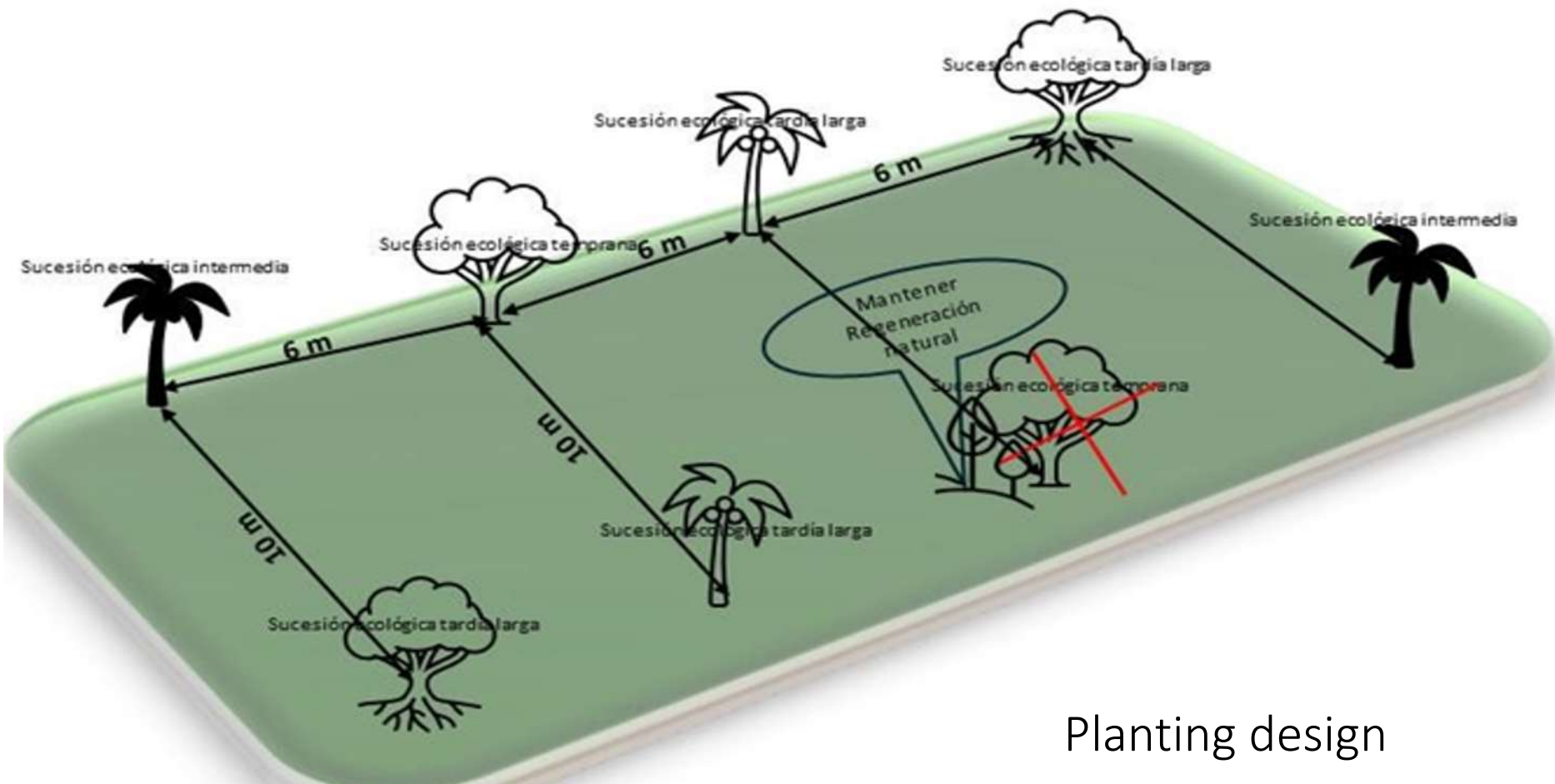
Melastomataceae, (85) Vochysiaceae (56), Euphorbiaceae (39), Urticaceae (29), Fabaceae (17) and Salicaceae (16).

Forest Landscape Restoration with Potential and Underutilized Species

Family	Scientific Name	State of succession
Myristicaceae	Virola elongata	Late long
	Otoba glycyarpa	
	Virola pavanis	
Meliaceae	Guarea glabra	Late long – intermediate
	Swietenia macrophylla	
	Cedrela odorata	
Lauraceae	Ocotea javitensis	intermediate
	Nectrandra sp.	Late long
Fabaceae	Cedrelinga cateniformis	intermediate
	Balsamo myroxylon	Late long
Arecaceae	Astrocaryum murumuru	intermediate
Olacaceae	Minquartia guianensis	Late long

Penafiel Deyci and Cuenca Pablo. Assessing the Ecological Succession of Degraded Forest in Ikiam: Implications for Landscape Restoration. In preparation. To submit: Forest Ecology and Management Journal.

Pilot Ecological Restoration



Planting design

Some reflections

- The families with the most incredible abundance in the forest will not contribute to the long-term recovery of its ecological functions.
- The degraded Ikiam forest requires an ecological restoration proposal using active restoration techniques with slow-growing species to facilitate natural regeneration.
- This research provides essential data to understand the composition and structure of degraded forests and the state of ecological succession.
- Incorporating underutilized species into restoration projects is essential to improving the forest's composition, structure, and functionality and generating economic and social benefits for communities.



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Thanks very much!

