

RESTORATION INITIATIVES IN THE LOWLAND TROPICS OF CENTRAL AMERICA

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BARCA

Brinkman y Asociados Reforestadores de Centro América

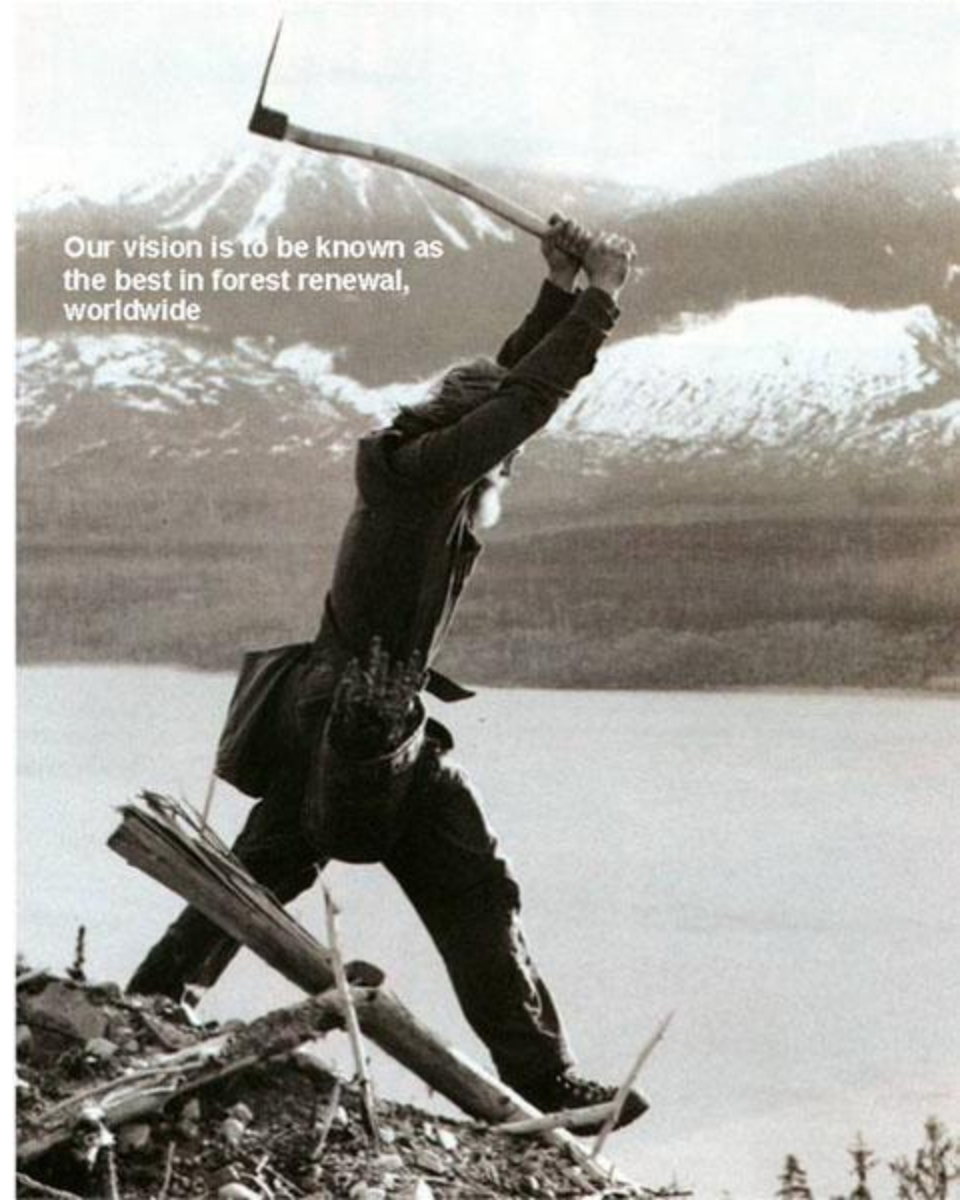
Yale Chapter of the International Society of Tropical Foresters.
January 26-28 , 2012



BARCA

Background

BARCA started operations in Central America in 1994 and is a subsidiary of BRINKMAN & ASSOCIATES working in Canada since 1970s.



Our main activity is reforestation. In 2010 we celebrated the planting of 1 billion trees (1970-2010).



Other work:

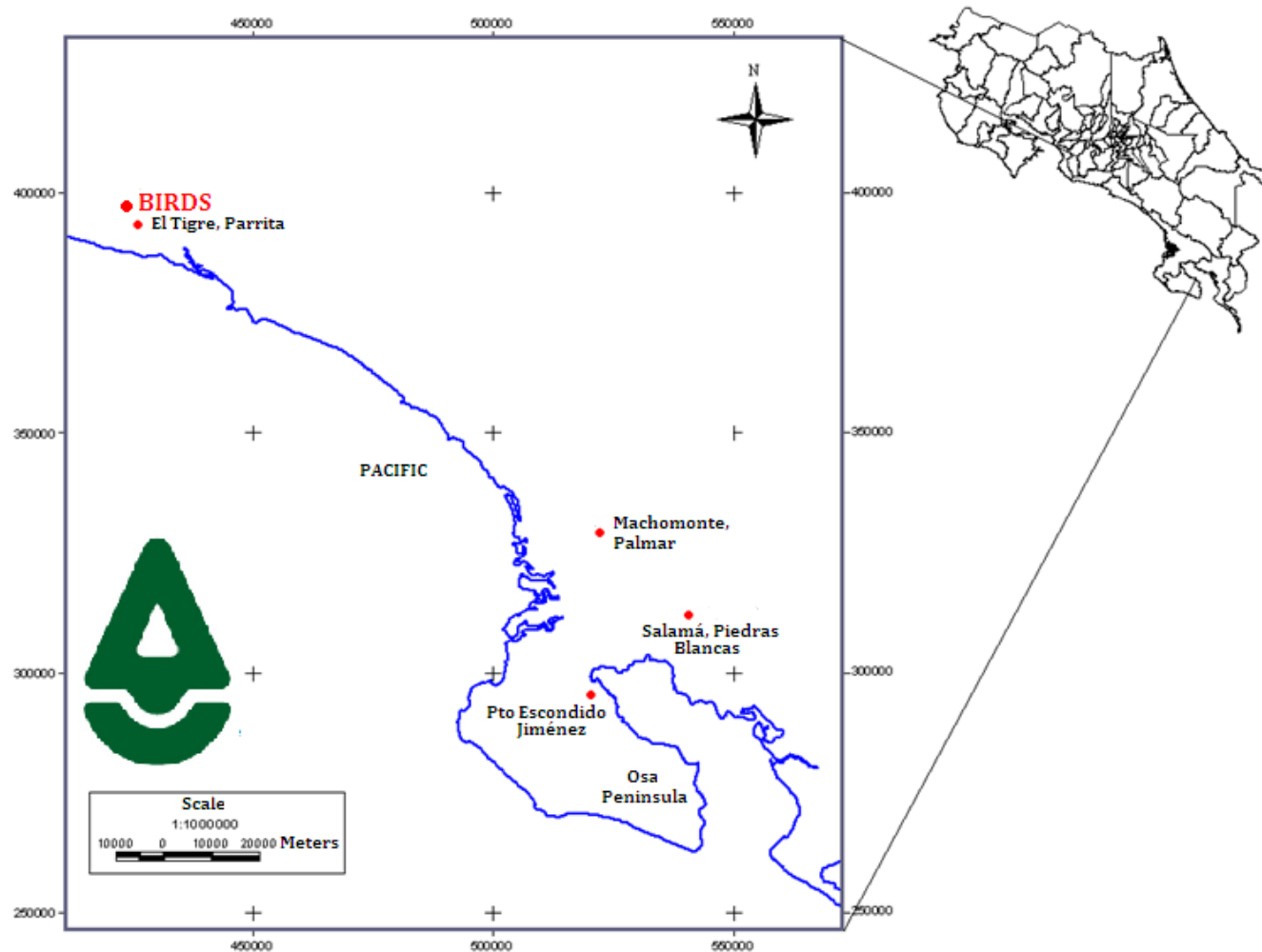
- Silviculture contracting services,
- Restoring urban landscapes,
- Agroforestry (mainly cacao),
- Forest management for indigenous landowners,
- Ecosystem restoration .



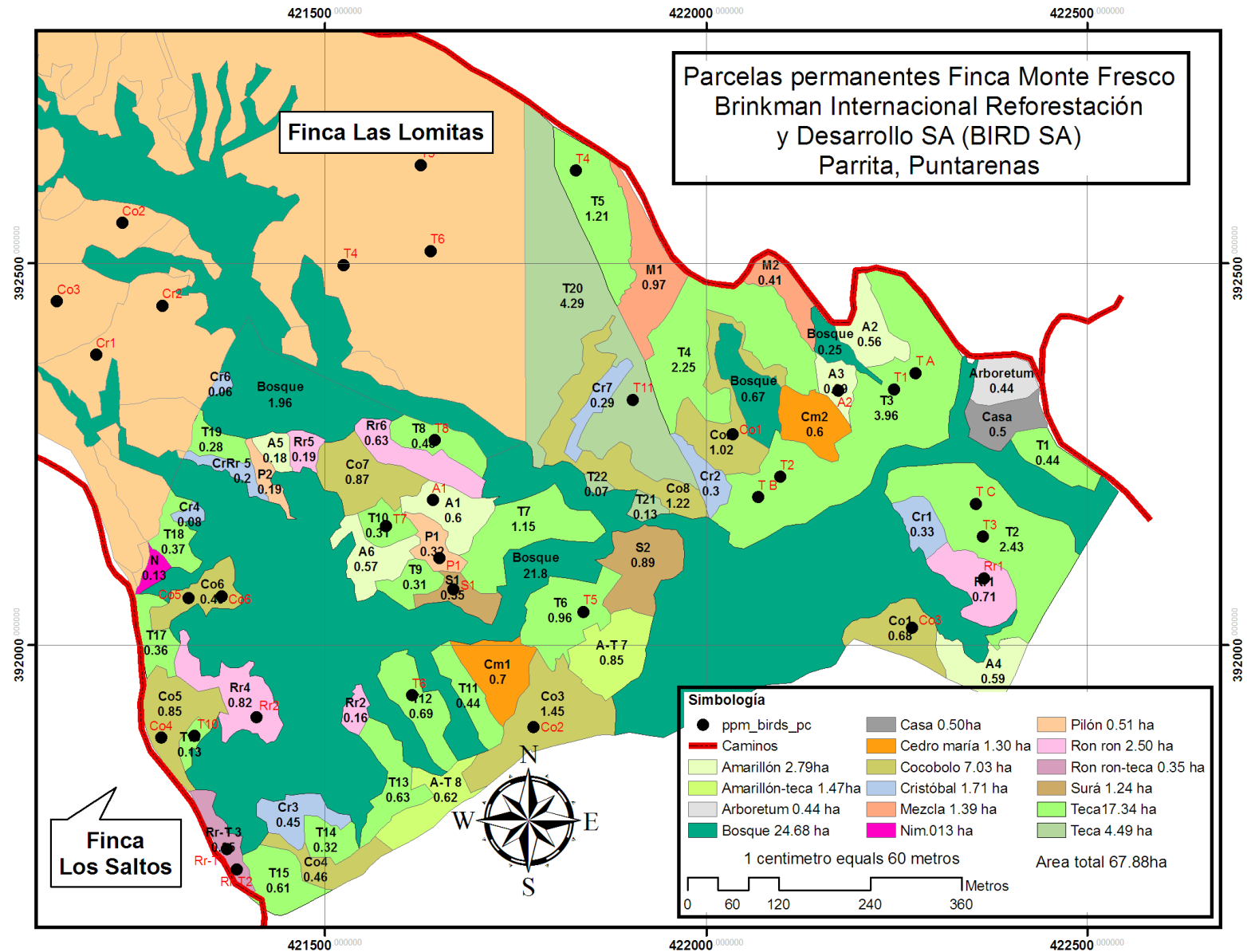
RESTORATION PROJECTS MANAGED BY BARCA

- The BIRD Projects, Central Pacific of Costa Rica.
- From reforestation to restoration, Osa Peninsula, Costa Rica.
- Restoration as a “Social Responsibility” Project, Darien, Panamá (Kuna-Madugandí).

THE BIRD PROJECTS



BIRD Farm Map with Location of Permanent Sampling Plots



Species Planted in the BIRDs Projects

Common Name	Scientific Name
Teca (Teak)	Tectona grandis
Amarillón	Terminalia amazonia
Cocobolo (Rose Wood)	Dalbergia retusa
Cristobal	Platymiscium pinnatum (curuense)
Cristobal/Cachimbo (Trebol)	Platymiscium parviflorum
Ron ron (Tiger Wood)	Astronium graveolens
Pilón/Zapatero	Hieronyma alchorneoides
Cedro maria	Calophyllum brasiliense
Surá	Terminalia oblonga
Cedro(Spanish Ceder)	Cedrela mexicana
Caoba (Mahogany)	Swietenia marcophylla
Neem	Azadirachta indica
Cenizaro	Samanea saman (Phitecelobium saman)





BIRD Corner (Co1-A4 “Frijol Area”): RoseWood; PurpleHeart;
Cristobal; Amarillon.



BIRD Farm Border

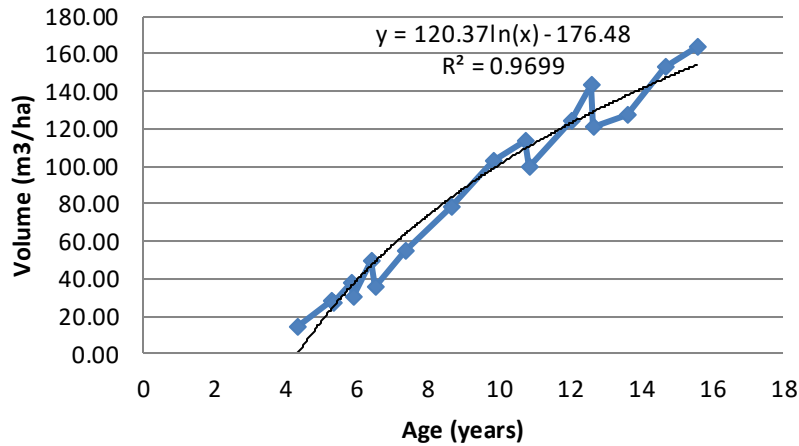


Brachiaria brizantha before “jaragua”

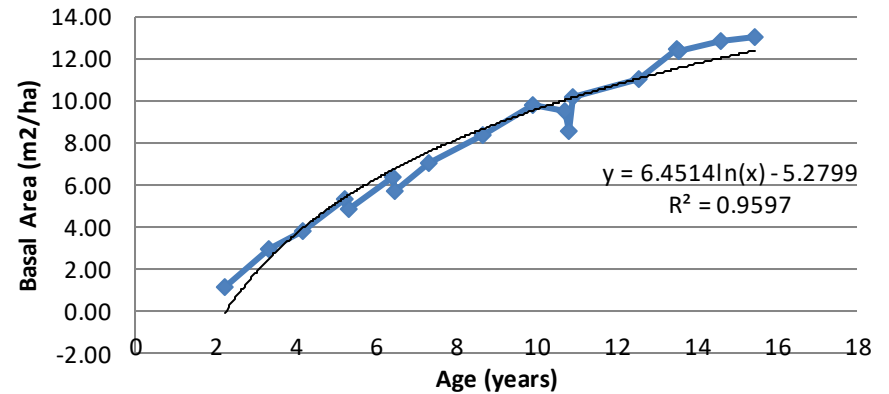
Understory: *Brosimum*; *Virola*; *Tabebuia*; *Platimiscium*; *Inga*;...



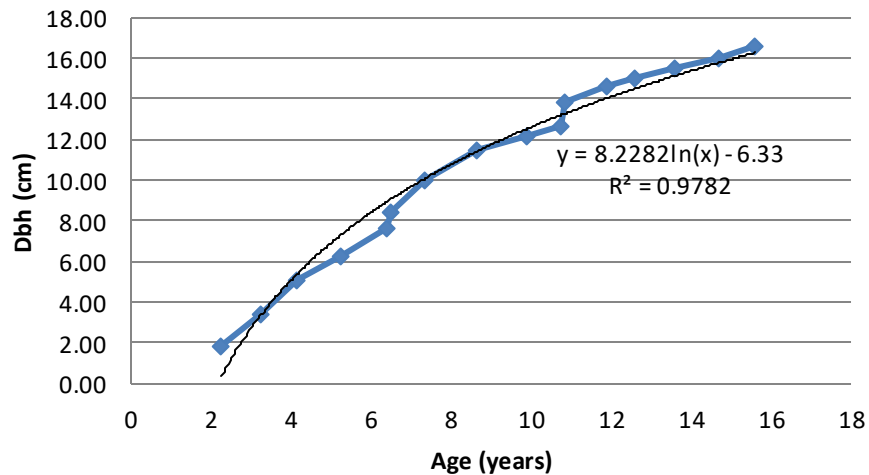
***Terminalia amazonia* Vol. Growth**



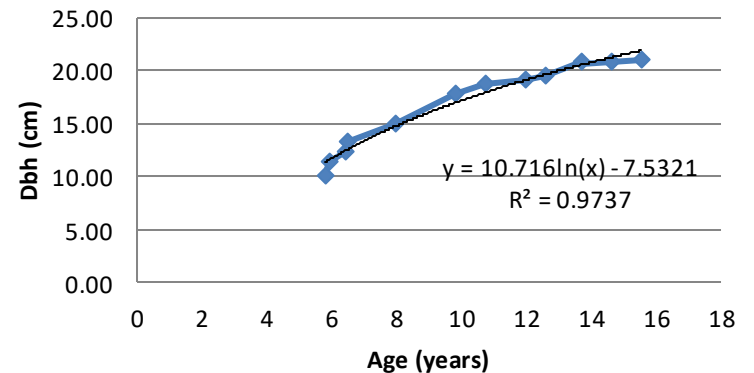
Basal Area Growth for Rose Wood



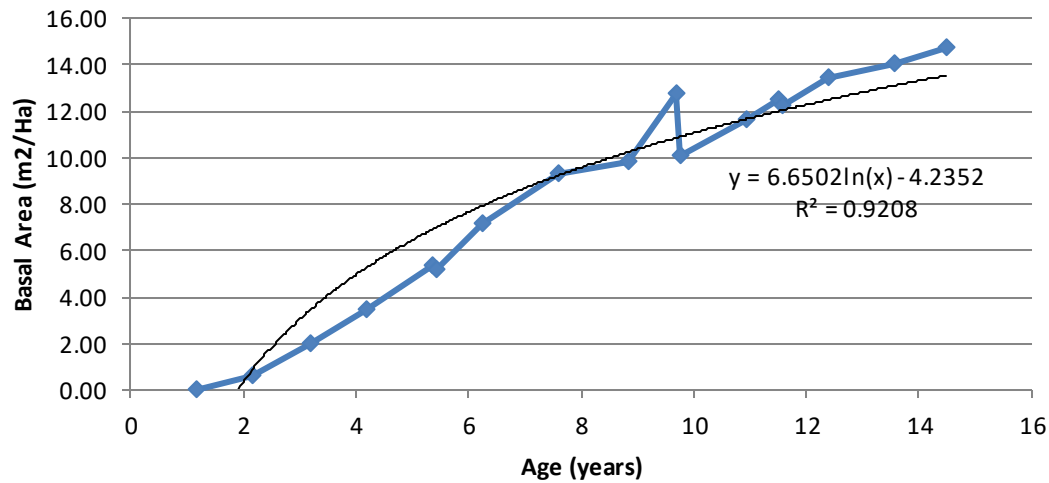
***Astronium graveolens* Dbh Growth**



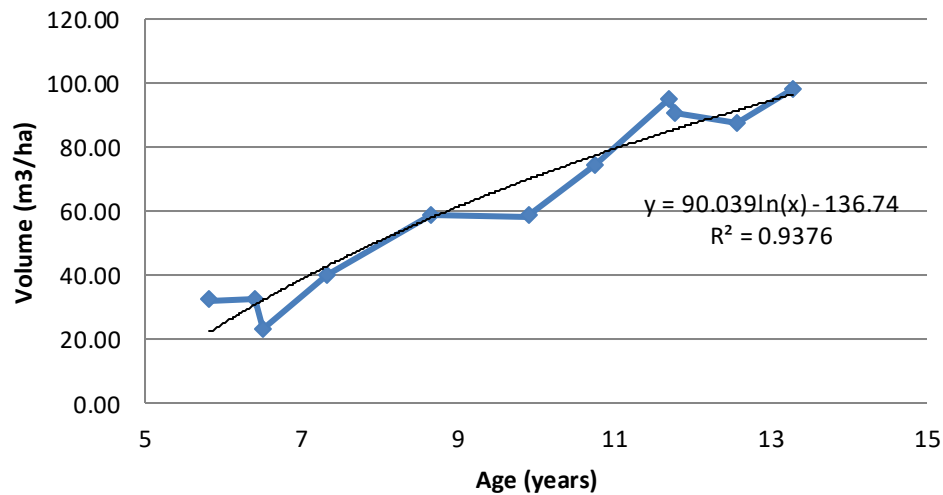
***Hieronyma alchorneoides* Dbh Growth**



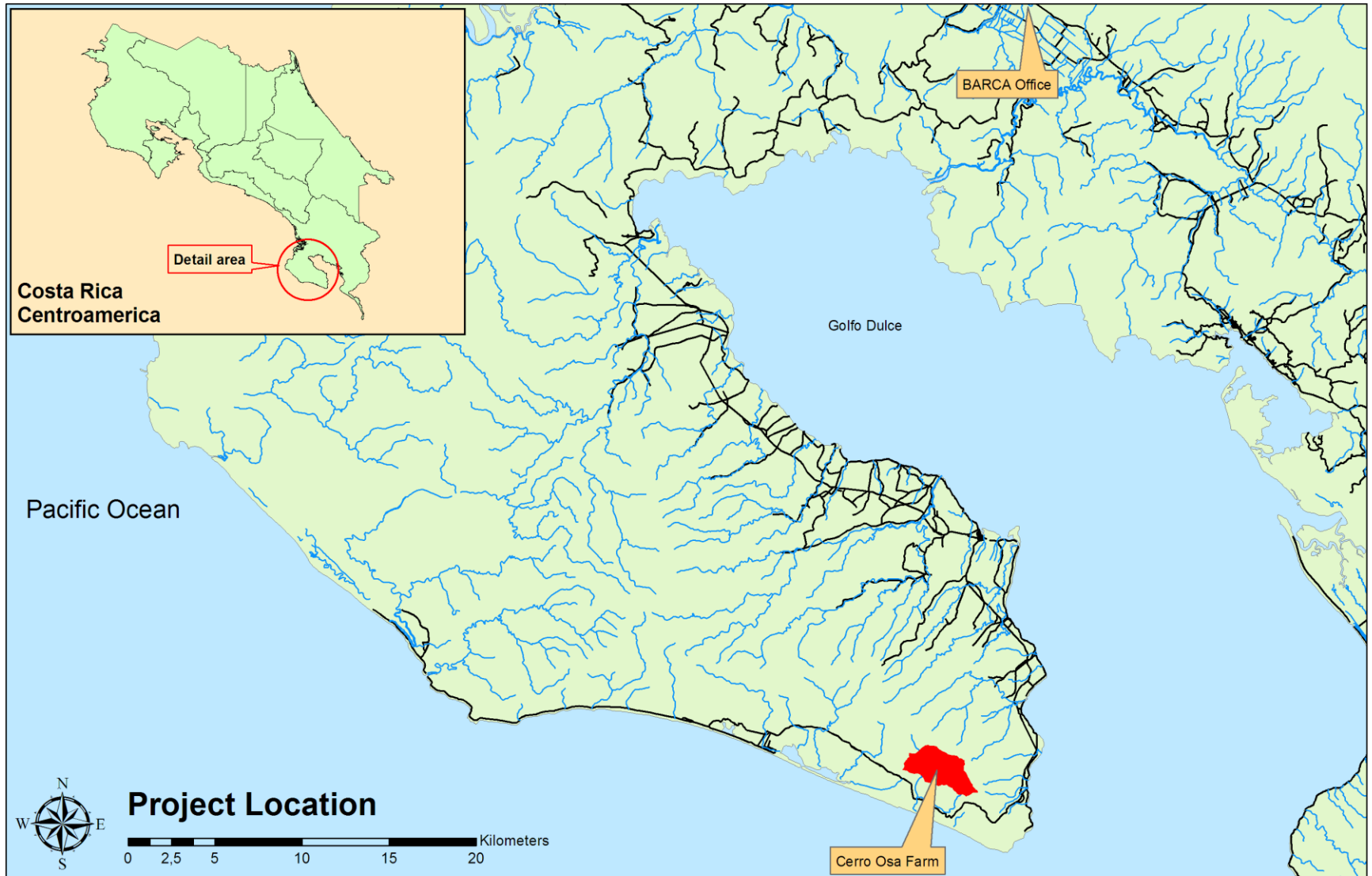
***Platymiscium pinnatum* Basal Area Growth**



***Terminalia oblonga* Vol. Growth**



NGO Friends of Osa/BARCA Restoration Initiatives



“Enrichment Planting” Friends of Osa/BARCA 2010

Common Name	Scientific Name	Number of Planted Trees
LORITO	Cojoba arborea	1600
PILON	Hyeronima alchorneoides	3000
MANGLILLO	Aspidosperma grandiflorum	2400
CRISTOBAL	Platymiscium pinnatum	3000
TOTAL		10 000

The objective of this planting was to enhance the biodiversity of existing pure reforestation stands (pochote, teak, amarillón).

New areas of the corridor have *Gmelina arborea* pure stands, and the goal is to substitute them with mixed native species stands.



LOCALIZACION REGIONAL DEL PROYECTO DE REFORESTACION EN IBIDI - COMARCA KUNA MADUGANDI

LOCALIZACION REGIONAL

LOCALIZACION NACIONAL

LEYENDA

- Camino de acceso
- Camino proyectado
- Límite de fincas

DESCRIPCION DE FINCAS

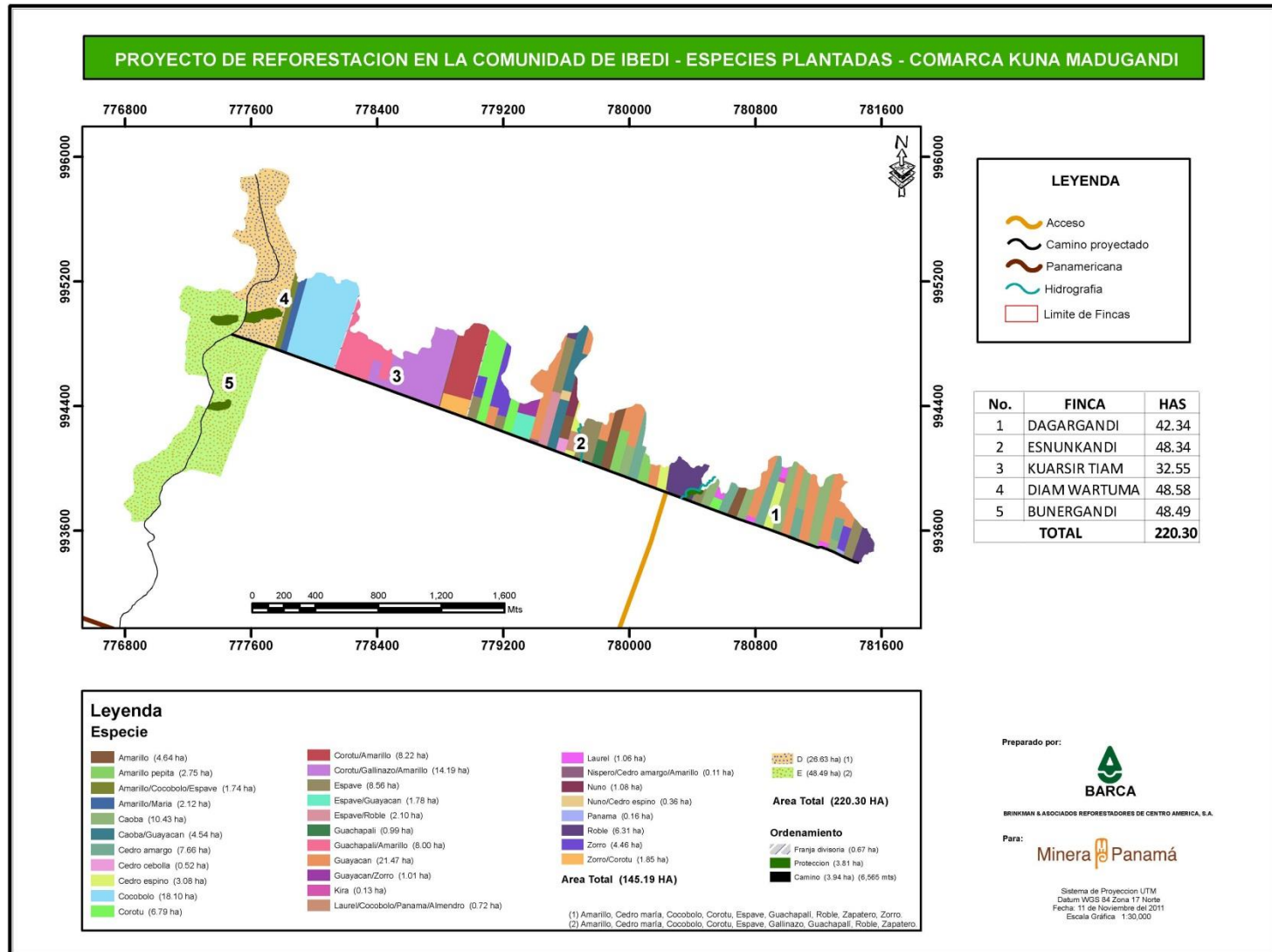
No.	FINCA	HAS
1	DAGARGANDI	42.34
2	ESNUNKANDI	48.34
3	KUARSIR TIAM	32.55
4	DIAM WARTUMA	48.96
5	BUNERGANDI	47.81
TOTAL		220.00

Preparado por:

INSTITUTO NACIONAL DE INVESTIGACIONES DE GEOTECNOLOGIA, S.A.

Escuela de Ingeniería Civil
Departamento de Ingeniería de Estructuras
Carrera de Ingeniería de Estructuras
Alcaldía de Bogotá, D.C.

Detail of the “Mosaic Planting” with native forest species in the Kuna-Madagnadí Comarca



Planted Species Kuna-Madugandí Restoration ("Social Responsibility") Project

N°	Common Name ("Panamenian")	Scientific name	# Planted Trees
1	Amarillo pepita	Lafoensia punicifolia	3,000
2	Cedro Amargo	Cedrela odorata	2,400
3	Cedro espino	Bombacopsis quinata	3,048
4	Roble	Tabebuia rosea	10,900
5	Almendro	Dipterix panamensis	8,075
6	Níspero	Manilkara Achras	240
7	Gallinazo o Tinecu	Schizolobium parahybum	21,000
8	Zorro	Astronium graveolens	8,800
9	Cocobolo	Dalbergia retusa	35,100
10	Caoba	Swietenia macrophylla	8,800
11	Guachapalí	Samanea saman	11,060
12	Guayacán	Tabebuia guayacan	20,900
13	Maria	Calophyllum brasiliensis	2,500
14	Corotu	Enterolobium cyclocarpum	20,440
15	Quira	Platymiscium pinnatum	200
16	Laurel	Cordia alliodora	3,060
17	Panama	Sterculia apetala	200
18	Zapatero	Hieronyma alchorneoides	20,000
20	Amarillo guayaquil	Centrolobium yavizanum	100
21	Amarillo	Terminalia amazonia	64,000
22	Espavé	Anacardium excelsum	14,196
TOTALES			258,019



The Comarca People need to:

- Protect their territory against “colono” invasions,
- Produce food, medicine and ornamentals,
- Produce construction materials (roofing, wooden boards and round logs, fuel for cooking)



Non-timber products:
“Guagara” (*Sabal allenii*) for roofing.



“Polycyclic Management”

Natural regeneration of trees found in project area

Initial proposed thinning regime of planted trees

Common Name	Scientific Name	Family	Thinnings	Age of Plantation (years)	Thinning Intensity %	No. of thinned trees per ha.
Jobo	Spondias mombin	Anacardiaceae				
Chirimoya	Annona pittieri	Annonaceae				
Palma Guagara	Sabal allieni	Palmaceae				
Balo	Gliricidia sepium	Papilionaceae				
Bongo	Ceiba pentandra	Bombacaceae				
Espavé	Anacardium excelsum	Anacardiaceae				
Periquillo	Muntingia calabura	Malvaceae				
Higuerón	Ficus sp	Moraceae	1º (First)	5-7	45 -50	500 -600
Tachuelo, Alcabú	Zanhtoxylum setulosum	Rutaceae	2º (Second)	10-12	25 -30	150 -155
Guarumo	Cecropia peltata	Urticaceae	3º (Third)	14 -16	25 -30	110 -115
Jobo lagarto	Sciadodendron excelsum	Araliaceae	4º (Fourth)	18 -20	20 -25	60 -70
Membrillo	Gustavia superba	Lecythidaceae	5º (Fifth)	25 -27	20 -25	50 -55
Cuipo	Cabanillesia pyramidale	Bombacaceae	6º (Sixth)	30 - 33	20 -25	40 -45
Coco Olla de mono	Lecythis sp	Lecythidaceae	Final Cut of Original planted trees	35	100	170 -180

Key Aspects for Restoration:

- Best available genetic stock for reproduction,
- Good Site and Micro-site/Species Correlations, and knowledge of forest species, tolerances.
- Excellent Management (silviculture and human resources)
- Incorporation of non-timber species/products,
- Work at grass-roots level, understanding local laws and traditions,
- Search for “buffer zones”, communal areas, if possible incorporate “environmental service payments” concepts
- Understand and work with natural regeneration.

Select “Plus Trees”

15 year old *Astronium graveolens*. BIRD Farm



15 years old *Platymiscium pinnatum*, Bird Farms

***P. pinnatum* 15 cm dbh**



***P. Pinnatum* 22 cm dbh**



15 years old *Platymiscium pinnatum*,
dhb > 30 cm, Bird Farm.



Phenotype Selection:

- a) Associated to Volume (less heredability)
- b) Associated to Quality (greater heredability)

Circular Plots (10 to 20 m radius) and select best, 4-8 trees around the “plus potential one”.

$$\text{Superior Tree (\%)} = ((\text{plus tree} - \text{neighbor tree}) \div (\text{neighbor tree})) * 100$$

Hieronyma alchorneoides “plus tree collection”



Site/Species Selection

Greater range of sites:

- *Tabebuia rosea*, *Terminalia amazonia*, *Vochysia* (acid soils)...

Wetter Areas:

- *Anacardium excelsum*, *Pterocarpus officinalis*,...

Benefits with some shade:

- *Platymiscium pinnatum*, *Calophyllum brasiliense*...

Drier shallower soils:

- *Dalbergia retusa*, *Byrsonima crassifolia*...

Below Canopy:

- *Miconia guianensis*, *Pouteria* sp, *Bromsimum* sp,...

Soil and Soil History

Inceptisols

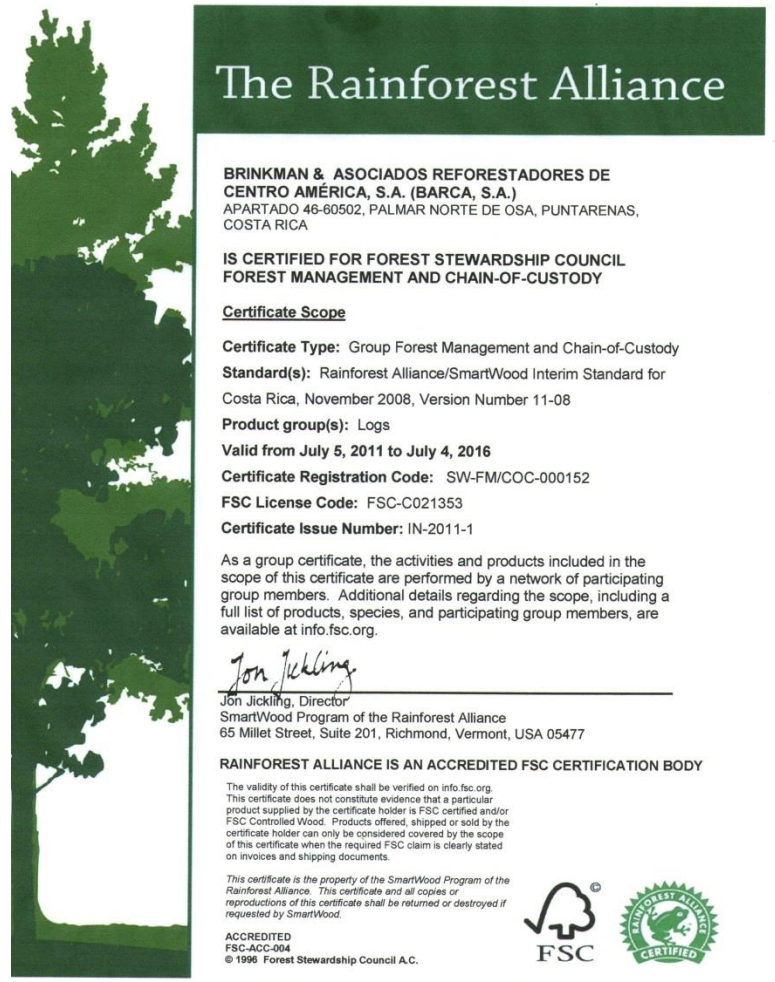


Ultisols



Also will greatly affect natural regeneration along with closeness to forests or forest patches.

Management and Human Resources



Systems
Protocols
Crew size
Training
Auditing
Ocup. Health
Fair Wages
Motivation
Know-How

Non-Timber Forest Products

Zamia skinneri



- **Vines and Palms:** for handicrafts (baskets, ornaments..)
- **Medicinals:** (*Psychotria ipecacuanha*, *Smilax*(s), *Quassia amara*..)
- **Ornamentals:** (*Zamia sp.*, *Philodendron sp.*, *Heliconia sp.*..)
- **Food:** (beans, corn, heart of palm, ginger..)
- **Roofs** (guagara..)
- **Fuel**

Community: work at grass-root level



Indigenous traditions and laws
National laws and requirements
Work ethics and group organization
Social/Ecological Restoration Sustainability
Jobs, products,.

Restoration Areas Where?

- Comarca/Indigenous areas
- Communal Areas
- “Protection Areas”
- Government Areas
- Private Sector “social responsibility”
 - “Environmental service payments”
(carbon footprint, water, soil
conservation, biodiversity, landscape)

The land use capability, the soil fertility and actual forest cover, along with social or community needs and actual government politics, laws, and legal security, will affect the modality and sustainability of the restoration of forests in the tropical countries.





Thank you!