

Designing Mixed-Species Native Tree Reforestation Trial in the Philippines

Mariya Chechina

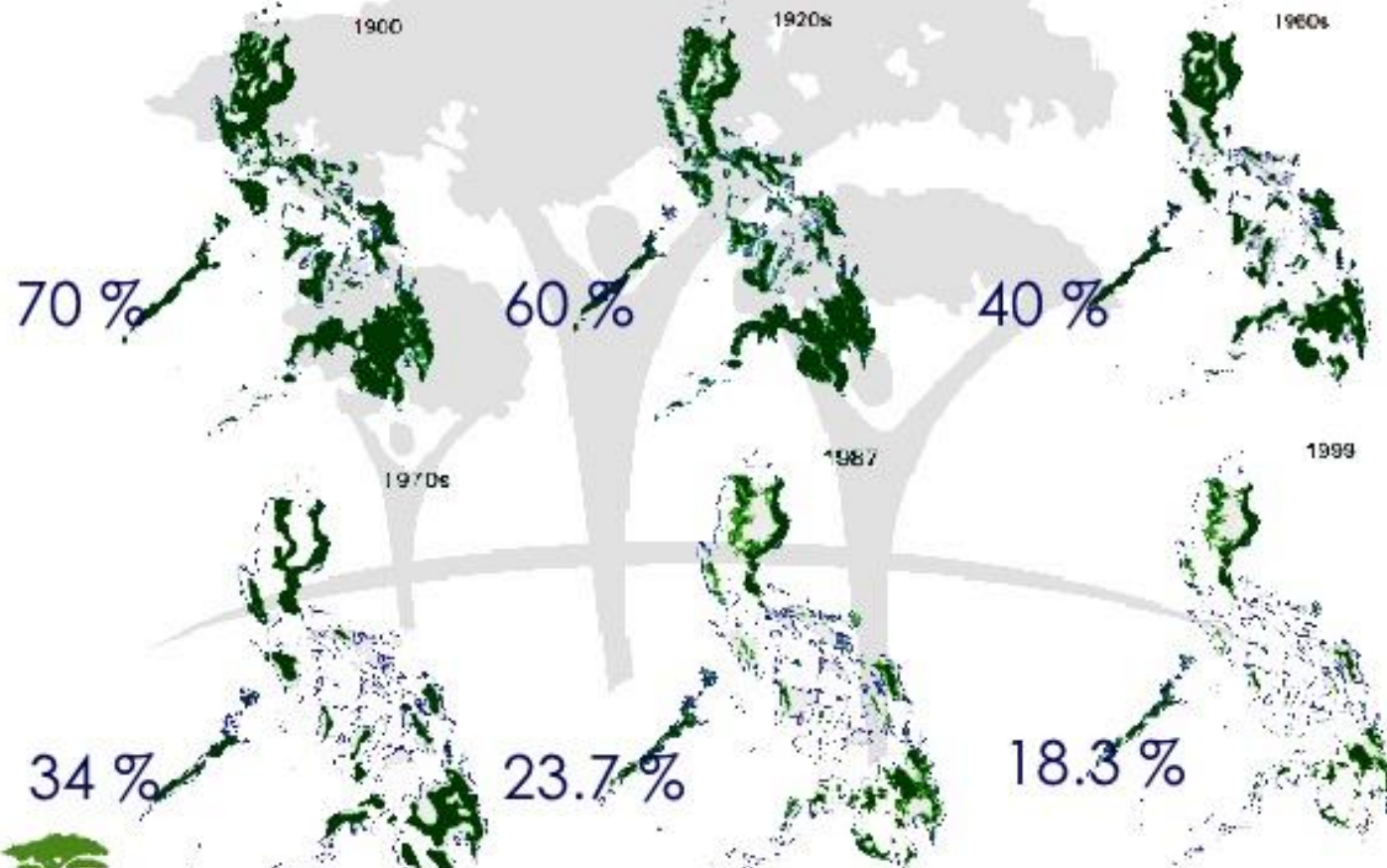
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Deforestation in the Philippines

Extent of Forest Cover Loss for the last 100 years



Source: Dolom, 2006; Adapted from Environmental Science for Social Change, 1999



National Greening Program (NGP)



Management issues

Native forests



VS.

Plantations of exotics



Lack of silvicultural knowledge & seeds

Show low survival and growth in trials

Limited data about site-tree matching

Available seed banks

Fast growing

Data on propagation and planting

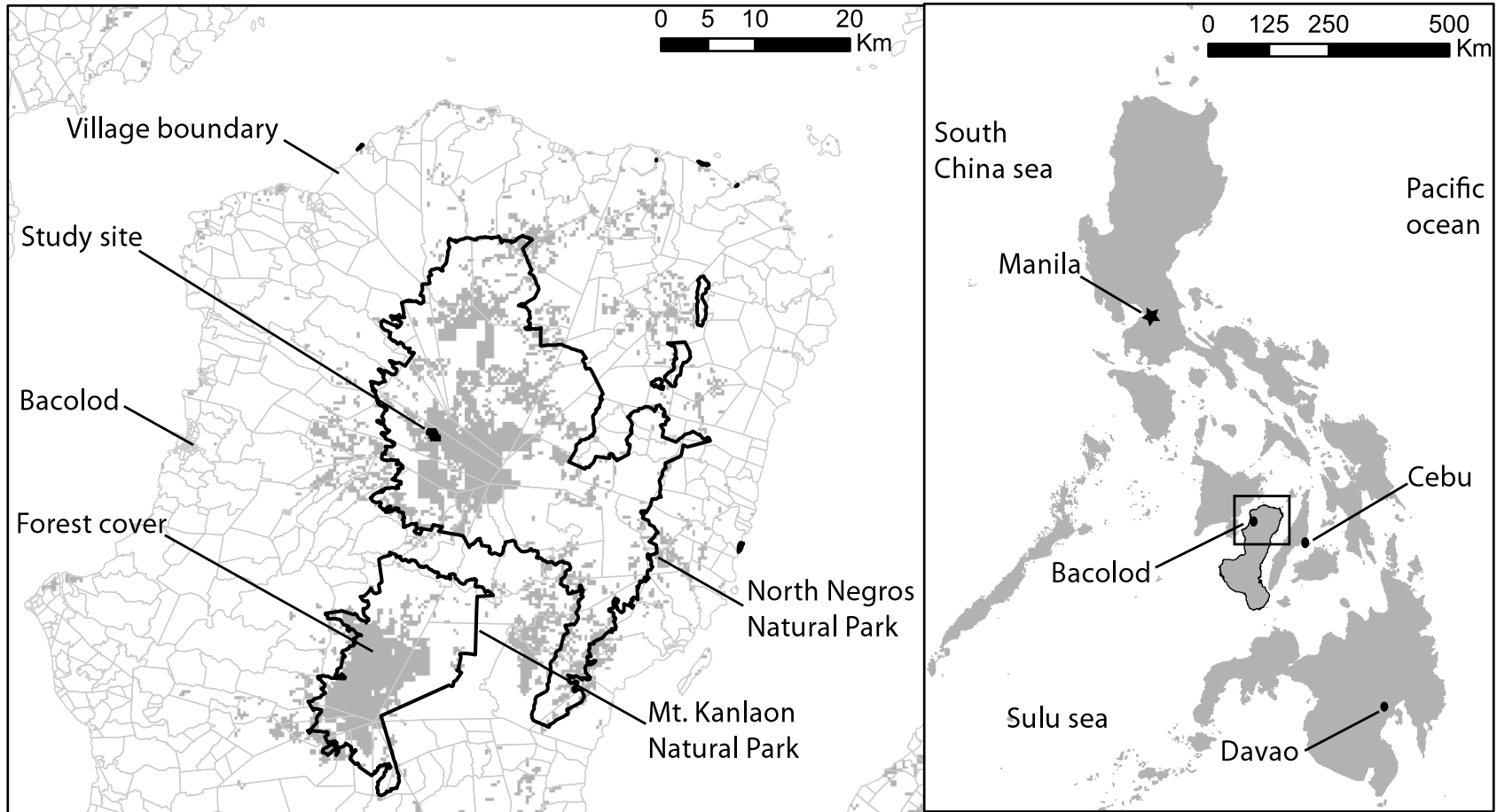
Research Objective

To establish mixed-species native tree trials for biodiversity and forest conservation based on ecological data

Native forests

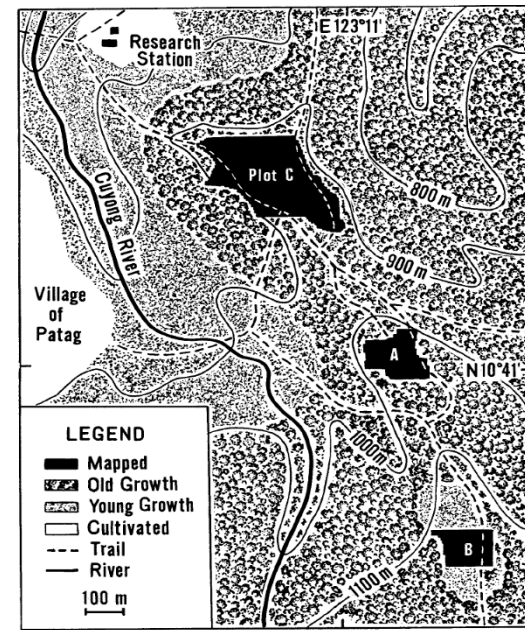


Long Term Ecological Plots



Forest plots

Early-successional Plot (A): 25 yrs old
Mid-Successional Plot (B): 50 yrs old
Late-Successional Plot (C): 100 yrs old



Plot A

Plot B

Plot C



Ecological data collection

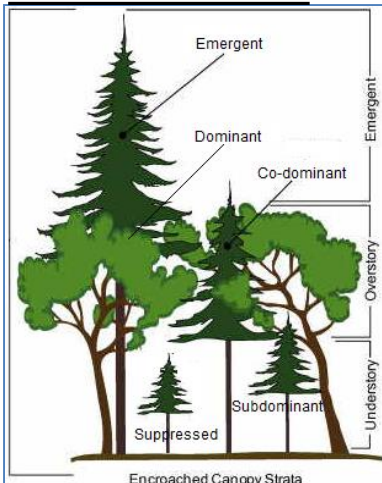
5 X 5 Meter Sub Plots and xy Location



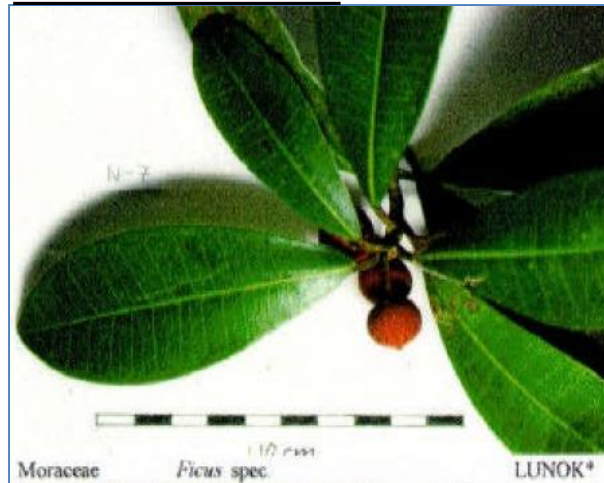
Diameter at Breast Height (DBH)



Crown Position



Local Tree Name



Permanent Tags



Native species traits

Frequency

Number of trees in each species in each plot

Basal Areas

Total area of all trees in a species in each plot

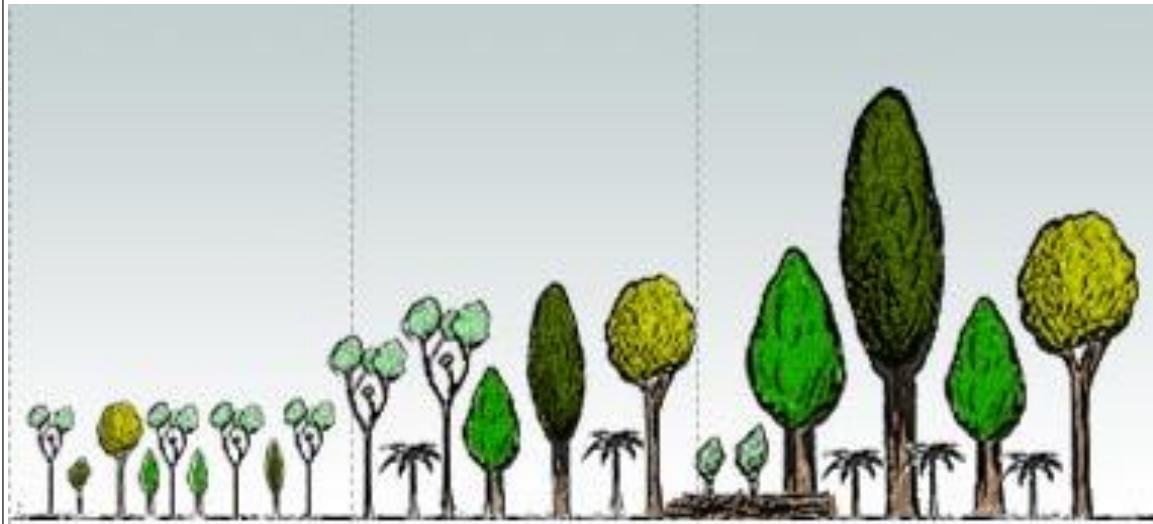
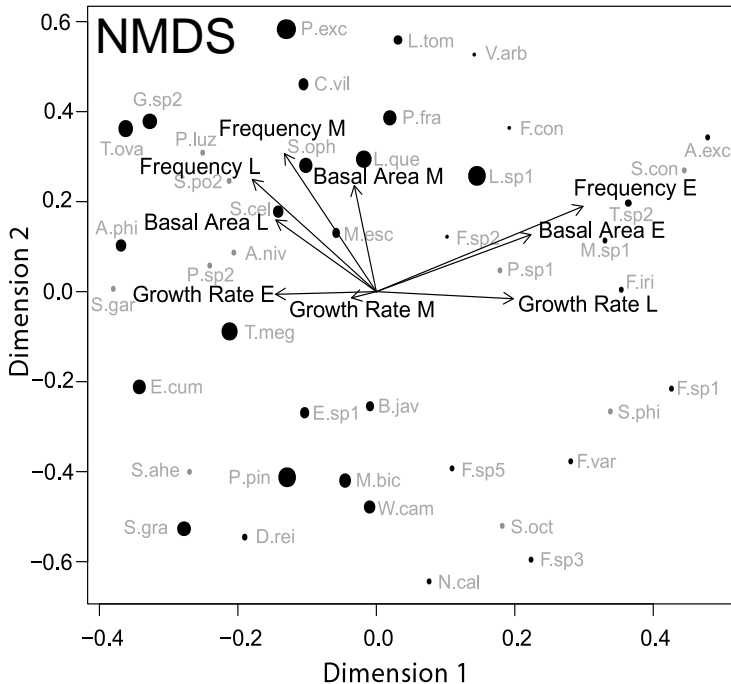
Growth rates

Difference in DBH of each species in each plot

Seed size

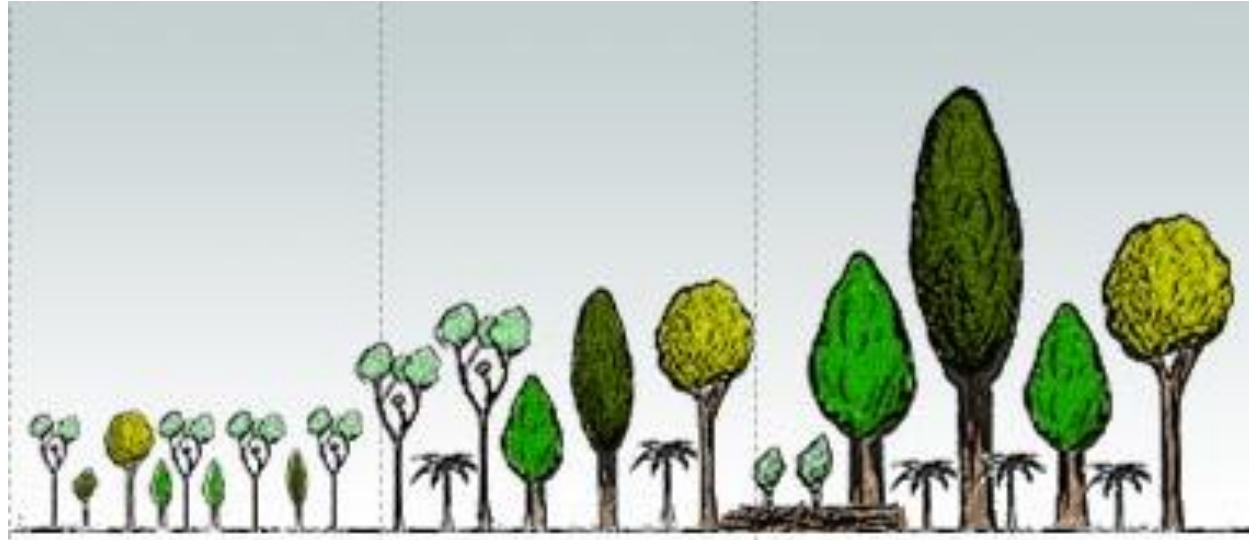
Derived from Hamann et al. 1999

Frequency (F) and Basal Area (BA) are Indicators of Succession



Early successional: High F and BA in young forest
 Mid Successional: High F and BA in mid-growth forest
 Late Successional: High F and BA in old growth forest

Growth Rates (GR) of Native Species



Early successional: High GR of trees recruited in gaps of old forest
Late Successional: High GR of trees recruited in young forest

Identified Succession of Native Species

62 classified of 118 identified

- 20 early successional species

Alphitonia excelsa	Ficus spp. 6	Shorea contorta
Ficus congesta	Ficus variegata	Schefflera octophyllum
Ficus irisana	Lithocarpus spp	<i>Spiraeopsis philippinensis</i> Elm.
Ficus spp1.	Litsea tomentosa	<i>Trema orientalis</i>
Ficus spp2.	Mallotus spp.	<i>Ternstroemia spec.2</i>
Ficus spp. 3	Neonauclea calycina	<i>Vernonia arborea</i> Ham.
Ficus spp. 5	Palaquium spp.	



- 22 mid successional species

<i>Garcinia binucao</i>	<i>Dillenia philippinensis</i>	<i>Turpinia ovalifolia</i> Elm.
<i>Garcinia brevirostris</i>	<i>Dillenia reifferscheidia</i>	<i>Canarium villosum</i> .
Garcinia spp.1	<i>Ficus benjamina</i>	<i>Litsea quercoides</i> Elm.
Garcinia spp2	<i>Ficus chrysolepis</i>	<i>Myrica esculenta</i> Buch.-Ham.
<i>Syzygium gracile</i>	Ficus sepiegata	<i>Platea excelsa</i> (Heine) Sleum.
<i>Syzygium</i> sp. 67	Ficus spp. 4	<i>Prunus fragrans</i> (Elm.) Kalkm.
<i>Bischhofia javanica</i>	Ficus spp. 8	<i>Siphonodon celastrineus</i> Griff.
		<i>Symplocus ophirensis</i> Clarke



- 20 late successional species

<i>Arthrocarpus heterophyllus</i>	<i>Macaranga bicolor</i>	<i>Symplocus ahernii</i>
<i>Acer niveum</i>	<i>Memexylon brachybotris</i>	<i>Shorea almon</i>
Agathis philippinesis	<i>Memexylon cumingii</i>	<i>Syzygium garciae</i>
<i>Actinodaphne</i> spec.	<i>Memxylon</i> sp2	<i>Shorea polysperma</i>
<i>Cinnamomum mercadoi</i>	<i>Palaquium luzoniensis</i>	<i>Ternstroemia megacarpa</i>
<i>Elaeocarpus cumingii</i>	<i>Pometia pinnata</i>	<i>Weinmania camiguinensis</i>
<i>Elaeocarpus</i> sp.	Pouteria sp.	



Social Preference of Native Trees



47 respondents

List of tree species and their uses

Preference of Native Trees (N=35/71)

	<i>Species (Code)</i>	<i>Uses</i>	<i>Rank</i>
Almaciga	<i>Agathis philippinensis (A.phi)</i>	Lumber, construction, Varnish, Charcoal	43
Nato-w	<i>Palaquium luzoniensis (P.luz)</i>	Lumber, construction, poles, edible fruits	25
Danlugan	<i>Shorea contorta (S.con)</i>	Lumber, construction, charcoal, medicinal	23
Odling-w	<i>Garcinia brevirostris (G.bre/G.sp2)</i>	Lumber, construction, food for birds	20
Odling-r	<i>Syzygium gracile (S.gra/S.sp2)</i>	Lumber, construction, food for pigs	20
Kaningag	<i>Cinnamomum mercadoi (C.mer)</i>	Construction, charcoal, firewood, food, medicine	19
Panobul	<i>Platea excelsa (P.exc)</i>	Food, habitat for birds and monkeys, medicine	16
Tangile	<i>Shorea polysperma (S.pol)</i>	Lumber, construction, poles	15
Katmon	<i>Dillenia philippinensis (D.phi)</i>	Edible fruits, food for birds	14
Bagasantol	<i>Prunus fragrans (P.fra)</i>	Construction, poles, fruits, food for birds	14

Rank = number of respondents + number of uses

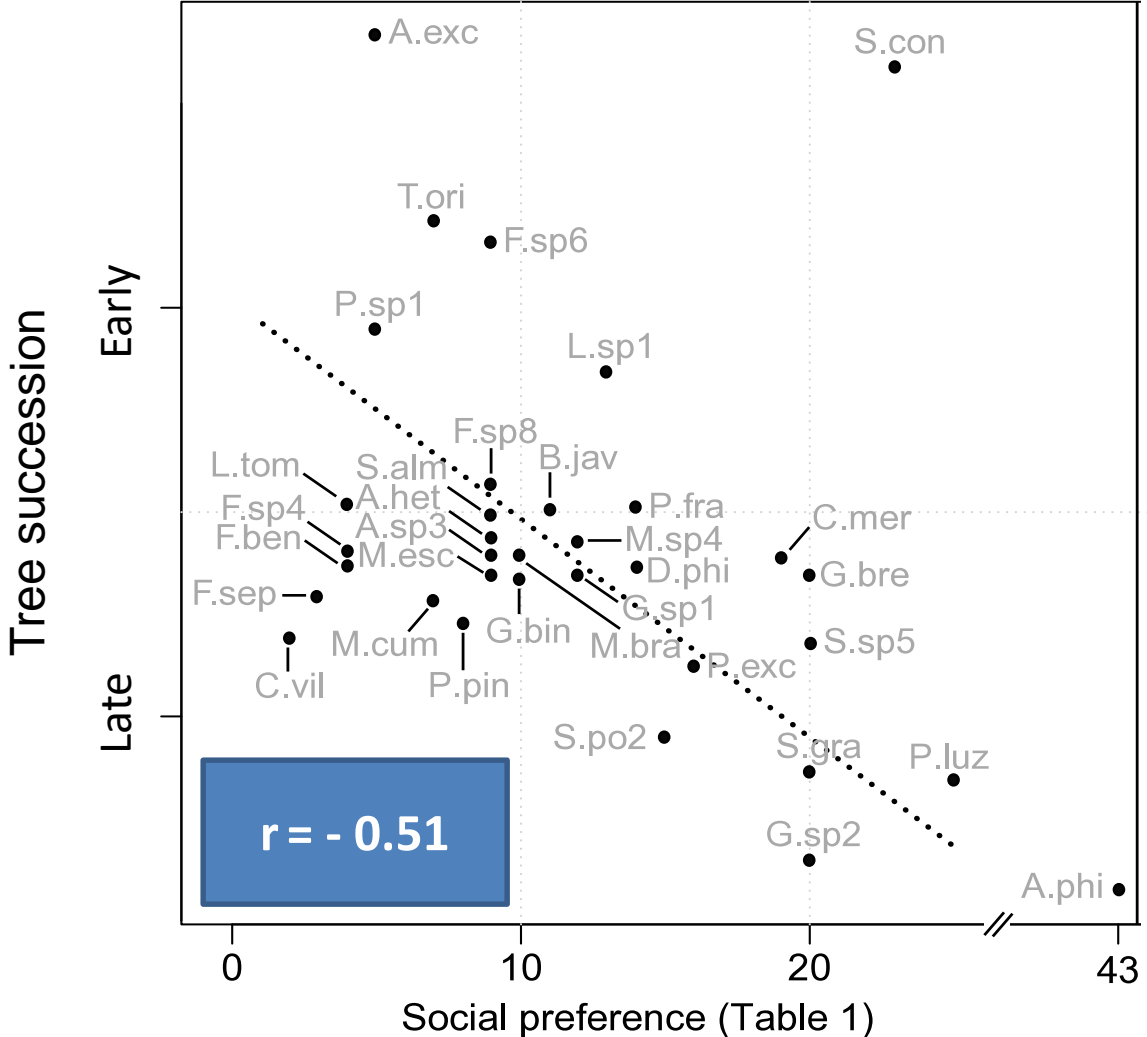
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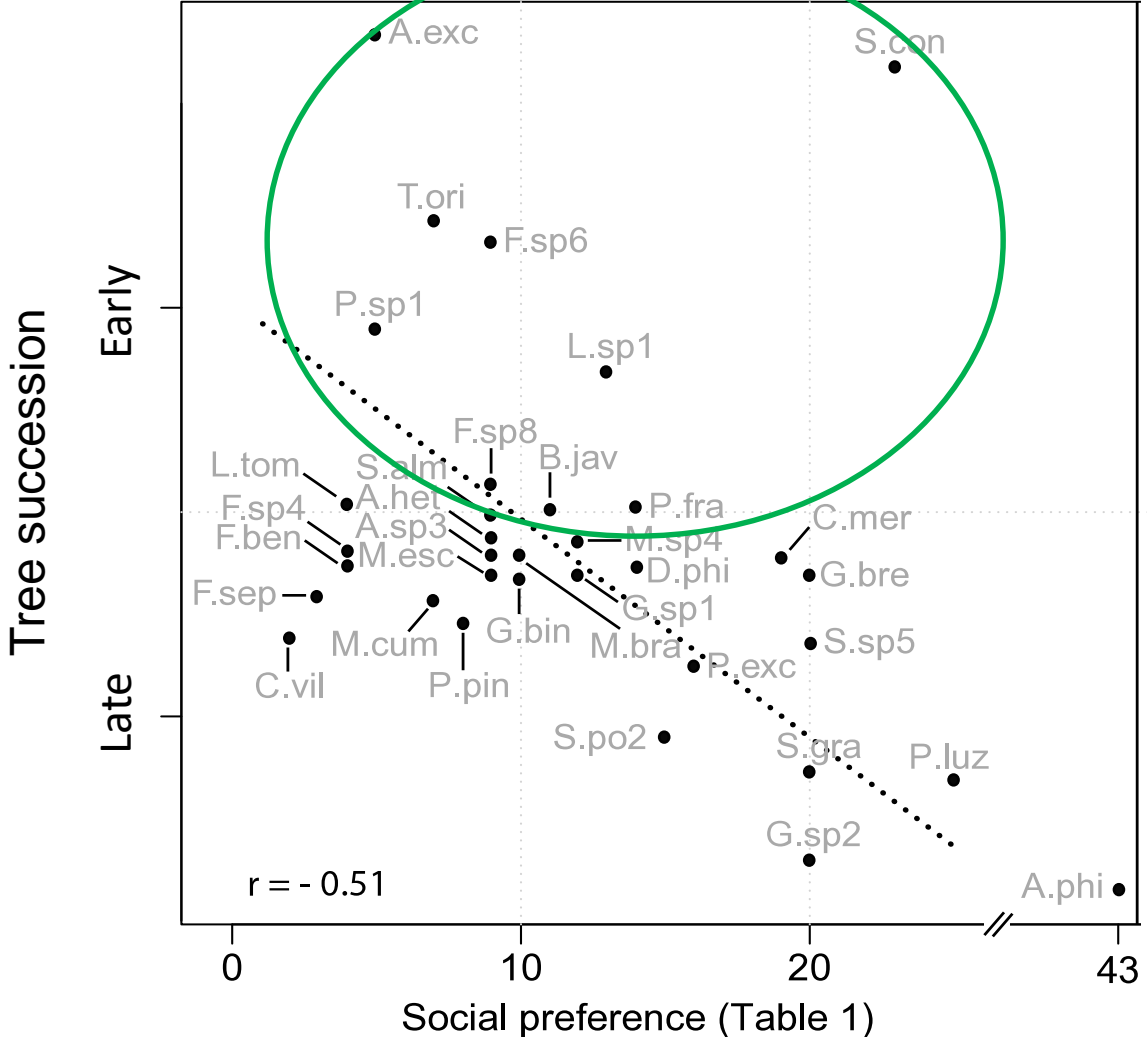
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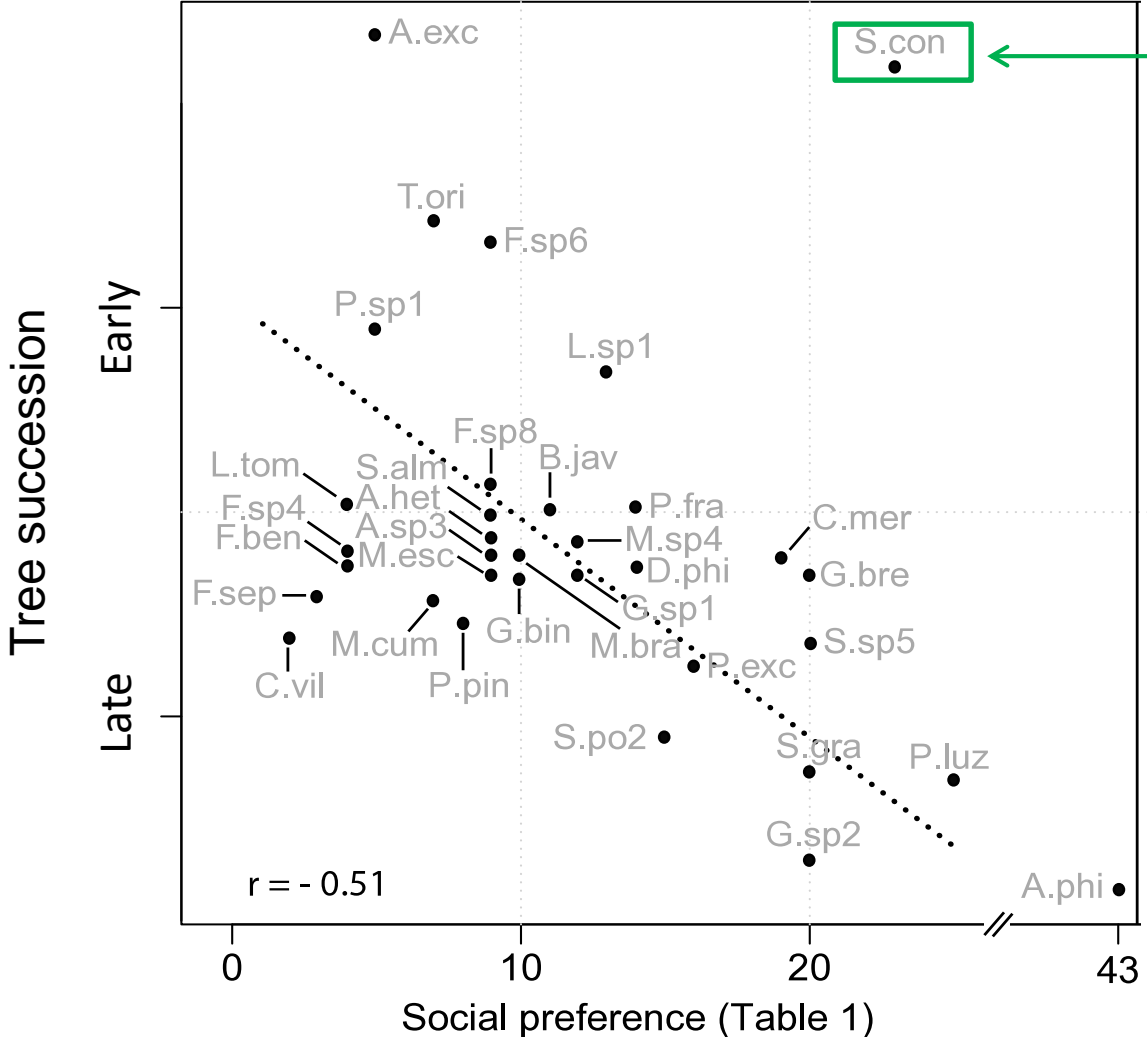
Ecologic and socioeconomic preference



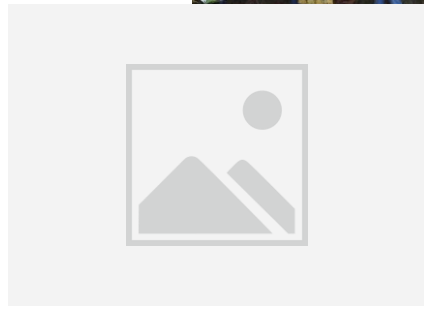
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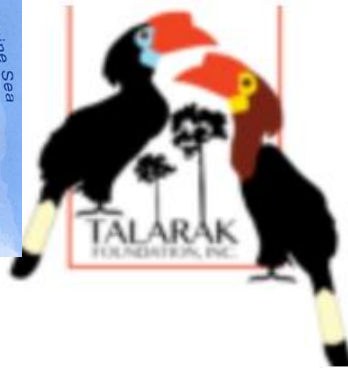
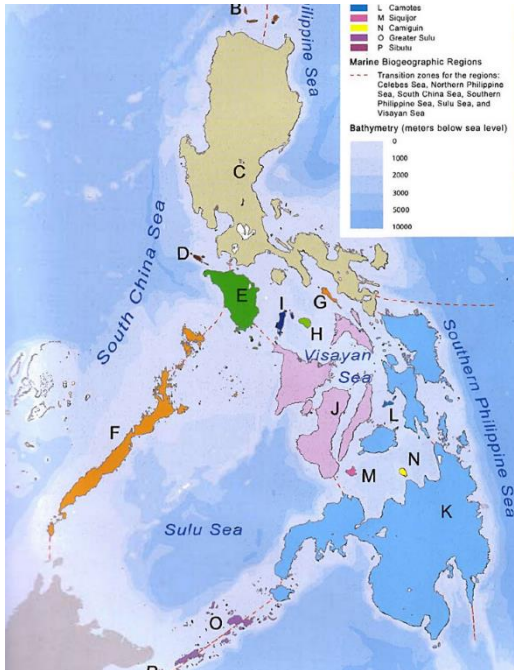
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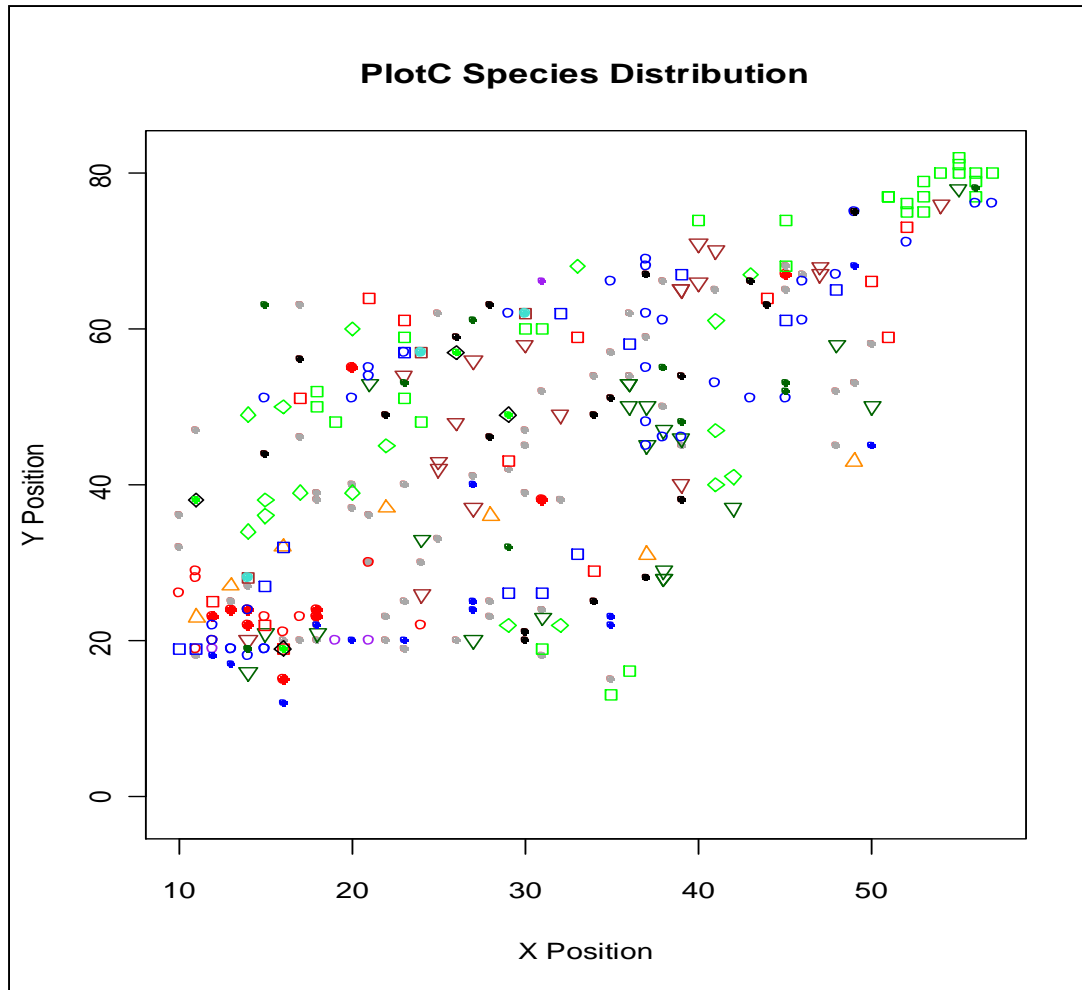
S.con ← *Shorea contorta*



Synthesis of Native Species Plantations



Spatial Association of Tree Species



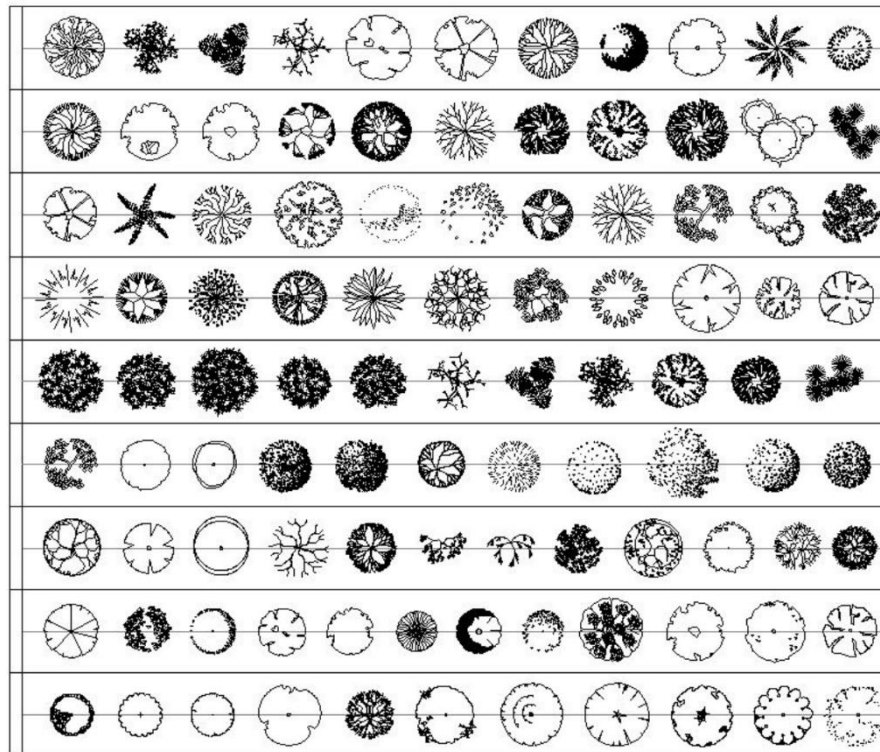
Growth rates versus
competition index (USC
work)

Neighborhood modeling
(Lasky et al. 2014)

Experimental Trial Design

Experiment 1: Randomized block design in shade vs. no shade

Experiment 2: Combinations chosen by spatial association in shade vs. no shade

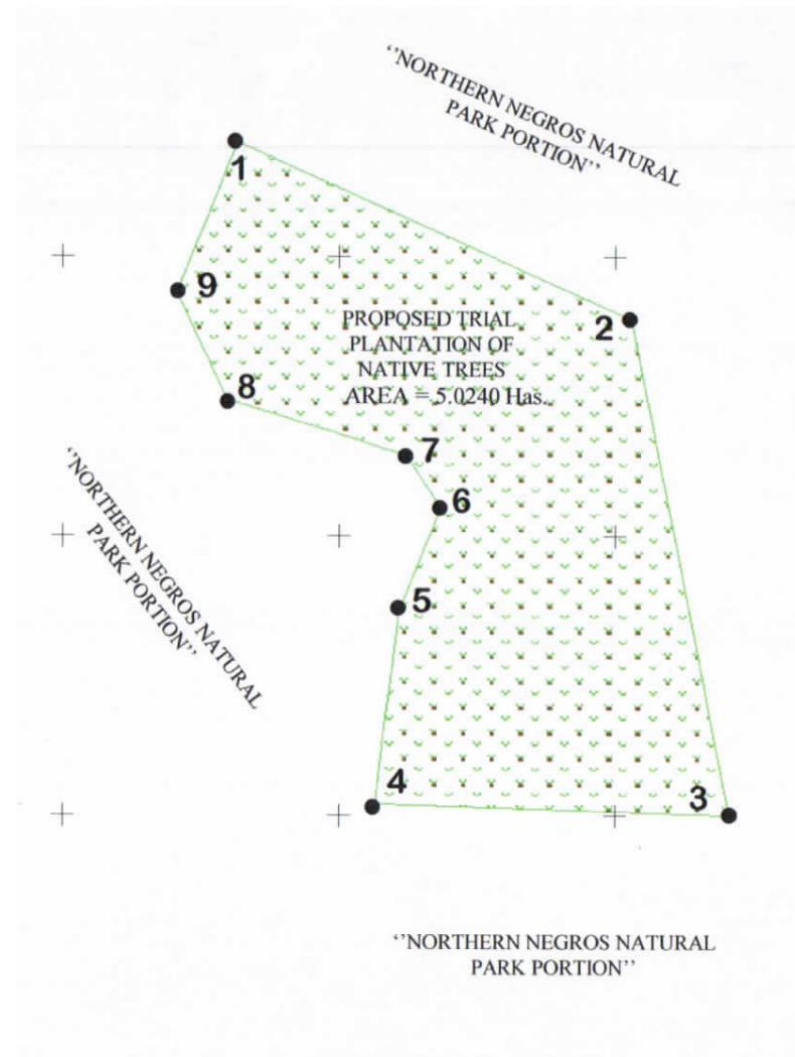


Trial Site Assessment: Inside Protected Forest Land

Cogon grass and Caliandra shrub

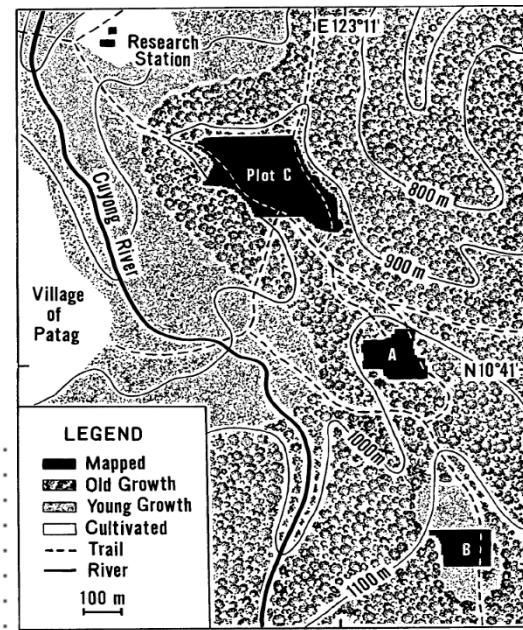
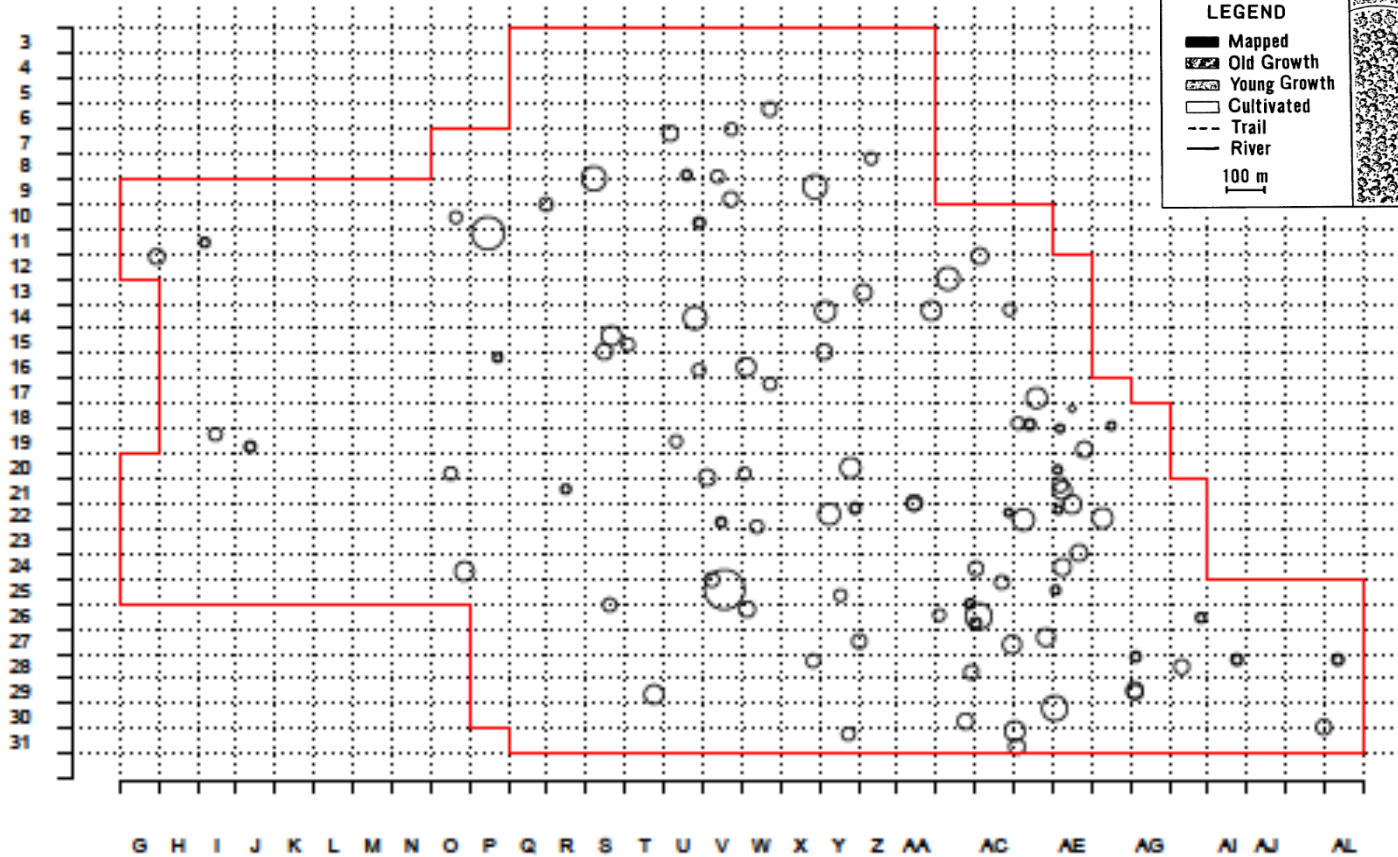


Located on poor acidic soils



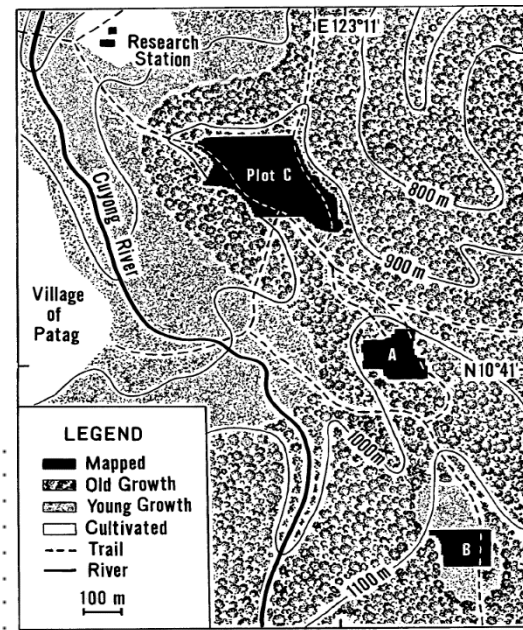
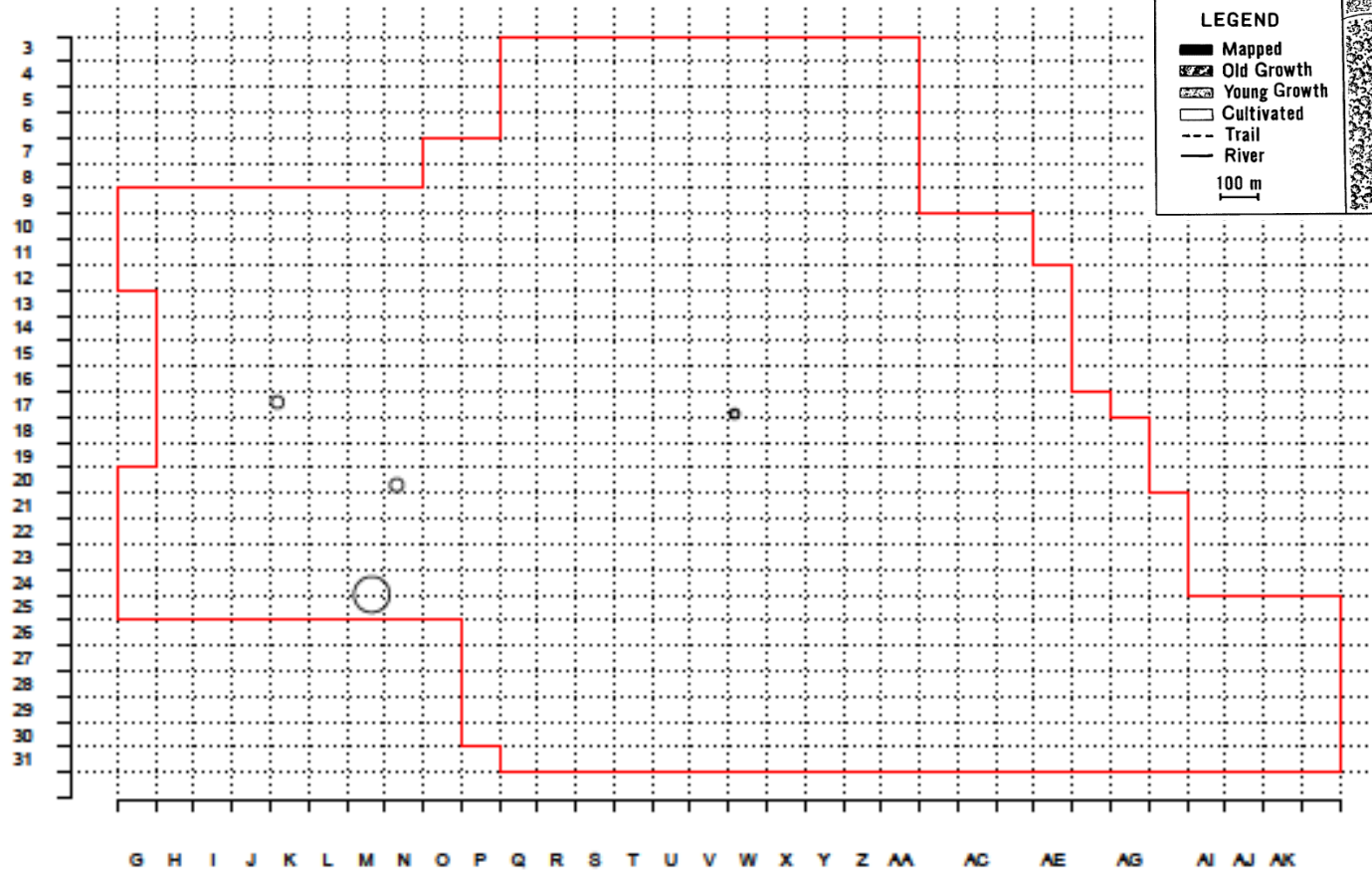
Wildling Collection

Ficus irisana BiriBiri



Wildling Collection

Parashorea melaanoan **Bagtican**



Nursery Establishment

Guide to Quality Seedling Production in Smallholder Nurseries



Target: ~40 native species (including 20 early successional)



Monitoring of Plantations

Leaf
number



Growth, survival &
base diameter



Rate of
photosynthesis



Project Green Light



Endorsement of Municipal Environment and Natural Resource Office of Silay City



Endorsement of DENR of Bacolod City

SCWA

MOA with Silay City Water Association

PAMB

Research Gratuitous Permit from Protected Areas Management Board of Bacolod

Acknowledgements



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