Typology and dynamics of Agroforestry systems in the mountains of Timor Leste

First results of a new study

The objective of this study is to provide a description of traditional agroforestry systems present in Timor Leste. In the Baucau region, located in the north-east of the country, at altitudes 0-1500 m, with rainfall 1000-2000 mm/year, the first inventories and surveys have identified 5 types of AFS which vary greatly in function of their tree density.

The pictures below illustrate the different AFS from the lowest to the highest tree density system: i) Crop system including a Fallow phase (3 months to 10 years) (CF), ii) SylvoPastoral system (SP); iii) Young Agroforest (YA); iv) Home Garden (HG); v) Forest Garden (FG). The Tab A aims to describe the different characteristics of these AFS that led to this typology, especially through literature references and field observations.

Typology reference adapted from "An Introduction to Agroforestry", P.K.R Nair (1993)	HOME GARDEN	YOUNG AGROFOREST	SYLVOPASTORAL	CROP SYSTEM INCLUDING A FALLOW PHASE	FOREST GARDEN
System	Agrosylvopastoral	Agrisylviculture	Sylvopastoral	Agrosylvopastoral	Agrisylviculture
Subsystem (Practices)	Homegarden involving animals (Multistorey combination of various trees, crops and animals around homesteads)	Plantation crop combination ((i) Integrated multistorey (mixed, dense) mixtures of plantation crop, (ii) Intercropping with agricultural crops)	Trees on rangelands or pasture (Trees scattered irregularly or arranged according to some systematic pattern)	Multipurpose trees and shrubs on crop land (Trees scattered haphazardly or according to some systematic patterns on bunds, terraces or plot/field boundaries)	Multilayer tree gardens (multispecies, multilayer dense plant associations with no organized planting arrangements)
Temporal arrangement of trees	Interpolated	Interpolated	Coincident	Intermittent	Coincident
Species diversity					
Density of trees inside the plot (low, medium, high)	Medium-High	Medium-Low	Medium	Low	High
Number of vegetation layer (herbaceous, creeper, bush, young trees, old trees)	5	5	5	2 to 4 (no young trees)	5
Main crops and animal husbandry	Corn, cassava, taro, yam, vegetable, condiment, banana, bamboo, papaya cucurbitaceae, beans, chili, pigs and chicken.	Chili, papaya, condiment, vegetable, banana	Horses, cows, buffalo, goats and sheep	Corn, peanut, sweet potatoes, cucurbitaceae, beans, horses, buffalo, goats and sheep	Yam, condiment
Main trees planted	Citrus, Coconut, Breadfruit, Mango, Candlenut, Teak, Gmelina sp.	Teak, Mahogany, Gmelina sp., Coconut, Citrus, Gliricidiae sp.	Teak	-	Palm (betel, coconut), Mango, Breadfruit, Gmelina sp., Teak, Candlenut
Main trees not planted	Palm (Borassus sp., Corypha sp.), Kussum tree, Goyava, Leucaena leucocephala, Sesbania grandiflora, Tamarind, Wild candlenut, Kapok/cotton tree	"Narlai" (Gariuai), Kussum tree, Rosewood (Samalari), Palm (Borassus sp.), Sesbania grandiflora, Leucaena leucocephala	Eucalyptus alba and "Narlai" (Gariuai), Rosewood (Samalari), Tamarind, Kussum tree, Ziziphus mauritiana, Delonix regia, Sesbania grandiflora, Leucaena leucocephala	Eucalyptus alba and "Narlai" (Gariuai), Rosewood (Samalari), Tamarind, Kussum tree, Ziziphus mauritiana	Sugarpalm

Tab A : AFS Typology

Photo credit : author 1
Location : Gariuai and Samalari villages, Baucau, Timor Leste

The Figure A aims to propose three different hypothesis on the evolution of these AFS :

- An historical evolution that outlines the main agricultural transformations and the transition from one AFS to another leading to an increase in biodiversity. However, it has been observed that home and forest gardens are often managed by older people for varied but self-consumed crops.
- An ecological regression hypothesis in the event that young people are more attracted to annual crop systems, more marketable, that would allow them to support the household economy. Although these crops are easier to cultivate in less dense AFS. In a context of demographic growth, they could be attracted to cut the forest garden grown by their elders to establish less dense systems such as crop systems including a fallow phase (CF).
- The last hypothesis tends to illustrate a more suitable ecological evolution for these old forest gardens (FG) by transforming them into home gardens (HG) or renewing them with more productive young agroforest (YA) that would adapt to the need of young people and provide valuable product. This evolution can eventually take place in the form of "clearings" or "patch-work", to avoid losing the ecological advantages of these FAS
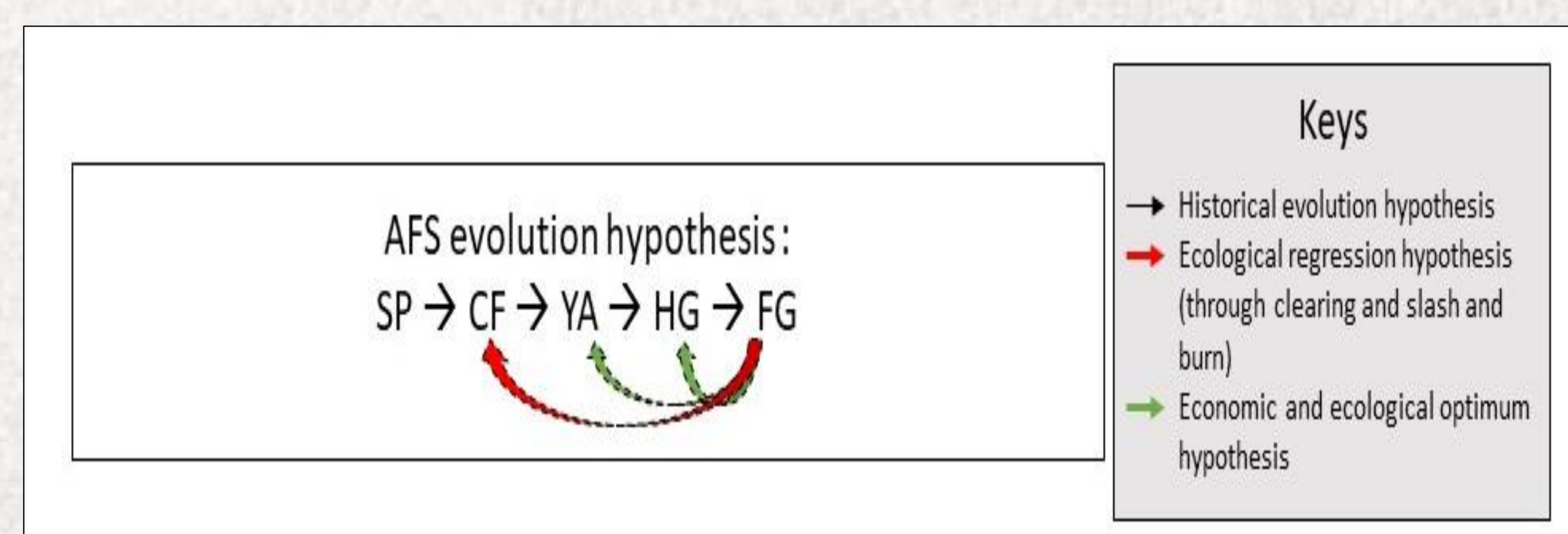

AFS evolution hypothesis :
SP → CF → YA → HG → FG

Keys
→ Historical evolution hypothesis
→ Ecological regression hypothesis (through clearing and slash and burn)
→ Economic and ecological optimum hypothesis

Figure A : AFS Dynamics

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