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

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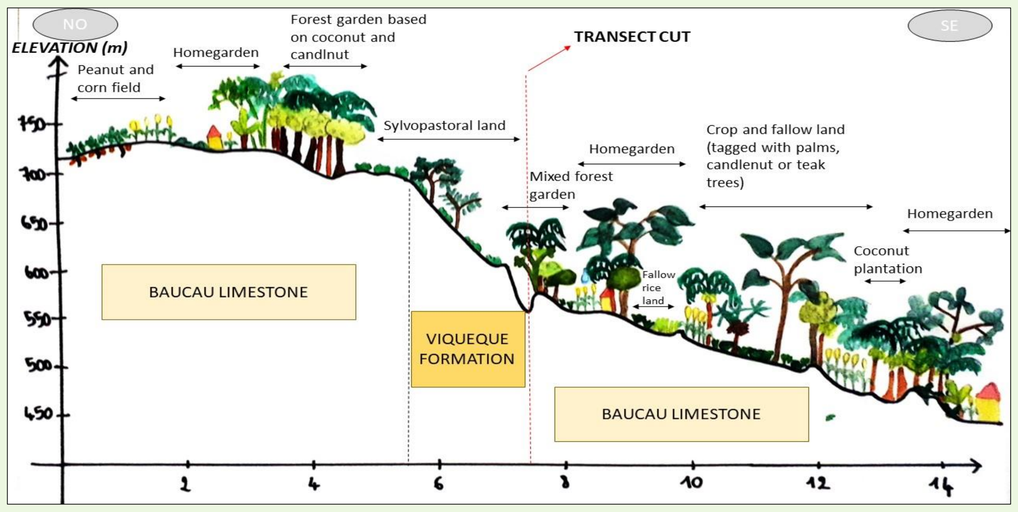
Background and aims

In Timor-Leste, a country located in the south-east of the Indonesian archipelago, GIZ has initiated a project with the aim of developing agroforestry systems (AFS) that are productive, profitable and preserve natural resources. Since 2020, CIRAD researchers join the project and wish to describe the diversity of traditional AFS existing in the country.



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Methods

In the Baucau region, located in the north-east of the country, at altitudes 0-1500 m, with rainfall 1000-2000 mm/year, first inventories and surveys have identified 5 types of AFS which vary greatly in function of their tree density. 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)**. Further biomass inventories, soil observations and sampling, participative mapping activities along with Peeble Score Methods and semi-structured interviews contributed to characterize the AFS at a socio-economic, ecological and agricultural practices level..

Results

AFS description is resumed in the following figures and table.

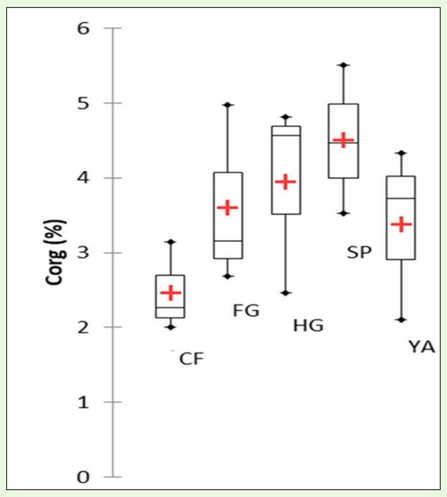

Figure 1: Organic carbon content at 0–10 cm soil layer as a function of AFS
(CF= Crop and fallow; ; FG= Forest garden; HG= Home garden; SP= Sylvopastoral; YA=Young agroforest). The boxes represent the first and the third quarti

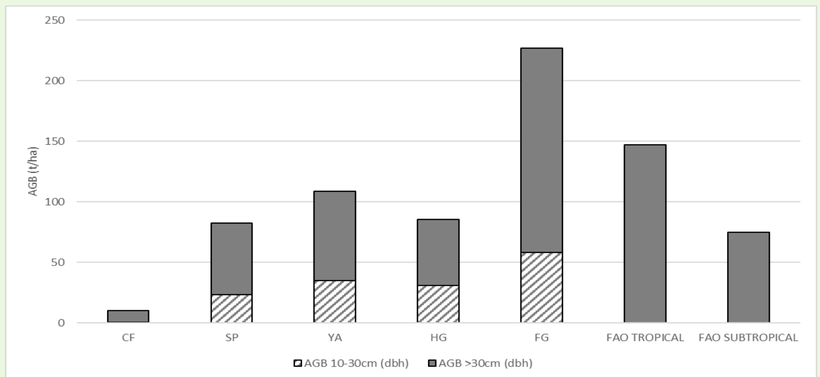

Figure 3 : Comparison of above-ground biomass (AGB) between 5 AFS in Gariuai village
(CF= Crop and fallow;; FG= Forest garden; HG= Home garden; SP= Sylvopastoral; YA=Young agroforest) and FAO standards taking into account tree DBH between 10-32cm and more than 32cm

Table 1: AFS species characteristics

ENGLISH NAME	CROP SYSTEM INCLUDING A FALLOW PHASE (CF)	SYLVOPASTORAL (SP)	YOUNG AGROFOREST (YA)	HOME GARDEN (HG)	FOREST GARDEN (FG)
Tetum/tetum terik name	*To'os muda muda, to'os udan, to'os la permanenti, to'os foun*	*Ai bobur laran, ai loek laran, tree's name-laran (main tree and/or functional tree), pastagem*	*To'os tuan, quintal foun, to'os posa, posalaki…*	*To'os uma hun, to'os uma oin, quintal*	*Abat*
SPECIES CHARACTERISTICS					
Main crops and animal husbandry	Corn, peanut, sweet potatoes, *Cucurbitaceae* , beans, horses, buffalo, goats and sheep	Horses, cows, buffalo, goats and sheep	Chili, papaya, condiment, vegetable, banana	Corn, cassava, taro, yam, vegetable, condiment, banana, bamboo, papaya *Cucurbitaceae* , beans, chili, pigs and chicken.	Yam, condiment
Main trees planted	Candlenut, Coconut, Teak, *Gmelina arborea*	Teak	Teak, *Swietenia mahagoni* , *Gmelina arborea,* Coconut, Citrus, *Gliricidia sepium*	Citrus, Coconut, Breadfruit, Mango, Candlenut, Teak, *Gmelina* , Goyava	Palm (betel, coconut), Mango, Breadfruit, *Gmelina* , Teak, Candlenut
Main trees not planted	*Eucalyptus alba* , *Timonius* , Rosewood, Tamarind, Kussum tree, *Ziziphus mauritiana* , *Albizia julibrissim* , *Corypha*	*Eucalyptus alba* and *Timonius* , Rosewood, Tamarind, Kussum tree, *Ziziphus mauritiana, Delonix regia, Sesbania grandiflora, Leucaena leucocephala, Albizia julibrissim* , Sandalwood, Palm (*Borassus* , *Corypha*)	*Timonius* , Kussum tree, Rosewood (Samalari), Palm (*Borassus* , *Corypha*), *Sesbania grandiflora* , *Leucaena leucocephala*	Palm (*Borassus* , *Corypha*), Kussum tree, Custard apple, *Leucaena leucocephala* , *Sesbania grandiflora* , Tamarind, Wild candlenut, Cotton tree	*Arenga* , *Corypha* , *Borassus*
LAND USES AND REGULATION					
Land ownership	Household	*Knua*	Household	Household	*Knua* or household
Main use	Food for self-consumption, animal food, economic income	Animal food, construction, firewood, traditional medicine	Economic income, firewood, land securization	Food for self-consumption, economic income, animal food	Construction, firewood, traditional medicine, food for self-consumption, economic income, land securization
Date of installation (crop and/or livestock system)	0 to 3 years	> 50 years	2 to 10 years	> 5 years	> 50 years

Discussion

The AFS evolution hypothesis is that they become denser over time, with 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, whereas young people are looking for crops that are more marketable and easier to cultivate in non-agroforestry systems

Conclusion

In order to avoid the clearing of these AFS, it is necessary to look for methods to intensify production, adapt it to the needs of young people and valorise the products. Finally, AFS are also markers of the complex social order between families in the same village or with other villages, concerning the sharing of tasks, ownership and exploitation of land products. It is essential to take these factors into account if continued external support is to be provided.

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