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## Heritage, agro-biodiversity and the local populations: Some examples from the use of palm trees in East Timor

Dominique Guillaud<sup>1</sup>, Laure Empeaire<sup>2</sup>  
and Patricia Bustamante<sup>3</sup>

The diversity of cultivated plants was created and maintained by traditional populations and represents a cultural, as well as a biological, heritage. This agro-biodiversity is crucial for the connection between culture and agriculture, two fields of public policies that most of the time function independently. This project, inspired by an experience in Brazil which involved the Brazilian Ministry of Culture and IRD, evokes the possibilities of setting up an innovative relationship between the local people and the scientific institutions, and its prospects for East Timor. It provides a method that emphasizes the structural elements of this agricultural diversity, such as the palm trees and other associated plants.

### Agro-biodiversity in East Timor

This approach combines questions about food independence, conservation of biodiversity and heritage. In the first instance, it concerns the question of food security: since the Indonesian occupation, rice has been recommended to enhance the self-sufficiency of East Timorese people, and has been developed in many suitable areas (lowlands and alluvial plains); the estimated surface planted in rice is 38,000 ha (Ministry of Agriculture). Rice cultivation creates a risk of loss of the agricultural biodiversity, which runs parallel to cultural diversity, a base for sustainable development.

Rice (of various types, rain-fed or irrigated) has been adopted in some parts of East Timor as a staple, and although introduced at different times in history, is overall a “recent” plant.<sup>4</sup> For some decades the promotion of rice was seen as an efficient solution to food shortage and nutrition issues, but there is a risk that, as with corn (*Zea mays*, an American plant that has been adopted in almost all the cultivation systems of the country), there might be some loss of agro-biodiversity and of the knowledge associated with it.<sup>5</sup> The question arises of what can be done to protect this knowledge and the plants themselves?

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<sup>4</sup> Even in groups who seem to have incorporated rice in their agrobiodiversity a long time ago, such as the Bunaq (Friedberg *pers. comm.*).

<sup>5</sup> The interviews conducted in several localities in East Timor suggest that the development of rice cultivation entails the replacement or dormance of some other cultivated or spontaneous plants. There are also frequent examples of the replacement of a cultivated plant by another in the agriculture of the region, eg on Nias, where the “american” sweet potato has invaded the fields, replacing yam in the cropping system, and taking over its local name (Guillaud, Forestier 2010,78).

Recent approaches have emphasized the concept of agro-biodiversity, which we define here as the diversity of cultivated or collected plants; often, this diversity has been elaborated on the long term by local populations. Agro-biodiversity therefore can be considered as the diversity of cultivated plants that has been obtained through the action of humans, and whose innumerable expressions can be found throughout the world. This diversity is created through social processes that are common in the Southeast Asian region and in nearby Oceania: it has been witnessed for instance in Vanuatu (Caillon 2005; Muller 2009) where the cultivars of tubers are commonly exchanged from one group to another, each group having its own diversity and enriching it with the varieties of other groups. In some societies, the stock of cultivated plants follow a special line, for instance the line of the women, who can be in charge of the cultivation of specific plants, or who inherit the plots of land for a specific culture. In every case, this agro-biodiversity refers to a social process, and is closely dependent on the way the society is organised.

In some other cases the agricultural practices of some groups consist of enriching their cultivars with some wild varieties, in order to plant as many different cultivars as possible, and obtain a diversified stock of available cultivars as to avoid the risk arising from the specialisation on one local variety only. Yet another phenomenon encountered in East Timor is the fact that some plant varieties have been returned to the wild by humans, and represent a stock of foraging resources that can tamper the usual production of the fields.

A specific knowledge is also associated with all these plants, wild or cultivated. It can refer to where and when to find those plants in the wild, how to cultivate them, or to technical *savoir-faire* (how to treat them to get rid of the acrid or irritating substance in it, how to get starch out of the pith of a tree...). It can also concern their medicinal or ritual uses, their place in the local cosmology or its social and symbolic significance, *etc.* Since the signature of the Convention on Biological Diversity in 1992, this traditional ecological knowledge is an essential element of *in situ* biodiversity conservation, implying, notwithstanding all the debates around this idea, that indigenous communities guarantee in some way the sustainability of such conservation.

All these practices and knowledge, whether technical, social, symbolic and in all cases related to human activity and organisation, mean that elements considered as biological, such as biodiversity or agro-biodiversity, can be shaped by local populations and represent something that can be considered as their “heritage”, tangible and intangible, to be handed down to coming generations.

With the first settlement dated more than 40,000 years, one can imagine that in East Timor, the human interactions with the environment are old and intense, even with relatively limited populations, and that the current landscape is in many places the product of these interactions. Some examples can be found in present-day landscapes: “sacred forests” are maintained as reserves of biodiversity in many communities; savannah formations have probably been created and maintained by fire; and in the other extreme, more recent, many landscapes have been colonized by invasive plants such as *Lantana camara* or *Chromolaena odorata*.

East Timor, lying between a world dominated to the West by rice (Asia), and to the East by tubers (Oceania), is a great place to study this agro-biodiversity, which relies on a large variety of plants: some rice and a lot of tubers, and also other plants that, until recently, served as staple for the populations during very long periods: wild tubers, palm trees, *etc.* As Fox (1977, 17) opposed “*the intensive wet-rice cultivation of the densely populated inner islands of Indonesia*” to the “*diverse, multicrop, dry-field cultivation of the less populated outer islands*”, he mentioned that this typology neglected “*a yet minor but increasingly important, ecological system in the outer islands*” of the Indonesian arch, described as a “*highly specialized form of gathering*” based on palm-trees. In East Timor, some communities rely on this “*savannah-based palm agro-ecosystem*” (Monk et al. 1997), which is everywhere combined or confronted to swidden agriculture. In all the communities, palm-trees and tubers are described as crucial to the livelihoods of groups in ancient but also in more recent times (famine periods, and Indonesian occupation).

## Palm trees in East Timor, especially *Corypha utan*

Palm trees appear at the centre of various systems of subsistence: there is never a palm tree very far away in Timor. Some of these palm trees, such as coconut (*Cocos nucifera*) and betelnut (*Areca catechu*) trees, are well known in the region or even have a tropical world-wide distribution. In the country, there are also a few species of palm trees that are interesting, although they are not part of an endemic biodiversity: there have been more or less scattered or maintained by human communities on the island. *Borassus flabellifer* (*akadiru* in Tetun) and *Arenga pinnata* are both exploited for their sap, used as a drink. *Borassus* is well known, notably through the works of Fox (1977) who reported that on the island of Roti there was a season when the *Borassus* sap was the only “food” available. This sap is used to make a nutritious wine (*tua’ mutin*), which can be afterwards distilled to obtain a stronger alcohol. According to Fox, *Borassus* savannahs have been gradually formed by the repetition of slash-and-burn practices and they appear as an anthropic formation. *Arenga pinnata*, exploited with more or less the same techniques, provides the *tua’ metan*, a more bitter and stronger wine which gave the tree its Tetun name<sup>6</sup>.

Although *Borassus* has attracted most of the academic attention in the region, there is in East Timor another very important and extremely common palm species: *Corypha utan* (the *gebang* or *gewang* palm). This tree has two names in Tetun according to the use envisaged: *akar* (as food from the starch) or *tali*<sup>7</sup> (as use of the palms for roofing, etc.). The tree is also tapped for wine but actually its uses are multiple, and as for *Borassus*, nothing is wasted of it (Monk *et.al.* 1997). It really appears as a “plant of civilization”: *Corypha* leaves are used to make roofs and basketwork, the ribs of the palm are used for the construction of houses, probably for various instruments, and also for its thorns, as fencing against the cattle. Most importantly, it provides a sago flour which is today known as a popular dessert.

In Insular Southeast Asia in general, there are several palm trees that provide sago (ie starch), the most documented one being *Metroxylon sago*, found in abundance in the island of Mentawai (off West Sumatra’s coast), or on the Northern coast of Papua New Guinea. Such a tree, growing in the lowland marshes, was probably more common in past times, before the introduction of rice, as shown for instance in Sumatra’s East coast lowlands (Manguin 2006); it has left traces in many places in Indonesia, where it is still used for roofing and a little bit for sago, but one can reckon that it was formerly an important staple in most lowlands.

*Corypha utan* in East Timor is adapted to the ecological conditions of a dryer climate. In some areas, it is the main staple food and accompanies fish or meat in everyday meals. In other regions, it is a food used during the gap between two harvests, or a famine food, to which people resort regularly due to the climatic variability.

*Corypha* groves (and sometimes what are left of them) are located to the foothills and lowlands below an altitude of 100 m (figure 1). Above that, one can still find some *Corypha*, but they seem to be less productive for starch. It can accept rather salty soils, and on significant areas along the coast one finds it in dense groves. It seems to grow spontaneously, although reforestation occurred some decades ago in the foothills of Baucau (N. Oliveira *pers. comm.*). It might not be a tree that is planted but the grove has to be taken care of, or protected. The presence of relict and current *Corypha* groves throughout East Timor shows the importance of this culture that has probably known an even greater importance in ancient times.

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<sup>6</sup> Some parts of the trunk of *Arenga Pinnata* are also used as a staple.

<sup>7</sup> *Tali* might be linked with the name of *Borassus* of Sanskrit origin (*tala*). Fox (1977, 204) mentions that *ta’al* is used in Madura, *tal* in Lombok and *ta’a* on Bima to call a *Borassus* tree. It probably shows that a name can travel and be transferred to another plant with similar uses.

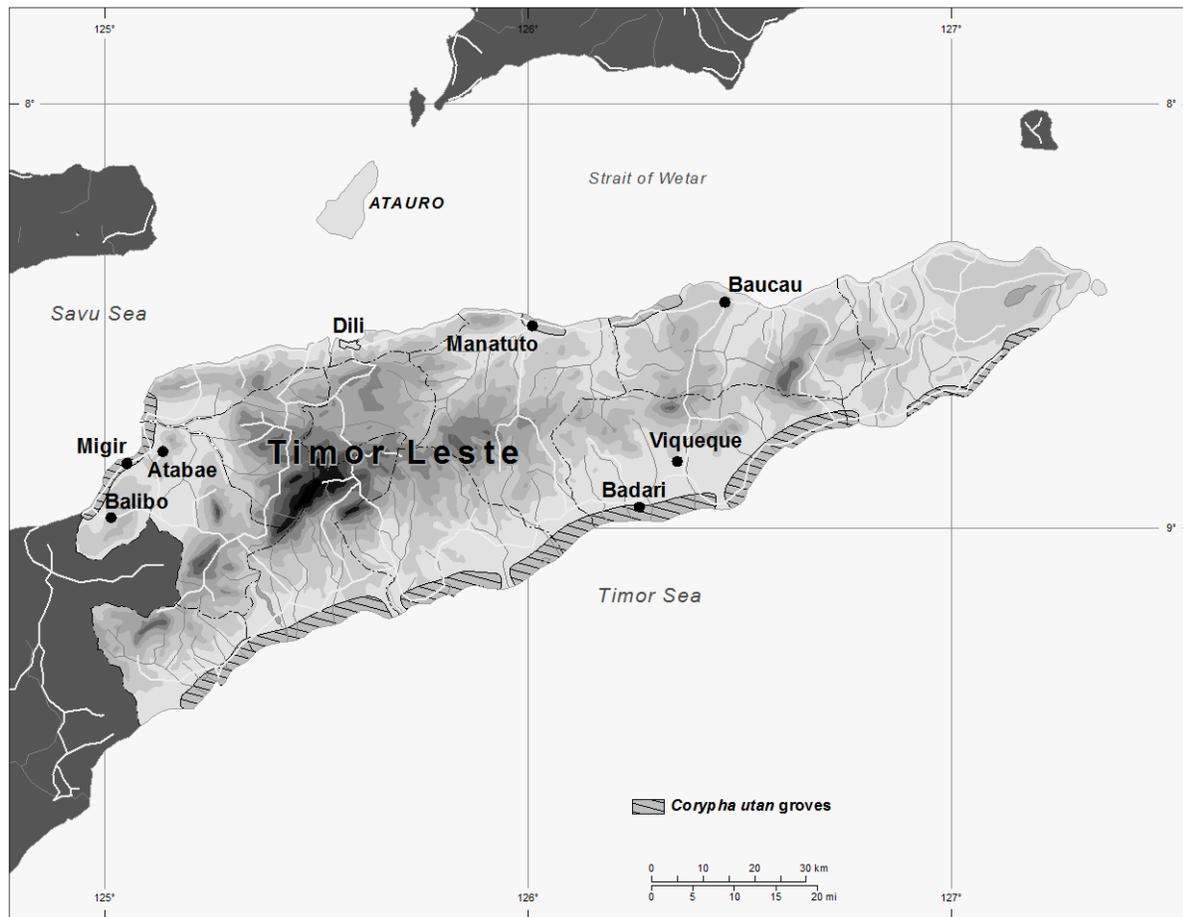


Figure 1 : Approximate distribution of *Corypha utan* – akar groves in East Timor

There is an important technical knowledge associated to *Corypha*. The rather long process to obtain starch out of the pith has been identified in the villages of Badari (Suco Luca Aldeia Omobot) and of Migir (Suco Atabae); apparently, it does not show great variations from one place to another. The tree is ready for processing when the palms have fallen off the trunk; then it is felled, barked, cut in big sections and taken back home, often by using a rolling system. There, the pith is cut into chunks that are suspended for a few days over a fire to dry, or into flakes that are sun-dried. Dry akar can be stored for a few months, or immediately consumed. When so, the pieces of pith are grinded in a boat-shaped mortar, with the use of drumsticks held by one to eight people, depending on the size of the mortar. The aim is to separate the fibre from the starch. The starch is then sieved in a container made of basketry, placed in a mat (today a plastic canvas) and mixed with water, to obtain a paste that slowly decants on the bottom, allowing to get rid of the water in excess.

When ready, the paste is wrapped into a *butak* (a package of *Corypha* leaves) and can be stored for a few days. There are different ways to prepare it: the paste can be spread between two ceramic plates, and placed near the fire for cooking. Special bamboo spoons are used to manipulate the plates. It can be steamed in a leaf basket over an earthen pot; or placed in a flat leaf basket directly into the ashes. The cooking techniques seem linked to two different industries: a vegetal one, involving all the basketry made with the leaves of the same tree, and a ceramic one.

The specific shape of the mortar, whose size varies but whose form remains approximately the same throughout the island, and the successive stages of the treatment, indicate an elaborated technique, but which has not much in common with other sago producing techniques such as the one applied to *Metroxylon sago*<sup>8</sup>. The origin of such a process and its antiquity are yet to be researched.

<sup>8</sup> Which is the same for instance in Northern Papua and in Mentawai.

## Yields and subsistence systems based on *Corypha* exploitation

Each family in the researched villages seem to have access to thousands of trees, and the only limitation to this culture is the investment of time required to fell and process the trunk. This observation questions the yields: a trunk is cut into sections of 0.6 to 1 m, giving 5 to 10 sections for each tree. Each section provides 12-24 *butak*, each *butak* providing a meal for 5 people. Each tree can therefore give 300 to 1200 meals; that is an average of more than two months of food for a family of 5. Processing a whole tree, which can be done whenever ready, independently of any special season, requires more or less 2 weeks for 2 persons, thus providing in theory two months of starch food.

*Corypha* apparently allows villagers in some regions to provide more than half of their food, the rest being mainly corn, sometimes rice. In the region of Luca on the Southern coast, in 2007, it provided some villages with 3 months of food/year. In Migir, West of Dili on the North coast, it provided half the food of the year (2013). This evokes Fox's observations in the island of Roti, asserting that under the climatic and soil conditions of the region, the palm-based system could support higher populations densities than slash-and-burn agricultural systems based on rice, corn, etc.<sup>9</sup> Moreover, the same author suggests that the collapse of swidden economies would provide the basis for palm-tapping systems, the deterioration of the condition of slash-and burn agriculture giving rise to the exploitation of palm-savannah (1977, 51-52)<sup>10</sup>. However, the traces of *Arenga Pinnata*, *Borassus flabellifer*, *Corypha utan* (and *Metroxylon sagu*)<sup>11</sup> in archaeological layers older than 40 000 years in the easternmost tip of Timor (Oliveira 2008, 235) seems to confirm the antiquity of palm exploitation, and could, rather than a definitive conversion, evoke a swing from one system to the other and *vice-versa*, according to soil, climatic, socio-politic and demographic conditions through time. This idea has yet to be explored as the current trend in East Timor today seems to be a return to swidden or irrigated agriculture, coupled with the increasing allocation of *Corypha* zones to other activities. In the grove west of Baucau, the production of sago has been completely abandoned over the past two or three years, and a large part of the land cleared of palm trees has been assigned to rice production. Other areas may suffer the same fate with industrial development, tourism activities, or other projects. In general, sago production is in strong decline, the hardness of the processing being the main reason mentioned for this abandon, but the image of sago as a poor person's food might also be an explanation. More generally, as Fox (1977, 206) notices for *Borassus*, the solutions recommended until now in agriculture always turn towards a disuse of palm-trees economies, which do not fall within the standards of development.

An additional point is that the use of *Corypha-akar* in a subsistence system is never exclusive: today it is often associated with corn, beans, and other ancient plants such as tubers, or rice. The combinations of different plants can be a response to diverse environments: eg wetlands or drier areas. In the limestone area of Balibo, West of the country, the occasional use of *akar*<sup>12</sup> is associated to the culture and harvest of peas including *Cajanus cajan*, different varieties of "wild" beans named *koto* ; and *maek* or *mahé* is a tuber (*Amorphophallus* spp.) described everywhere as an important ancient staple. Many other plants such as yams, wild or cultivated, and taro are also involved in the subsistence system. These combinations are adaptations to specific environmental, but also socio-political and demographic conditions: safety, land availability and accessibility are important issues in food production.

It seems that past societies used a wide combination of collected and cultivated plants. These economies have been revived by the livelihoods imposed to the resistance fighters during the war, depending largely on spontaneous resources.

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<sup>9</sup> However his observations are based on the exploitation of the *Borassus* sap only, not on the food use of *Corypha utan* which in his works is confined to livestock.

<sup>10</sup> One argument for this hypothesis is the lack of mythology and rituals concerning *Borassus* in Roti.

<sup>11</sup> This species has still to be investigated, as the local population seems to know of its existence but no single specimen has been encountered yet.

<sup>12</sup> *Akar* is processed on the coast during food shortage.

The *Corypha* palm groves are managed as a common resource: everywhere people attest that they belong to the community and that their use is free. But this still has to be questioned, as some groups or individuals might be responsible for their management. When a group comes from outside the village and wishes to process an *akar* tree, they have to ask permission locally.

The *Corypha-akar* displays a number of advantages: it involves no chemical nor other input; it can grow on marginal lands, often salty and unsuitable for other cultures. It has a lot of additional uses (as other palm trees do) for construction, basketry, tools, etc. The symbolic of the plant, the myths associated to it, if any, its origin and social significance are still to be researched, but it offers a promising field of research.

### **Cultural Heritage: A new prospect to the conservation of Agrobiodiversity**

How to protect these systems? There is an opportunity to learn from an experiment conducted in Brazil by local associations and the National Institute for Historic and Artistic Heritage (Brazilian ministry of Culture) with the participation of scientific institutions such as the IRD, which allowed the traditional agricultural system of the Rio Negro to be classified in 2010 as Brazil intangible heritage. This system is based on cassava with a strong connexion between the social system and the construction of agrobiodiversity. It is a highly dynamic system, which relies on a network where varieties are exchanged.

The context of this registration was the erosion of agro-biodiversity and of the knowledge associated to it; the expansion of agricultural models which did not take into account cultural diversity; and, mainly, the lack of recognition and protection of the cultural and ecological value of the traditional agricultural systems. Such context is also relevant for East Timor.

In the case of the Rio Negro in Brazil, the system was organised around cassava. In East Timor one has to define the structuring element in order to protect the system with the social values and knowledge associated to it. This implies interviews and mapping, field trips in order to inventory the cultivated and collected plants, and the analysis of the relations between the society and the plants, including the identification of the exchange networks of plants. Biodiversity conservation is in fact a very complex issue, as it questions the species to identify and collect for preservation, which refers to *ex situ* conservation. But there is always a need for *in situ* conservation as well, which must rely on the combination of plants in a given subsistence system. The knowledge involved in a subsistence system can be technical, symbolic, culinary, and it is sometimes linked to identity; commonly shared, it represents the common heritage of local communities.

Finally, questions of governance are important in conservation. Local populations have to be involved in the process as they are the curators of the subsistence system, but the dominance of some actors on the conservation process has to be avoided. In the case of *Corypha*, the collective appropriation of the groves could be considered contrary to the global tendency to privatisation. Moreover, the exploitation system of *Corypha* is on some points opposed to the one based on rice: *akar* is collectively owned, individually felled, while rice implies to some degree a hierarchical organisation for water irrigation. Both plants correspond to two rather different systems of thought. The question as how to combine them at the scale of a country might represent some challenge, but the issue of self-sufficiency should not exclude that of heritage.

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