Biogeographical and Ethnobotanical Analysis of the Raphia Palm in the West Cameroon Highlands

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ABSTRACT

Silvicultural stability is of vital importance to human populations and activities, that is, the ability to maintain its structure and vitality in the face of internal and external influences. The gallery swamp forests of the West Cameroon Highlands are habitat for *Raphia* Species which apparently have had not much scientific study despite their ethnobotanical importance. The study focuses on the biogeographical and ethnobotanical analysis of the *Raphia Spp.* in this afro-alpine region where the community is presently undergoing an abrupt change from providing traditional subsistence products towards the provision of market – oriented products. This study uses a combination of primary and secondary data sources to reconstruct and to describe the primary habitat of the *Raphia spp.* in terms of distribution, floristic structure and composition, and to establish the internal external influences on the ecosystem. It concludes that the collection of forest products should not be conceived as a discrete activity but rather as a first stage in the process of gradual domestication of valuable species. In this process a gradual transition from collection from natural forests to purposeful cultivation in plantations should be promoted in order to ensure stability and sustainability. This requires detail research in the monetary evaluation, biogeography, botany and ecology of the plant as measures towards the development of an agroecosystem.

Key words: biogeographical analysis, ethnobotanical analysis, Raphia Species, domestication, agroecosystem, tropical highlands.

RÉSUMÉ

La stabilité de la syviculture est d'une importance vitale pour l'homme et ses activités, c'est-à-dire la capacité de préserver sa structure et sa vitalité contre les pressions internes et externes. Les bas-fonds hydromorphes des Haut Plateaux de l'Ouest – Cameroun sont l'habitat des espèces du genre *Raphia* qui apparemment on fait l'objet de peut d'étude scientifique, malgré leur importance ethnobotanique locale. Cette étude met l'accent sur l'analyse biogéographique et de ethnobotanique ces plantes dans les régions afro-alpine, où elles sont en voie de passer d'une exploitation de subsistance à une agriculture commerciale. Elle utilise une combinaison des données primaires et secondaires pour reconstituer et décrire l'habitat, la distribution, la structure, la composition et les influences internes et externes sur l'écosystème de ces plantes. Elle conclut que l'exploitation d'un produit forestier ne devrait pas être perçue comme une activité discrète, mais plutôt comme une première phase dans le processus de sa domestication, c'est-à-dire un passage graduel de l'écosystème naturel à la plantation. Ce passage exige une étude détaillée de la valeur économique de l'espèce, sa biogéographie, sa botanique et son écologie, conditions sine qua non de l'élaboration de l'agroécosystème d'une espèce.

Mots cles : Analyse biogéographique, analyse ethnobotanique, *Raphia* spp., domestication, agroécosystème, Hautes terres tropicales.

INTRODUCTION

The issue of sustainability in silviculture has been the focus of much interest in the field of forestry over the past decades. It is particularly important in mountain regions because mountains and uplands cover approximately 20 percent of the earth's surface, about 10 percent of human kind lives in mountain regions, and they affect the lives of more than 50 percent of the world's population (Motta and Haudemand, 200; Ives, Messeril and Spiess, 1997). Montane forests have drawn growing international attention with many organizations and conferences acknowledging their importance over the last decades (Price, 1998; Zingari, 1998). This started with the United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro in June 1992 and the inclusion of Chapter 13 in Agenda 21. Most research effort dealing with ethnobotany in tropical regions stresses the importance of tropical lowland flora for the subsistence and survival of local populations and their cultures. Kapelle et al. (2000) established that similar data are available for sub – tropical mountains such as the

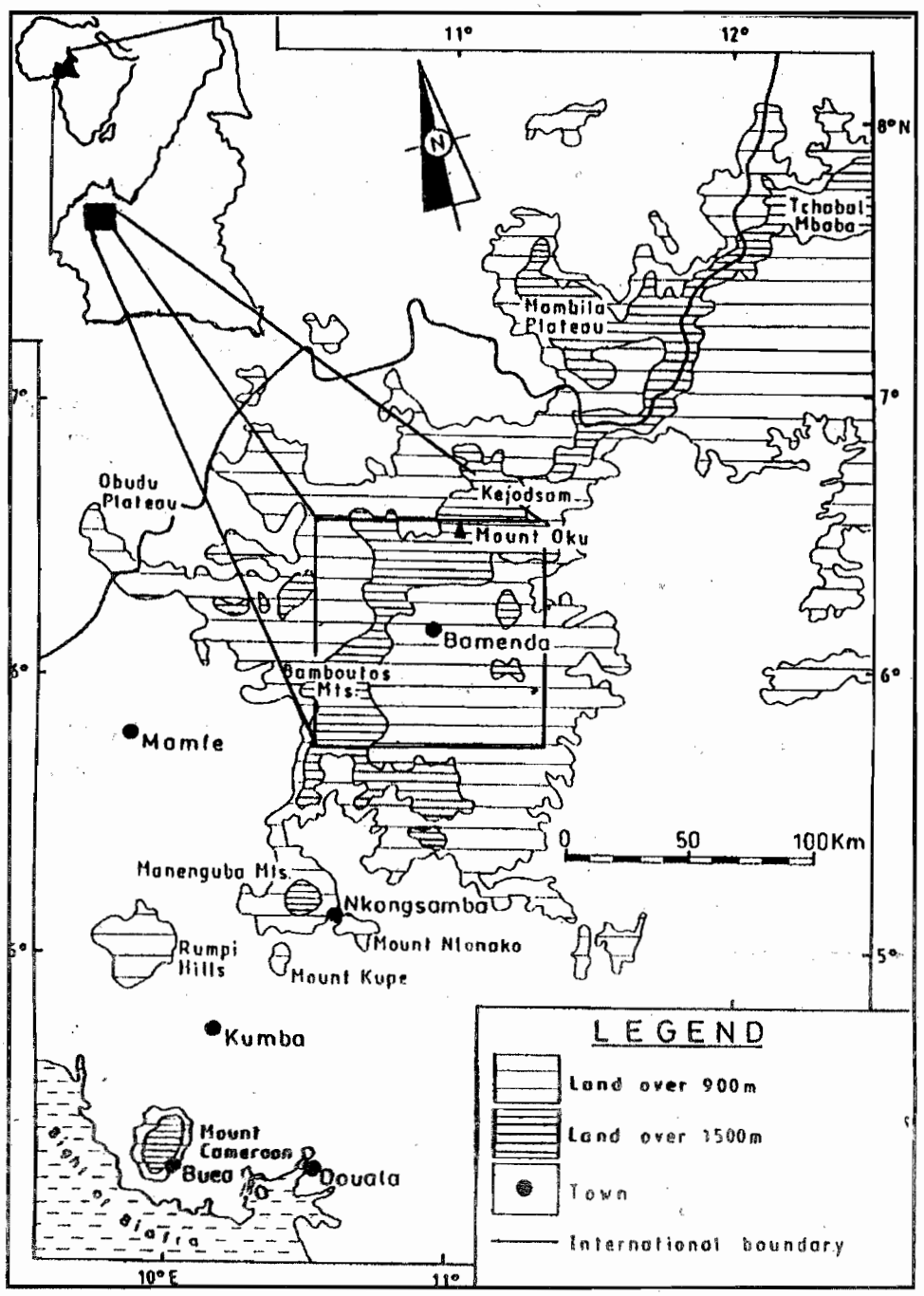

Figure 1: Location of study area: West Cameroon Highlands

Himalayas, and that there is an almost complete lack of information on upland tropics in terms of how their populations use these rich resources.

In an effort to begin filling this gap this study focuses on the swamp forests of the West Cameroon Highlands that are mainly colonized by raphia palms. The paper makes a biogeographical analysis and also assesses the knowledge about how mountain dwellers use the plant. This community is presently undergoing an abrupt change from providing traditional, subsistence forest products towards the provision of market – oriented products and therefore suffers from threatening biological stress. Since the 1960s the swamp forests have been under anthropogenic pressure. There is therefore a need to analyze the biogeography, ethnobotany, and the socioeconomic value of NTFPs provided by the Raphia palm as a first step towards seeking data that can enable sustained management. This is particularly important because several authors have suggested that the extraction of NTFPs (non – timber forest products) from natural forests should not be conceived as a discrete activity but rather as the first stage in the process of gradual domestication of valuable NFTP species (Hertog and Wiersum, 2000; Homma, 1992; Wiersum, 1997).

STUDY SPECIES AND AREA

The raphia palm belongs to the family *Palmaceae*. As a group of plants it has 20 species worldwide (Knöpfli, 2001). The species which is the focus of this study is widely found in West Africa, continental equatorial Africa and along the Guinea Coast and Madagascar (Dalziel, 1937). They grow particularly well in swampy areas and river banks where they occur as gallery swamp forests. Two main species are found in the study area. The problem now is that apparently not much scientific work has been done on raphia palms (Kemoie, 1997). Experts in the Limbe Botanical Garden have distinguished the two species common in the area as the *Raphia pedunculata* and the *Rapha vinifera Beauvois*. Knöpfli (2001) argues that some experts use these names for the same species interchangeably. Hawkins and Brunt (1965) working in the study area made an inventory of gallery swamp forests in Mbaw plain. This included the *Raphia hockeri* and the *Raphia sudanica* in areas above 1000 metres above sea level. This calls this classification into question. The present study therefore contents itself with the collective term Raphia palms. According to Knöpfli (2001) the vague botanical name *Raphia vinifera Beauvois* is said to cover several species, for example, the *R. pedunculata*, the *R. farinifera*, the *R. Hookeri* and the *R. guertneri*. Since it is difficult to classify the two types of raphia palms in the region, this study will use the indigenous names *nka* – raphia palm and *mbu* – raphia palm. They all grow in gallery swamp forests in the highlands.

The West Cameroon Highlands are located along the Cameroon volcanic province. The northern part is composed of the Bamenda Highlands while the southern portion is the Bamileke Plateau. Both the highlands and the plateau are horst –like mountains with elevations generally higher than 1000 metres above sea level (Figure 1). Most of the mountains take the form of gently undulating plateaux composed of Precambrian granitic, migmatic and crystalline rocks which in some places are overlain by volcanic rocks of the ages ranging from Cretaceous to Quaternary (Tamura, 1986). Some high mountains composed of volcanic rocks of Quaternary to Tertiary age rise above the gently undulating plateau. The shallow valleys and intermontane plains are colonized by gallery swamp forests.

This is a relatively high rainfall area in the Sudano – Guinean savanna zone. The high relief and the southwesterly rain-bearing monsoon winds from the gulf of Guinea exert high orographic influences on the rainfall amount. The mean annual rainfall is 1800mm and the rainy season lasts 8 months. Temperatures vary with elevation with an annual average of 24^{0}C. Although these climatic circumstances do not seem to reject the existence of forest, the actual distribution of montane and sub-montane forest is restricted to remote escarpments, steep slopes, deep valleys and high mountains. The Bamenda highlands is characterized by almost treeless grasslands with a mosaic of cultivated fields, natural pastures and fallows on the crest of mountains and hills while the valleys are colonized by a network of gallery swamp forest refugia. On the other hand the Bamileke Plateau is characterized by intensively cultivated homegardens enclosed by hedgerows.

The above characteristics of the present vegetation landscape are considered to have been formed under the great influence of anthropogenic pressure (Letouzey, 1968; Kadomura, 1984; Tamura, 1986; Ndenecho, 2006, Nkwi and Warnier, 1982). Letouzey (1968) suggests that the gallery forests are the remnants of the climax vegetation of the highlands. The main tree components of this natural plant community are raphia palms, *Albizia sp., Anthocleista vogeli, Mitragyna stipulosa, Newtonia sp., Chlorophora excelsa, Musanga cercropioides, Polyscias fulva, Pterygota macrocarpa, Phoenix reclinata,*

Spondianthus preussi and *Syzygium sp.* Main shrubs are *Aframonum sp.; Impatiens spp.* and *Vernonia conferta.* Dominant lianes and creepers include *Astabotnys sp.*; and *Erymospatha macrocarpa.* The main ferns are *Pteris quadriaurita* and *Pteris similes.* The main grass is *Setaria caudula* while the main sedge is *Scleria racemosa.* The floristic community grows on swamp forest alluviums in flood plains and stream banks in locations where swamp conditions appear to prevail throughout the year, that is, the soils remain waterlogged.

RESEARCH METHODS

The study focused on the West Cameroon Highlands. These highlands have two distinct morphological units in terms of land use pressure, population density and vegetation. These are the Bamileke plateau and the Bamenda Highlands. Based on the above differences in site characteristics and the objectives of the study, three sites were the focus of this investigation:

- Bamenda Highlands: The Mbaw plain and the Santa Upland gallery swamp forest constituting habitats for the raphia palm were studied. The Mbaw plain has a population density of less than 5 inhabitants / km^2 and the pressure on both land and natural pastures is very low. This site was selected because it possesses climax stands of gallery swamp forests. The biogeographical analysis was complemented by previous studies by Hawkins and Brunt (1995), Knöpfli (2001) and Knecht and Argenti (1999). Floristic components of the ecosystem were identified and presented in qualitative terms. The second site selected for study is Santa. In order to assess the impact of pyrogenic factors, grazing and farming pressure on the raphia palm ecosystem, this area was selected for analysis. The above land pressure parameters were investigated in qualitative terms using field observations and land use maps.
- Bamileke Plateau: This unit is characterized by pressure on available farmland. In order to establish the need for available farmland on the raphia palm ecosystem, Bamendjou was selected as a study site. Based on a study by Dongmo (1986) threats to the raphia palm involving the conversion of the gallery swamp forests to market gardens were established in quantitative terms using aerial photographs, field observations and secondary data sources.

The mapping of threats to the ecosystem, and the

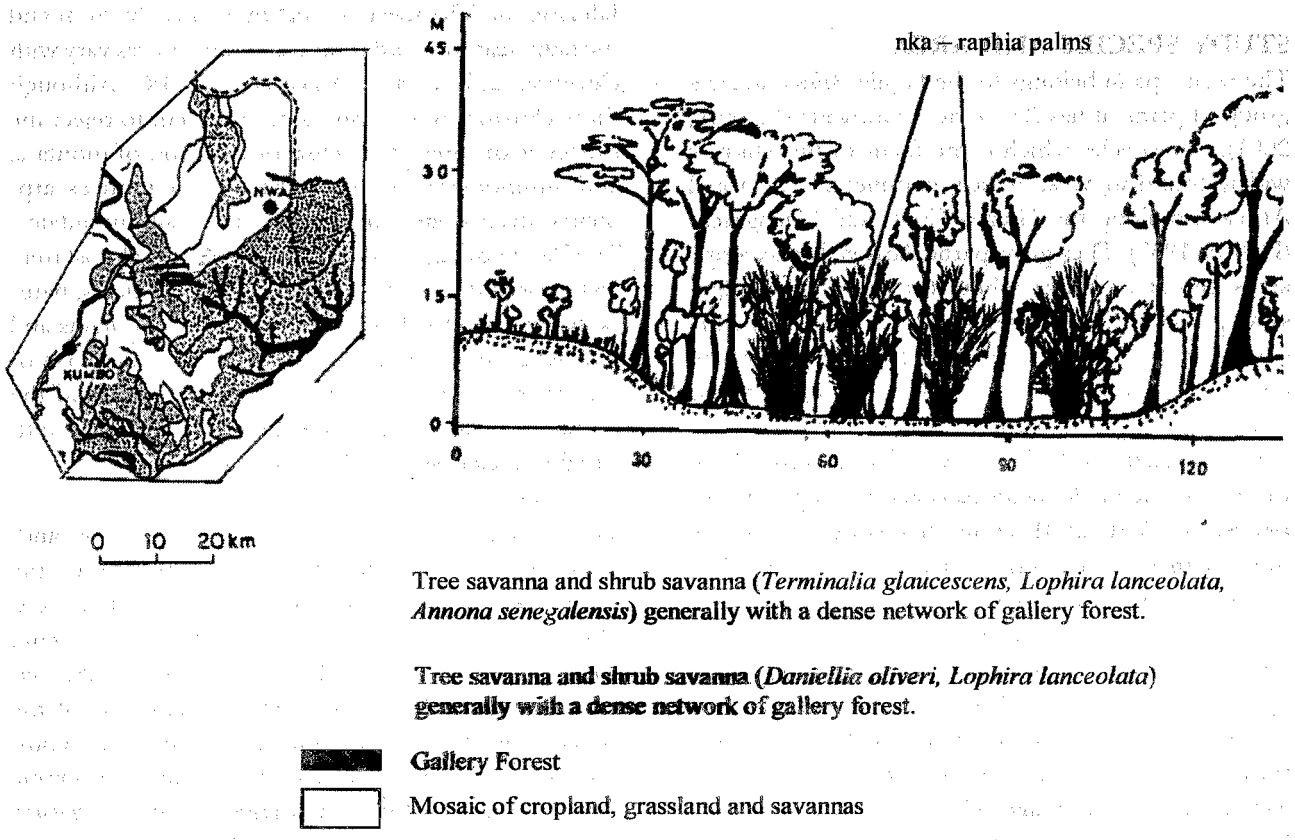

Figure 2. Cross section of gallery swamp forest with *Raphia*: Natural plant community for raphia palms (Mbaw Plain)

floristic structure and composition was assisted by land use maps produced by the National Geographic Institute (IGN) for the Santa and Mbaw plain sites and aerial photographs (Photo NB – 32 – X1 - 1C 200 produced by IGN for the Bamelike Plateau and the Santa Area. Studies in the Mbaw Plain included the identification of floristic components which were assisted by the herbarium of the Bambui Research Station and transect studies to establish a cross section of the climax habitat. These were complemented by field observations and interviews of indigenous populations involving open questions that established a qualitative botanical, husbandry and ethnobotanical analysis of the palm, biological stresses and tendencies towards domestication.

RESULTS

Figure 2 presents the distribution of gallery forests in Mbaw Plain and a cross section of the floristic community. The plant grows in association with other tress, shrubs, ferns, lianes, grasses and sedges. To thrive the raphia palm needs water and light. It will therefore not grow under large trees. Swamp forest alluviums, flood plains and river banks where swamp conditions appear to prevail throughout the year are ideal locations. At these locations mounds of micro – relief accumulate around the breathing roots of larger trees, raphia palms and date palms. During the rainy season, pools of stagnant water may accumulate in the depressions in micro-relief. Most of this water drains during the dry season, but the soil remains waterlogged. Finely sorted alluvial soils seem to be ideal. In the three locations investigated, the soils do not have an organic horizon in the profile. It is mottled right to the surface. The texture increases quickly from a silty clay loam at the surface to a very sticky and plastic clay at greater depths. The profile is gleyed and the permeability is restricted. The gallery swamp forest presents three distinct strata.

- Strata A: several climbing plants and lianes; *Terminalia sp.* and *Mitragyna stipulosa* with heights ranging from 2 to 5 m.
- Strata B: This is the intermediate strata. It is composed mainly of dense stands of raphia palms.
- Strata C: Evenly distributed tall trees ranging from 20 to 30 m in height (See figure 2).

Figure 3 presents the details of the structure of the

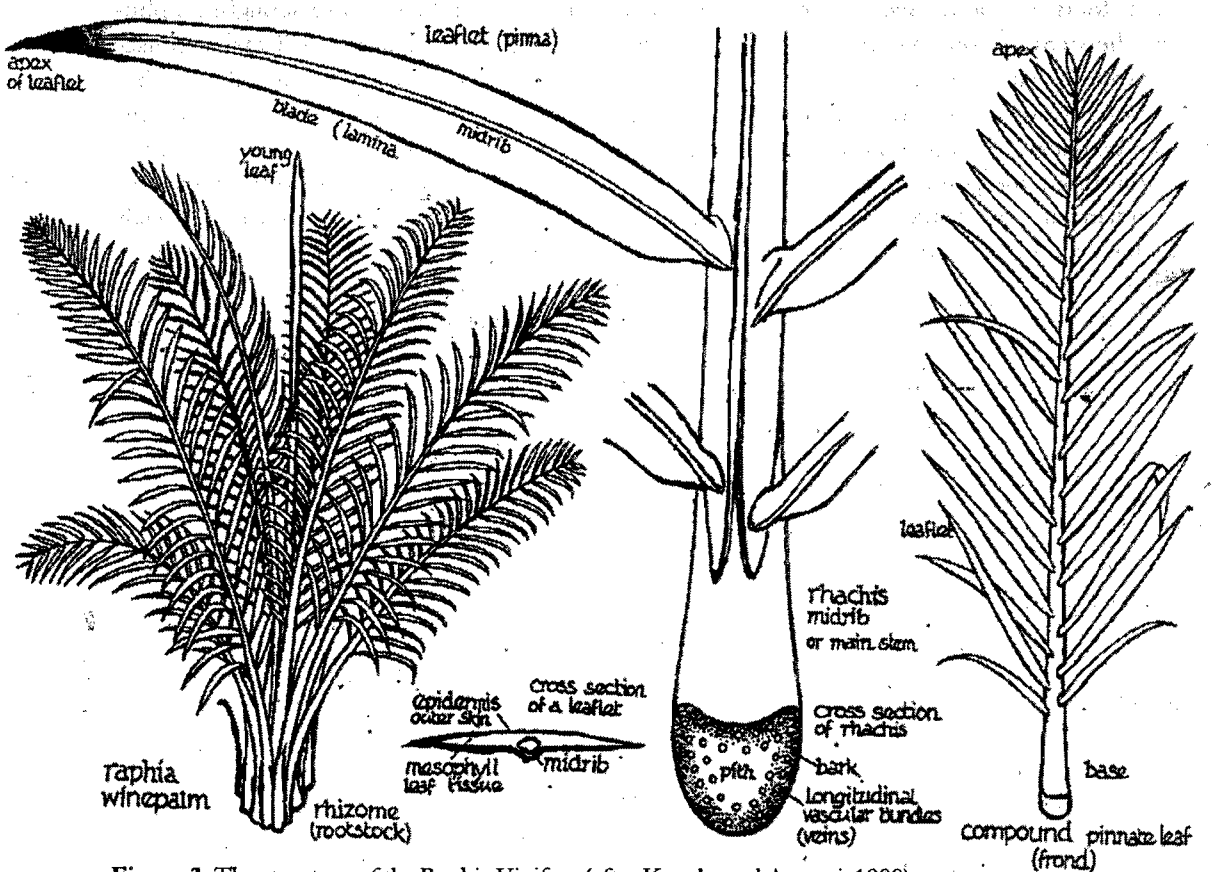

Figure 3: The structure of the Raphia Vinifera (after Knecht and Argenti, 1999)

nka-raphia palm. It is more widely found in the highlands, where it prefers the cooler climate. It grows well at altitudes ranging from 1200 to 2000 meters (Knecht et al, 1999), whereas the *mbu*-raphia palm grows well between 800 and 1000 metres above sea level. The *nka*-raphia palm is a giant clustering feather palm without a trunk, which has many offshoots from the rootstock, the tall, erect and gracefully arching pinnate fronds (leaves) are up to 15 metres high. These fronds have leaflets which are glossy, dark green and over 2 metres long. These narrow, slightly spiny leaflets which are 5cm wide and set almost at right angles to the stems, can usually be seen fluttering in the wind (Knöpfli, 2001). On the other hand, the *mbu*-raphia palm is a large clustering feather palm with a trunk which has offshoots also from the rootstock. The trunk measures up to 6 metres high. This is a false trunk because it is made up of bases of the typically long, pinnate fronds. The offshoots can grow up to 12 metres in height.

A single plant is enlarged by its own offshoots, and new plants are propagated through seed dispersal by rodents, birds, runoff and streams, flood waters, and man. The individual seeds cluster on a bunch and appear as individual nuts with a scally but smooth surface. The seed when peeled, a yellow oily pulp is revealed, which is eaten as food. The actual seed is surrounded by this pulp. The stems of the long pinnate fronds are commonly called "bamboo" by the local population. To distinguish it from the Indian bamboo it is called the "Raphia bamboo". This demonstrates the lack of information about the plant. It may be recalled here that the Indian bamboo (*Phyllostachus spp*) with its 700 species which are known worldwide belongs to the grass family (*Graminae*). The Indian bamboo is thick-walled, hallowed and recognized by numerous ringed joints along its stem. The raphia stem is solid and has no joints along its length.

Depending on the soil characteristics and the climate, a raphia palm takes 8 to 12 years to mature, that is, until wine can be tapped from it and other non-timber products harvested from its various organs. The peasant sap is tapped from both species. The *nka*-raphia palm is tapped at the rootstocks, if possible at ground level, but tapping can be done one metre or more below ground level. The *mbu*-raphia palm is tapped above the ground using a ladder. To tap the wine from the *mbu*-raphia is a more tedious job. The tapper needs a ladder made from raphia stems to climb to the top of the trunk, which can be up to 6 metres high. Tapping is done using a special tapping knife. A productive plant will have a continuous sap flow for two to three weeks, sometimes even longer. Such a plant may produce up to 5 litres per day. Palms are tapped in rotation, in order to allow them to regenerate for about 6 to 12 months before they can be tapped again. New plants grow from seedlings.

It was found that knowledgeable people preferred seeds which sprout from the middle to those sprouting from around the end of the nut (Knöpfli, 2001). The seeds are egg-shaped and it is said that those seeds that sprout at the pointed end produce plants with a lower yield of raphia palm wine locally known as "white mimbo". Planting spots in riparian areas are cleared of herbs, grass, trees and climbers. The round clearings have an approximate diameter of 2 meters. Planting is done in June to August. The seeds are nursed at the base of the mature rhizome or rootstock. These are then uplifted for transplanting when the shoots attain a height of 30 to 50 cm. The seeds are nursed on mounded earth and may take two years to transplanting stage. The planting distance is about 9 metres.

For a farmer, it is important to have a raphia grove which is well maintained, in order to get the best possible raphia yields. This entails regular pruning of dry leaves to create room for air and sunlight. This enables healthy growth through the effect of sunlight on photosynthetic processes. New leaves will thrive consequently. There is also need to clear the tall grass between and around the plants. Most farmers recommend one or two clearing rounds. It is also in the wine-tapers interest to do so in order to keep the surrounding of the palm free from snakes. Apart from weeds the other known pest are rodents who apart from propagating the seeds also eat the pulp and nuts. Birds such as weaver birds move in flocks and harvest the leaves, reducing the rate of photosynthetic processes. The raphia palm beetle bores into the rhizome and feeds on this sap and can eventually kill the tree in whole or in part.

Windstorms at the beginning and end of the rainy season may damage the fronds and the central spear-like leaf shoot. The fronds can then be fractured and dry out. Yield level is variably reduced until the plant recovers. There is a need for selective pruning of fractured fronds. Raphia palm groves also suffer from fire damage during the dry season. Severe damage occurs in mature plants. Younger plants may be killed or retarded. Fire damage also causes mal- formed fruits with whole sections of the bunch having no fruits.

Table 1: Ethnobotanical analysis of the raphia palm in the West Cameroon Highlands.

PLANT ORGAN	MATERIAL	SPECIFIC USES
Stem	Dry poles	▪ Firewood ▪ Roofing materials ▪ Construction binding materials ▪ Construction materials for walls ▪ Door shutters ▪ Ladders ▪ Chests/boxes/coffins ▪ Fire brands ▪ Fence mats ▪ Fence poles ▪ Framed panels for walls and ceilings ▪ Wall mats/ceiling mats ▪ Ceiling boards ▪ Framework for bedsteads ▪ Household furniture ▪ Granaries ▪ Animal cages ▪ Beehives ▪ Traditional umbrellas ▪ Rafts/canoes ▪ Toys ▪ Construction of canopies ▪ Pestles ▪ Construction of bridges ▪ Musical instruments ▪ Animal pens ▪ Walking sticks ▪ Shoulder poles used to carry loads
Stem	Fresh poles	▪ Construction binding material ▪ Weaving of baskets ▪ Animal cages ▪ Ritual uses ▪ Stripes and handles of wine calabashes
Frond	Leaflets	▪ Brooms ▪ Roofing mats
	Leaf midrib	▪ Brooms ▪ Tooth-pick ▪ Fishing baskets/traps
Pith	Pith (dry)	▪ Toys
	Vascular bundles	▪ Decoration of baskets
	Lath-like strips	▪ Packing baskets
Central spear-like leaflets	Fresh central leaflets	▪ Fibre for weaving ▪ Ritual uses ▪ Basketry ▪ Twine ▪ Traditional textiles
Central spear frond	Sap	▪ Rituals ▪ Palm wine (drink) *
Rhizome	Habitat	▪ Edible beetle (food)
Seeds	Pulp	▪ Edible pulp (food)
	Nut	▪ Woven into decorative curtains ▪ Used to play a traditional chest-like game ▪ Musical instruments ▪ Toys

* The principal product

It was noted that the raphia palm requires much sunlight. The compound pinnate leaves (fronds) must therefore tower above the associated trees, shrubs, epiphytes, herbs and grasses in search of sunlight. Real enemies to the raphia palm are the creepers and climbing plants (*Artabotrys sp, Eremospatha macrocarpa, Lomariopsis guineensis* and *Rhektophyllum mirabile*). They grip, tie down and choke the young leaves thereby reducing the growth of fronds, the leaf area index and the rate of photosynthesis. Tall grass also has a similar effect. It was observed that where the above elements dominate the raphia palms are dwarfed. Under brushing of grasses and herbs (*Aframomum sp, Brillantaisia owariensis, Cephalis peduncularis, Commelina sp, Dissotis sp*), clearing of trees and ferns are therefore important routine maintenance operations. This is normally done at the beginning of the dry season. Camber mounds can then be formed within the raphia stands. These are often planted with shade tolerant tubers such as cocoyams (*xanthosoma sagittifolium*) and colocasia (*Colocasia esculentus*) in association.

Table 1 summarizes the ethnobotanical importance of the raphia palm. The plant provides several indigenous products for diverse uses to the local populations. It is probably the most versatile and economic plant in the region. Its uses are, indeed, limitless, so the table only highlights and demonstrates how the plant supports rural livelihoods and mountain cultures. The stem and leaves provide multi-purpose uses. A view of the cross-section of the stem shows numerous vascular bundles (veins) in the pithy inner portion. These are extracted and cleaned to obtain the soft, white vascular bundles which are used for decorating baskets. The central spear-like leaflet provides fibre. The epidemis from these leaves are removed in long, thin strips. It is removed from the upper surface of the leaflet at the time when the frond becomes free of the expanding cone of leaves (spear-like) and the leaflets folded face-to-face. The fibre is used for traditional textiles using looms made of raphia poles. Above all the sap produces wine which is of great economic importance in both rural and urban markets. The seed pulp is edible and is sold locally. Both the beetle and the larvae that live in the stems are edible. These and other products are locally marketed. In recent years the economic value of the

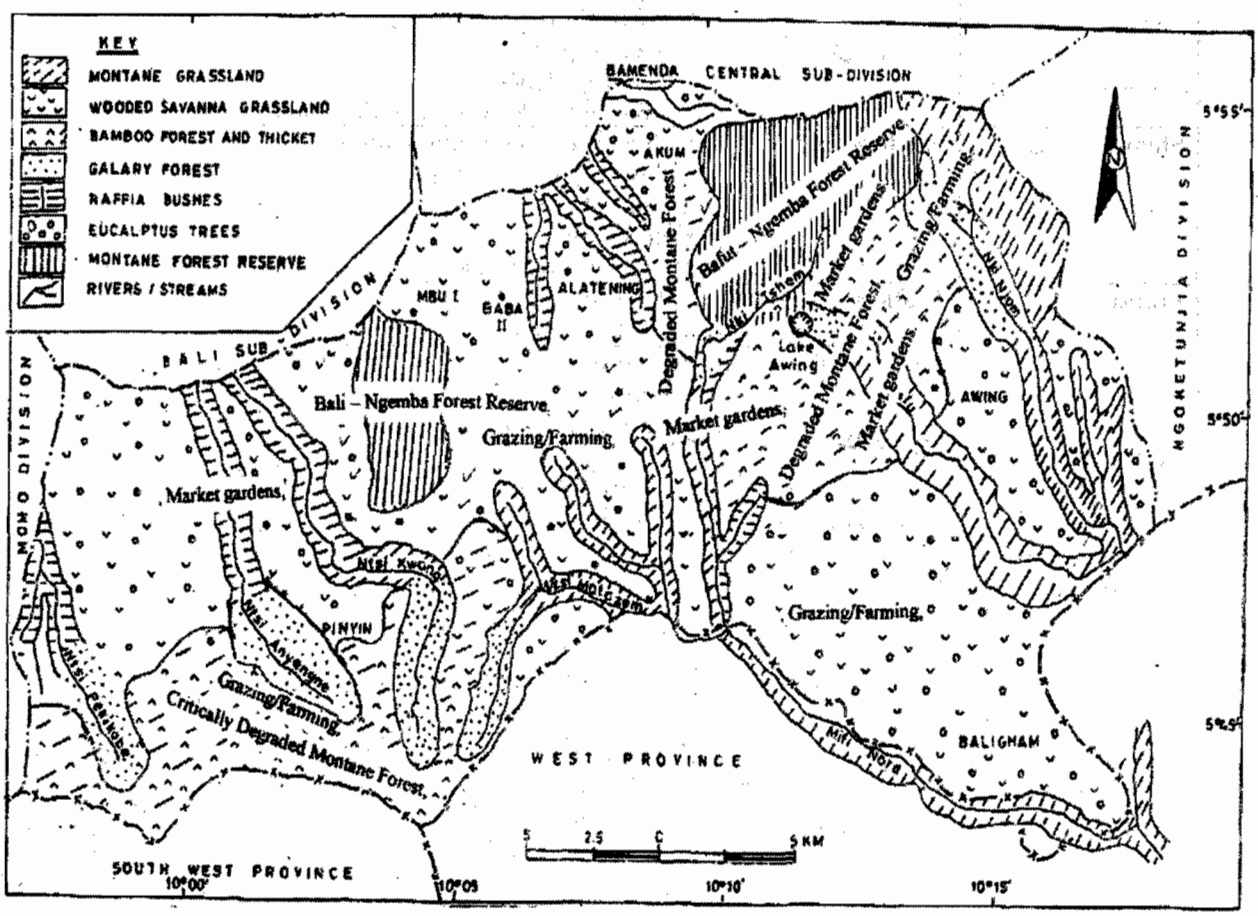

Figure 4: Fragmented gallery swamp forests of Raphia palm bushes in Santa

raphia palm has been recognized by rural people. The study observed that during the peak months of the wet season (June – July – August) the weekly local markets in Bui, Mezam and Ngoketunjia have exhibitions of raphia palm seedlings. Farmers come to buy good quality seedlings for planting in their own holdings. This trend is a result of the realization that the collection of timber and NTFPs from the raphia palm in the wild is increasingly becoming difficult.

Figures 4 and 5 present the anthropogenic pressures that are degrading the raphia palm groves. Santa area (figure 4) offers a network of gallery swamp forest in the high lava plateau. These ideal ecological niches for the *nka*-raphia palms are experiencing stresses (annual bush fires associated with extensive grazing of cattle and slash-and-burn farming systems, invasion by cattle, dry season market gardening, drainage for settlement and unsustainable harvesting of products). With an average population density of 100 inhabitants per square kilometer, there is immense land pressure in the area. This plant community in Santa, like in most of the Bamenda Highlands, has been greatly fragmented (Ndenecho, 2003). Large mammals that can effect the propagation of the plant are not abundant due to indiscriminate hunting and forest clearance which continue to threaten the raphia palm (Stuart, 1986, Ndikefor, 2003). Cattle and goats invade the forest during the dry season in search of browses and watering points. Goats and sheep are voracious feeders and inhibit natural regeneration of forest species.

Accompanied by trampling by cattle and fire damage almost no regeneration takes place, leaving a moribund vegetation, inducing savannization (Ndenecho, 2005), desiccation of the land and therefore an environment not suitable for growth, physiological development and reproduction by the *nka*-raphia palm. Alteration of edaphic conditions and pyrogenic factors leading to more xerophytic conditions will adversely affect the plant.

Figure 5 maps raphia palm holdings in the densely populated Bamileke Plateau at Bamendjou. The population density in the area exceeds 200 inhabitants per square kilometer. Land use is characterized by homegardens enclosed by hedgerows. In this land pressure area the gallery swamp forest are being systematically drained for the development of gardens. These large valley bottoms which are flooded in the rainy season but remain marshy in the dry season were hitherto traditionally abandoned in the Bamelike Plateau despite the high demand for farmland. This was because the indigenous people had no knowledge of land drainage and water management technologies. Within a framework of an integrated development programme, public authori-

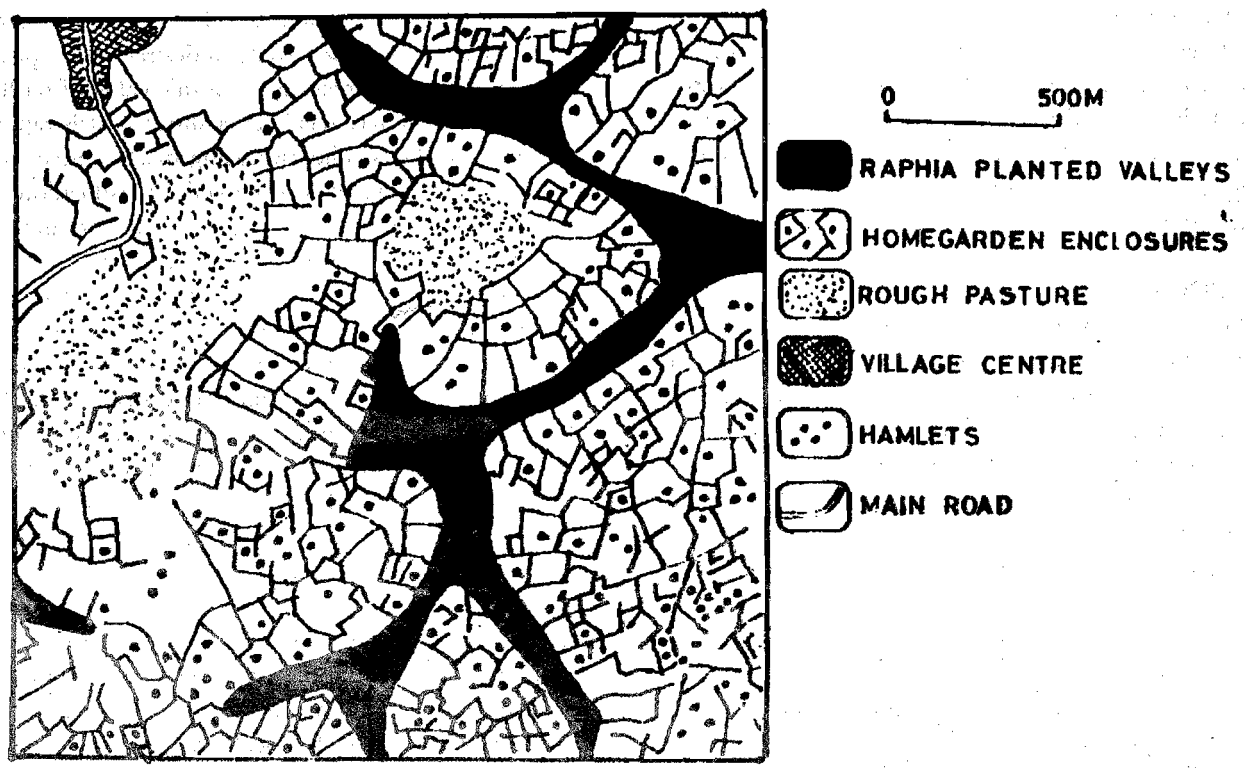

Figure 5: Distribution of gallery swamp forest in Bamendjou: conversion to farmland.

Table 2: Distribution of land in reclaimed raphia palm sites

Farm size (m2)	Gallery swamp forests		
	Batsingla	Fokamezo	Balefok
Less than 400	5	5	0
400 – 599	50	53	2
600 – 999	24	41	4
1000 – 1999	17	47	72
2000 – 4999	10	9	15
3000 – 10.000	0	0	1
Over 10.000	0	1	0
Farms involved	161	339	712

Source: Dongmo, 1986.

ties embarked on a land drainage programme in order to make these valleys available to indigenous peoples for market gardening.

Table 2 presents some data on the systematic drainage of swamp forests in the Bamendjou area of the Bamelike plateau. This has resulted in a spectacular transformation of the rural landscape with negative impacts on the survival of the *nka* – raphia palm. The degradation and conversion of natural raphia palm forests to farmlands and market gardens in the highlands is widespread (Ndenecho, 2006; Ndenecho 2007). If this is allowed to continue, not only will the *nka* – raphia palm be eliminated in the region but also the products and livelihood activities it supports. Craftwork dependent on the raphia palm is the traditional and cultural heritage of the indigenous people. It deserves to be preserved and promoted, for it gives life, colour and pride to the community. It is the cement that binds the numerous ethnic groups together, and by it, even the post – modern world, they may regain self respect and begin to re-discover their cultural identity (Knöpfli, 2001).

DISCUSSION

The plant is sustaining the livelihoods of a large population of rural and urban dwellers. Yet, little is known about the botany and agronomy. There has been an increased tendency towards domestication and the establishment of raphia palm holdings in rural areas. This is certainly a reaction to the fact that the plant is being overexploited for diverse uses and the degradation of its natural niches by competing land use systems. The process of gradual intensification in developing and managing raphia plantations is in agreement with the model of evolutionary people-tree interaction developed by Wiersum (1997). In the model, different phases of people-plant interactions are arranged along a gradient of increasing input of human energy per unit of exploited land, from uncontrolled utilization through controlled utilization to protection and maintenance to purposeful regeneration. Concomitant with this process of management intensification, a gradual transformation of the natural ecosystem into a domesticated agroecosystem takes place. As concerns raphia palms, these different phases are not discrete. There is not a clear boundary between natural and cultivated raphia palm groves, but rather a gradual transition from the harvesting of raphia palm resources from the wild through increased management of naturally occurring raphia palm groves and enrichment planting by landowners who claim use rights in swamp forest bordering their croplands to transplanting seedlings on private land.

The main economic trends inducing intensification in the growing of raphia palms are the on — going economic crises, increasing scarcity of desired raphia palm materials and the increasing economic value of raphia palm products. There has been a shift towards raphia palm tree products. The increasing market prices for these products have also provoked intensification of planting. The extraction of raphia palm products is not limited to natural swamp forest. The trend has been towards domestication and integration in different types of local agricultural production systems. Intensification has taken place because of demand and supply factors. Supply includes natural occurrence of the plant, ease of cultivation of the species and socioeconomic factors including land and tree tenure. These are growing factors that have necessitated intensification by the establishment of individual holdings.

On the other hand, demand factors include prevailing market conditions in favour of cheaper products manufactured from raphia palm materials, at active prices for raphia palm products and a high degree of substitutability of beer by locally tapped raphia palm wine. There is, therefore, an urgent need to research on both the botany and agronomy of the crop as a

move towards domestication and integration in the local farming systems. This is particularly important in the creation of more on-farm and off-farm employment opportunities for both men and women.

CONCLUSION

The raphia palm has as its habitat the gallery swamp forest. Little scientific data on the biogeography, botany and agronomy of the plant has been documented. Despite its economic value and multi-purpose uses, and the role it has played in the socio-cultural civilization of the indigenous people it still suffers from uncontrolled utilization, no protection and maintenance and the lack of purposeful regeneration. There are however signs of a gradual transformation of this natural ecosystems into an agroecosystem. These weak and isolated grassroot initiatives require scientific assistance from botanists, agronomists, ecologists; natural resource managers and researchers to demonstrate to the government and development agencies the monetary evaluation of the raphia palm as a source of multipurpose products and thus the need for protection and purposeful regeneration through domestication. This study draws attention to the fact that the raphia palm ecosystem has been treated with the disrespect accorded to seemingly limitless resources despite its multi-purpose uses.

ACKNOWLEDGEMENTS

I thank Asah Henry (late) of the Bambui Research Station, Kemoie Jean – Berlin of the Botanical Club of the Regional College of Agriculture in Bambili and Bogne Andre of the Regional College of Agriculture (Bambili) for assistance with the botanical analysis and Kum Sylvester of PEMSAHR – Cameroon for field assiatance.

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Received: 23/03/2005

Accepted: 08/05/2007