

Full Length Research Paper

Seasonality of non-timber forest products in the Kupe mountain region of South West Cameroon

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Non-timber forest products (NTFPs) are economically-important commodities, especially in the humid and semi-humid regions of many sub-Saharan countries. However, in many of these countries, there is little information on the seasonality characterising their availability and collection, rendering difficult the development of meaningful packages for their sustainable use and valorisation. A study was therefore conducted in randomly selected villages in three zones around the sub-montane forests of Mount Kupe in South West Cameroon, in order to evaluate the effects of seasons on the collection and availability of these products. Data were collected through administration of semi-structured questionnaires and a rapid rural appraisal. Most NTFPs (85%) showed seasonality to different extents, in availability and abundance. Although, considerable differences were observed in the proportion of respondents who collected NTFPs during the dry and rainy seasons, no such difference could be attributed to the climatic or geographical zones. Half of the respondents collected NTFPs during the rainy season when there was relatively less work in their farms. About one-sixth (15.2%) collected NTFPs during the dry season (peak agricultural period) and a third (35%) collected some NTFPs all year round.

Key words: Cameroon, humid forest, non-timber, seasonality, collection.

INTRODUCTION

Until recently, timber products like industrial and derived sawn timber, wood chips, wood-based panel and pulp have been considered as the major or even the most important forest products due to their income-generating capacity. Meanwhile, other forest products, especially those used as food, medicinal plants, household and agricultural implements, etc. have traditionally been considered of minor or secondary importance (Makon et al., 2005). The importance of these later materials, extracted from forest ecosystems, has increased considerably today following their use within households and as they are equally traded for their social, cultural or religious significance (Ndoye and Tieguhong, 2004; Ngwasiri et al., 2005). Unlike some authors who term these materials

as non-wood forest products (FAO, 1991; Sunderland and Oboma, 1999; Vantomme, 1999), the term non-timber forest products (NTFPs) used by other authors (Falconer, 1992; Kio and Abu, 1993; Okafor, 1989) is preferred in this study since some of the products such as axe handles, fuel wood and chewing sticks contain lignin (wood).

Most NTFPs are not domesticated and are just collected from the wild. They are often not available year-round or when available, are in limited quantity. The exploitation of NTFPs could therefore be regarded as a seasonal activity that contributes to improving the livelihoods of rural populations where prices of major agricultural products are low, fluctuating and seasonal.

Agriculture is the mainstay of the people of the Kupe area. Farming is carried out mainly for subsistence and the traditional farming system is shifting cultivation which is wasteful to land. Arable crops, tree crops and animals are being farmed. Major arable crops are

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Table 1. Market value of some important NTFPs in Southern Cameroon.

Species name	% of harvest sold	Total revenue (CFA) in 4 months	Total revenue (\$ US) in 4 months
<i>Coula edulis</i>	5	15000	3.1
<i>Cola acuminata/nitida</i>	30	2500	5.1
<i>Cola pedidota</i>	30	3800	7.8
<i>Dacryodes edulis</i>	10	11000	22.5
<i>Dacryodes macrophylla</i>	10	2000	4.1
<i>Elaeis guinensis</i>	<1	2800	5.7
<i>Garcinia lucida</i>	10	400	0.8
<i>Irvingia gabonensis/ wombolu</i>	20	79000	161.6
<i>Ricinodendron heudelotti</i>	100	5800	11.9
<i>Strophanthus gratis</i>	100	32500	66.5

cocoyam, plantains, banana, cassava, yam, maize, cabbage, pepper and okro. Tree crop agriculture involves the growing of cacao, coffee and oil palm. Animal farming includes the rearing of goats, sheep and birds. Fishing of tadpoles and frogs is carried out in in-land water bodies.

Disturbing and persistent drop in the prices of cocoa and coffee (major export crops of the area) for two decades now have further worsened poverty levels in this area. However the sale of food crops now constitutes a major income source particularly as foreign buyers from mostly Gabon and Equatorial Guinea have flooded the market. NTFPs usually collected in the study area are used for food, medicine, household utensils and construction material.

Due to slightly different vegetation and climatic conditions in the three zones considered in the study, it is expected that species variation and variation in time of production of NTFPs will be observed (Leakey et al., 2000). For example, off season *Dacryodes edulis* could be found in Kupe East. Also *Gnetum* spp. (Figure 4L) which is of local, national, regional and international significance could be found only in Kupe East with higher temperatures throughout the year. With local variation in the vegetation and climatic conditions in the study area, it is possible that a particular product could be obtained from different species in different zones.

Although most of the NTFPs are collected for household consumption, some are traded to supplement the cash income of households. While NTFPS such as *Ricinodendron heudelotti* and *D. edulis* are traded locally in village markets, others such as *Irvingia* spp. and *Gnetum* spp. are taken to city markets and are bought by buyers who export to Nigeria, Europe and the United States of America.

In the Kupe area, collection of NTFPs is an income diversification activity which is risk-reducing and at the same times a way of coping with constraints in the main income generating activity of the area, agriculture. Important NTFPs such as *Garcinia cola* (Figure 4a), *Piper*

guinense (Figure 4E, F and I) and *R. heudelotti* that play a major role in generating income for the local people are not available throughout the year. The scarcity of such NTFPs during off-seasons leads to food insecurity and economic vulnerability. This adversely affects the socio-economic life of the community as malnutrition and associated diseases coupled with poverty reduce the living standard of the people.

The absence of a particular medicinal NTFP such as *Afromonium melegueta* (Figure 4J) at a certain period of the year can also result to serious health problems in the communities that depend on it for the cure of various ailments. Dijks Van (1999) showed that NTFPs collection and production can provide a source of livelihood as shown on Table 1.

In such an area where NTFPs play a major role in enhancing status and wellbeing of the local people, where there is ethnic diversity, local variation in climatic conditions with consequent variation in use and availability of NTFPs during different seasons of the year, there is need for relevant, reliable and timely information on their seasonal availability and estimates of their stocks if adequate forecasts of use, marketing and sustainability are to be made.

The objective of this study was therefore to provide information on the true value and significance of non-timber forest products during different seasons of the year in the Mount Kupe area. More specifically this study attempts to:

- i. Identify the various types of non-timber forest products in the study area during the different seasons.
- ii. Assess the factors affecting the involvement of local populations in their collection.
- iii. Proffer recommendations on management strategies that will mitigate the effect of seasonality of these products.

Based on the objectives of this study the hypothesis

tested were as follows:

- i. That the availability of NTFPs depends on different seasons of the year.
- ii. That the availability of NTFPs depends on zones.
- iii. That NTFPs contribute to the socio-economy of the local people during different seasons of the year.

MATERIALS AND METHODS

Survey locus

The Kupe area straddles two regions of Cameroon, the South West and Littoral regions. The population that inhabits the Kupe area represents an array of socio-cultural, economic and political identities possessing a diverse ethnic originality made up of various indigenous Bantu clans (Muetuck, Mbo, Manehas, Muasundem etc), settlers from the North West Region and immigrant Bamilikis from the West Region of Cameroon. This people make up a population of about 100,000.

Forests that make up the Mount Kupe are mostly sub-montane equatorial rain forest and are known to support a wide variety and abundance of resources which are of huge importance to the people that inhabit the area for livelihood improvement, recreation, cultural promotion, etc. Forests resources present include timber, NTFPs, ethno-botanical resources, etc. The area is also known to have huge eco-tourism potentials as well as very rich cultural values. Moreover the quality of the forest provides for undeniable environmental services including water catchments.

The survey was conducted through out the year 2008 in the Mount Kupe area located within the humid forests of Southern Cameroon. The Kupe Mountain spans the borders of the South West and Littoral Regions of Cameroon. The area, home to the Bakossi tribe and a high proportion of non-indigenes, could be partitioned into three zones populated by three different clans with distinctively different eating habits: Manehas in the East (Francophone), Muetuck in the West (Anglophone) and Muasundem in the North- Anglophone (Ejedepang-Koge, 1986). These zones are different with respect to their altitudes, geographical positions, climate and vegetation.

The difference in altitudes and geographical position has led to differences in the climate as well as the vegetation of the different zones. The climate of this area is of the equatorial or transitional tropical type. Despite some local variations, there is a zonal uniformity of high and constant temperatures. Rainfall varies from 2500 mm per annum in Kupe East, to about 5000 mm per annum in the entire area. Minimum monthly temperatures vary from 19 to 21 °C; though much lower in Kupe West (2064 m) and maximum from 30.55 to 35.20 °C. Relative humidity is about 85%.

Generally two main seasons could be distinguished separated by an intermediate season. (i) Mid-June to October: a major rainy season of overcast and misty weather, continuous rains and drizzling; (ii) Mid-November to Mid March: a major dry season of dry foggy weather, harmattan and diffuse radiance, (iii) Mid October to mid-November/mid-March to mid June: intermediate/transition season of changeable weather, storms and rain showers alternating with bright intervals.

Sampling of respondents and data collection

The studied area was stratified based on the zones around the Kupe mountain (East, West and North of the mountain). Three clans were randomly selected from the entire Kupe area, and three villages randomly selected from each clan, as shown as follows:

- i. Kupe East zone (Manehas clan): Nlohe, Lala and Kola villages (French speaking villages);
- ii. Kupe West zone (Muetuck Clan): Nyasoso, Ngusi and Atop villages (English speaking villages);
- iii. Kupe West zone (Muasundem clan): Mpako, Tape-Etube and Bendume villages (English speaking villages).

A semi structured questionnaire was used as the main survey instrument for information collection. It was designed in five parts A to E. Section A was designed to elicit information on the background of the villages. Section B dealt with the biodata of the respondents. Section C sought to elicit information on the identification of NTFPs. Section D was to gather information on seasonal variation in the collection of NTFPs and section E duled on the socioeconomic contribution of NTFPs.

Before the actual administration of the questionnaire a reconnaissance survey was undertaken during which some background information on the study area was collected. A pre-test survey was also undertaken. During this exercise test questionnaire were randomly administered in three villages which though different from the villages selected for the actual study were within the same locality. The completed test questionnaire were collated and analysed. Adjustments were made before the final production of questionnaire before the survey proper was undertaken.

Ten percent of the estimated number of households in the selected villages was calculated (Hannagan, 1989). 280 questionnaire were filled and 250 returned as follows: 66, 87, and 97 for Kupe East, Kupe North and Kupe West respectively. In addition to this, a rapid rural appraisal (RRA) was carried out - using transect walks, structured direct observations and key informant interviews.

Data analyses

The data were statistically analysed for the sources of variance on a randomised complete block design using the M-stat software (Aika, 1997). This was complimented by descriptive statistics using the Sphinx package.

RESULTS

This survey showed that non-timber forest products were obtained from about sixty plant species and twenty animal genera (Tables 2 to 4). The majority of respondents collected NTFPs during the rainy season (Figure 2). On the average for the three zones, about half (50.4%) of the respondents collected NTFPs during the rainy season, while 15.2% collected NTFPs during the dry season. Also, 34.4% collected some NTFPs all the year round. Significant differences ($P < 0.05$) were observed between the number of respondents collecting NTFPs during the rainy and dry seasons but there was no significant difference between those collecting in the rainy season and those collecting all year round. There was a significant difference in the number of respondents collecting NTFPs during the different seasons in the different zones of the study area. The main reason for much collection of NTFPs during the rainy season was as a result of less farm work during this period (Table 5); though most of the NTFPs show seasonality in their collection (Tables 2, 3 and 4). Some human food NTFPs

show stark variation in collection during the different seasons of the year (Table 2). For example, though bushmeat (game) is generally harvested more frequently during the rainy season, pestilential species were caught relatively more frequently during the dry season. In the Eastern side of Kupe, fruit production was much later (end of season) and off-season fruit were available for collection. Construction materials show much less seasonality. However most construction and maintenance of houses, fences and huts takes place during the dry season (Table 3). Non-timber forest products also provide a source of livelihoods for rural people. This employment is basically on part-time basis (Figure 3). The situation was similar in the different zones but more full-time employment was provided by NTFP activities during the rainy season than during the dry season.

DISCUSSION

The reason for collection of NTFPs in the different seasons was tested and revealed that most respondents collect NTFPs during the rainy season because of less work in their farms. This was also observed by Sunderland and Oboma (1999).

This can further be attributed to the fact that during the dry season most labour is devoted to agricultural activities, while during agricultural slack periods much time is allocated to NTFP collection. This sometimes leads to over harvesting and unsustainable harvesting of NTFPs. Biliso and Lojoly (2006) also posited that there are no other significant sources of income during the rainy season. During the peak of the rainy season (hungry period), stored food supplies dwindle, most food crops on the farm are yet to mature and as such there is scarcity of food. NTFPs are important during this period as substitutes for staple foods, accompaniments and snacks to supplement the food crop supplies. When not available the local people are deprived of important food nutrients, medicines and household income. This has a very serious adverse effect in Kupe West and Kupe North than in Kupe East where off-season products are available and commercialisation of NTFPs more lucrative due to access to major city markets.

Some respondents showed that harvesting periods of most NTFPs in Kupe coincide with school resumption (September in rainy season), hence NTFPs are highly needed to raise income for fees, uniforms and purchase of books. Buyungu (2000) also observed that this was also the situation in other West African countries like Ghana, Nigeria and Cote d'Ivoire. Some NTFPs such as *D. edulis* and forest vegetables are very much perishable hence more seasonal than bush mango (*Irvingia gabonensis* and *wombulu* Figure 4D) which can be dried to be used when not in season. This has also been observed by Leakey et al. (2000). It was also observed that *Irvingia gabonensis* was available in the rainy season

(June-September) while *Irvingia wombulu* was available during the dry season (October to February) making the product, ogbono available all year round. It was also observed that off-season fruits could be found in the Eastern side of Mount Kupe probably due to dryer climatic conditions in the leeward side of the mountain. Another important reason for much NTFPs collection during the rainy season is that very important NTFPs such as *D. edulis* (plum or safou), *G. cola* (bitter kola, Figure 4G) and *Cola acuminata* and *nitida* (kolanuts, Figure 4A) mature during the rainy season.

The study showed that in the heart of the dry season, the availability of snails dwindles as they go into aestivation and are sometimes destroyed by wild fires. More forest vegetables were collected during the dry season as a result of scarcity of vegetables from farms. According to Hart et al. (2005), the harvesting of forest vegetables is more during the dry season because these serve as alternatives to cultivated vegetables which are perishable and scarce at this period. Though more game was obtained during the rainy season, pestilential species of bushmeat are caught during the dry season when their habitats are destroyed during land preparation for the next planting season. In this study, it was observed that the availability of some forest spices such as *Ricinodendron heliudothii* (njangsang) and *Tetrapleura tetraptera* (four corner or essisang) show very little seasonal variation in availability because they generally keep well, if dried. Value is added when preserved and are sometimes exported to neighbouring Nigeria. This contributes immensely to improving the living standard of the local people.

Palm wine consumption largely depended on seasonal availability and perishability and is mostly drunk during the dry season when tapping is easy, without dilution from rain water. Local gin (locally called "afofo" and "odontol") mostly produced from palm wine is drunk more during the rainy season when palm wine is relatively scarce. People tend to drink more of this local gin during the rainy season to have themselves warmed up.

The collection of non-timber forest products used as medicine, construction materials and household items was much less seasonal because the parts mostly used for these purposes are the bark (cortex) and wood which are less perishable and are available throughout the year. Also in the case of some species like bitter cola (*G. cola*) and 'ngou' (*Garcinia lucida*) whose fruits are used as medicine, the bark is taken as a good substitute for treating the same ailments when the fruits are not in season. This also has a destructive effect on the tree which is sometimes girdled to death, especially as this occurs even in the dry season. Much harvesting of medicinal plants was observed in Kupe North because *Croton* spp. ("Ndume", Figure 4B) which is considered by the Bakossi ethnic group as the most important medicinal plant is abundant in Bendume village from which the village derived her name (Bendume meaning plenty of

Table 2. Seasonality of major food NTFPs in the Kupe area.

Source	Product	Usefulness in the study area	Kupe West			Kupe North			Kupe East		
			Rainy	Dry	All year	Rainy	Dry	All year	Rainy	Dry	All year
(a) – Food of plant origin											
<i>Elaeis guineensis</i>											
	Palm oil and kernel	Cooking oil	2	3	2	1	2	1	2	3	2
	Palm wine	Alcoholic drink	1	3	1	1	3	1	1	1	1
	Raphia hookery	Palm wine	2	3	2	1	2	1	3	1	1
Spices and condiments											
	<i>Riciodendron heudelotii</i>	Njasang	3	1	1	3	1	1	2	1	1
	<i>Irvingia gabonensis</i>	Ogbono	2	0	0	2	0	0	1	0	0
	<i>Irvingia wombulu</i>	Ogbono	0	2	1	0	1	0	0	1	0
	<i>Piper guinense</i>	Bush pepper	2	3	2	0	1	0	1	1	1
	<i>Tetrapleura tetraptera</i>	Essisang	2	3	1	1	2	1	1	1	1
Fruits/seeds											
	<i>Dacryodes edulis</i>	Plum	3	1	1	2	0	0	3	1	1
	<i>Cola acuminata</i>	5 piece kola	3	1	0	1	0	0	1	0	0
	<i>Cola nitida</i>	1 piece kola	0	0	0	0	0	0	2	1	1
	<i>Garcinia cola</i>	Bitter cola	3	1	0	1	0	0	0	0	0
	<i>Aforsthyrix</i> sp.	Bush onion	2	1	1	2	0	0	1	0	0
Mushrooms and vegetables											
	<i>Agaricus campestris</i>	Kokobiako	3	1	1	2	1	0	2	1	0
	<i>Gnetum africanum</i>	Eru	0	0	0	0	0	0	1	2	2
	<i>Gnetum buchulzianum</i>	Eru	0	0	0	0	0	0	1	2	2
	Other forest vegetables		2	3	2	2	2	1	1	2	1
(b) – Food of animal origin											
Insects											
	<i>Apis mellifera</i>	Honey bee	1	3	1	1	3	1	1	2	1
	<i>Rhynchophorus phoenicis</i>	Maggot	1	2	1	2	1	2	1	3	1
Bush meat (game)											
	<i>Cricetomys gambianus</i>	Bush rat	3	2	1	3	2	2	3	2	1

Table 2. Cond.

<i>Thryonomys swinderianus</i>	Cane rat	Source of protein	2	3	2	2	3	2	2	2	1
Cephalopus spp.	Duikers	Source of protein	3	2	2	2	1	1	2	1	1
<i>Atherurus africanus</i>	Porcupine	Source of protein	3	2	2	2	3	2	2	3	2
Monkeys		Source of protein	3	2	2	3	1	1	3	1	1
<i>Potamochoerus porcus</i>	Bush pig	Source of protein	2	1	1	2	1	1	1	1	1
Fishes		Source of protein	0	0	0	1	1	1	2	1	1
Birds		Source of protein	1	1	1	1	1	1	1	1	1
Snakes	.	Source of protein	3	2	2	3	2	2	2	1	1
Snails											
<i>Archachatina. Archatina</i>	Snail	Source of protein	3	1	1	1	1	1	1	0	0
<i>Archachatina marginata.</i>	Snail	Source of protein	0	0	0	0	0	0	0	0	0

0 = none; 1 = very few; 2 = few; 3 = many.

Table 3. Seasonality of major non-food NTFPs in the Kupe area.

NTFP and source	Usefulness in the study area	Kupe West			Kupe North			Kupe East		
		Rainy	Dry	All year	Rainy	Dry	All year	Rainy	Dry	All year
<i>Cordia</i> sp.	Construction of houses	3	3	1	3	2	2	2	3	2
<i>Elaeis. Guineensis</i> (palm fronds)	Construction of houses	1	3	2	1	3	1	1	3	1
<i>Raphia</i> spp. (palm fronds)	Construction of houses	1	2	1	1	2	1	1	2	1
<i>Thaumatococcus</i> spp. (ngongo leaf)	Wrapping leaves	3	2	2	2	2	2	3	3	2
<i>Neubouldia laevis</i>	Live fencing	3	3	3	2	2	2	1	1	1
Household implements										
<i>Bambusa</i> sp. (Indian bamboos)	Construction of houses	2	2	2	3	3	3	2	2	2
<i>Cordia</i> sp.	Mortar	3	3	1	3	2	2	2	3	2
<i>Elaeis guineensis</i> (palm oil)	brooms	1	1	1	1	1	1	2	3	2
<i>Calamus</i> spp. (cane)	Can chairs baskets, beds	3	3	3	2	2	2	2	2	2
<i>Acacia</i> spp. (gums)	gum	0	0	0	0	0	0	1	1	1
<i>Irvingia</i> spp.	carving	1	1	1	1	0	0	0	0	0
<i>Pterocarpus sauyouxii</i> (camwood)	Mortar, cosmetics	2	2	2	2	2	2	2	2	2
Firewood										
<i>Albizia</i> spp., <i>Irvingia</i> sp. etc.	fuel	1	3	2	1	2	2	1	2	1

0 = none; 1 = very few; 2 = few; 3 = many.

Table 4. Seasonality of major medicinal NTFPs in the Kupe area.

NTFP and source	Usefulness in the study area	Kupe West			Kupe North			Kupe East		
		Rainy	Dry	All year	Rainy	Dry	All year	Rainy	Dry	All year
Medicine										
<i>Croton</i> spp.	Most are marketed: Chase evil spirits, stomach ache, well being of pregnant women	1	1	1	3	3	3	0	0	0
<i>Elaeis guineensis</i> (kernels)	Babies welfare and cosmetics	1	1	1	1	1	1	3	3	3
<i>Gnetum africanum</i>	Cure for spleen, bed wetting, stomach ache, drunkenness	0	0	0	0	0	0	1	2	2
<i>Gnetum buchulzianum</i>		0	0	0	0	0	0	1	2	2
<i>Enanthia chlorantia</i> (Chloroquine plant)	Prevention and cure for malaria, added to local gin	2	1	1	3	3	3	0	0	0
<i>Azadirachta indica</i> (Neem)	Treatment of malaria, preservation of stored crops	1	1	1	1	1	1	3	2	2
<i>Garcinia cola</i> (bitter kola)	Cough, hepatitis, aphrodisiac	3	1	0	2	0	0	3	1	1
<i>Allanblankia floribundia</i>	Treatment of toothaches and diarrhoea	3	1	1	0	0	0	3	2	1
<i>Albizia</i> sp. (essang)	Malaria	2	2	2	2	2	2	1	1	1
<i>Garcinia lucida</i> (meckak)	Tooth ache	3	3	3	2	2	2	2	2	2
<i>Garcinia mannii</i> (ngou)	Tooth bush	3	3	3	2	2	2	2	2	2
<i>Maesopsis eminii</i> (Rhamnaceae)	Gonorrhoea and other bacterial infections	2	2	2	1	1	1	0	0	0
<i>Afromomum melegueta</i> (alligator peper)	Charms, aphrodisiac	3	3	3	3	3	2	2	2	2
Cosmetics										
<i>Pterocarpus soyauxii</i> (camwood)	Rubbed on women after delivery	3	3	3	2	2	2	2	2	2
<i>Tectona grandis</i> (teak)	Bathing sponge	1	1	1	1	1	1	0	0	0
Chewing stick										
<i>Garcinia mannii</i>	Tooth brush	3	3	3	2	2	2	0	0	0
<i>Massularia acuminata</i>	Tooth brush	3	3	3	2	2	2	1	1	1
Animals										
<i>Chamelion</i> (<i>Chamaeleon</i> <i>spp.</i>)	Reduce shock from fright after accidents	3	3	3	2	2	3	1	1	1

Table 4. Cond.

Pocupine (<i>Atherurus africanus</i>)	Easy child birth in women	2	2	2	2	2	2	1	1	1
Bush fowl (<i>Francolinus cameroonensis</i>)	Prevent child birth	1	1	1	1	1	1	1	1	
Giant rat (<i>Cricetomys cambianus</i>)	Protection against witchcraft, poisons and charm to win the love of women	3	3	3	1	3	2	1	1	1
Grass cutter hair (<i>Thryonomys swinderianus</i>)	Healing of eyes	2	2	2	2	2	2	0	0	0

0 = none; 1 = very few; 2 = few; 3 = many.

Table 5. Reasons for seasonality in collection of NTFPs.

Reason	Kupe East	%	Kupe North	%	Kupe west	%	Total	%	X
Little farm work	3.3	28.4	38	32.7	45	38.8	11.6	46.4	68.7
Availability	2.0	20.8	34	35.4	4.2	43.7	9.6	38.4	32
Weather	13	34.2	15	39.5	10	26.3	38	15.2	12.7
Total	66	26.4	87	34.8	97	38.8	250	100	

Ndume).

Much firewood and yam stakes are collected during the dry season since land preparation for the next farming season involves clearing of bushes. Some respondents revealed that a little more construction material is used during the dry season. At this time houses and other huts are constructed using poles, palm frond petioles or bamboo stems and twines. During the rainy season, some of these constructions require maintenance and construction materials are again needed to fortify them.

The study revealed that a particular product could be obtained from different species in different zones. For instance, palm wine is obtained from both *Elaeis guineensis* and *Raphia hookery* in all the clans, but the latter is more commonly found in fresh water swamps in Kupe West and more available in the rainy season as it is easier to tap (less readily diluted by rain water during tapping).

Though collection of NTFPs provides employment to the inhabitants of the area, agriculture is the mainstay of the people of Kupe. The people are more involved in farming activities during the dry season than during the rainy season. Little time is spent on gathering of NTFPs during the period of crop cultivation. However, during agricultural slack periods the collection, processing and marketing of NTFPs becomes the major occupation of some rural dwellers. More fulltime employment was

observed in Kupe West and Kupe North than in Kupe East (Figure 3). This is probably because of the abundance of the products in Kupe West and Kupe North than in Kupe East (Tables 2, 3, and 4).

Conclusion

This work has thrown some light on the availability and collection of non-timber forest products in Kupe. These products show seasonality in availability and collection with most of them being collected during the rainy season when there is little work in the farms and when food crops are yet to mature. The duration of the rainy season (7 months) in the study area is more than that of the dry season (5 months). This is another reason why more NTFP collection takes place during the raining season. Collection of NTFPs is an income diversification activity in The area and is also a risk-reducing strategy against household income fluctuations.

It was observed that during particular periods of the year a particular NTFP will exist in abundance and sometimes in excess while there is acute scarcity during another period of the year. This seasonal nature of NTFPs has been an enormous setback in the utilisation of these important resources. To enable the local people and other actors benefit from the exploitation of NTFPs, research on production of off-season varieties should be

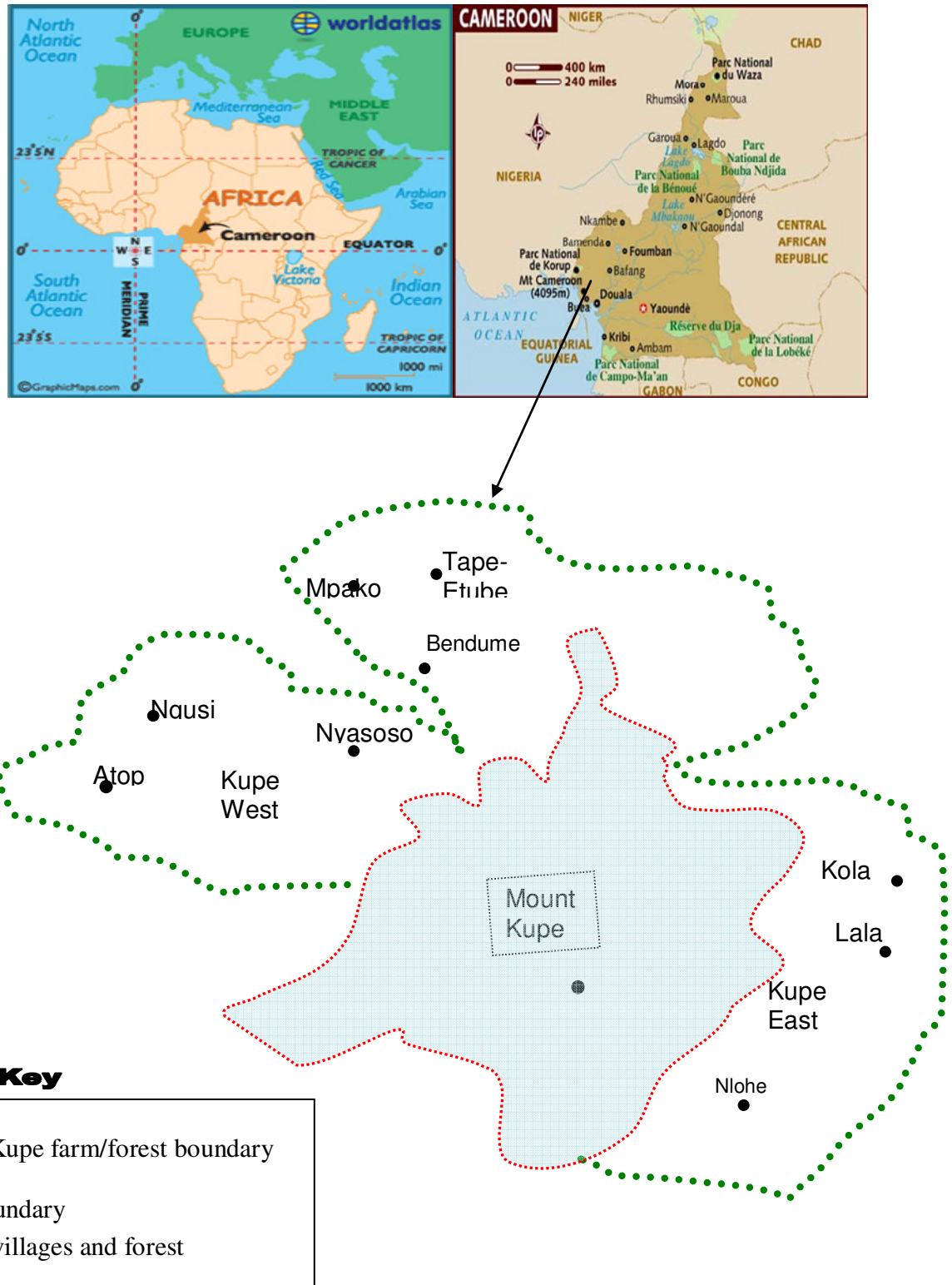


Figure 1. Location map of the study site (Mt. Kupe area).

encouraged. Selection for all-year-round production for important NTFPs such as *D. edulis* and *Irvingia* spp. can certainly have considerable impact on the availability of

products as there is typically some within-species variation in phenology with some trees flowering and fruiting outside the main season. Artificial and deliberate

Seasonality of NTFP Collection in the Kupe Area

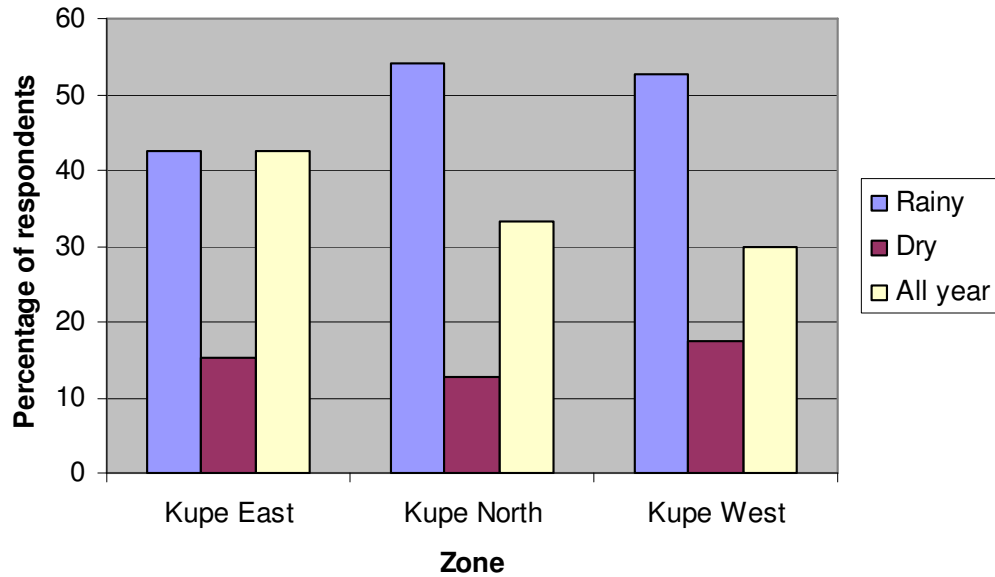


Figure 2. Seasonal variation of NTFP collection in the study area.

Employment pattern of NTFPs

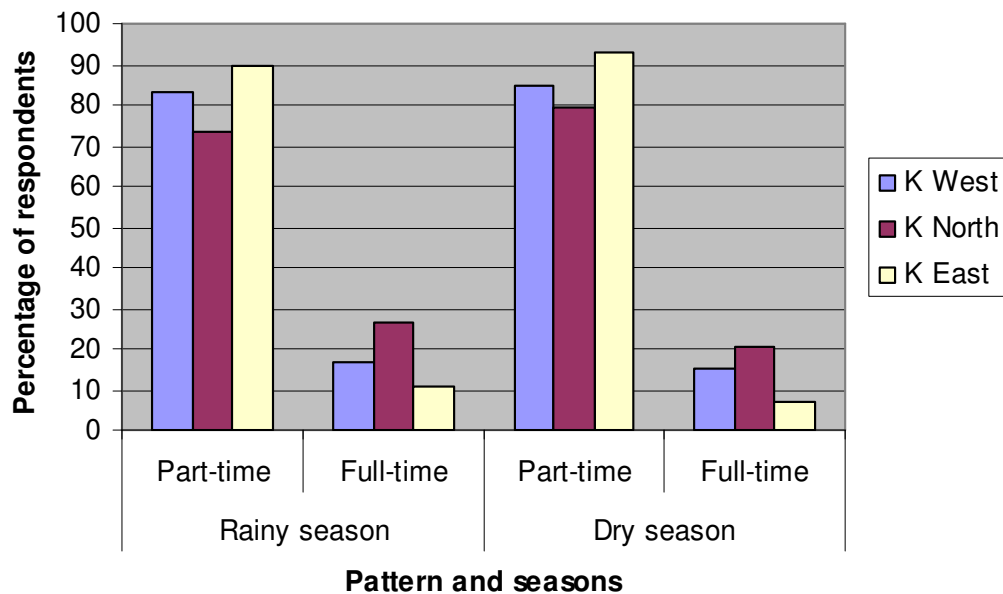


Figure 3. Effect of geographical zone and different seasons of the year on employment patterns in the survey zone.

actions such as improved preservation techniques, irrigation and incorporation of NTFPs in agroforestry systems and organic gardens can be important in

providing off-season products. This will be very useful today in the mitigation of the effect of climate change on availability, collection and management of NTFPs.



Figure 4. Some common NTFPs in the Mount Kupe area found in the Tombel Town Market place.

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