

Local Knowledge of Utilization of Nipa Palm (*Nypa Fruticans*, *Wurmb*) in the Coastal Areas of Akwa Ibom State, Nigeria.

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ABSTRACT

This study was aimed at identifying the uses and problems associated with the local utilization of nipa palm (*Nypa fruticans*, *Wurmb*) in the coastal areas of Akwa Ibom State of Nigeria with a view to making recommendations for improved local utilization techniques. Multi-stage sampling technique was used in randomly selecting 140 households from 14 coastal villages randomly selected from two of the seven Local Government Areas where nipa palm is found in the state. Data collection was by means of 140 questionnaires sent to representatives of each of the selected households for completion. The data collected were subjected to descriptive statistics and chi-square (χ^2) tests at 95% probability level. Results showed that 91.6% of the respondents derived economic benefits such as roofing mats, brooms, fuel, hats and dyes from nipa palm. 97.7% of the people inherited their knowledge of nipa palm utilization. The sources of knowledge of nipa palm utilization was independent of the sample villages, whereas their levels of dependence for livelihood, their perception of effects of the spread of the palm on the environment, and opinions on ways of controlling the spread varied from village to village ($p=0.05$). Since the utilization is based on local knowledge, it is necessary for government and environmentally based non-governmental organizations to enlighten the people on improved and scientific techniques of utilization.

KEY WORDS: Local, knowledge, utilization, nipa, Akwa Ibom

INTRODUCTION

The Nipa palm (*Nypa fruticans*, *Wurmb*.) belongs to the family Arecaceae. It has an underground stem, which branches to form new above ground plants. According to Hutton (1996), nipa palm is the only palm found in the mangrove forest and its fruit is in the form of an impressive spiky head. The plant is adapted to muddy soils along rivers and estuaries (Martins, 1999). However, it can be found inland as far as the tide can deposit the floating seeds of the palm. The plant can tolerate infrequent inundation, provided the soil does not dry out for too long (Tomascik *et al.*, 1997).

Nipa palm seeds were introduced into Calabar, Nigeria from Singapore in 1906 (Keay *et al.*, 1964), and planted along the Idua Oron beach in 1912 to check erosion of the beach by tidal waves of the Atlantic ocean through the Cross River estuary (Nigerian Conservation Foundation, NCF, (2000a). However, its colonizing characteristic has rather helped to reduce the firmness of the soils by its prostrate underground stem (NCF, 2000b).

In Akwa Ibom State, the palm is found in the coastal Local Government Areas of Mbo, Oron, Okobo, Udung Uko, Ibeno, Ikot Abasi and Eastern Obolo (Fig.1).

In some Southeast Asian countries, nipa palm provides products such as fodder, alcohol, vinegar and sugar. It can produce about three tons of sugar per hectare (Yokofun, 1996). In the Indonesian islands of Roti and

Savu, the sap tapped from the palm is fed to pigs to fatten them during the dry season when fodder is scarce, and the pigs are also fed the leftovers after sugar extraction (Tan, 1995; Mastaller, 1997). The flower petals can be brewed to produce an aromatic tea (Hutton, 1996). In some other Asian countries, the dried fronds are used as thatching materials, and also woven into mats, baskets, and other household items, while the young leaves are used to roll cigarettes (Hutton, 1996; Tan, 1995).

In Nigeria, various parts of the nipa palm are used for several purposes. Despite these uses, and the fact that the plant is regarded as being endangered in Singapore (Hutton, 1996; Tan, 1995), it is regarded as a nuisance in Nigeria because of its adverse ecological impacts on waterways and marine lives. For example, its spread has blocked waterways and, therefore, has hampered the movements of watercrafts. Its rapid invasion of the mangrove ecosystem has led to the elimination and subsequent loss of the mangrove floral species such as *Rhizophora* spp. and *Avicennia africana*, which normally provide the people with fuelwood, poles and tannin, while the mangrove environment offers good sites for rice cultivation, as well as shelter, nurseries and breeding grounds for fish, oysters and clam (Owonubi *et al.*, 2001; Etukudo, 2001).

This threat to the mangrove environment by the invading nipa palms has been a source of concern to the people who depend on the mangrove resources for their socio-economic livelihood. However, the people living along

Table 1 Distribution of respondents according to sex

Sex	Frequency of Responses														Total	%
	A	B	C	D	E	F	G	H	I	J	K	L	M	N		
Male	9	8	8	9	7	6	10	5	6	1	4	5	7	6	91	69.5
Female	1	2	1	1	2	3	0	2	2	9	5	5	3	4	40	30.5
Total	10	10	9	10	9	9	10	7	8	10	9	10	10	10	131	100.0

Source: Field Survey, 2002

- Key to the selected villages indicated in Table 1 and all the subsequent tables:

A Idua Asang	E Ukpata	I Okposo	M Ukorutip
B Esin Ufot	F Esuk Mma	J Upenekang	N Nta Ilang
C Esuk Oron	G Etim Inyang	K Atia I	
D Udung Okung	H Mkpanak	L Itak Idim Ukpa	

Table 2 Distribution of respondents according to occupation

Occupation	Frequency of Responses														Total	%
	A	B	C	D	E	F	G	H	I	J	K	L	M	N		
Fishing	9	4	6	9	4	7	2	2	3	1	4	3	6	6	66	40.7
Farming	9	4	4	8	8	1	10	2	1	5	2	4	2	4	64	39.5
Trading	1	2	2	0	1	1	0	3	2	5	3	3	2	0	25	15.4
Mat making	1	2	1	0	0	2	0	0	1	0	0	0	0	0	7	4.3
Total	20	12	13	17	13	11	12	7	7	11	9	10	10	10	162*	99.9

Source: Field Survey, 2002

* Total above sample size because of multiple responses

these coastal areas have developed local technologies for utilizing the palm to produce various products that are used locally. Local (indigenous or traditional) knowledge here refers to the knowledge of indigenous people as well as any other defined community (Warren, 1993). Grenier (1998) defined indigenous knowledge as a unique, traditional, local knowledge existing within, and developed around the specific conditions of women and men indigenous to a particular geographic area. Local knowledge has been used by various people from generation to generation in solving problems that affect them in various human endeavours. It is gained through experience, and passed down from one generation to the next. Unfortunately, even government policy makers seem to ignore the wisdom that abounds in indigenous knowledge, as this knowledge is not always considered when policies affecting the people are being formulated and implemented without their input. Thus, Emadi (1998) advised development agencies to integrate indigenous knowledge into development because it is less expensive, readily available, environmentally appropriate, socially familiar, and has a proven record.

These local technologies have not been adequately documented and verified. They need improvement. Lack of scientific technology on the utilization of any species generally results in its underutilization and inadequate management. Recently, effort has been made by Nigerian Conservation Foundation (NCF) to improve on the quality of products made from nipa palm to meet market demands and to enlighten the local people on

the various uses of the palm. In order to improve on these local technologies, there is need to find out how the people have been able to convert this 'problem plant species' into useful items. On the basis of such information, scientists could then devise means of strengthening the capacity of the local people to maximize the utilization of this species, and make such technologies available to other localities.

The objectives of this study were therefore to:

- Identify the local uses of the palm;
- Identify the people's sources of knowledge of nipa palm utilization;
- Identify the problems associated with the utilization of the palm;
- Find out the perception of the people towards this plant species and its products; and
- Recommend possible ways of improving on the local utilization technologies of the people.

Hypotheses

Based on the problem and set objectives of the study, the following null hypotheses were formulated and tested for significance at 95 percent probability level.

- (1) The proportion of people who depend on nipa palm for their livelihood is independent of the sample village chosen. Simply put, the 'k' population proportions, which use or do not use nipa palm, are equal.
- (2) The source of knowledge of use of nipa

Table 3: Distribution of respondents according to age.

Age class	Frequency of age distribution														Total	%
	A	B	C	D	E	F	G	H	I	J	K	L	M	N		
Below 21 years	0	0	0	0	0	0	0	2	0	0	0	1	0	1	4	3.1
21 - 30 years	1	2	1	0	0	6	3	2	2	7	0	1	0	3	28	21.4
31 - 40 years	2	3	1	5	4	2	1	1	2	1	5	1	5	0	33	25.2
41 years & above	7	5	7	5	5	1	6	2	4	2	4	7	5	6	66	50.4
Total	10	10	9	10	9	9	10	7	8	10	9	10	10	10	131	100.1

Source: Field Survey, 2002.

Table 4: Distribution of respondents according to educational level.

Educational level	Frequency of responses														Total	%
	A	B	C	D	E	F	G	H	I	J	K	L	M	N		
No formal education	2	5	4	2	2	7	10	2	3	0	3	7	2	3	52	39.7
Primary education	8	5	5	8	6	2	0	3	4	6	4	2	7	7	67	51.1
Secondary education	0	0	0	0	0	0	0	2	1	2	2	1	1	0	9	6.9
OND/NCE	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2	1.5
HND/First degree	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0.8
Total	10	10	9	10	9	9	10	7	8	10	9	10	10	10	131	100.0

Source: Field Survey, 2002.

Table 5: Respondents' dependence on nipa palm for livelihood.

Dependence	Frequency of responses														Total	%
	A	B	C	D	E	F	G	H	I	J	K	L	M	N		
Yes	10	9	7	6	9	9	10	5	8	10	7	10	10	10	120	91.6
No	0	1	2	4	0	0	0	2	0	0	2	0	0	0	11	8.4
Total	10	10	9	10	9	9	10	7	8	10	9	10	10	10	131	100.0

Source: Field Survey, 2002.

hypotheses. Hypothesis 1 (H_{01}) was based on a $2 \times k$ contingency table with $k = 14$ sample villages each with sample size n_i , where 'i' ranged from seven to ten. Hypotheses H_{02} , H_{03} and H_{04} were based on $3 \times k$ contingency tables.

RESULTS AND DISCUSSION

Biodata of respondents:

Table 1 shows that 69.5 percent of the respondents were male, while 30.5 percent were female.

As shown in Table 2, 40.7 percent of the respondents were fishermen, 39.5 percent were farmers, 15.4 percent were traders, while only 4.3 percent were mat makers. Thus, a majority of the people living along the coastline are fishermen and farmers. Generally, fishing is the commonest occupation of the coastal and riverine areas. This observation corroborates Inyang (2000). The fact that there were multiple responses indicates that some people had secondary occupations to supplement their principal occupations.

Table 3 shows that 50.4 percent of the respondents were within the 41 years and above age class, 25.2 percent were 31 to 40 years old, while 21.4 percent were 21 to 30 years old. Only 3.1 percent of the respondents were below 21 years of age. These figures reflect the fact that majority of those who were interviewed were elderly people, and had sufficient experience of the life in the area, and so were

adequately equipped to give information required from them as representatives of their respective households.

Table 4 shows that 39.7 percent of the respondents had no formal education. However, since about 60 percent of the respondents had one level of formal education or the other, with 51.1 percent having had primary education, it can be concluded that the literacy level is high, considering the occupations of the people.

According to Table 5, 91.6 percent of the respondents indicated that they derive some economic benefits from the nipa palm. These benefits include provision of products such as roofing mats, brooms, fuel, hats and dyes (Table 6). However, only 8.4 percent of the respondents were not dependent on the nipa palm for livelihood.

Table 6 gives a summary of the parts of nipa palm, which are used for various purposes in the study area. The dry fruits are used as fuel for smoke-drying fish and other marine lives caught, such as crayfish, and for cooking. The people have resorted to this alternative fuel source because of inadequate supply of fuel wood especially as the mangroves have been decimated and the environment colonized by the nipa palm. Other reasons, which were given by the respondents, for using the dry fruits as an alternative to fuel wood are that the dry fruits burn faster and the flame lasts longer than conventional fuel wood, while the smoke gives a characteristic brown colour to the smoke-dried food

item. The stalk of the bunch of fruits is also beaten out or fibrillated and the broad end, so produced, used as brush for painting canoes. A decoction of the fruits yields a dye that is used for dyeing fishing nets. Although there is no scientific backing, the respondents believe that such dyed fishing nets give them more catches than undyed nets because the dyed nets are inconspicuous in water to fishes. These claims require further scientific studies to determine the calorific value of the dry fruits and compare it with those of conventional fuel wood species, and to determine whether the dye and colouration of fishing nets have effects on volume of catch.

The seeds are used for producing earrings, necklaces, rings, key holders and hair clips. This was reported in only two of the villages studied, namely: Esin Ufot and Udung Okung. According to the respondents, their knowledge of the utilization of the seeds for these products was from the NCF, which organized workshops in the area on nipa palm utilization.

The leaves are used locally as roofing mats, ceiling mats, and for hat making. The hats, locally called 'ikpoto', are said to be mostly used by beach lovers and women who trade in fish. They are used both in the dry and wet seasons because the hats are so thick that they can withstand the weather conditions in both seasons. The palm fronds are used for cladding fences. All these uses are, for the most part, in line with the utilization of leaves in some Asian countries (Hutton, 1996). Brooms are also made from the midribs of the mature pinnate leaves.

From the above findings, nipa palm is still underutilized in the study area due to lack of improved technology.

For example, the seeds and young leaves of the palm are edible (Tan, 1995); the sap from the inflorescence can be tapped for sugar extraction (Tan, 1995; Mastaller, 1997), and the white translucent and hard jelly-like immature fruits are a common ingredient in local desserts in Malaysia and Singapore (Hutton, 1996). Another notable observation is that apart from the leaves which are utilized in all the fourteen villages

studied, knowledge of the utilization of the seeds was only reported in two villages, while the fruits were reportedly used in all the villages except three, namely Esuk Oron, Udung Okung and Ukpata. Thus, the leaves are the most used part of the nipa palm in the study area.

Table 7 shows that knowledge of the utilization of nipa palm in the area is mostly inherited (97.7 percent), while Non-Governmental Organizations (NGOs) play a very negligible role (2.3 percent). No respondent acquired the knowledge through formal education. The knowledge acquired through exposure and education by NGOs is aimed at broadening and improving upon inherited (local) knowledge of various ways of utilizing the nipa palm.

Results in Table 8 show that 79.4 percent of the 131 respondents indicated that nipa palm displaces other plant species and colonizes land area easily. This is in line with an earlier observation by Etukudo (2001). Another adverse effect of the spread of nipa palm in the area, as indicated by 61.1 percent of the respondents, is that it hinders fishing. This is also a serious adverse effect, socio-economically, considering the fact that these coastal dwellers are mostly fishermen. According to the respondents, the rapid spread and colonization of the mangrove and riverine ecosystems by the nipa palm hinders fishing. This is because the palm plants entangle with and sometimes, tear fishing nets, hampering access to the rivers for fishing. The spread destroys breeding grounds for fishes and other marine organisms, which are food and means of livelihood for these coastal dwellers. It is therefore, not surprising that only 1.5 percent of the respondents indicated that the spread of the palm in the environment provides a conducive habitat for fish, which probably, is out of ignorance of the adverse effects of the spread on the mangrove habitat. Moreover, the displacement of the mangroves by this ecologically aggressive plant species, robs the fishermen of fuelwood for smoke-drying their catches, as well as wood for constructing their huts in

Table 6: Nipa plant parts and uses in the study area.

Plant part	Uses
Fruit (including bunch)	(a) Fuel for smoke-drying fish, and for cooking. (b) Brush for painting canoes. (c) Dyes for dyeing fish nets.
Seeds	For making earrings, necklaces, rings, key holders and hair clips.
Leaves	1. (a) For roofing mats (b) For ceiling mats (c) For hat making 2. Palm fronds for cladding fences 3. Midrib of mature pinnate leaves for broom making

Source: Field Survey, 2002.

Table 7: Sources of knowledge of use of nipa palm in the study area.

Source of knowledge	Frequency of responses														Total	%
	A	B	C	D	E	F	G	H	I	J	K	L	M	N		
Inherited	10	10	9	10	8	9	8	7	8	10	9	10	10	10	128	97.7
NGO	0	0	0	0	1	0	2	0	0	0	0	0	0	0	3	2.3
Total	10	10	9	10	9	9	10	7	8	10	9	10	10	10	131	100.0

Source: Field Survey, 2002.

Table 8: Respondents' perception of effects of spread of nipa palm on land and water.

Effects	Frequency of responses															Total	%
	A	B	C	D	E	F	G	H	I	J	K	L	M	N			
Displaces other plants and colonizes land easily	10	10	9	10	9	9	10	3	7	8	9	3	2	5	104	79.4	
Hinders fishing and could tear fishing nets.	10	10	9	10	9	9	10	0	4	3	0	1	0	5	80	61.1	
Provides habitat for fish	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	1.5	
Total	20	20	18	20	18	18	20	3	11	11	11	4	2	10	186		

Source: Field Survey, 2002.

Table 9: Summary of respondents' suggestions for maximizing the utilization of nipa palm.

Suggestion	Response	
	No.	%
Enlightenment	77	79.4
Provision of employment opportunities	17	17.5
Commercialization	3	3.1
Total	97	100.0

Source: Field Survey, 2002.

the fishing ports and villages.

Of the 97 persons who suggested ways of maximizing the utilization of nipa palm (Table 9), 79.4 percent of them opined that the utilization of the palm could be maximized through enlightenment campaigns. This approach is necessary because many people are ignorant of other methods of utilization apart from those listed in Table 6. Universities, Research Institutes, the Akwa Ibom State Science and Technology Ministry, as well as NGOs such as NCF and the United Nations Development Programme (UNDP) could handle such enlightenment programmes. It would also help the people to improve on the already known local technology and utilization of the palm in the area. This would make more of the products available in the market through increased demand for the products, thereby enhancing the people's standard of living.

The involvement of more people in the harvesting and processing of nipa palm produce was suggested by 17.5 percent of the respondents as another way that could help in maximizing the utilization of the palm. This would also make more of the products available in the market. However, people's involvement in the utilization of nipa palm is itself dependent on the level of public enlightenment. This suggestion was only made in the five selected villages where NCF workshops on nipa palm utilization were held, so the people were aware of the importance of the species and the lack of manpower faced by the organization in the utilization of the palm. Only 3.1 percent of the respondents suggested commercialization of the harvesting and processing of the palm as another way of maximizing its utilization. This would, for instance, facilitate the commercial production of such items as vinegar, sugar, earrings and necklaces. On the other hand, however, such large

scale production could check the spread of the plant and hence its sustained availability for commercial purposes. This, in essence, means that unless the stock of the raw material is sustained, commercialization cannot be sustained.

Based on the respondent's perception of the economic benefits of the nipa palm, about 40.3 percent of them suggested that the spread of the palm could be controlled by commercial production of the various products, which can be made from it. In addition, 17.2 percent suggested that there should be public enlightenment on the uses of the plant so that people can appreciate it and be involved in its harvesting and processing. Such enlightenment could be through seminars, workshops and symposia. On the other hand, 26.1 percent of the respondents were of the opinion that since the plant colonizes land rapidly, and its importance to them is limited, it should be eliminated.

Table 11 shows that the calculated χ^2 of 29.078 for H_{01} was higher than the table value of 22.362 ($p=0.05$). Therefore, the null hypothesis was rejected. This implied that although 91.6 percent of the respondents depended on the palm as a source of their livelihood (Table 5), there were significant differences between the sample villages studied in their levels of dependence on the palm. (Table 11). In other words, some areas were more dependent on the palm than others. This points to the fact that some communities are becoming more aware of the relevance of the plant species in their local economy, especially since the species regenerates rapidly. On the other hand, the test of H_{02} yielded a computed χ^2 of 19.767, which was less than the table value of 38.885 ($p=0.05$). Therefore, the people's source of knowledge of the use of nipa palm was independent of the sample villages they came from. Virtually all the

Table 10: Ways of controlling the spread of nipa palm in the study area.

Control measure	Frequency of responses														Total	%
	A	B	C	D	E	F	G	H	I	J	K	L	M	N		
Commercialization	6	4	5	5	4	0	8	0	6	2	6	3	2	3	54	40.3
Elimination	4	4	4	5	5	6	2	2	0	3	0	0	0	0	35	26.1
Enlightenment on use	0	0	0	0	0	0	0	2	4	3	3	2	5	4	23	17.2
No action	0	0	0	0	0	3	0	3	2	2	1	5	3	3	22	16.4
Total	10	8	9	10	9	9	10	7	12	10	10	10	10	10	134*	100.0

Source: Field Survey, 2002.

*Total above sample size due to multiple responses

Table 11: Results of tests of hypotheses

Hypotheses	df	χ^2_{cal}	χ^2_{tab}	Decision
(i) Dependence of the people on nipa palm	13	29.078	22.362	Reject Ho
(ii) Sources of knowledge of use of nipa palm	26	19.767	22.362	Accept Ho
(iii) Respondent's perception of effects of nipa palm	26	45.859	38.885	Reject Ho
(iv) Ways of controlling spread of nipa palm	39	92.382	54.572	Reject Ho

Source: Field Survey, 2002

respondents had their knowledge of nipa palm use from the same source and as indicated in Table 7, this knowledge was inherited by 97.7% of the respondents. According to Grenier (1998), indigenous knowledge is a unique traditional, local knowledge that exists within, and is developed around the specific conditions of women and men indigenous to a particular geographic area. It is the sum total of the knowledge and skills possessed by people in a particular geographic area which enable them to get the most out of their natural environment (Marrewijk, 1998). Therefore, since these riverine people are homogenous, both in terms of culture (traditions) and occupation, this inherited knowledge, which to some extent is part of their culture, should be about the same.

The people's perception of the effects of the spread of nipa palm in the environment, however, varied from community to community ($p=0.05$) (Table 11). This was evidenced by the computed χ^2 of 45.859, which was higher than the table value of 38.885 ($p=0.05$). Thus, their locations or villages of origin did not affect their perceptions of the effects of the palm on the environment. Similarly, the people's opinions on ways of controlling the spread of the palm also varied from community to community as the null hypothesis was rejected because the calculated χ^2 of 92.382 was greater than the table value of 54.572 ($p=0.05$).

CONCLUSION

Despite the aggressive invasion of the mangrove habitat and subsequent displacement of the mangroves by nipa palm, it has been of some economic values to the

people. However, its utilization is mostly based on the people's indigenous knowledge. There is need for more research into better utilization techniques of the plant and its parts. It is also necessary for government and environmentally based non-governmental organizations to enlighten the people on such improved and scientific techniques of nipa palm utilization in order to improve on the products and their markets. Since nipa palm has devastated the mangrove habitat, it is seen as a nuisance in the environment. However, by eradicating it completely, some people would lose their means of livelihood. Research into ways of controlling its spread while still making it available for people to derive some economic benefits is very necessary and should be pursued vigorously.

REFERENCES

- Emadi, M. H., 1998. Indigenous Knowledge, Sustainability and Empowerment. Indigenous Knowledge and Development Monitor, NUFFIC-CIRAN, Netherlands. 6(3): 16.
- Etukudo, I., 2001. Potential of Forest Resources Development in Akwa Ibom State Economy. In: E. S. Udo (Editor), Forestry and Sustainable Environment, Forestry Association of Nigeria, Akwa Ibom State. pp.56 - 69.
- Grenier, L., 1998. Working with Indigenous Knowledge. A guide for Researchers. Ottawa, IDRC 1998, 16pp.
- Hutton, W., 1996. Tropical Fruits of Malaysia and Singapore. Periplus Edition (HK) Ltd. pp. 18-25.

- Inyang, I., 2000. Development Regions. In: Idorenyin B. Inyang (Editor), *South-eastern Nigeria: It's Environment*, Abaam Publishing Company, Ali Akilu, Kaduna, Nigeria. pp. 196-207.
- Keay, R. W. J., Onochie, C. F. A. and Standfield, D. P., 1964. *Nigerian Trees* Vol. II, p.441. Nigeria National Press, Apapa, Lagos.
- Marrewijk, A. V., 1998. Indigenous Knowledge, the proof is the eating of the pudding. *Indigenous Knowledge and Development Monitor*, NUFFIC-CIRAN, Netherlands. 6(3): 16.
- Martins, F. W., 1999. Multipurpose palms you can grow; the best. In: *Craig Elevitch* (Editor) *Multipurpose palms* pp.24-40.
- Mastaller, M., 1997. *Mangroves: The forgotten forest between Land and Sea*. Tropical Press pp. 14-30.
- Nigerian Conservation Foundation (NCF), 2000a. Documentation of environmental degeneration in fifteen communities in Akwa Ibom State. The United Nations Development Programme (UNDP), South South Zonal Office, Uyo, Akwa Ibom State pp.33-35.
- Nigerian Conservation Foundation (NCF), 2000b. Nipa palm utilization project on the Nigerian coast. Mobil and NCF.
- Owonubi, J. J., Oguntala, A. B., Ladipo, D. O. and Oni, P. I., 2001. Forest Rehabilitation: A Crucial Need for the Enhancement of the Ecological Status of the Niger Delta Area of Nigeria. In: L. Popoola, J. E. Abu and P. I. Oni (Editors), *Forestry and National Development* pp. 92-98. Forestry Association of Nigeria, Ibadan.
- Tan, H. T., 1995. *A Guide to the threatened plants of Singapore*. Singapore Science Centre, Singapore pp. 52-63.
- Tomascik, T., Mah, A. J., Nontj, A. and Moosa, M. K., 1997. The ecology of the Indonesian seas – Part 2, *Ecology of Indonesia*. Tropical Press. Pp. 19-23.
- Warren, C., 1993. Background to International Symposium on Indigenous Knowledge and Sustainable Development. *Indigenous Knowledge and Development Monitor*, The Hague, Netherlands. Vol. 2.
- Yokefun, C., 1996. Wetland Resources in Malaysia. *Malaysian Naturalist* Malaysian Nature Society (MNS), Kuala Lumpur. 49(4): 10.