Indigenous Knowledge Systems for Promoting Community Conservation Education in a Nigerian Protected Area

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Abstract

The study has explored the adoption of indigenous knowledge systems of local populations living at the margins of protected areas to promote community conservation education. It assessed the ethno-ecology and ethno-biology knowledge of valuable wild and cultivated plant species by local people inhabiting the 'support zone' of the Cross River National Park, South-Eastern Nigeria. It explored paradigms for the successful convergence of 'insiders' local knowledge with the 'outsiders' professional/ scientific knowledge as tools for promoting community based conservation education and achieving nature conservation objectives. Participatory research methodologies are adopted in eliciting information from the study communities. The results indicate a broad indigenous knowledge base of the ecology and biology of the valuable species in the region. The implications of the convergence of this knowledge with scientific information, to further community based nature conservation education are harmonized for effective conservation of natural resources.

Keywords: Indigenous knowledge, Ethno ecology/ biology, Conservation education, Protected area, Nigeria

1. Introduction

Till date, many academics and development professionals are yet to appreciate the value of indigenous knowledge as a valid mode of learning, research and application for sustainable development and socio-economic transformation of the rural community and society at large. This is not surprising because until lately, this mode of learning was yet to be given recognition in the academic curriculum of universities, research institutions and private firms relying heavily on formal scientific methods. Indigenous knowledge has been defined as "local community-based systems of knowledge, which are unique to a given culture or society and have developed as that culture has evolved over many generations of inhabiting particular ecosystem… refers broadly to the collective knowledge of an indigenous people about relationships between people, habitat, and nature" IUCN (1997) quoted in Shelagh et al (2003). Many scholars and development practitioners are in the vanguard of promoting this emerging philosophy of development rooted in recognising and integrating indigenous knowledge in the development process and practice, and include such works as Chambers, 1983; Chambers, Pacey & Thrup (eds) 1989; Richards, 1985; Scones, et al, 1994; and Compass, 2002, among others.The fit of this knowledge in promoting local level conservation decisions by policy makers and development practitioners is contentious. While doubts and cynicism are still expressed in many quarters about the technical feasibility and scientific validity of rural knowledge system to promoting grass root development and natural resources conservation, there is a growing body of evidence that attest to the success (despite some limitations) of community based forest and natural resource management decisions.(Bisong, 1998; Alden-wily *et al*,2001; Nolan, 2001; Bisong et al, 2007)

The establishment of protected areas have often created conflicts with indigenous populations living at the margins due to somewhat divergent objectives between local resource use patterns on one hand and protecting the integrity of protected areas ecosystems on the other. Reconciling these objectives by conservationists have often been fraught with difficulties particularly when little is thought of the knowledge base and resource management capabilities of indigenous peoples as regards the functional workings of the ecosystems. Local people are nevertheless a repository of knowledge as to the workings of the ecosystem they are dependent upon for livelihood and sustenance. They are best suited to ensure the harmonious working of these systems in their resource use interactions if their knowledge base is solicited and integrated in the ecosystem management plans of protected areas.

This paper in furtherance of this evidence seeks to document what local people know about the functional relationships existing within the biotic community of a rain forest eco-system that may be drawn upon to promote its conservation as well as educate local cultures toward imbibing nature conservation ethics.

2. Integrating Indigenous Knowledge in Conservation Education and Development

Theoretically, communicating environmental education has been conceptualised via a number of approaches namely simulation, exploratory and conscientisation approaches. The relevance of simulation to conservation education involves the adoption of role-playing such as theoretical displays, which capture succinct environmental issues as deforestation and land degradation. The use of exploratory approach is concerned with discussion sessions involving the local people, who are in the position to contribute effectively to indigenous conservation options. The renewed emphasis for conscientisation, an approach developed by Paulo Freire (1971) is largely to encourage literacy training by enabling an interactive forum for dialogue between conservation specialists and the local people.

Ethno biological studies offer great opportunities for promoting conservation education and managing biodiversity. Studies in Africa and South Asia anchored on this methodology have yielded tremendous information on a wide array of ethno botanically useful plants for socio-economic purposes, a few of which include uses as medicine, pesticides, insect repellent and agro forestry development. (African Biodiversity Support,1992; ICIMOD,1994) Linkages however between ethno biological information generated by local people and conservation policies and practices by Protected Area Authorities and Community Development Agencies are virtually non-existent Thupp, *et al* (1994) exploring the possibility of linkages between grass root action and policy making for sustainable development in Latin America, observed that the process of integrating community into development commences from the 'bottom up' via variants of Participatory Rural Appraisal based community level analysis and planning for identifying key natural resource management based problems and priorities. This, when carried out in a constellation of communities within a socio-ethnic or ecological region will generate concrete products such as a document of local resources problems, options and planned priorities that can be utilized by communities for resolving regional problems through the process of negotiating effectively with governments or other competing interest groups.

Waters-Bayer and Veldhuizen (2005) acknowledged the fact that innovation through informal experimentation (and observation) has long been in place, but only recently been seriously identified and documented. While acknowledging the importance of documenting local innovation, the thrust of rural development challenge they posit, must move beyond existing innovations developed through indigenous knowledge and creativity to further developing these ideas in joint experimentation such that they are integrated with relevant ideas from elsewhere. Local innovations constitute the basis for linking indigenous knowledge and scientific knowledge into a community – driven Participatory Innovation Development (PID). The PID process starts with what the local people are already trying out in their attempts to solve problems, comprehend or grasp opportunities already identified. The joint situations analysis by community members and outsiders (researchers or developers) follow this concrete evidence and proceeds through examining opportunities, jointly planning experiments to explore ideas and evaluate outcomes together. Local innovations may therefore, through this process become the focal points for community groups to work in partnership with development agencies.

Integrating indigenous knowledge in conservation and development efforts have been conceptualized by Ortiz (1999) as a process that involves information flow, which takes place when individuals with certain knowledge are made aware of new information. When the new information is interpreted, an interaction takes place between the pre-existing knowledge and new information.Although the cognitive processes are highly complex (Malim, 1994 in Ortiz, 1999) four main types of interaction are considered to take place when local peoples knowledge meet with scientific information, namely Formative interaction, Modifying interaction, Reinforcing interaction and Confusing interaction (Ortiz, 1999). Formative interaction occurs where new knowledge in some situations replaces the previous knowledge held by individuals and groups. Modifying interaction takes place when local knowledge is slightly adjusted by scientific information, such that local people are able to comprehend the ecosystem principles behind the phenomenon they observe. The process of adjustment and modification helps them to attain a better understanding of the workings of nature. Reinforcing interaction occurs when local peoples knowledge are confirmed by scientific information. This allows them to feel confident of their own observations and practices. While, Confusing interaction occurs when there is conflict between local peoples knowledge and scientific information. This usually occurs when scientific knowledge is inappropriately presented to local people. The above models of interaction between local and exogenous knowledge highlights the cooperation and conflicts that may exist in Protected Areas where indigenous and scientific viewpoints may fraternize or collide. When indigenous knowledge is appropriately integrated with scientific knowledge for protected area management, all but the last model of interaction may be assured. This is the desired framework for assessing the ethno biology and ethno ecology knowledge of communities living at the margins of Protected Areas that has utility for agro forestry development and nature conservation.

It is difficult to tell what mode of interaction has taken place between scientist and local people in the forest margins of Cross River State. Development policy and practice have over the years been driven with utter disregard for local knowledge particularly in the field of agriculture and conservation. The underlying logic of engagement between outsiders' knowledge and local peoples' knowledge has been that of a superimposition of outsiders view of conservation and agricultural practices on local cultures and setting rather than that of co-operative interaction hinged on mutual respect as equals. A situation that affords the two-knowledge systems to learn, adjust and benefit from each other. The forms of interaction between scientific and local knowledge in the region may therefore be cast in the mould of Formative interaction in some cases and Confusing interaction in others. Through the imposition of exogenous systems of cultivation over the years, certain time tested traditional systems of agriculture were jettisoned and completely replaced by western models. Undoubtedly, Ortiz's Formative interaction framework may not always be positive as originally proposed. In Bendeghe Ekiem Community in Cross River State for instance, the assessment of changes in agricultural practices documented by Bisong (1993) show the loss of certain pest control systems for staples such as yam and its subsequent replacement with unsustainable systems of control. Presently, specified pesticides are recommended by agricultural extension personnel to deal with the destruction of yam stems by beetles locally referred to as Ngbede, responsible for extensive crop damage and loss. In the past however, tying pumpkin leaves to the yam stakes, which attracts the insects, which come to take shelter within the pumpkin leaves when the sun is overhead, controlled this pest. The farmer simply collects and liquidates these insects to save the crops from pest damage. (Bisong, 1993).

Although no formal attempt has been made at integrating for mutual benefit both scientific and local knowledge systems, for the promotion of agro forestry development and biodiversity conservation in Protected Areas of Cross River State, this study attempts to fulfil the initial condition for this integration. This, it attempts, by exploring local peoples understanding of the ecological and phenological attributes of the most important species of socio-economic importance in the 'Support Zone' villages of the Cross River National Park. It assesses how local understanding relates to scientific information and what modes of interaction best explain the convergence of local understanding with scientific information. In addition, the study will provide the platform for the meaningful engagement of scientific knowledge with local understanding in order to promote conservation education and the conservation of Protected Areas.

3. The Study Region

Cross River State, South-Eastern Nigeria is a region of greatest biodiversity concentration in the country. Its natural forest of 924,951 ha represents a sizeable 31% of the total remaining Tropical Moist Forest in Nigeria. The region is home to the Cross-River National Park and 14 other Forest Reserves plus vast tracts of community-controlled forests. 205 species are endemic to the region making the region one of Africa's foremost Biodiversity 'hot spots'.

Abomkpang and Butatong communities are selected for the study being part of the support zone settlements of the Okwango Division of the Cross River National Park (CRNP). Okwango Division of CRNP covers about 920sqm and a project area occupying about 2.250sqkm in South-eastern Nigeria, lying north and east of the Cross River, and extending to the Cameroon boarder (Figure 1) ODA/WWF (1990). While Abomkpang is accorded the highest priority rating (Score 6) relative to her share in the support Zone Development Programme (SZDP) resource allocation, Butatong is accorded a medium rating (Score 3) of the SZDP resource allocation. The communities in this region are and thickly forested and highly dependent on natural resources revolving around activities such as hunting, subsistence/ commercial agriculture, and Non-Timber Forested Product (NTFP) collection. The 1998 estimated population of Abomkpang and Butatong are 696 and 1,217 persons respectively.

4. Method

The study adopted participatory research methodologies in investigating the ethno ecology and ethno biology knowledge of growth and phenological properties of the most important plant species valued by natives for their socio-economic importance. Specifically, it focused on what native wisdom had to say about the ecological niche of the species, their population density and spatial distribution, pollination agents, germination properties, general phenological properties such as leaf fall, flowering, seeding, fruiting, growth span and method of propagation. Also examined were the attributes of seed dispersal and mortality, seed predators and the growth potentials of each of the species. The units of analysis were key informants and focus groups of elderly hunters and farmers. Two settlements namely Butatong and Abo Mkpang, were studied in the Okwango Division of the Cross River National Park, Nigeria (Fig.1). In each settlement studied, a combined group of twenty-five persons in the settlement consisting of available hunters and interested farmers and local resource gatherers were interviewed. While the hunters were all males, the farmers and local resource gatherers were of both sexes. Semi Structured Interviewed (SSI) was utilized to generate information on the ethno biology of flowering plants.

5. Results and Discussion

5.1 Ethno ecology and Ethno biology of Wild & Cultivated Species and their Implication for Conservation Education

Tables 1 and 2 reflect local peoples understanding of the ecology and biology of wild and cultivated plant species. The results presented in Tables 1 and 2 demonstrate immense knowledge base of the biology and ecology of valued and cultivated species far in excess of what is usually accorded to indigenous populations. Thel people, can for instance, tell where within the forest ecosystem, particular tree species occur, give fairly accurate description of tree density and spatial distribution, identify pollinators of specific species such as birds, butterflies, etc, give account of germination properties, including germination duration and growth characteristics under closed or opened forest canopy. In addition, they are conversant with the phenological properties of wild and cultivated species as leaf fall, emergence of new leaves, their flowering, seeding, fruiting, growth duration and methods of propagation with specific indication of the timing and duration of these activities.

Secondly, an excellent knowledge of the seed dispersal agents as well as the seed predators of specific plant species was observed. While seed dispersal agents were identified to be largely Big Squirrels, Elephants, variety of Monkeys and Man for species such as the Bush Mango (*Irvingia gabonensis);* Birds, Parrots, Horn birds, and Squirrels were responsible for dispersing seeds of *Dacryodis edulis* (the Native Pear) and *Milicia excelsa* (Iroko); while bees, birds, and butterflies are involved in pollinating flowering plants like *irvingia spp, kola accuminata, Dacryodis edulis* and *Millicia excelsa* (Table 1).

The participatory appraisal and learning exercise during the field survey in the course of the study provided a platform for the meaningful convergence of local knowledge with scientific knowledge. It was therefore possible to explore the mode of interaction in question in the convergence of the two knowledge systems in order for rural people to have a self-reflection on their knowledge of ecosystem attributes and functioning vis-a vis their resource harvesting practices, and their corresponding effects on livelihood security and ecosystem integrity. The local knowledge of the ecology, habitat and distribution of the wild and cultivated species (Table 1) is evidently confirmed by scientific information. For instance, *Garcinia kola* (Bitter Kola) is understood by the natives to be a low density product (an average of one stem occurs in five hectares of forest land). *Elaeis guineensis* (Oil palm tree) is also understood to be scarcely distributed with an average of one tree per hectare in the closed canopy forest. Scientific information exhibited by the Forestry inventory results in the Cross River State (Dunn et al, 1994) confirms this understanding as the products indicated above, have low density occurrence. This is a typical example of reinforcing interaction where local understanding is confirmed by scientific information.

The implication of this for promoting conservation education is clearly evident as local people can be easily mobilized in making conservation plans for low density species. In the case of very rare species occurring at extremely low densities like the *Garcinia kola* (Bitter Kola), local laws already exist for protecting the species. For instance, it must be fire-traced and heavily protected in the process of bush burning. This is to guard against its becoming extinct as the species apart from being rare, are highly susceptible to fire. Very stiff penalties are known to be imposed by natives in some communities for failing to protect the Bitter Kola against bush fires.

A question was posed to the natives on what was considered the possible effects on plant species of socio-economic value if animal species such as Big Squirrels, Elephants and Monkeys were hunted to extinction? In addition, they were required to consider the effects on the valuable plant species if the agents of pollination such as bees, birds and butterflies were hunted to extinction. The natives were firm in responding that the ability of these species to be propagated within the ecosystem will be greatly impaired. In addition to the expressed views, the functional relationship between members of an ecological community and the effect this has on the viability of ecosystem became forcefully apparent to the local community. Thereby indicating a need for the local people to imbibe ecosystem conservation ethics based on the concept of the interrelationship existing within an ecological community.

The response of the natives as to the possible effects on the ecosystem when certain members are eliminated clearly confirms scientific notions with respect to the concept of the community. It is an ecological truism that the easiest way to impair or impact negatively an organism within the ecosystem is to modify the community rather than a direct attack on the organism. This mode of interaction clearly fits into the concept of modifying interaction, as the conservation attitudes of the local people have been somewhat adjusted by scientific information based on an enhanced appreciation of the functional relationship existing between organisms in the ecosystem.

The study population indicated a willingness to change hunting behaviors towards some keystone species indicated earlier, in order to maintain the health and stability of the ecosystem. This idea seems to have a great effect on local people with respect to promoting conservation education. The prevailing atmosphere of this reflective process was that of a greater awareness and appreciation of the inter-connectedness of nature made evident from their very knowledge of the growth and phenological properties of valuable plant species of the wild. Incorporating the knowledge system into the curriculum of community education for promoting conservation will find easy grassroots' acceptance as it is already rooted in their knowledge categories about the real world.

6. Conclusion

Local people are a reservoir of knowledge of the workings of the ecosystems of their surroundings that they are dependent upon for livelihood and sustenance. Conservationists may utilize local knowledge of pollination process and agents of flowering plants as well as their knowledge of seed dispersal and seed mortality processes to demonstrate the relationship between species diversity and ecosystem stability and continuity. Rather than policing the forest against locals, the principles of modifying interaction and reinforcing interaction engendered by the convergence of local knowledge of ecosystem functioning and scientific information, on the stability of natural systems hinged on such knowledge may open a new form of cooperation as local perspectives are altered and reinforced. The ecological integrity and survival of Protected Areas are better served if this knowledge is solicited and integrated into the rural development component and ecosystem management plans for Protected Areas. Given the vast knowledge of local conservation potential, it is imperative that the educational curriculum be amended to create room for local conservation knowledge if the natural resources of the environment are to be sustainably utilized.

References

African Biodiversity Support Programme. (1992). African Biodiversity Support Programme: Foundation for the future. USAID/?

Alden-Wily, *et al.* (2001). Community based forest Management: Commercial Harvesting of the rainforest Indonesia. *The International Forestry Review*, Vol 3 (3).

Bisong, F. et al. (2007). Participatory Land Use Planning for Community –Based Forest Management In Cross South-Eastern, Nigeria *LWATI: A Journal of Contemporary Research,* Vol. 4, 329-347.

Bisong, F.E. (1993). Participatory Rural Appraisal Report for Ikom, Akamkpa and Oban Forestry Charges. The Cross River State Forestry Project (ODA Assisted) Calabar.

Bisong, F.E. (1998). Three Model Community Participation in forest Management in Cross River State. Forestry Development Department, Cross Rivers State.

Chambers, R, Pacey, A & Thrupp, L. A. (1989). (eds) *Farmer First. Farmer innovation and agricultural research*. London, Intermediate Technology Publications.

Chambers, R. (1983). *Rural Development. Putting the Last First*. Essex, Long man Scientific & Technical.

Compass. (2002). *Ancient Roots, New Shoots Endogenous Development in Practice* ETC/Compass Haverkort, B, et al (eds) The Netherlands, Zed Books.

Dunn, R., Out, D., and Wong, J. (1994). Report of the Reconnaissance Inventory of High Forest and Swamp Forest Areas in the Cross River State, Nigeria. Cross River State Forestry Project (ODA Assisted), Calabar.

Freire Paulo. (1971). *Pedagogy of the Oppressed Hardier and Hardier*, New York.

ICIMOD. (1994). Indigenous Knowledge Systems and Biodiversity Management. Proceedings of a Mac-Arthur Foundation ICIMOD Seminar. Kathmandu, Nepal.

ODA/WWF. (1990). Cross River National Park Okwango Division. Plan for Developing the Park and it's Support Zone. Survey, WWF.

Okwangwo Division of the CRNP and Abomkpang, a highest priority settlement on the basis of proximity considerations.

Ortiz, O. (1999). Understanding Interactions between Indigenous Knowledge and Scientific Information. In *Indigenous Knowledge and Development Monitor*, November 1999.

Richards, P. (1989). *Indigenous Agricultural Revolution. Ecology and Food Production in West Africa*. London, Unwin Hyman.

Scoones, I & Thompson, J. (1994). eds *Beyond Farmer First. Rural people's knowledge, agricultural research and extension practice.* London, Intermediate Technology Publications Ltd.

Shelagh, K et al. (2003). Course C93: *Conservation And Humankind*. Imperial College at Wye, University of London.

Thrupp, L.A., Cabarle, B & Zazueta, A. (1994). Participatory Methods and Political process: Linking grass roots actions and policy-making for sustainable development in Latin America. In Scoones, I & Thompson, J (eds) *Beyond Farmer First*. London Intermediate Technology Publications

Walters-Bayer, A & Veldhuizen, L.V. (2005). IK Notes; Promoting Local Innovation: Enhancing IK Dynamics and Links with Scientific Knowledge. No 76 World Bank.

Table 1. Ethno Ecology of Selected Wild and Cultivated Species

Ethno Ecology Parameters	Irvingia spp. (Bush mango)	Cola acuminata (Native kola)	Garcinia kola (Bitter kola)	Gnetum Africana (Salad)	Dacryodis edulis (Native pear)	Milcia excelsa (Iroko)	Elaeis guineensis (oil palm tree)
Ecology							
• Habitat	Any where in high forest on mostly level land	Anywhere in high forest and sec forest; but common on ridges.	Any where in high forest; not common in valleys.	Common near rivers/streams in thick forest Anywhere in forest, fallows farms.	Any where in forest/ fallows/ farms.	Anywhere in forest but more common on ridges and hilly areas.	Usually near river or stream bank in high forest
Population Structure							
Density per hectare	4 – 7 stands per hectare	Occurs 20 to 30m apart, 100m in some cases	1 per 5 hectares	About 100m between clusters		2 – 3 stands per ha approx 30m apart	Very scarce usually 1 stand ha in closed canopy forest. Common in fallows of sec forest
Spatial Distribution	Scattered; But clustered in few places	Scattered; common on ridges	Scattered	Usually clustered; A few are scattered		Clustered in occurrence	Clustered
Pollination Agents							
Pollinators	Bees spp. (Apidae & Apis mellifera); Butterfly spp.	Variety of Bee spp Apidae; Apis mellifera	Not known	Birds	Bees (Apidea & Apis millifera)	Suspected Bees & flies They can be heard humming around trees in flowering period	Bees
Seed Dispersal/ mortality							
Seed Dispersal	Big squirrel; elephant; variety of Monkey spp; man	Rabbits & Bush rats	Squirrel	Porcupine & Rabbit	Birds; seed also drops when ripe	Birds; parrots, Horn birds; Squirrel	Unknown
Seed predators	Bush pig (Potamochoerus porcus)	Rabbits & Bush rats	Squirrel	Birds prey on seed	Water beef, Hyenna porcupine	-	Bush pig, Bush dog spp
Yield Vol. Potential							
NO/VOL per stand	5okg of dried seed per stand = 10,000 seeds.	-	-	-	-	-	-
Climate Effects	Early rain favourable for good yield wet harmattan required for good yielding harmattan causes poor yield.	Same as Bush mango. Early rains & Wet harmattan for growth.	-	-	Favourable growth in wet hamattans Early rain; un favourable harmattans & late rains.	-	-

Table 2. Ethno Biology and Phenology of Some Wild and Cultivated Species

Ethno Ecology Parameters	**Irvingia spp. (Bush mango)**	**Cola acuminata (Native kola)**	**Garcinia kola (Bitter kola)**	**Gnetum Africana (Salad)**	**Dacryodis Edulis (Native pear)**	**Milcia excelsa (Iroko)**	**Elaeis guineensis (oil palm tree)**
Germination properties							
Propagation Methods	Seeds Planted			Largely by Wildlings	Seed Planted	Wildlings where found Seed Planting	
Germination conditions/ farm trials	Seed germinates under closed canopy;	Germinates anywhere on forest floor	6 months	Any where	2 weeks under forest floor	-	2 months in open ground; but very long period under closed canopy
Germination duration	4 – 6 weeks under forest floor.	2 month under forest covers. 1 month for normal germination on farms		3 weeks germination period.	Stunted/hindered growth under closed canopy; matures quickly under gaps or open canopy		
Growth XTICS in closed & open canopy	Accelerated under open canopy, stunted in close canopy						
Phenological properties							
Leaf fall	Jan/Feb; Feb/March (Sweet Variety) Sept/Oct. (Bitter Variety)	Twice per year. Oct/Nov (Dry sea son yield) March/April wet season yield.	Dec/Feb	-	Jan – March	Dec – Jan	
New Leaves	2 weeks after leaf fall (Feb/March for sweet variety) Sep/Oct. (Bitter variety)	New leaves appear with flowers.	Dec/Feb	-	Jan –March	March – May	
Flowering	March/April about 3 weeks after new leaves (sweet) Early Oct/Nov. (Bitter).	Oct/Nov (dry); March/April (wet) i.e. as soon as leaf falls.	-	August/Sept	Jan – March: Feb – March for late flowering	March - May	Jan – Feb (Dry season) June Aug (wet season)
Seeding/Fruiting							
Commencement	April/May (Sweet) Dec/Jan. (Bitter)	Dec (Dry) May (Wet)	May-June	Seeds Oct/ Nov; fruits March; drops and germinates after rains	April – May	-	Feb- April (Dry Season)
Maturing period	June/July i.e. 3months after fruiting commences (Sweet); Feb/March 3 months after fruiting commences (Bitter).	Feb/ March (Dry) June/July (wet) season yield.	June/July 1 month after fruiting commences.	6 months from seeding	May – June/July to August if it flowers late	-	August to Sep (wet season) matures 3 months after flowering
Growth Duration	10 yrs	Seeds planted	30 yrs	1 month	5 yrs in farms/ open ground; 7 yrs under closed canopy	About 50 years	3-4 years in open ground; 6 years under closed canopy

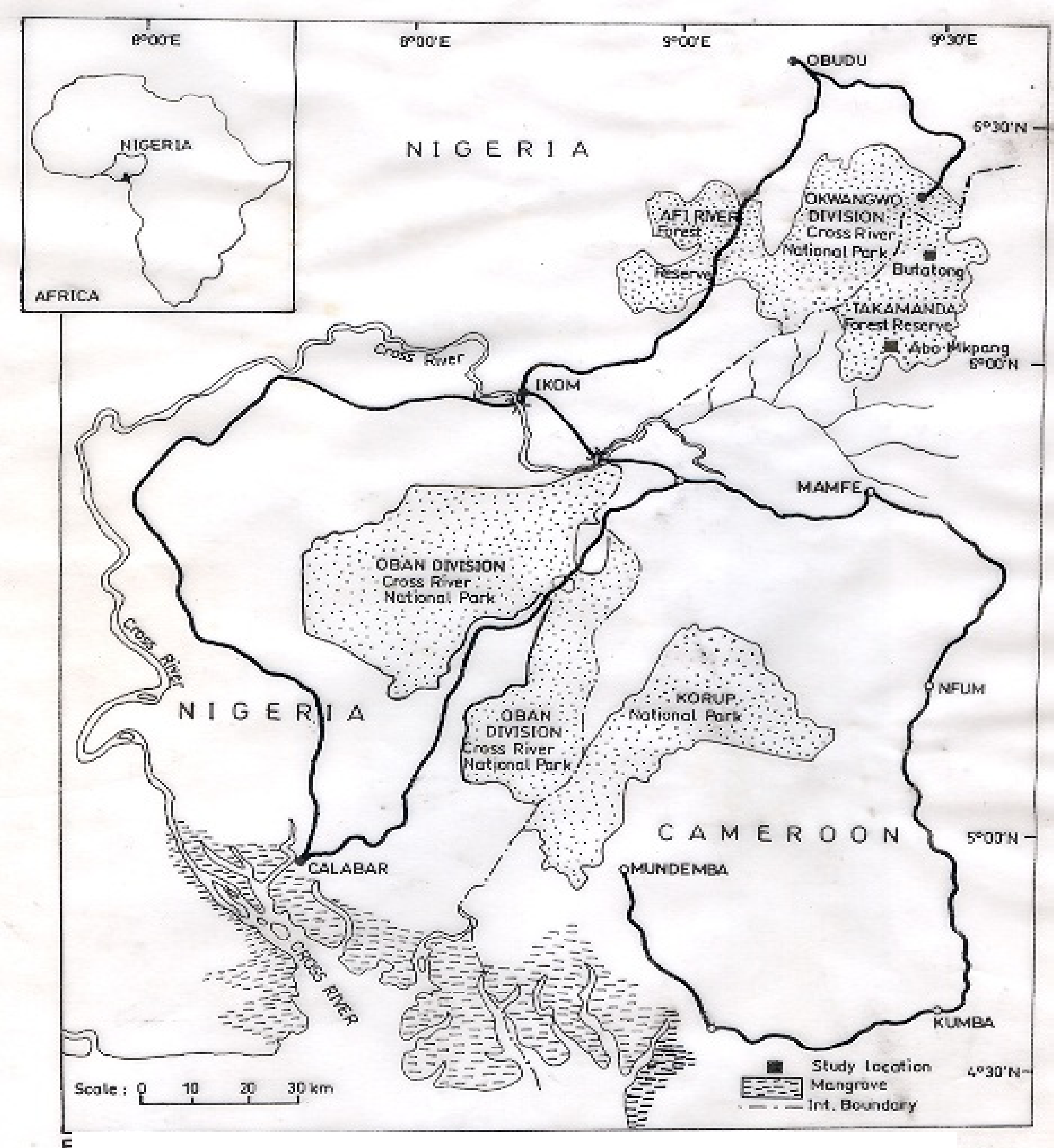

Figure 1. Location of the Cross River National Park, Nigeria