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Traditional Knowledge in the Use and Management of Forest Ecosystem for Livelihoods and Food Security in Nigerian Savanna

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ABSTRACT Indigenous traditional knowledge and biodiversity are complimentary phenomena essential to human development and sustainable resource management. The rural communities have a significant role to play in maintaining the integrity of ecosystems to ensure that they continue to support livelihood activities. This paper focuses on the use of traditional knowledge in the management of forest resources in the Nigerian savanna and how this knowledge has been used to improve the livelihoods of the people. It combines focus group discussions, key informants interviews and household survey in 11 communities across 10 local councils with vegetal surveys. The study reveales that the respondents possess wide knowledge of the natural resources they use. It recommends that strategic programmes are more likely to succeed if land degradation, biodiversity loss and ecosystem services are considered in poverty alleviation and food security.

INTRODUCTION

Global awareness of the crisis concerning sustainable resource management is assured following the United Nations Conference on Environment and Development held in June 1992 in Rio De Janeiro. Ecosystems, especially forests and woodlands, play an essential service in climate regulation and support for rural livelihoods and food security (Munang et al. 2011). There is growing recognition of the importance of indigenous peoples' knowledge in ensuring the ecological and socio-economic sustainability of natural resources (Natural Resources Canada (NRC) 1997). Rural communities have a significant role to play in maintaining the integrity of these ecosystems to ensure that they continue to support food and water production and other livelihood activities (Zoa 2009).

Recognition of the role of communities as stewards of ecosystem services and strengthening their capacity, and empowering them to manage the ecosystems sustainably is essential for the continued functioning of the ecosystem (Folke et al. 2002; Fabricus et al. 2004). This is testified by the growing awareness of the importance of indigenous knowledge for ecological and socio-economic sustainability (NRC 1997). Indigenous traditional knowledge and biodiversity are complimentary phenomena essential to human development and sustainable resource management. Even though very little indigenous knowledge has been documented yet, it represents immense databases that provide humankind with insights on how numerous communities have interacted with their changing environment, including its flora and fauna resources.

Most environmental and resource management approaches are often formulated without acknowledging local people's culture, knowledge and expertise on the issue, often resulting in the total rejection of such initiatives by the people (Bhandari 1988; Chaudhury 1993). This lack of acceptance of the importance of tradition, indigenous traditional knowledge, and absence of a sense of participation, responsibility and ownership among local communities has also led to the eventual failure of many well-meaning development interventions (Varte 2012). Development concerns such as prevention of the degradation of the environment, conservation of scarce natural resources or finding alternatives to them, have wide ramifications in the domain of culture. Sustainable resource management per se and development in general can be meaningful and successful if formulated in accordance with the cultural parameters and felt needs of the people using tools like indigenous traditional knowledge.

In view of the interrelationship between the natural resource, its sustainable management and

the cultural, social, economic and physical well-being of local people, national and international efforts to implement environmentally sound and sustainable resource management should recognise, accommodate, promote and strengthen the role of indigenous people and their traditional knowledge systems. This paper argues that adopting a social-ecological system perspective that integrates the people-focused rural livelihood approach with conservation-focused natural resource management approach, taking cognisance of the traditional knowledge of the people, is needed to ensure ecosystems sustainability. The paper discusses traditional knowledge in the use and management of forest resources in the Nigerian savanna and how this knowledge resource has been used to improve the livelihoods of the people. The paper is divided into five sections. Following this introductory section is the second section which provides brief explanations of the conceptual basis of indigenous knowledge in natural resources management. Section three discusses the methodology used in conducting the research while the fourth section provides a discussion of the research findings. The last section provides a conclusion of the paper.

Traditional or indigenous knowledge refers to the knowledge, innovations and practices of indigenous peoples (Kirsty 2010). Ajibade (2003) views indigenous knowledge as the knowledge systems developed by a community as opposed to the scientific knowledge that is generally referred to as 'modern' knowledge. Unlike Western science, indigenous knowledge is usually holistic, not reductionist, and passed down orally, not written down. In many cases, indigenous knowledge is more practical than theoretical, grasped only through long experience (Agrawal 2011; Kirkland 2011). Indigenous knowledge is the basis for local-level decision-making in many rural communities. It has value, not only for the culture in which it evolves, but also for scientists and planners striving to improve conditions in rural localities (Robinson and Herbert 2001).

Indigenous peoples and traditional communities around the world have over the centuries developed a close and peculiar connection with the lands, waters and environments in which they live and work. In recent times, it has become clear that this traditional knowledge garnered will be a valuable resource in resource management and environmental security. According to Rist et al. (2010), much ecological and resource knowledge is encoded in local languages. It follows logically that indigenous communities are perhaps uniquely situated to assist in integrated conservation/management of rare and endangered resources. Kirsty (2010) puts it thus;

In recent years, there has been an increasing realisation that the observations and assessments of indigenous groups provide valuable local level information, offer local verification of global models, and are currently providing the basis for local community-driven resource management and adaptation strategies to global environmental change that are way past the planning stage and are already being implemented and tested.

Local communities have their own indigenous ways of managing their immediate environment in order to sustain available resources such as waterand soil among others. This also emphasises that the environment which could be ecologically adaptable should be promoted. It has been basis of community coping practices that have helped vibrant communities survive natural extremes over centuries (Rist et al. 2010).

Indigenous people are excellent observers and interpreters of change on the land, sea, and sky. Their community-based and collectively held traditional (indigenous) knowledge accumulated and maintained through practice over countless generations, offers valuable insights into the state of the environment. Indigenous knowledge possesses chronological and landscape-specific precision and detail that is often lacking in scientific models developed by scientists at much broader spatial and temporal scale. Moreover, indigenous knowledge provides a crucial foundation for community-based adaptation and mitigation actions that can sustain resilience of social-ecological systems at the interdependent local, regional, and global scales (Raygorodetsky 2012).

Indigenous people depend directly on diverse resources from ecosystems and biodiversity for many goods and services. In addition, indigenous communities hold within their traditional knowledge base historical climate data that ranges from temperature, rainfall and the frequency of climactic events, as well as current fine-scale information that relates across all sectors including water resources, agriculture and food security, human health, and biodiversity (Kirsty 2010). Some elements of indigenous knowledge may be centuries old, but indigenous knowledge is dynamic, constantly growing and changing as people react to new conditions (Berkes 1989).

For example, in the case of forest management in Canada, Aboriginal people have developed a unique cultural and spiritual connection with the land and an intimate knowledge of the forest and other ecosystems and their traditional way of life is based on the idea of using and managing the resource so that it will last in perpetuity. It stands to reason that their ecological knowledge can contribute to sustainable forest management practices (NRC 1997).

METHODOLOGY

Study Area

The study area is roughly defined by Longitudes 3°50' to 5°50' East and Latitudes 8° to 9°15' North. It covers about 40,000km^2 in parts of Oyo, Kwara and Niger State in West-Central Nigeria. The area falls within the wooded savanna (also called derived savanna) that is dominated by mixture of forest and woodland interspersed with tall grasses and fire-resistant trees. The tree cover is as much as 40 percent. This zone continues to expand to the south as more forest land is degraded (Bucini and Lambin 2002; Hoffmann and Jackson 2000). The protected forest of the Old Oyo National Park (OONP) is the most significant forest block in the study area. A number of other forest reserves that exist have been significantly degraded by uncontrolled human activities. The area is also a very important headwater for several important rivers including the Teshi, Moshi, Asa, Oro and Kampe rivers that flow into the Niger River and Ogun, Ofiki, Oba and Oyan rivers which flow southwards towards the Atlantic Ocean (Fasona et al. 2013). The wooded savanna is characterized by a sub-humid Koppen's *Aw* climate [an equatorial savanna where minimum precipitation is less than 60mm in dry season (Kottek et al. 2006)]. Population density is relatively high and survival for large rural communities depends on small-holder rain-fed agriculture (Afiesimama et al. 2006; Odekunle et al. 2005).

Data Collection and Analysis

This paper is derived from a larger study (Fasona et al. 2012) on community- based management of ecosystems and natural resources for the improvement of rural livelihood and food security in the wooded savanna, funded by the Global Change Systems for Analysis, Research and Training (START), through the Global Environmental Change Research in Africa. The aspects of the methodology related to this paper include social surveys and vegetal surveys.

The total sampling frame is over 2000 communities. A multistage stratified random sampling was adopted. The first stage involved setting criteria for candidate community selection. The criteria were as follows:

- The community must not be more than 5km away from a forested land or woodland in order to be able to connect livelihood to forest or woodland. This is based on the assumption that the more isolated a forested or woodland landscape, the less the risk of disturbance; and
- The community must be rural or semi-urban. This is based on the assumption that the natural resource capital is more important to livelihood and food security in rural and semi-urban than urban areas.

From the preliminary list of over 400 communities that satisfied the above criteria, another stage of stratified random sampling was used to select 42 community clusters across 21 Local Government Areas (LGAs) mainly in Oyo and Kwara States. A pilot survey was carried out on the 27th and 28th December 2011. Based on the results from the pilot survey, the sample size for the final survey was further reduced to 11 communities (total estimated population of about 140,000). These communities were spread across 10 LGAs in Oyo and Kwara States. The final survey was conducted from 5 to 9 February 2012. The final sample size was 191 households (see Table 1).

A structured questionnaire was administered to household heads and focus group discussions involved key informants. Five focus group discussions with selected men, women, and youths in the communities were convened in Sepeteri, Igboho, Ipapo, Orile Igbon and Baasi. Four traditional rulers were engaged in Iganna, Ikoyi Ile, Agbonda and Yaaru for the key informant interview. Descriptive analytical methods were used to analyze the data.

RESULTS AND DISCUSSION

Socio-economic Characteristics of Respondents

The results revealed that 78 percent of the respondents were married, 15 percent were single and 6 per cent widowed/or separated. Those

Table 1: Surveyed communities and household respondents

S.No.	*State*	*LGAs*	*Communities*	**Population (1991)*	***Population (2012)*	*No. of selected household respondents*	*% of respondents to total respondents*
1	Kwara	Ifelodun	Yaaru	1222	1961	22	11.5
2	Kwara	Ifelodun	Idofian	5519	8857	16	8.3
3	Kwara	Irepodun	Agbonda	1030	1653	13	6.8
4	Oyo	Surulere	Orile Igbon	219	351	14	7.3
5	Oyo	Saki East	Sepeteri	12317	19766	22	11.5
6	Oyo	Iwajowa	Iganna	17666	28350	17	8.9
7	Oyo	Orelope	Igboho	38871	62380	19	9.9
8	Oyo	Olorunsogo	Dogo	450	722	10	5.2
9	Oyo	Itesiwaju	Ipapo	5962	9568	19	9.9
10	Oyo	Orire	Ikoyi-Ile	3328	5341	23	12.0
11	Oyo	Atisbo	Baasi	541	868	16	8.3
				87125	**139817**	**191**	**100**

*NPC, 1991 **Estimates based on 2.83 annual growth rate.

between ages 31 and 45 accounted for 40 percent, ages 18 to 30 accounted for 20 percent and ages 46-60 accounted for 22 percent. The area is characterised by large household sizes. Household sizes of between 4 and 7 persons accounted for 38 percent, and those between 8 and11 persons were 29 percent. Only 17 percent had households smaller than 4. One reason for large households is the large number of children. It is a general assumption that children are expected to help their parents on the farm. Those with no formal primary education constituted the largest proportion of the respondents (31 percent). This was closely followed by those with primary education (30 percent). This result reflects the low level of literacy among many of the population in the area.

The income profile shows that over 70 percent earn or generate a maximum of ₦ 30,000 (less than $150) every month from their primary livelihood activities. 17.7 percent generate below ₦7,500 (<$50), 20.8 percent make between ₦7,500- ₦10,000 ($50 to $66), Only 73 percent make above N50,000 (about $333) in a month. This suggest that a majority of the population (who are peasant farmers) can be classified as poor. This has implications for investments, savings and capital formation to break the cycle of poverty. For farmers, farm produce is harvested seasonally (or annually for most crops except maize which is harvested twice within a year). It was also observed that no books are kept for income and expenditure (at least by a majority of the farmers).

Livelihoods Activities

Livelihood activities in the study area were substantially tied to the natural resource system with different activities performed by each gender group (Table 2). The agro-ecological characteristics of the area favoured root and tuber crop cultivation. Specifically, farming activities, firewood making and charcoal processing were mostly done by men. Women were more engaged in small agro-processing of cassava to produce *garri* (the commonest staple food in Nigeria) and cassava flour. Other examples include processing of yam to yam flour and production of local soap and processing of *Vitalaria paradoxa* seeds to Shea butter. Women were also known to collect edible fruit, seeds, firewood and leaves.

The study sought to know what farmers have been doing in recent times to improve their conditions and also improve yields. The results show that irrigation, use of organic manure, and rain harvesting to water crops and also for domestic consumption is prominent, and at least 60 percent of the farmers use one of these. About 17.7 percent also now hire labourers to assist them in farm works. Evidence from the field show that in the majority of the communities farmers rely on inland wetlands (*fadama*) along seasonal streams and the few community-managed small irrigation schemes to grow crops during the dry season.

Traditional Knowledge in Resource Use

Twenty- four different tree species are very significant to the local economy (Table 3). They

Table 2: Gender categorisation of ecosystem-based livelihood activities in the study area

Livelihood categories	*Male*	*Female*
Crop farming	Cash crops, tubers and citrus planting	Vegetable gardening, mushroom, cereals (maize in particular) along flood plains
Farm produce harvest	Collection of fibres, roots and packaging ready for sale	Collection of small snails during the rainy season; collection of fruits, seeds, herbs and fibres
Forest resources collection and harvest: Fuel wood and charcoal	Tree logging and processing	Packaging and selling of charcoal and firewood Collection of herbs, leaves, nuts, seeds and nuts
Agro processing	Cutting of hedges, harvest of tubers from farm plots before processing	Food processing such as locust bean, shea butter, local soap, garri and yam flour
Agro-pastoral	Bush burning for grassland regeneration	Water collection for livestock
Hunting	Wild animal game and collection	Meat processing including smoking

Source: Authors's Analysis

Table 3: Ranking of wood species for local use

S. No.	*Local name*	*Scientific name*	*Building*	*Farm implements*	*Sheds*	*Home furniture*	*Road mending*	*Herbs/therapy, oil & balm*	*Leaves collection/ harvest*	*Seed/roots and soup*	*Cane/chewing stick*	*Aggregate % Score*	*Charcoal production*
1	Ayin	Anogeissus leiocarpus	14.1	16.1	17.7	13	15.6	7.8	2.6	10	12.5	109.4	*5.2*
2	Aayan	Prosopis Africana	1	8.3	3.6	0.5	1.6	1	0.5		78	94.5	*0.5*
3	Emi (shea butter)	Vitalaria Paradoxa	18.2	12.5	10.9	19.8	13.5	10.4	8.9			94.2	*45.8*
4	Kasia	Acasia		1.6	9.4	3.1	5.7	6.8	1	10.4	5.7	43.7	*6.3*
5	Dongoyaro (neem)	Azadirachta indica		1.6	1.6	1	4.2	17.2	9.4	7.3		42.3	*2.1*
6	Iya	Daniela ogea	12	12	1.6	6.8	1.6	2.1	1			37.1	*1*
7	Iroko	Milicea excelsa	6.8	2.6	5.7	11.5	5.2	2.1	0.5			34.4	*0.5*
8	Aganho (maho-gany)	Khaya Senegalensis	9.4	0.5	1.6	9.4	4.2	8.3	0.5			33.9	*3.1*
9	Igba	Parkia biglobosa		2.1	3.6	2.6	2.6	4.2	2.6		8.9	26.6	*2.1*
10	Cashew	Anacardium occidentale									23.4	23.4	
11	Idi	Terminalia glaucescensis		3.6	2.6	3.1	3.6	5.2	1		2.6	21.7	*2.1*
12	Melina (gmelina)	Gmelina arborea	14.1	3.6								17.7	
13	Abafe	Piliostigma thonningii	1	9.4	1	1.6	2.1	1.6				16.7	
14	Odan		1	0.5	6.3	3.1	3.1	1	1			16	
15	Ibepe (pawpaw)	Carica papaya								15.1		15.1	
16	Oparun (Bamboo)	Bambusa vulgaris	1.6		6.8	2.1	0.5	0.5	0.5			12	
17	Apepe		1.6	5.2	0.5	0.5	1	0.5	1.6	1		11.9	*1*
18	Sedun		2.6	3.1	2.6	1		1				10.3	*0.5*
19	Orombo (citrus)	Citrus sinensis								9.9		9.9	
20	Mangoro	Magnifera Indica	2.6								4.7	7.3	
21	Odu			0.5	2.6	0.5	0.5	1	0.5			5.6	
22	Ope	Elaesis guineensis			3.1	0.5	1	0.5				5.1	*1*
23	Guava	Psidium guajava		1.6	0.5			1.6	0.5			4.2	*0.5*
24	Asapa				0.5							0.5	
25	Any Dry wood				0.5	4.2	0.5	7.8	0.5			13.5	*13*

Source: Authors Analysis 2012

are used in construction (building, shed, furniture and fabrication of handles for simple farm tools), road mending, herbs and therapy, oil and balm, leaves, roots and seeds for soup, cane weaving, chewing sticks, firewood and charcoal. The aggregate percentage responses suggest that *Anogeissus leiocarpus (Ayin), Prosopis africana (Aayan), Vitalaria paradoxa (Emi), Acasia (Kasia) and Azadiracthta indica (Dongoyaro*) are the most preferred wood species for a variety of domestic uses including construction and health issues. In particular, *Anogeissus leiocarpus, Prosopis africana* and *Vitalaria paradoxa* are the three most outstanding species of significance to rural livelihoods and local economies of the wooded savanna. Apart from the fruit trees (*Psidium guajava, Magnifera indica, Citrus sinensis* and *Anacardium occidentale),* only *Acacia* and *Gmelina arborea* are the non-indigenous tree species that made the list of useful trees in the study area.

Charcoal production typifies the conflict between the short-term ecosystems provisioning services required by people and the long-term supporting services needed to maintain the health and integrity of the ecosystems to ensure continuous flow of ecosystems goods and services. Commercial conversion of wood into charcoal is a major ecosystems destruction activity. But it also provides livelihoods for a significant number of people.

Charcoal is a major energy source for a small number (about 2%) of rural homes, but for a large number of urban homes due to inadequate power supply in Nigeria. Most of the charcoal produced is therefore destined for urban markets. By virtue of traditional knowledge, *Vitalaria Paradoxa* is the most preferred tree specie (46% of respondents) for the production of charcoal across the communities. *Vitalaria paradoxa* is also the second most preferred (after *Anogeissus leiocarpus*) for local constructions and health and therapy issues. During the Focus Group Discussions (FGDs), some community members refer to the *Vitalaria paradoxa* as the 'cocoa of the savanna' (a reference to the economic importance of the tree which is comparable to the real cocoa). The multiple uses of the *Vitalaria Paradoxa* put the tree as likely the most endangered in the wooded savanna of Nigeria. However, it is neither cultivated in woodlot/plantation nor purposely planted by the local population. Engagement with different stakeholders suggests that only fruit trees including citrus, mango and cashew are planted. Other local economic trees including *Vitalaria paradoxa* grow wild in discreet locations and people have to wade through the woodlands to locate them.

Results from the field survey show that about 84 percent of rural households rely on firewood for cooking and heating. Firewood is also the most preferred energy source for 59 percent either because it is readily available (42%), it is considered free (14.6%), or it is cheaper than other fuel sources (13.5%). In addition, commercial fuelwood collection provides supplementary income for a significant number of these rural households. About 50.5 percent of the households believe any available dry wood is good enough for firewood and 3 percent again favoured the *Vitalaria paradoxa* as the most preferred for fuelwood.

About 56 percent of households affirmed that trees harvested for both charcoal and fuelwood are never replanted. This is an important issue for ecosystems management. Possibility of natural regeneration is cited by 41 percent as the major reason for non-replanting of harvested trees. Other reasons cited include lack of seeds or seedlings (15%) and lack of information about the need to replant (2.6%). About 49 percent knows no particular method for preserving their lands and 20 percent is indifferent to forest preservation. About 9.9 percent favours the creation of more protected areas and 6.3 percent prefers traditional means including creation of local sacred forest/groves. About 2 percent suggested that some tree species should be prevented from being cut in the forest either by government law or some local code or cultural norm. The general belief across most of the communities is that *trees are planted by God* which is a reference to the strong belief in natural regeneration of the ecosystem.

Farming is the major occupation for about 65 percent of those interviewed. Clearing of bush is seen as a necessary exercise that must be done by farmers prior to cultivation. Cutting and burning is the traditional and still the predominant method of bush clearing and practiced by over 80 percent. With respect to the effects which the present bush clearing methods could have on the ecosystem, 38 percent of the respondents believes bush burning has no negative effect on the environment. Only 6.8 percent believes that bush burning is a threat and 3 percent think

it has some potential to advancing desertification and land degradation.

The various methods of land preparation do have grave implications for the ecosystems. While the conversion of forest and woodlands into farmland generally leads to degradation of the terrestrial ecosystems, clearing land through bush burning destroys specific animal habitats and plant communities. In several instances, fire often extends beyond the original intended lands into other areas thereby causing severe ecosystems perturbation. Frequent fires in the wooded savanna (especially during the dry season) often retard the growth of trees and prevent forest and woodland communities from reaching their climax (Hoffmann and Jackson 2000). About 22 percent of households are indifferent to any future threats to the ecosystems and biodiversity resulting from bush burning.

Small scale agro-based processing includes cassava processing to *garri* (grinded and fried cassava) and cassava flour (sun-dried and ground cassava). Others include *Igba* seeds (from (*Parkia biglobosa*) to *Iru* (*locust bean*), *Emi* seeds (from *Vitalaria paradoxa*) to *Ori* (Shea butter), yam to *elubo* (yam flour)), and processing of wood-ash to local (black) soap. About 5.2 percent of the population who are mostly women are engaged in this trade.

Traditional Knowledge in the Management of Resources

Indepth interviews and key informant interviews conducted revealed that people and community leaders in the area are aware of the importance of the ecosystems and the threat posed to the sustainability of the environment and human well- being by destructive practices. The destructive practices include bush burning and forest fires and unsustainable logging, that is, cutting down trees to produce charcoaland tree felling for firewood, without any tree replanting intitiatives. The opinions of these community leaders are crystalised in the following statements:

The traditonal ruler of Yaaru noted:

*Our main resource is the tree. These trees are not maintained by our political leaders (the LGA). Usually we observed that some unknown people will go into the forest to cut down trees without the consent of anybody. These people will cut down our trees indiscriminately without any license or valid order to do so. I have reported these cases to other Obas during our sundry meetings and we know that the people of *** have been secretly contributing to this. We have a particular tree here called "Emi". This tree is used for the production of "Ori" (Shea butter). There is another one known as "Igba" which is used in the production of locus beans. These people will just go into the forest and cut down these productive trees particularly for charcoal production. To our knowledge, these trees are much more beneficial even to the government than these charcoals that they are using it for. Back in those days, these tree species were a good source of income for people to fend for their families. In those days it was forbidden for anyone to cut down trees for charcoal in our land here since these trees are our "cocoa". If we are cutting all those trees now the breeze will be disturbing us, but if the trees are still in our environment the winds will not be disturbing us too much. During the rainy season when strong winds usually blow across our area, these trees help to reduce the strong winds. They also protect our properties from damages that the strong winds might cause.*

Community leader in Baasi commented:

It is very painful to see this happen (deforestation) although several measures have been taken to stop it but no result.

The Alapa Eku of Agbonda land commented:

By a common rule or understanding, the making of charcoal was banned about two years ago, and you are not expected to cut down any tree even on your own land or farm without the permission of the King or his designate. Although there are few exceptions where the land is for building construction.

Suggested Methods for Preventing Threat to Sustainability of Forest Ecosystem

In spite of the approval during focus group discussion of the importance of replanting after harvests for forest ecosystem management, majority (56%) of respondents indicated that trees are never replanted after being harvested. This could be due to a lack of access to facilities to adequately protect forest and woodland resources as indicated by 49 percent of respondents.

CONCLUSION

The results of this study revealed that respondents possessed wide knowledge of the natural resources they use. Such knowledge can

potentially inform scientific approaches to management, either as a source of baseline data to fill information gaps that cannot otherwise be addressed or to provide alternative management approaches from which scientists and managers might learn.

There is considerable potential in the local use of renewable energy for heating. Communities were aware of threat of extinction to some native economic and multipurpose tree species such as the *Vitalaria paradoxa* that has conflicting uses. They were willing to embark on mass planting of such a tree. However, they insisted that affordable seedlings be made available to them. Communities were willing to engage in agro forestry or silviculture and would provide land to government for mass silviculture, but with a strong assurance that such will be community managed and with no intention from the government to use that to excise their lands as has been the case sometimes in the past. Communities are willing to change or modify some of their farming practices especially the slash and burn system, but required farming inputs such as herbicides, fertilizers and modern implements such as tractors.

RECOMMENDATIONS

Increasing the resilience of livelihoods is a key component of an effective poverty reduction strategy. Building partnerships through natural resources management projects that are community-driven or have substantial communityparticipation is important to sustainable natural resource management in the wooded savanna. It was recommended that strategic programmes are more likely to succeed if land degradation, biodiversity loss and ecosystem services are considered in poverty alleviation and food security. Such integrated measures must be science-based but community driven to ensure its sustainability and synergy for providing social safety nets for the most vulnerable.

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