Rufford Small Grant Report 2009

Conservation Education and Capacity Building: Rural Participation in Conservation and Production of Fuel-Efficient Stoves

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By

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Cover Photo: *Local people advertising the Fuel-efficient stove during a carnival*

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Table of content

1.0 Introduction

Earth's biological diversity is rapidly declining and the need to reduce this rate of biodiversity loss cannot be overemphasized (Mulder and Coppolillo 2005). The observable conflict between humans and biological diversity (Gowdy and McDaniel 1995; Gaston 2005; Mulder and Coppolillo 2005; Chen et al. 2005) has given rise to a clash of interests: "putting biodiversity first or human first" (Mulder and Coppolillo 2005). One important question raised by Adams and Hulme 2001 however remains; how should tradeoffs between varying interests be negotiated? This has proved to be a major challenge in the effort to conserve biological diversity. Though the debate goes on, it is becoming increasingly undisputable that for conservation to succeed, it is necessary to look at both sides of the coin.

The decline of the world's flora and fauna has become a serious global concern and global awareness has been created on the need to preserve the world's heritage. Priority sites have been chosen and many programs on conservation have been initiated and new policies introduced (Myers et al. 2000; Fishpool and Evans 2001). There is no doubt that conservationists are not resting on their oars, but this definitely isn't enough (Ginsberg 1999). On the other hand, there remains a high rate of poverty among the rural populace and dependence on natural resources remains a way out for the rural dweller; hence any initiative that preaches otherwise becomes the adversary. This too has become a global concern.

Recently community involvement in conservation has been advocated (Adams and Hulme 2001) and community development initiatives are seen as avenues to bring out the benefits of sustainability. Conservationists are becoming increasingly aware of the need to involve communities in conservation initiatives, hence such terms as community-based conservation (Hackel 1999; Western 2001). However this approach has been met with mixed reactions (Berkes 2003) from conservationists. Nevertheless, local communities continue to view efforts of conservationists with caution (Githiru 2007). There is therefore a subtle rejection (in some cases outright rebuff) of the olive branch being offered by conservationists. It is obvious that there is a huge gap between rural dwellers (resource custodians and users) and conservationists (resource managers). The earlier this gap is filled, the more rapidly conservation will be embraced by rural people. Without proper rural involvement, various efforts by

conservationists geared towards conserving biodiversity will continually be frustrated. Hence it is vital to improve the pathway of information flow between local communities (resources custodians) and conservationists, the resource managers (Githiru 2007).

A more recent concern is the issue that conservationists are targeting the wrong people in the blame for loss of biodiversity (Githiru 2007). He points out that forest activities of rural dwellers cannot be compared to the foot prints of civilization and argues for a "departure from the relenting focus on rural communities, broadening communication reach to the real unconverted, the urban dwellers". Hence one way to make conservation work is to improve communication in all directions. Bridging this divide will lead to a better understanding of the motives and priorities of all parties. This will enhance the level of conservation success and create a lasting impact.

In Nigeria, the main conservation NGO, the Nigerian Conservation Foundation (NCF) has been carrying out community-based conservation for several years. They initiated the Laminga Forest Project in 1999 after the Laminga Community Forest (Amurum Forest) in Jos, Central Nigeria became gazetted as a protected area as a result of an Important Bird Area (IBA) study in 1998. The IBA study was funded by the Royal Society for the Protection of Birds (RSPB). In 2001, the A.P. Leventis Ornithological Research Institute (APLORI) was founded and located within the Reserve and the Laminga Forest Project was handed to the Institute. The objectives of APLORI, apart from training Nigerians on ecology and conservation at the Masters level, included establishing a community-based sustainable management system for biodiversity conservation as well as working towards improving the livelihood of the support-zone communities. Since inception, the Institute has trained over 30 students to MSc. level in Conservation Biology and has reduced to an extent, the poverty level in these communities.

This present project was carried out in 2008 at the Amurum Forest Reserve. It was aimed at understanding the problems and needs of the community and improving communication between these communities (the forest custodians) and APLORI (the forest managers). This was carried out with the use of questionnaires, meetings with community members and a series of workshops where both locals and research team of APLORI participated.

1.1 Project History

This project is an outcome of a preliminary survey carried out on fuelwood extraction and use in the three villages around the Amurum Forest Reserve in 2005. Results of the study showed that sales of firewood in large quantities to the cities ranked highest of all categories of wood exploitation, followed by cooking. It was also discovered that the women were more involved in this trade as they complained that they had no other source of income. Not surprisingly majority of the people interviewed in the villages complained about not having access to their source of livelihood (the forest) whereas no alternatives were provided.

We made the following recommendations:

- Training workshop on fuel-efficient stove production and sales should be carried out with women as main participants.
- Spread of the stove to the cities is necessary.
- Possible ways of constructing fuel-efficient fire-wood ovens and/or stoves for commercial purposes (cooking, baking etc.) should be investigated.
- Conservation awareness programmes and tree planting campaigns should be carried out, targeting both rural and urban dwellers.
- Provision of social amenities e.g. Electricity and water to rural areas.
- Government should be made to get involved.

In response to the fuelwood study, Henrik Dahl, a visiting lecturer to APLORI with whom earlier discussions had steered thoughts in this direction, met with two pottery experts; Dan Wahlstrom and Annie Lindgren from Kyrkeruds Folkhögskola, a technical School in Sweden. They were invited from Sweden to train the community women on stove production at the Reserve. Experiments were conducted on models of fuel-efficient stoves that will best suit the needs of the communities. The community members had been interviewed via questionnaires on such issues as family size, occupation as well as willingness to accept an alternative to the three-stone cooking stove normally used. An average family size within these communities ranged from 10-15 people. The first model of the fuel-efficient stove was not very satisfactory as it was found to crack over time. Further experiments were conducted to obtain a more

durable design and finally in November 2007, the team came up with the ***Amurum brick stove***. The stove was made with local materials – clay, grass etc. – molded into bricks. These were burnt in a fuel-efficient kiln. A test was carried out to compare this fuel-efficient stove with the three-stone stove. The same amount of wood was set in both stoves for cooking; in addition to spending less time cooking, the brick stove used about 30% less wood than the three-stone. 30 women were trained during the first stove-making workshop and since then, the stove has been improved upon. This first stove making workshop was sponsored by the Swedish Ornithological Society (Sveriges Ornitologiska Förening; SOF).

Picture showing (from top to bottom): the first stove model; the first brick stove workshop; bricks burnt in a fuel-efficient kiln; the Swedish team (Dan Wahlstrom, Henrik Dahl and Annie Lindgren) with the brick stove model.

1.2 Aim

This present project, which commenced in February 2008, was aimed at promoting rural involvement in identifying and solving community and environmental related problems with an expected outcome of:

i. Improving communication between the local community and conservationists

ii. Increasing awareness on conservation through conservation education and production of fuel efficient stoves.
iii. Building capacity to enhance skill acquisition and to reduce the degree of poverty.

1.3 Study Area

This project was carried out in Amurum Forest Reserve, Jos Central Nigeria 09˚53′N 08˚59′E (Fig.1), about 15 km from the city of Jos. The Amurum Forest is surrounded by three villages, Zarazon, Kerker and Laminga villages. The predominant occupation is farming and a number of small farms border the Reserve. The farming system is mainly small scale subsistence farming and no large scale intensive agriculture. Only few people produce enough food for sale in the Jos city, in this case, mainly tomatoes. There is neither electricity nor portable water, and people have to walk long distances (> 5km) to fetch drinking water from a river in a distant community. Hence the rate of poverty is very high. Over 20 people from the community have been employed to work in the Research Institute, yet a lot more will be required to alleviate poverty among these communities.

Within the Reserve, all forms of exploitation including cutting down trees for firewood is prohibited, though people are allowed to collect dead wood. Villagers therefore go to surrounding forests outside the Reserve to collect firewood in large quantities. This act may in the long run reduce the buffer area for the thriving biological diversity in the Forest Reserve. The study is expected to provide useful information/recommendations to the management of APLORI in carrying out future community projects.

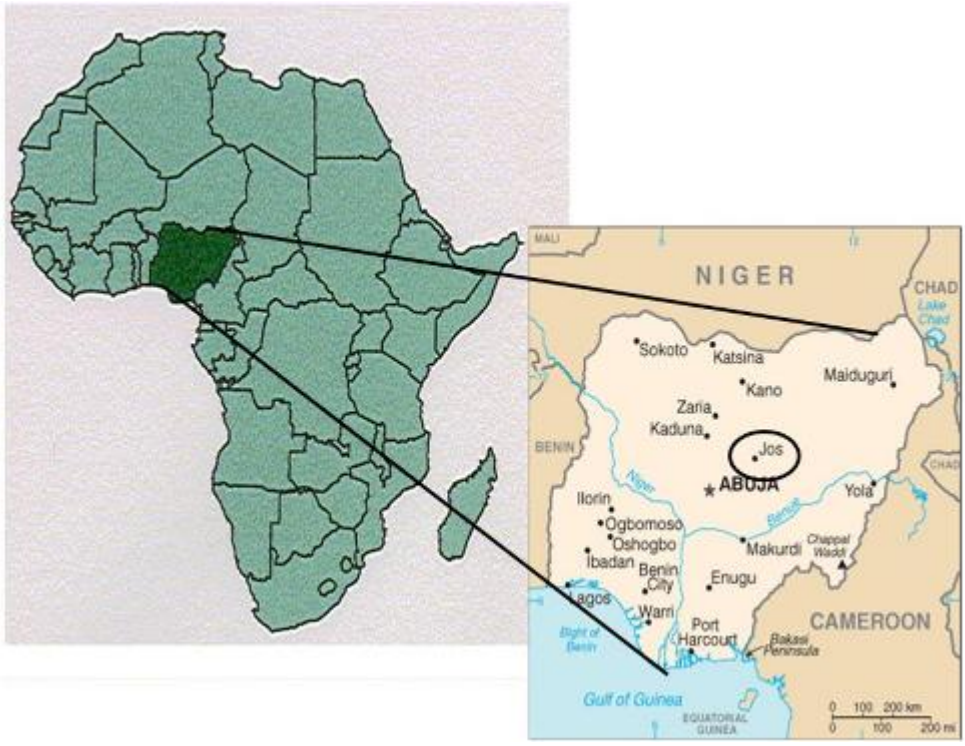

Figure 1. Map of Jos, Nigeria

2.0 Method

The project was carried out in three (3) phases, which we have termed the **QMT** approach. This is a simple approach to improving communication that can be applied to any rural setting in Africa. It is a combination of both scientific and traditional methods of collecting information. It involves distributing **questionnaires** and seeking the permission of community leaders to call for community **meetings** (a local method used in disseminating information); followed by **training** workshops on conservation and display of indigenous knowledge.

Phase 1. Questionnaire: A questionnaire survey was carried out to understand the knowledge, attitude and perception of members of the support-zone communities, comprising Laminga, Kerker and Zarazon villages, of the establishment of the Amurum Forest Reserve.
Phase 2. Meeting: Meetings were held with members of these villages to discuss the outcome of the questionnaire survey and bring up ways to tackle the issues raised. A workshop on the

impacts of forest exploitation and importance of sustainability as well as an exercise on indigenous knowledge was organized with selected community members as participants.

Phase 3. **Training**: Two conservation groups were formed to work with the project team: one group made up of 18 people (all youths) was trained on environmental education and communication to teach and increase conservation awareness within the community; and a second group of 22 women was to participate in a stove-making workshop.

Questionnaire survey

3.0 Project Results

3.1 Phase 1 – Questionnaire survey

We administered questionnaires to members of the Laminga, Zarazon and Kerker communities and 50 individuals were interviewed in each village. In addition to the questionnaire interviews, we interacted freely with the locals to get other relevant information. Mostly, the questionnaire included questions relating to what forest resources were most utilized; what tree species were mostly preferred and what the most pressing needs of the communities were. Others included the problems encountered by the villagers as a result of the establishment of the Reserve and an understanding of their perception of and attitude towards the creation of the Reserve.

Results of the survey showed that the most pressing need of the community was water, followed by employment and education (Fig. 2), as rated by most people. Problems posed by the establishment of the Reserve were in this order: increased (i) bird and (ii) monkey numbers (that feed on their crops) as well as (iii) lack of employment (Fig. 3); as no alternative was provided to some community members who gave up their land for the Reserve and people who hitherto collected wood from the forest. Among the forest resource used (Fig. 4), the most harvested is wood and the most preferred tree species, *Parkia biglobosa* (Fig. 5) as recorded in a previous study by Chaskda (2007). Their attitude towards and perception of the establishment of APLORI and of the need for conservation was more positive than negative (Fig. 6). However there was evidence that a lot was needed to improve the relationship between the community and Reserve management.

An important observation made by one of the locals during the interactive session was that there was no science school in the locality (the closest science secondary school was >15km away in the Jos town). He noted that this was as a result of the absence of a science laboratory in all the schools in the community and appealed for assistance in that regard.

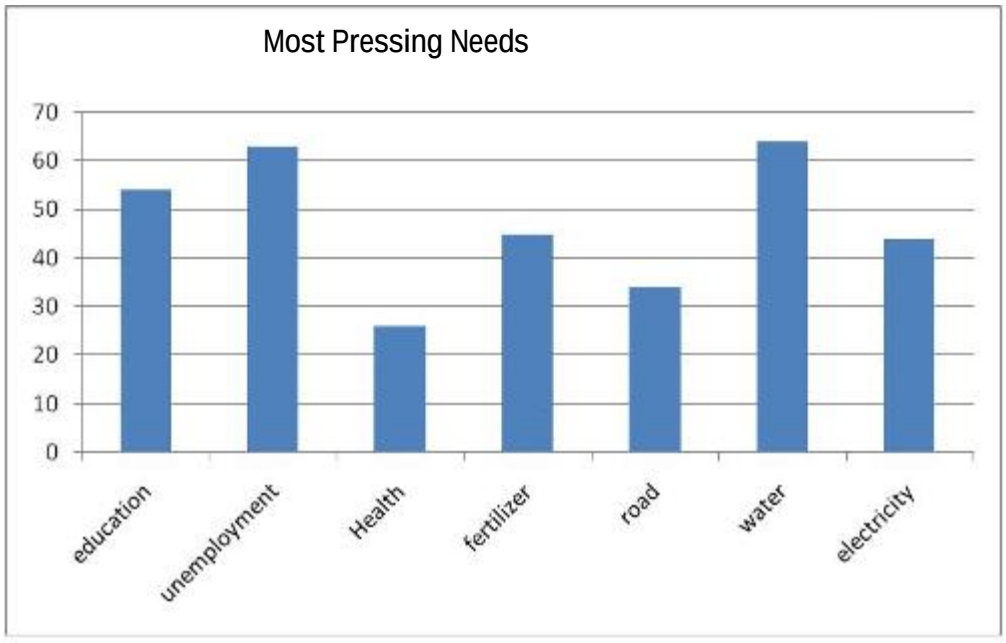

Figure 2. Most Pressing needs of Amurum Forest Reserve support-zone comnunities. No of individuals in the y-axis

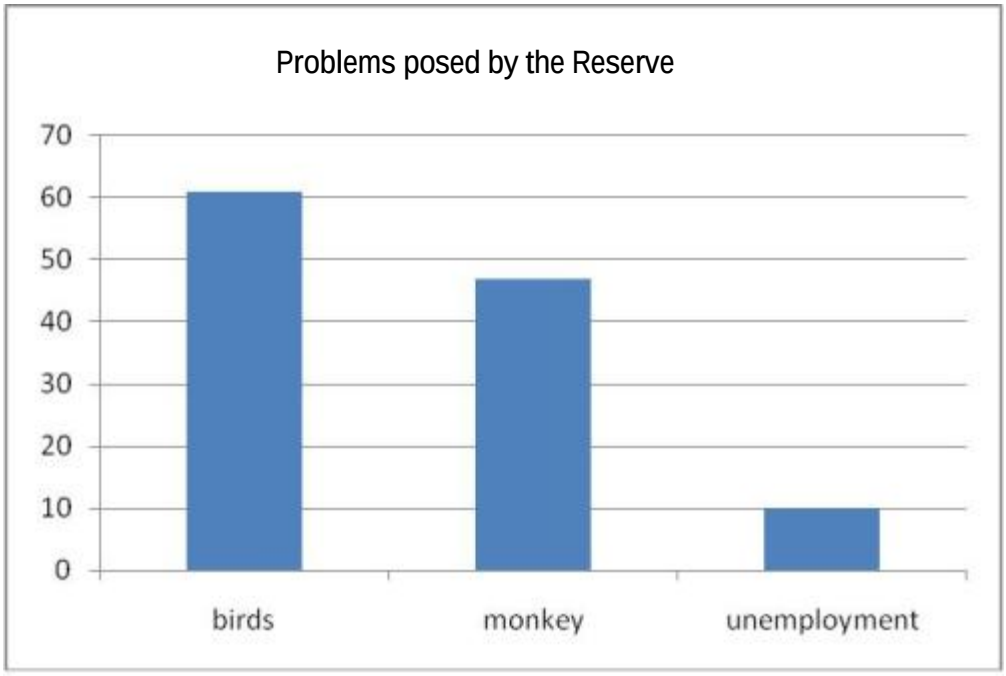

Figure 3. Problems caused by establishment of the Reserve. No of individuals in the y-axis

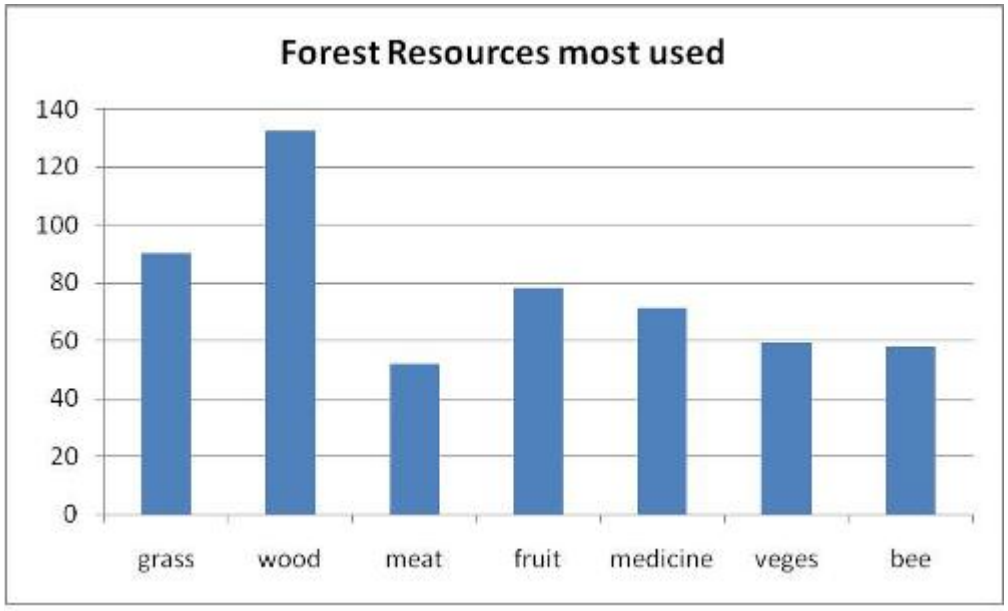

Figure 4. Forest resources most utilized. No of individuals in the y-axis

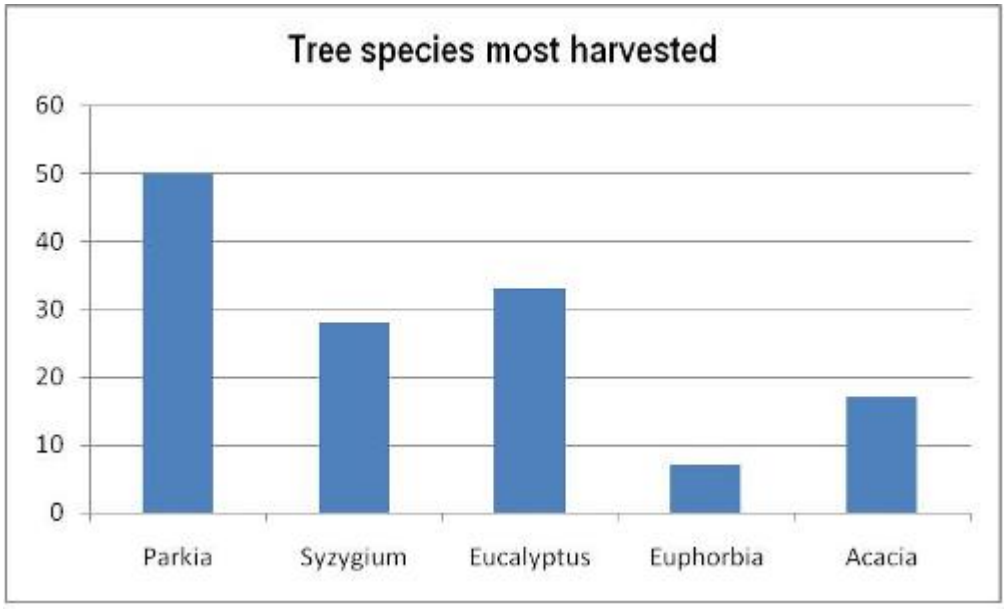

Figure 5. Tree species most harvested. No of individuals in the y-axis

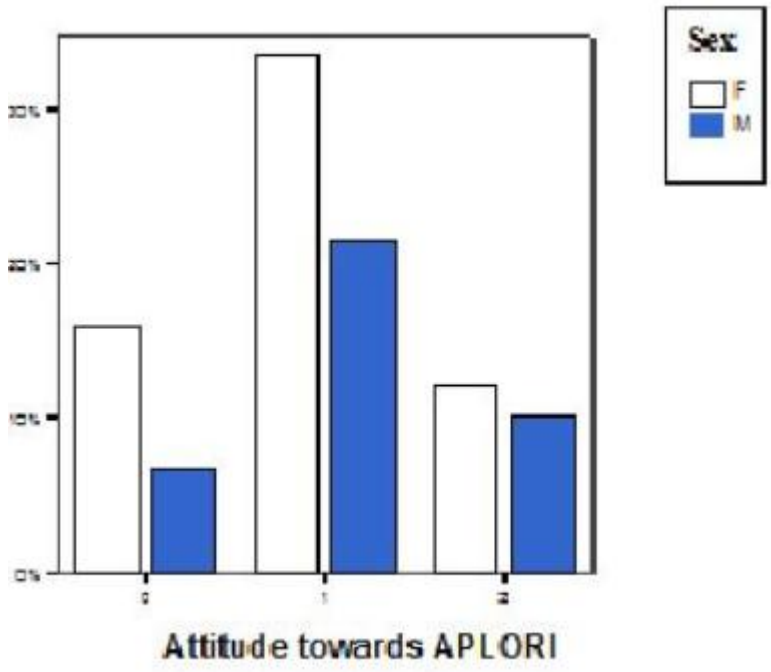

Figure 6. Attitude towards the establishment of APLORI. Percentage no. of individuals in the y-axis (0=negative, 1= positive, 2 = need for more work)

3.2 Phase 2 - Meetings

Following the questionnaire survey, we classified community members into 3 groups – youth, women and elders and we held meetings with each group on a separate occasion. In many local communities, women and youths are usually the marginalized groups. Separating them from the men group during meetings like this will enable them to freely express themselves and increase the chances of getting more information on the situation in the villages. We conducted the meetings in the local fashion (under a tree) in the Institute premise within the Reserve. We had the meetings first with the youths, followed by the women and finally elders/chiefs. The outcome of the meetings is as follows:

Meeting with community youths

We had good interactive sessions with the youths of the three villages as they freely expressed their views on the experiences of the local people. The youths were mainly interested in finding solutions to the pressing needs of the community. In order to effectively tackle these

problems a youth organization comprising the each village was formed under which other smaller focus groups would belong. These included:

i. **Youth farmers club**: this group was formed to handle the problems of fertilizers by meeting with the State Ministry of Agriculture to get some fertilizer allocation.

ii. **Education group**: this group was expected to generate a list of young students who have no funding for their education and to work with the project team to source for funding for scholarship.

iii. **Health group**: This focus group was to address health issues by looking at ways to improve the community clinic. One of those ways included get in contact with members of the community who are health workers and reside in the city, to discuss ways of making drugs more available.

The project team is expected to work with all three groups in achieving their desired goals. The youths however made a few suggestions on how the livelihood of the local people could be improved. One possible employment opportunity they mentioned was the establishment of a community piggery. After brainstorming on this a conclusion was reached by both the youths and the project team. A piggery and biogas plant can be constructed with waste from the piggery used as material for the biogas digester. This could serve both as a means of generating income as well as a good supplement to the fuel-efficient wood stove. They also made an appeal for seminars to be organized with the assistance of the Research Institute, APLORI on youth empowerment and the value of education, since many youths had no interest in education, which is the main cause of poverty in these communities. Also they asked for aid in the provision of water, electricity and good roads (presently under construction).

Meeting with community women

During the meeting with the women of the three communities, they were interested in two aspects of the questionnaire survey: the problems posed by the Reserve and the pressing needs of the communities. They came up with different ideas of how to reduce the impacts of birds and monkeys on their farms. These ranged from having scare crows placed in farms to having dogs chase these animals from the farms. One final suggestion brought up by one of the

women, which was strongly supported by others, was to have very large farms. She noted that one reason why monkeys and birds had a huge impact on their crops was because they had very small farms.

Concerning the issue of unemployment, most women complained about being prevented from collecting firewood, which was their main source of livelihood, since many of them had no formal/informal training or opportunities of learning other trades. During this meeting, we tried to remind them of what would befall the communities if all the trees were lost, they would still have lost their "only" source of income. We therefore encouraged them to come up with ideas on other alternative means of earning income. Subsequently, they came up with the following:

(i) Trading
(ii) Apprenticeship/skill acquisition
(iii) Poultry management
(iv) Adult Education
(v) Baking

The project team agreed to come up with ideas on how to achieve the above. We also encouraged the women to come up with ideas on how their goals could be achieved. We however concluded that in the mean time, women interested in learning how to make stoves can receive training during the stove-making workshop, with the expectation that sales of these stoves will serve as an alternative source of income to sales of wood. In solving the problem of employment, an association comprising the women of the 3three communities was formed, with 2 women from each village as executive members. The group was called "Amurum Forest Women's Unity Group" **AFWUG**. The executives were to meet with our project team to discuss the interests of women in these communities.

Meeting with community elders/chiefs

The elders and chiefs were briefed on the results of the meetings with the youths and women and they were appreciative of the outcome. However they were concerned that since the inception of the Reserve, the elders of Laminga Village, who gave out the area that is presently, the Amurum Forest Reserve, have not been formally recognized. Of all the elders that were at

the presentation of the Amurum Forest in 1999, only one of them was still alive and he was present at the meeting. They stated that they expected the management of the Reserve to properly acknowledge the only surviving elder and families of those that supported the donation of the Amurum Forest for conservation. We were pleased to be enlightened on what was expected of us by the community. This was one of the gains of an improved communication link between the community and Reserve managers.

Picture shows meetings: youths, women and chiefs/elders; only surviving member of those who gave their land for the Forest Reserve.

Conservation workshop

The second part of Phase 2 of this project was a workshop on the impacts of forest exploitation and 30 participants were selected from the women and youth groups. During this workshop the effects of deforestation and importance of sustainability were presented under the topics: **Impacts of deforestation** and **Thinking about tomorrow through conservation and sustainability** respectively. Slide shows of the devastating result of forest exploitation, as well as case studies where forest resources were utilized sustainably for the

benefit of local people and of the success of rural participation in different localities were shown. This actually influenced their attitude towards conservation and they expressed their enthusiasm to work towards achieving the goals of conservation and sustainability. They were eager to exploit this golden opportunity of reducing poverty through sustainable use of natural resources.

Indigenous Knowledge

Participants also had a field exercise where they demonstrated their indigenous knowledge. Both the project team and local people formed two groups, each led by a local community member who was conversant with different species of trees and shrubs in the forest. Herbs that were hitherto unknown to be of medical importance were pointed out. Over 30 trees and shrubs of economic and medicinal value were identified by the group leaders and other participants. Some of these are shown in the table below.

Table. Trees and herbs used traditionally for medicinal and economic purposes

SN	Scientific Name	Family	Local Name (Izere)	Economic/medicinal uses
1	*Adansonia digitata*	Bombacaceae	Kuka	Its leaves can be used as soap
2	*Albizia zygia*	Mimosaceae	Atson	Used to cure pile
3	*Anogeissus leocarpus*	Combretaceae	Kasi	Bark used to cure cough
4	*Canarium schweinfurthii*	Burseraceae	Rifar	Bark used to cure cough Fluid from tree heals toothache When burnt, scent drives away snakes from the house
5	*Carissa edulis*	Apocynaceae	Kufufon	An economic tree, fruits sold in the market
6	*Combretum Spp*	Combretaceae	Avac	Bark serves as pesticide if mixed with grass
7	*Daniellia oliveri*	Caesalpiniaceae	Amudom	Its bark is used to heal sprains or fractured bones
8	*Dichrostachys cinerea*	Mimosaceae	Ikritsan	Its leaves is used to cure diarrhea
9	*Erythrinia sigmoidea*	Fabaceae	Igis	Its bark can be used to cure fever
10	*Euphorbia ingens*	Euphorbiaceae	Izuzuk	Liquid from the tree is used to cure ringworm
11	*Euphorbia spp*	Euphorbiaceae	Izuzuk tsan	Leaves are burnt and applied to cure boil on skin
12	*Ficus ingis*	Moraceae	Iforeb	Its leaves can be used to cure catarrh
13	*Ficus spp*	Moraceae	Ataphu	Economic value, fruits sold
14	*Ficus spp*	Moraceae	Kufen	Its bark when mixed with potash can cure urinary tract infections
15	*Garcinia livingstonei*	Clusiaceae (Guttiferae)	Izor	Can relieve bee sting
16	*Gardenia erubescens*	Rubiaceae	Itso	Fruits are edible
17	*Hymenocardia acida*	Euphorbiaceae	Shikon	Can be used as an orthopedic cast to hold

				broken bones in place until it heals Its fruit can be used as soap
18	*Jatropha curcas*	Euphorbiaceae	Arugban	An economic tree, can be used as oil and fuel
19	*Khaya senegalensis*	Meliaceae	Madachi	Used to cure stomach ache Its oil is used to cure ear pain
20	*Parkia biglobosa*	Mimosaceae	Aruron	Economic value: Can be mixed with coal tar for road construction Medicinal value: its bark is used to cure stomach ache
21	*Saba senegalensis*	Apocynaceae	Riphon	Its fruit is used as a spice Can be used to cure cough in goats when the leaves are smoked
22	*Tapinanthus spp*	Loranthaceae	Irwek	Cures stomach ache
23	*Terminalia mollis*	Combretaceae	Efueb	Its leaves can cure dysentery
24	*Uvaria chamae*	Annonaceae	Rihiak	Its root is used to cure mental illness
25	*Vernonia amygdalina*	Asteraceae	Ritun	Can be used to cure stomach ache
26	*Vitellaria paradoxa*	Sapotaceae	Ishon	Its oil is used to cure boil on the skin
27	*Zanha golungensis*	Sapindaceae	Ikamzuk	Bark is used to cure stomach ache

This exercise was evidence that local people benefit largely from forest resources and would, as much as conservationists want to prevent the extinction of wild species of traditional importance.

At the end of this workshop, two groups were formed to participate in two training programs: 22 women were to be trained in stove making, while 18 youths would receive training in environmental education, aimed at raising conservation awareness at the community level.

3.3 Phase 3 - Training workshops

Fuel-efficient Stove workshop

The stove workshop was held for 6 days, 20 women and a few youths who opted to join were trained to produce the stoves. In addition to the 30 women trained during the first stove workshop, this made a total of 50 women.

Community women making a stove

Conservation Education Training

This part of the project was intended to be a "training the trainers" session, where locals will be trained on environmental communication, with the aim of promoting conservation at the community level. 18 community youths were selected to receive introductory lectures on conservation. The training took place for two days and on the second day participants were introduced to bird watching as a means of viewing nature from an aesthetic point of view. They were given binoculars and were taught to use them. At the end of the bird watching session, each participant expressed great delight and satisfaction.

The participants were given different lectures on how to do conservation, conservation in Nigeria as well as the benefits of sustainability. They were also introduced to the term climate change. Also part of the lecture was the need for conservation education and communication, and their responsibility as a conservation education group was explained. They were very happy to receive this training and were enthusiastic about participating in conservation. Each participant was presented with a certificate of attendance by the Director of the A.P. Leventis Ornithological Research Institute.

Conservation Education training group with project team (in the middle is the past director of APLORI, Dr Georgina Mwansat)

The project team was made up of the director and former students of the A.P. Leventis Ornithological Research Institute, past and current students on industrial (research) training (IT) as well as field assistants.

Tree Planting

After the training program, a tree planting session was held where trees were planted along the road leading from the Reserve to one of the villages, which had suffered from erosion.

Tree planting

4.0 Project Evaluation

4.1 Stove Carnival

Twelve months after the meetings with community members a carnival was organized to culminate the project and advertise the brick stove to surrounding villages. The local people who participated in the project from inception played a major role during the carnival. There was music as the party moved from one village to another, displaying pictures of the stove. They used this opportunity to communicate to people on the streets and in market places about conservation. Speaking in their local dialect, they were able to educate people on the values of conservation and the need to replace the three-stone cooking method with a more fuel-efficient cooking stove. This has increased awareness on the use of the fuel-efficient stove and on the need to reduce the rate of wood exploitation in the area. The carnival was carried out strictly by the local people; the project team only provided the resources. We were very impressed with the outcome because it showed that local people could communicate conservation effectively. A video clip of the event is available.

Stove carnival organized by support zone communities of the Amurum Forest Reserve

4.2 Major challenges

This project was a success, as awareness on conservation has increased within the surrounding communities; however, there was one major disappointment. Though community women have accepted the stove and are very happy to abandon the use of the three-stone stove, they are unwilling to produce and sell the stoves themselves. This shows that communities (including each target group) have their priorities. The women are more interested in other trades and skills. Instead the community youths who were trained along with the women during the stove workshop are more willing to earn a living from stove production. The women on the other hand are more eager to buy the stoves mostly because it reduced the amount of wood they had to collect and because it cooked faster than the three-stone stove.

Top to bottom: stove making crew; improved brick stove model built outside; and inside an outdoor kitchen. Photos by Dan Wahlstrom

4.3 Project Update

1. Within 12 months of starting this project, we (the project team) have received reports from the Youth Education group. In addition to compiling the list of children lacking funding for education, members of this group, mainly young graduates from higher institutions and teachers came up with an initiative to provide free evening lectures to school children in the community. They have also reiterated the need for a youth empowerment seminar to be organized by the project team. We are working towards providing the resource persons for this proposed seminar.
2. Leaders of the women group have met on several occasions with the project team to brainstorm on possible trading opportunities and how to raise funds. The women have also asked for assistance in starting up a loan scheme, which will be organized by them. They have come up with a budget for trading for 104 women and have asked for expert advice on the costs for starting a poultry farm with a capacity of 500 birds. The poultry will be managed by 16 women. 56 women are interested in learning different skills (apprenticeship), while 19 women are interested in receiving adult education. None of these have been achieved to date, though plans on meeting with different government and non-governmental agencies for assistance are underway.
3. The project team carried out training on baking during this project and five women were trained to make cakes and other snacks. One of the women now earns income from baking and selling cakes.

Community woman with her baking pans

4. The stove making team have gone commercial and so far have produced and sold over 20 stoves within and outside the community at affordable prices.
5. The project team has come up with proposals to finance a water bore hole for the three villages to ease the problem of water as well as a biogas plant for cooking, to supplement the fuel-efficient wood stove. The gas will be produced from waste materials from a proposed community piggery. The water and biogas projects are intended to solve the first and second most urgent needs of the community - water and unemployment respectively.
6. We have also formed a group called "Sustainability and Conservation Education for Rural Areas" (SCERA), comprising members of the project team, research students and other interested conservationists working in the Amururm Forest Reserve. It is a community development group under the A.P. Leventis Ornithological Research Institute. We have agreed to continue to work with the youth and women groups in the community to initiate community-based management schemes. We also hope to instigate other conservation initiatives that will encourage the involvement of government organizations and other stakeholders.

4.4 Recommendations to Reserve management

1. Community projects can only succeed when conservationists "listen" to rural people. Sometimes community projects fail, not because they are faulty but because they are misdirected – not the main priorities of communities. Conservation efforts should be directed towards the "needs" of communities.
2. More women-targeted projects should be carried out to build the capacity of women in the community. Attempts should be made to look into the ideas brought up by the women of the Amurum Forest Reserve support-zone during this project.
3. This project showed that if given the opportunity, members of these communities (especially the youths) are very willing to be part of the conservation efforts at the Reserve. They should be involved more in the planning and implementation of conservation projects.
4. Direct contact with locals instead of meeting only with community heads will yield more fruitful results. In this project, it brought out the true picture of the needs of the communities and how they can contribute to community and environmental related

issues. Despite the fact that the communities lacked skilled and educated man-power, we discovered during this project that there are more goal-driven and educated youths in the community than previously thought. Such people should be involved in tackling environmental and community related issues around the Reserve.

5.0 Conclusion

Rural dwellers depend on the forest for their livelihood; communities adjacent to areas of high biological diversity therefore have a greater capability to protect these resources. An improved communication between conservationists and local communities should lead to a better understanding of the goals and aspirations of both camps.

In this project, we have been able to reduce the communication gap between conservationists at the Amurum Forest Reserve in Jos Nigeria and the local people residing adjacent to the Reserve. We have also come up with a fuel-efficient stove model that has been fully accepted by the support zone communities, with the aim of reducing the rate of fuelwood consumption in these communities. We discovered that the needs of communities around the Amurum Forest Reserve in Jos, Nigeria include (in order of priority): water, employment, education, fertilizers for farming, electricity, good roads and health facilities. Community projects within this Reserve should therefore target these priorities.

One of the benefits of an improved communication line that this project has achieved is the ability of the local people to freely express their views and at the same time, listen to the other party (the conservationists). As Githiru (2007) points out, local people are the most sustainable in their way of life. Rural people do not demand the use of automobiles that leave a cloud of exhaust, polluting the environment behind them. They do not insist on having huge mansions nor big factories and industries that could take up a significant part of the forest, neither do they carry out industrial (logging) activities that consume a fair share of biodiversity. Their ecological footprint is almost negligible. They only ask for a more decent way of living in their simple, unpolluted environment.

Conservationists and the society as a whole can help to make life easier for them; it will not take the stock market to reduce poverty in rural areas. It will only take a little of our time as conservationists and proponents of biodiversity protection to convince ourselves and local authorities as well as other organizations to come to the aid of these people. This can be done through rural empowerment - capacity building and provision of basic amenities such as water and electricity. We can also propose multiple ways they could use forest resources more

sustainably than they already do, since we have the means to tap from knowledge of people all over the world. These local people do not have internet (most never even heard of it), nor libraries or other means of acquiring information, so they are limited in their knowledge. Rural areas are laden with one of the greatest burdens of humanity – illiteracy. A reduction in the rate of illiteracy by providing educational facilities and other learning resources in rural areas should dramatically change the trend in the rate of unemployment.

In most of our projects as conservationists as well as in the policies of decision makers, we concentrate too much on preventing rural people from exploiting the forest (Githiru 2007). The impact of local people around forest areas is insignificant compared to the impact of the urban dweller. From our earlier study on fuelwood consumption in these communities, it was noted that firewood was transported in large quantities to cities, where they are used at bakeries for baking bread; for cooking during parties or other ceremonies etc. the rural dweller lives a conservative life compared to the urban elite whose ecological footprints have rendered the urban environment almost unfit health-wise.

In this project, we hoped that teaching the villagers how to make fuel-efficient stoves would reduce how much firewood they would need to fetch from the forest for cooking. This however may not create as much impact as we would expect. However, if they are able to sell these stoves to urban dwellers, the amount of firewood transported to the cities may reduce dramatically. On the other hand we still have a lot to do in communicating conservation to the urban dwellers. In bakeries, large chunks of logs are loaded into local (firewood) ovens to produce enough heat for baking. We hope in the future, to modify these fuel-efficient stoves to be suited for use in these kinds of bakeries.

For now, we are not wrong in starting with the rural dwellers because it is through this group of people that we can reach the urban dwellers that use the forest. The urban community cannot bypass the rural communities to get to the forest. If we are able to improve communication with local communities to the extent that we understand and try to work towards meeting each other's needs and priorities, we can work together to influence the thinking of the other groups of the "unconverted" (Githiru 2007).

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