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Self-Help Farmer Cooperatives' Management of Natural Resources for Sustainable Development in Southwest Nigeria

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Abstract

There is ample evidence that much of Africa fails to meet basic criteria of agricultural sustainable development and environmental preservation. The objective of this study was to explore the management of natural resources by self-help farmer cooperatives. The study was carried out in five local government areas of Southwest Nigeria. These local government areas are forest zones covered by derived savannah. The raining season normally starts around April and ends in October/November, followed by a dry season. Agriculture is the main occupation of the people. Several methods were used to collect information. These included group discussions and questionnaires. Results from the study show that women have played a major role in almost every aspect of agriculture. Farmers possess valuable knowledge of the natural resources in their environment. They have made use of changes in soils and topography, which have resulted in planting patterns in the scattered farms around the villages and distant farm plots. With the help of cooperatives, farmers are taught how to develop innovatory regenerative techniques to conserve the tree stock on the farm. These techniques focus around the preservation of forest species. This study has shown that given the opportunity, local farmers can face the environment and tackle the problems when given the required support.

Key words: farmers; cooperative and natural resources management.

Introduction

Formidable technological challenges raise from the need to feed and improve nutritional standards for a growing world population in the context of continued natural resource degradation and the conversion of farmland to non-agricultural use. The rate

of productivity growth in sub-Saharan Africa has been in sharp decline since the late 1980s (Gill, 2002).

Despite the predominance of the agricultural sector in national economies, development strategy debate in the region still continues to exhibit a great deal of uncertainty about sustaining agriculture and management of natural resources in order to achieve rapid economic growth. In agriculture, sustainable development seeks to conserve land, water, plant and animal genetic resources, which are environmentally non-degrading, technically appropriate, economically viable and socially acceptable.

The more serious environmental problems in African agriculture relate to the mismanagement of resources in extensive farming systems. Poverty and population growth have reached the point where serious resource degradation is occurring. Until recently, natural resources were generally abundant, and farmers could allow damaged resources time to recover through rotations and shifting cultivation. Moreover, many of the more fragile lands were not farmed at all. Today, they must support moderate to high population densities, providing not only increasing amounts of food but basic essentials such as fuel wood, water and housing (Adeyemo, 1993).

In the absence of adequate increases in agricultural productivity to secure their livelihoods, farmers expand into new areas, many of which are environmentally fragile and are easily degraded. Environmental problems associated with rain fed farming include conversion of primary forest to agriculture, with loss of biodiversity, climate change, and exposure to fragile soils; expansion into steep hillsides with resultant soil erosion, and lowland flooding; degradation of watershed protection areas; shorten fallows with loss of soil nutrients and organic matter, resulting in declining yields; increased pressure on common property resources (*e.g.*, wood land and grazing areas), with breakdown of indigenous institutions that regulate and manage these resources, leading to open access regimes and resource degradation and declining resilience in ecosystems, in turn reducing the ability to rebound from stresses like droughts (Adeyemo, 1998).

There is ample evidence that agriculture and environment in much of Africa are failing to meet basic needs of the population. Reports from agronomists, ecologists, foresters, hydrologists, and meteorologists indicate that growing human demands are eroding life support system throughout the continent. The pieces of this emerging mosaic of a continent in decline are found in studies of United Nations agencies, the World Bank, the United States Agency for International Development and others. As surely as soil erosion undermine agriculture in several parts of Africa, these trends of ecological deterioration, if not reversed, will undermine Africa's economic future.

The degradation of soils, the devastation of forests, the undermining of water regimes and atmospheric pollution have raised urgent questions in regard to the limits and possibilities of future growth. The rising pressures on limited resources in Africa have accelerated the number and magnitude of "natural disasters" as well as widened the human spread of their consequences. During the 1970s, six times as many people died from such disasters as compared to the 1960s, and twice as many people suf-

ferred, because of the extended base of poverty. Similarly, whereas 9.3 million people were annually affected by draught in the 1970s, more than 12 million people were so affected in the 1980s (FAO, 1989).

Although figures for the 2000s are not yet available, the evidence from all zones would indicate that this decade will be liable to disasters, which will affect many more people (especially poorer) than ever before. The poor are also affected through the (environmental) depletion of their energy resources, especially fuel wood. According to the FAO, by the end of the 20th century, 49 million people were expected to be affected by the most acute scarcity of fuel wood, the wood being cut down faster than its regeneration. Needless to say, it is the rural poor among the population that experience the severest shortages, while among the rural poor, it is the women (who have to walk long distances in search of fuel wood) who suffer the most.

Role of cooperatives

There is another side of Africa, not yet popular to most mass media and the world at large, which recognizes that Africa can survive if Africans draw on their own traditions, energy and creativity in sustaining the environment. However, in most of the African countries, resource management is disintegrating while governments are at the same time unable to provide effective management support. This is particular the case in Nigeria, thus creating a vacuum, which is being filled by self-help cooperatives. These self-help organizations were set up by the people without government interference. They are not under the control of the government.

Cooperatives have increased in number over the years, helping rural farmers in all areas of their endeavors. The concept of cooperatives has two sides – the economic democracy and economic equality. These are achieved by mutual help, assistance and cooperation. The cooperative way of organization has established its root all over Nigeria. This factor has made the cooperative system of organization different from other forms of economic organization. Cooperatives have proved the most effective and superior organization on account of their honest service and loyal patronage of their members. In Nigeria, cooperatives have been given a prominent place as a tool of socio-economic development. It is more so in the agricultural sector after realizing that cooperative management intervention in natural resources can provide sustainable benefit flows.

The next section discusses research objectives and methodology, to be followed by an analysis of results and discussion. This Section, is subdivided into four subsections, namely farmers' characteristics, production practices, farmers' perception of the state of resources and natural resource management. The last section presents the conclusion and implications arising from the study.

Research objectives and method

The general objective of this study was to explore the management of natural resources by self-help farmer cooperatives in Southwest Nigeria. Specifically, the objectives were to:

- 1) discuss the characteristics of the farmers
- 2) examine the production practices, and
- 3) determine the extent of their natural resources management in the area in order to come up with policy implications.

The data for the study were first collected between September and November 2002 and completed between January and March 2003. This study was carried out in five Local Government Areas in Southwest Nigeria: Afijio, Oridade, Odo-Otin, Yewa and Ayedade.

These local government areas are forest zones combined with savannahs. The areas consist of several cities and villages. The climate is tropical with two seasons. The raining season starts around March and ends in either October or November followed by the dry season. Agriculture is the main occupation of the people as the tropical nature of the climate favors the growth of cash and food crops. This also allows for the rearing of sheep and goats.

Prior to field work, the cooperative offices in the zone were contacted. Lists of participating farmers were given. From the list, one hundred farmers were purposely selected for our study. The assistance of the community heads was sought as to the farmers selected and in identifying those on the list. Semi-structured interviews with questionnaires were prepared. Twenty farmers in the zone who were not members of the self-help cooperatives were selected for interview. The questionnaire covered several aspects of traditional farming. Most interviews involved several visits. Researchers spent two weeks (before the interview) with the villagers in order to become acquainted with the community. The fieldwork consisted of interviews and group discussions with the selected farmers. A range of quick rural appraisal techniques was used, including mobility/resource mapping, oral history techniques, sketches and informal group and individual interviews, mostly with women.

Analysis of results and discussion

Characteristics of the farmers

Age

It is well known that age is a very important characteristic of farmers in developing countries, since farmers still use hoes and cutlasses. These implements involve a lot of human energy. About 54 percent of the respondents were between 21 and 40 years old. As shown in Table 1, 38 percent of the farmers were between 41 and 60. Only

eight percent of the respondents were over 70. It was noted that older farmers tended to stay in the villages looking after their vegetable gardens. As to gender, 42 percent of the responders were females.

Table 1: Age of respondents

Age	Number	Percentage
21-30	30	25
31-40	35	29
41-50	27	23
51-60	18	15
61-70	10	8
Total	120	100

Source: *Field survey 2002 and 2003.*

Education:

The data from this study revealed an interesting pattern concerning the education of the respondents. Only 20 percent of the farmers had not attended any school before. But during our survey, information was passed to us that most of them had migrated to the region. Instead of enrolling in an adult school, they settled to learn the language of their host community. The learning was normally done on the field and not in the class. Looking at Table 2, about 53 percent of the respondents finished their elementary schools while 18 percent finished their high school education. Six percent of the respondents went to technical school, while three percent went to college. One important issue in the study was that it belied the notion that farmers in Africa, especially in Nigeria, are illiterate. The results of the study proved that most of the Nigerian farmers are literate.

Table 2: Education of respondents

Level of Education	Number	Percentage
No school	24	20
Elementary	63	53
High school	22	18
Technical	7	6
College	4	3
Total	120	100

Source: *Field survey 2002 and 2003.*

Marital status

Results from the survey showed that about 16 percent of the farmers were single. These were in the age range of 21 to 25. During our field work, most of the single respondents told us that they would get married as soon as they secured the financial means to pay the dowries of their prospective wives. Most farmers were married before their late twenties. Table 3 shows that 72 percent of the farmers were married. An average married household had about nine members, including the husband and wife or wives, children and extended family members. We found cases where a household included about twenty members. The Table also shows that 10 percent of the farmers had separated. It should be noted that in this area, society does not respect divorced wives, so women concerned normally leave their marital house and stay with their parents instead of going to a law court to fight divorce case. During our survey, the separated couples felt that with the intervention of their parents or community leaders, they could still come together. Most of the quarrels that led to separation were revealed during our group discussions. Prominent among them are husbands' refusal to agree with wives to attend a clinic dealing with family planning and the incompatibility of husband and wife in the same household.

Table 3: Marital status of the farmers

Marital status	Number	Percentage
Single	19	16
Married	86	72
Separated	10	8
Widowed	5	4
Total	120	100

Source: *Field survey 2002 and 2003.*

Ethnic composition

The area of study is known for its food baskets and the composition of people in the area. This led us to undertake the identification of migration streams in the area. Incidentally, about 75 percent of our respondents had migrated from other parts of Nigeria to the area of study. The distribution showed that 53 percent (more than half) of the respondents came from the West, with low proportions of migrants from distant locations. Thus, migrants from Kaduna and Kano States accounted for only seven percent of the total migrants. It was noted during our interview that migrants did not take their families along during their first time of leaving home. The practice was that after settling in the area, they arranged for accommodation and secured farm plots before asking their families to join.

Table 4: Ethnic composition of respondents

State of origin	Tribe	Number	Percentage
Oyo			
Ondo	Yoruba	48	53
Ogun			
Kogi	Igbira	22	24
Kwara			
Kaduna	Hausa	6	7
Kano			
Imo	Igbo	14	16
Anambra			
Total		90*	100

Source: *Field survey 2002 and 2003.*

* During the compilation of data only 90 respondents clearly indicated their states of origin as requested.

Production practices

Cash and food crops

Agricultural production in Southwest Nigeria is family based. In the area of study, women have played a major role in almost every aspect of agriculture, food and cash crops as well as animal rearing. The cash crops produced in the region are cocoa, kola nut and palm products. The food crops cultivated are yam, maize, cassava, co-coyam, vegetables, tomatoes, beans, and others.

When listing crop priorities, women invariably listed tomatoes as most important after maize and yam, whereas men prioritized cash crops, thus reflecting women's responsibility for earning cash. Agricultural yields as reported by the farmers were relatively low and declining.

Usually, a family would have fields in several locations around the village. Families thus spread the risk. Due to labor constrains, most families did cultivate the full extent of the land, but opened fields up within the holding on a fallow rotation. Men and women worked together on the family plots with tasks divided along gender lines according to the season.

In addition to the family holdings described previously, most women worked on their own small plots of land, which were located within the precincts of the villages. The plots were also found near the household compound. There were also household gardens, owned by the male head of the household, but cultivated exclusively by women and their children, for mainly subsistence crops. If there was a surplus, a woman could sell the produce and use the money earned to buy clothes, shoes, etc. Although, as revealed during discussion sessions, women prioritized children and household goods over their own personal needs.

Livestock

Farmers recognized livestock, an important area of diversification, as an important income generating activity. There were two major types of production systems for sheep and goats. In the extensive management system, animals were not housed. Instead, they were kept in free-roaming flocks with no special provision of forage and with minimal management. They scavenged domestic food wastes in the neighborhoods. The semi-intensive management was the other type of system. It involved confining the animals at certain times of the day and year. The numbers of goats kept by farmers ranged from three to ten; the numbers of sheep ranged from two to twelve. It was observed that more female sheep and goats were kept than their male counterparts. The reason given was that the female animals were used as breeding stocks.

Evidence from the survey showed that farmers with small plots were increasingly taking up livestock as an income generating activity. While building up skills in animal husbandry, other farmers were leasing livestock to rear. The herder and owner shared the offspring of the livestock equally. Nomads in control of large numbers of animals were found in the areas of study.

As to fowls, almost all the households visited kept such. The number of fowls kept by each household ranged from eight to twenty-two. Information gathered during the survey indicated that about 72 percent of the respondents sold their fowls directly to the consumers and the rest was sold through wholesalers and retailers.

Fuel and woody resources

Our interviews provided details concerning the nature of fuel wood procurement. The amount of time spent collecting enough fuel wood for a household weekly needs, varied from six hours to one hour. During that time, women carried loads weighing 12 to 27 kilograms as far as seven kilometers. Naturally, the volume of wood used depended on the amount of cooking the diet required. According to the respondents, they depended heavily on the forest for fuel, wild-foods, medicine and building materials, as well as for grazing for livestock. Another principle determining fuel wood consumption is the availability of wood and energy substitutes. As wood became scarce, women spent more time gathering and carrying it to their homes until they resorted to alternatives. Those who could afford it, purchased charcoal for some or all of their cooking.

We observed that forest had declined over the years. This was largely due to the exploitation of the trees by firewood gatherers, charcoal makers and demand for other uses; we found out that in the past years the decline was largely due to lack of proper natural resources management in the area by the local population, including nomads and government authorities.

Farmers' perception of the state of their resources

During the discussion sessions held with all the respondents, farmers were asked about their perceptions of degradation and the need for natural resources management. The results of the sessions were analyzed. The focus was on the perceived change in the state of natural resources during the last twenty years, and less for the younger farmers.

Table 5: Cooperative farmers' perception of the state of resources

Resources	Present state compared with twenty year or less
Soil	Fields eroded, lot of gullies has formed
Water	Wells are not producing enough water, running water dry faster
Vegetation: trees, others	Large trees are available; many are being cut for domestic use
Livestock	Numbers are declining (due to poor feeding)
Wild animals	Nearing extinction
Population	Has considerably increased

Source: *Field survey 2002 and 2003.*

Table 6: Non-cooperative farmers' perception of the state of resources

Resources	Present state compared with twenty year or less
Soil	There is erosion more than before
Water	Have water when needed but not enough in dry season
Vegetation: trees, others	All small trees have gone scanty during the dry season
Livestock	Declining numbers
Wild animals	Not many around anymore
Population	Has increased

Source: *Field survey 2002 and 2003.*

There was a general perception that respondents were keenly aware of the situation in their environment, and that the natural resource base had dwindled drastically over the years and that the situation would continue to worsen unless stringent resource management is put in place. It emerged from discussion that income from exploitation of the wild animals (including bush meat) was a significant means by which

most of the respondents earned some money. The respondents emphasized the importance of soil and water conservation. Their arguments were mainly based on views such as “there would not be a place we would move to after the final degradation of our land”, “as to our children, we would not be able to pass anything to them as assets”.

In summary, it appeared that farmers realized the need for natural resources management. They informed us that only recently they could organize their cooperatives to define the strategies of sustaining their land. This indicates that farmers perceived that intervention in resource management would be of benefit to them. Later in this study we will show the extent of adoption of management practices.

Natural resources management of cooperative farmers

Investigation during our fieldwork revealed that self-help cooperative farmers who live in the area and use their resources possess valuable knowledge of the natural resources. For many given species they may know the plant habitat, growth rate, methods of propagation, compatibility with other plants and interaction with animals and insects. In general, cooperatives are usually actively involved in local management and development through the provision of services (seeds, pesticides, fertilizers, food items). They are lately involved in natural resources management functions. Cooperative organization also developed particular competence in the promotion and development of local cooperatives based on participation and democracy through the provision of cooperative officers and extension personnel.

Self-help cooperative farmers are formed for very specific reasons, but realizing the state of their natural resources they have demonstrated a common goal and commitment to conservation. The cooperatives play an important role in collective and personal management of resources. On the one hand, farmers are able to express their agricultural needs more effectively, help pool resources and define development paths. On the other hand, cooperatives are in the position to collaborate with other partner groups with respect to sustaining the environment and also help the community meet its needs.

The section that follows, details the contribution or activities of the cooperative farmers to the natural resources management although they came to the area only few years ago.

Farmers made use of changes in soils and topography, which have resulted in continuous planting in the scattered farms around the villages and long distance farm plots. Root crops are usually planted on ridges and mounds and climbing crops such as yams and cucurbits are usually staked or planted close to trees, which act as support. Maize is usually planted in furrows on the lower sides of the ridges or mounds. Fruits species such as oranges and pineapple are planted along pathways of the scattered farms not far from the villages. Cowpeas are often planted along fences to

facilitate harvesting. Due to different maturity periods, crop species are invariably planted and harvested at different times. Yams, for example, are planted before the onset of the rains, while maize and millet are planted a few months after the raining season has begun. Cassava is planted about four weeks after maize and harvested the following year. This diversified and continuous production of food is important, also because storage of harvested products is difficult and post-harvest losses are high.

Planting patterns are also related to the light requirement of the component crops. Thus, the great majority of crops are at least moderately shade tolerant, *e.g.*, yam, cocoyam and beans. Helophytes (light lovers) such as maize, and to some extent cassava, are usually planted in the outlying fields where tree and shrub density is lower and hence shading is less.

On-plot measures

Farmers, especially those belonging to cooperative groups, carried out improvement measures, such as soil conservation structures due to increasing degradation. Most families have large holdings, so most lands are fallowed on a regular basis. The intervals between fallows vary according to size of holdings, labor availability and quality of soil.

Shallow cultivation using hoes is practiced. This is effective in creating minimum soil deterioration. Farmers are concerned to maintain yields and are practicing crop rotation and intercropping. Intercropping especially is a common practice, which develops a dense soil cover during the cropping season so that erosion is minimal. In addition, the high percentage of ground cover reduces soil water evaporation and therefore drought vulnerability. Intercropping involves planting cassava alongside with maize, yam with maize, and so on.

To improve soil fertility, mulching with weeds and crop residues and the application of leaf litter are common. Only 12 percent of the farmers mentioned manure as a means of fertilization. The use of mulch and organic matter is well known as a good method of maintaining and improving soil fertility. Most of the fields not far from the respondent's villages are under natural bush vegetation, which also reduces soil erosion.

Animals are often taken in the fields after the harvest for manure but the effects are not significant. In the past, as we were told during our group discussion, reciprocal arrangements between pastorals and farmers ensured a certain amount of manure but this has diminished with worsening relations between the two groups. Herders allegedly cutting live wood, trampling their crops and making the land infertile with cow urine, which is said to contain harmful quantities of salt, worry farmers. Herders complained that farmers have restricted their access to pasture and water sources and have planted trees on land, which was formerly used for grazing. Thus, a previously benefited system had become a vicious pattern of accusation and counter-accusation, a pattern repeating itself across most parts of Nigeria. Very few farmers have expressed the need for cooperative organization to transport manure to the fields. About

78 percent showed interest in chemical fertilizers. Farmer organizations are handling the supply and distribution of fertilizers. What farmer cooperative do is to link credit with production. Fertilizers are supplied on credit and at subsidized rates. Farmers only pay after disposing their produce. These enable farmers to channel most of their produce through their organizations. Cooperatives in return render other services that encourage management of natural resources, as some farmers proclaimed during our group session: “cooperatives revived our indigenous knowledge and capabilities and combined them with that of trained officers in an interactive way.” By strengthening confidence in their innovative capacities, farmers are able to build on traditional knowledge adapted to current environmental and social conditions.

Regenerative management

With the help of cooperatives, within the farm in which savannah is increasingly intruding, farmers are taught how to develop innovatory regenerative techniques to conserve the tree stock on the farm. The techniques focused around the preservation of forest species. These techniques were shown to us during the survey.

The managed fallow that occurred on the land has degraded into tall grassland. In the past, farmers used to leave grassland to fallow for long periods hoping that processes of forest regeneration would naturally develop. This was not the case and the annual bushfires, which blazed through the area, have destroyed tree species and prevented the development of improved nutrients cycling. Cooperative farmers came to the conclusion that they must take a hand in the process by managing the fallow. To achieve this, they engaged in permanent cultivation of food plots for a minimum of two to three years. The plot normally became the subject of a focused weeding regime in which grass species were rigorously weeded out and all regenerating forest shrubs and trees were carefully preserved. By the third year, the shrubs and trees began to dominate the plot, which would form the regenerating secondary forest.

The other practice discovered during our survey focused on species like “*Newbouldia laevis*”, a tree reputed to have soil enhancing qualities. Cooperative farmers were found to preserve the high densities of the tree in fallows and then incorporated into cropping systems. Unlike the conventional cropping system, the trees were not cut, nor was the farm burnt after clearing: crops were planted beside the trees. The canopy of “*Newbouldia laevis*” made it highly amenable to incorporation into cropping systems. To enable incorporation into the cropping systems, the trees are pollarded and the cut branches left as mulch on the ground.

On the distant cocoa farms, the tree crop has experienced a different rate of change over the past few decades. The production of cocoa had been on the decline, one of the reasons for the decline being the old age of cocoa trees. Before government initiated a major program of planting, cooperatives in the area of survey have encouraged farmers to replant cocoa tree. This program by the cooperatives proved to be a powerful stimulus to agro-business in the area and led to the establishment of a modern cocoa plantation.

At this point, in order to show how cooperative farmers have adopted the natural resource management practices as directed by the cooperatives, cooperative management practices are compared with non-cooperative farmers. As shown in Table 7, non-cooperative farmers' management practices were low in all the activities considered when compared to cooperative farmers. This Table shows the high rate of adoption of cooperative farmers in the field of resource management.

Table 7: Management practices of non-cooperative and cooperative farmers

Non-cooperative farmers in percentages	Techniques	Cooperative farmers in percentages
75	Shifting cultivation, all types	81
55	Mulching	89
76	Intercropping	90
50	Regenerative	87

Conclusions

The agricultural and the resource management crises are one and the same, resulting in a threat to survival. Government has tended to emphasize the gross national product rather than the "green national product" little of which is ever figured into the official GNP, but which is actually more important to the lives of most citizens. Efforts to put Nigerian agriculture on a sustainable basis amount to steps toward preserving the environment. More importantly, conservation of environmental resources is a first step toward sustainable agriculture.

This research explored the natural resources management of self-help cooperatives in Southwestern Nigeria. Agriculture has been the major form of land use in the area of study. The farmland is usually made up of two or more plots, scattered around the village and far distant from the place of abode. Both derived savannah and rain forests exist. Timber is exploited from natural forest within forest reserves. It was found that traditional cropping systems consist of:

- Shifting cultivation (leaving the area and farm in another location);
- Bush fallowing (periodic shifting of farmland only);
- Rudimentary sedimentary cultivation (one to two years fallows rotations);
- Intensive sedimentary cultivation.

Results from the survey show that it was when the farmers realized the deterioration of their natural resources that they were motivated to organize their cooperatives to manage their resources in an efficient manner. Independently of government, farmers in conjunction with their cooperatives have worked out some responses (though at small scale level) to degradation, which are similar to services provided by research institutions. Numerous advantages are inherent in the multi-cropping sys-

tems practiced by the cooperative farmers in the area of study. These include diversified production, risk minimization, enhanced labor efficiency, continuous production (thereby minimizing post-harvest losses due to poor storage facilities), better nutrient cycling and nutrient-use efficiency than in mono-cropping system and good soil conservation due to continuous ground cover.

Government has not seen the management of natural resources as a high priority item. Land deterioration and accelerated soil erosion do not command attention until they become crisis issues. Lip service is paid to combating degradation of resources but the political will is directed elsewhere. There seems to be little appreciation that a major goal of Nigeria – food self-sufficiency – cannot be attained if soil and plant resources are allowed to deteriorate. The result of this study should challenge the government in paying active attention (financially and morally) to natural resource management.

Implications of the research effort

Our analysis has proved that given the chance local farmers can face the environment and tackle the problems, given the required support. Past experience indicated that the failure of many programmers was due to inadequate consideration of local people in the design and implementation of the programs. There is enough evidence from this research that local cooperative farmers have played a major role in organizing and managing their resources. With the support of the government and research institutions, the farming community should be able to build on the strength of the existing management systems in the area. The farming community should have the responsibility for making operational decisions and enforcing collective action. Since resources are location specific, institutional mechanisms should have some flexibility to be location specific. Location specific solution for conservation problems assumes added significance since most solutions may not be global.

The positive role of non-government organizations in promoting activities involving community participation should be recognized and encouraged. Here, it should be kept in mind that there are limits to individual or voluntary action aimed to prevent or slow degradation. In this context, it is important for community initiatives to be encouraged in all parts of Nigeria, and to take up responsibility for natural resource management.

Non-existence of strong institutional mechanisms to transfer available information on conservation measures is a major bottleneck in the adoption of these measures. Since market mechanism is not capable of supporting the relevant package of practices, it is important that adequate institutional mechanism is created to bridge the information gap in the transfer of technology suitable for sustaining agricultural development.

Suggestions for further research

A new research agenda is required to explore the productivity of group versus non-group farmers in the area of resource management. We will be able to see the role of self-help organizations in farming communities.

The result of this research has shown that women play an important role in fuel wood collection, replanting and management of farms. It will be interesting to analyze gender role in the management of natural resources. Women, according to their socio-economic gender role, often suffer more than men from environmental degradation, as they are forced to over-exploit the natural resources in order to secure the livelihood of the household. Therefore, a rigorous study of women as key agents will help us to develop strategies that can improve the long-term welfare of rural and urban communities.

Lastly, another area of further research is to study other ecological regions, enabling to document variables of interest like tenure right, migration stream, short-term food security and risk-averse land use strategies.

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