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Full Length Research Paper

Environmental mitigation and regeneration through sustainable farming and food security

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We recognized the farming practice of the communities around Keyo hills in Kilak, which is a complex and fragile ecosystem, as being purely dependent on annual food and cash crops production system and rain fed agriculture in nature. There are noticeable decline in food and cash crops production in the area. There are regular reported cases of mild to severe famine in the northern and eastern parts of Uganda. The community has resorted to overexploitation of natural resources such as charcoal burning and stone quarrying for daily subsistence. This practice is not sustainable and is environmentally destructive yet this hill is the main watershed that feeds rainwater to River Nile. Over the years, the rainfall pattern in the area has become unreliable due to environmental destruction. We designed a project that aimed at introducing perennial food and cash crops and improved livestock with high milk production to reduce poverty and ensure availability of food throughout the year. Another component of the project was to introduce the use of wood saving stoves or cooking places to reduce wastage of firewood and conserve trees. We supplied improved banana suckers to the communities to provide food security and income and with the help of Send a Cow; we received 57 in-calf heifers and 264 goats. They were distributed to individual households and beneficiaries. It is too early to quantify the economic and environmental benefits of the project to the community. But some of the beneficiaries are already eating and selling bananas and those with cows are drinking and selling milk and many more are using wood saving methods for cooking. Having given alternative sustainable means of generating income and food security, we later embarked on the sensitization of the communities against setting bush fires, indiscriminate feeling of trees, farming in wetlands and stone quarrying with a few to reduce dependence on the environment capital and allow natural regeneration.

Key words: Environment, mitigation, regeneration, perennial, food security and sustainable development.

INTRODUCTION

The UNDP Report (1997) recognized the fact that progress in reducing poverty over the 20th century has been remarkable and unprecedented. The report took special exception that the advances have been uneven and marred by setbacks and that poverty remains pervasive. Sub-Saharan Africa has the highest proportion of people living in poverty, and yet has the fastest population growth. New global pressures are creating further increases in poverty in developing world as evidenced by slow economic growth, stagnation and or decline of growth in many developing transition countries. Political instability with continuing conflicts in many countries, food insecurity and the rising threats of HIV/ AIDS are catalysts for poverty entrenchment in the African continent. The impacts of these factors are the over exploitation of the environmental capital by the rural and urban poor.

The effects of deforestation, both for commercial and agriculture and to a certain extend wood fuel collection as being responsible for enormous loss of natural economic wealth to the Africa continent has been described by UNEP (2002) and State of the Environment Report for Uganda, (1996, 1998). It can be stated with accurate degree of generalization that all residential areas in many African cities occupied by the rich are heavily forested with some trees as old as 100 years. In the same cities, you hardly see any tree standing in the poverty stricken slam settlement although there is electricity. The highest consumers of wood fuel in form of charcoal are the urban

poor. It can, therefore, be stated with confidence that forests shall not benefit from the rural electrification programs as long as poverty continuous in its present form in Africa. The cost of electricity and electrical appliances are beyond the affordability of the poor communities in both rural and urban settlements.

In the Ugandan plan for Poverty Eradication Action Plan (PEAP, 2000), agriculture was recognized as being central in the process of rural transformation because it generates incomes which create markets for industrial output. Poverty eradication strategies in Uganda emphasized the following as being important in poverty reduction; fast and sustainable economic growth and structural transformation, good governance and security, increased ability of the poor to raise their incomes and increased quality of life of the poor (PEAP 200, 2001, Vision 2025 1999; Plan of Modernization of Agriculture (PMA) 2000). UNDP Report (1997) recommended several key priorities for sustained poverty reduction for pro-poor growth. It is believed that creating an enabling environment for small-scale agriculture is crucial for the rural poverty reduction strategies. It is in the light of this background that we are conducting research in the areas of sustainable agriculture and food security as prelude for effective environmental mitigation and protection strategies in the rural areas.

Description of the study area

Kilak county was one of the most fertile areas in Gulu District (Figure 1) where extensive cultivation of food crops took place. It is the major water catchments area for the whole of Gulu District. The area is a complex of hilly contours with major rivers and streams that flow into the River Nile originate from. Some rivers such as Ayugi, Tochi, Ayago, Aswa and Daga originate from Keyo hills, which is one of the hills forming Kilak hills complex. The Colonial Government realized the importance of Kilak hills as the main watershed in the region and made it a protected area or forest reserve in the 1940's (Pope Opira personal communication).

Kilak County has the most extensive biodiversity (Flora and Fauna) and viable ecosystem in the whole of Gulu District. The County is bordered by Aswa County in the North East, Nwoya County in the South, West Nile Region in the West and as well as the Aswa–Lolim game reserve. It is bordered by the Sudan in the North at Nimule. There are Kilak animal Sanctuary and hot springs at Amuru. All these offer diverse biodiversity that can be depleted if the local population is left to continue with their present unsustainable method of agriculture and livestock grazing. This project will concentrate on Keyo hills first, and will eventually expand to cover the whole of Kilak hills.

We recognized the farming practice of the community in this complex and fragile ecosystem as being purely dependent on annual food and cash crop production system and rain fed agriculture in nature. There are noticeable decline in food and cash crop production in the area within the communities. There are reported cases of mild to severe famine in the northern and eastern parts of Uganda in general. This is because these areas of the country depend on annual cash and crop production systems. These crops are very susceptible to any slight climatic fluctuations. Too much and or too little rain is equally destructive and bears negative impact on agricultural productivity.

The farming system in the north and eastern parts of Uganda is environmentally destructive. All the cash and food crops grown in these regions are very susceptible to heavy tree shades. The farmers cut down all the big trees to eliminate shade. One can rightly say that for every hectare of land under cultivation, there is a similar amount under deforestation. With the increasing population and decreasing agricultural productivity per environmental unit* (*hereby defined as "A measure of land with all its ecosystem components in temporal and spatial scale"), more land is being brought under cultivation subsequently more land is being deforested and degraded. The traditional co-evolutionary process under which societies and ecosystems used to have sufficient time and space to adjust mutually through complex feedback mechanisms (Norgaard, 1984) no longer exists with the increasing world population.

The poor agricultural yield has forced the community to cut trees for charcoal and crash stones (Figure 2) for economic gains. The direct encroachment on the environmental capital in the region has caused fluctuating rainfall patterns, reduced agricultural productivity and massive environmental degradation. This requires immediate attention.

In our efforts to create environmental awareness, we realized the role of rural poverty on poor health, famine and environmental destruction and degradation. This project was, therefore, to integrate environmental conservation programmes with income generation at both individual and community household levels. We believe that the economic empowerment of the rural community through Sustainable Farming and Food Security will lead to reduced demands on natural resources with subsequent natural regeneration of the environmental ecosystems on the hill.

General objective

To introduce sustainable farming system that ensures high income and food production for the local community around the hills with eventual reduction on overexploitation of the natural resources on the hills.

Specific objectives

1. To encourage the community to carry out afforestation

Figure 1. Map of Uganda showing the location of the project a few Kilometers west of Gulu Town (see arrow).

Figure 2. Quarry works on Keyo Hills. Trees in the surrounding area are cut down and the logs used for heating and weakening the stones for easy crushing.

on individual lands.
2. To introduce use of wood fuel saving techniques in domestic cooking.
3. To encourage economic and agricultural production systems that guarantee food security on a sustainable basis in respect to environmental conservation.
4. To promote profitable and acceptable livestock farming systems in the community.
5. Promote Community Environmental Management and Conservation activities.

MATERIALS AND METHODS

We carried out a Participatory Rural Appraisal (PRA) exercise with the aim of establishing the environmental and agricultural problems in the project area. These major problems identified were as follows: Lack of firewood for domestic consumption, as a result of heavy deforestation; There is repeated and uncontrolled bush burning, which has caused death and destruction of several species of Fauna and Flora in the area; The population is also experiencing reduced agricultural productivity; The wetlands in the area are under threats of disappearance as a result of drainage for agricultural activities, over use of the wetland resources (papyrus) leading to siltation; There is the problem of unpredicted climatic changes especially in rainfall, which has made planning for seasonal rain fed agricultural activities difficult and the stone quarrying and charcoal production are destroying the hill very rapidly

Main project activities

Held sensitization meetings with the community on the progress of the project and identified the problems that it may be affecting the progress; Trained the community on environmental skills; Carried out monitoring and evaluation activities; Held sensitization meetings on environmental management strategies; Sensitize the community about dangers of bush fire, charcoal burning, digging in wetlands and stone quarrying on the environment and sensitize the community to pass by-laws banning the above detrimental activities.

This objective was designed to encourage the community to plant trees on individual land on the basis of “own a tree” for domestic consumption. We encouraged the planting of native tree species such a*; Meesopsi, Eminee, Terminalia, Khaya* and *Albeizzea* together with some exotic first maturing timber trees such as *Pines, Carribea, Cyprussus, Lasitanica, Grevelea, Robusta and Eucalyptus spp*. The gazetted land on the slopes of the hills was to be demarcated and given out to groups or individuals for tree planting. We were not able to implement this objective due to insecurity in the region which forced the population to live in camps.

Provided training to extension supervisors on construction of wood fuel saving techniques, and they in turn trained more community members on the construction and use of fuel saving techniques. We trained 200 community members (women groups) on how to construct and use energy saving methods and cooking stoves, the use of other alternative sources of energy other than firewood example Rice husks and saw dusts etc**.**

Monitoring and evaluation

Monitoring and evaluation were carried out every six months from the starting date of the project. Monitoring was based on the following criteria: Physical visits by the project supervisors to record the number of various plants that have been planted and are surviving; Physical checking and farmers record of germination of seeds in nurseries and survival of seedling transplanted in gardens; Records of total number of acres under banana, trees and fruits planted by the identified groups and families; The number of heifers bought by groups or families for cross breeding and milk yield per cow per month and the number of families using fuel saving stoves.

RESULTS

Over 640 wood saving cooking places were constructed in the period of 6 months. Over 10,500 banana suckers were distributed to 160 beneficiaries and were planted. So far, there are over 125,000 banana suckers in the project area (Figure 3). The project attracted the attention of National Forestry Authority and over 500 hectares of soft wood pipe has been planted (Figure 5). We were not able to provide seedlings for fruit trees due to prevailing insecurity in the region.

As in objective three, objective four aims at providing economic potentials to the community in the target area by introducing heifers (dairy breed) and other animals to improve the economic status of the rural community. Through this, the project also aims at enriching the soil by encouraging organic farming practice. The groups that are destroying the hills through quarry works were the target beneficiaries as an inducement to make them stop quarrying. We distributed 57 in-calf heifers to 57 families and 264 goats. The heifers and goats were donated by Send a Cow, Uganda. Out of the 57 heifers, 34 have delivered (Figure 4). We liaised with other partners in the implementation, sustainability and the expansion of this project.

DISCUSSION

We were interested to introduce perennial cropping systems together with fruit trees, soft woods, banana, and coffee and zero grazing livestock for milk production in the project area. This was in recognition of the fact that the present farming practice which relies solely on annual food and low value cash crops in the region will not be able to meet the increasing population demands without significant environmental degradation within the near future. According to WCED (1987), for any development to be sustainable it must possess the characteristic of “Fulfilling the needs of the present without Jeopardizing the future”.

We were encouraged by the community response to the project, but noted that the continued insecurity in the district made it difficult to consolidate and expand the project. The insecurity has forced the population in live in camps around the trading centers. The displaced persons are living on borrowed land and they are not willing to invest their labour planting perennial crops on land that does not belong to them. The people who own land

Figure 3. A farmer harvested some banana bunches from his plantation and taking them to the market to sell.

Figure 4. This cow produces over 15 liters of milk per day. It can provide cash and milk for the family consumption with limited impact on the environment.

Figure 5. The wood saving stove (cooking place) with three outlets made by the local communities. It can cook or boil three items at the same time. This means it saves firewood up to 3 times.

around the trading center are basically traders who are not interested in agricultural activities. Some of them even got tree seedlings or banana suckers, but never planted, while others planted but were unable to take care of the plants. We noted cases where goats destroyed some of the seedlings and planting materials provided.

We attempted to introduce perennial crops to the communities that were used to growing annual food and cash crops. The long duration the perennial crops take to mature and become food or cash crops had some bearing on the acceptability and adoption of the project by the community. A number people did not want to participate and discouraged others from active participation on the basis that crops take too long to mature and bear fruits. The issues of adaptability of agricultural practices have been a topic of intensive studies and the several factors come into play have been described by Franzel (1999) and Place and Dewees (1999).

The concept of sustainability of agricultural activities has complementarities between environmental conservation and agricultural productivity. For sustainable agricultural activities and growth to be successful, there must be proper management of resources for agriculture to satisfy changing human needs while maintaining or enhancing the quality of the environment and it must ensure that chronic poverty is done away with (Kanchan and Rao, 1991).

Increased awareness on environmental issues/management and conservation; Increased income from increased production of banana and other fruit trees; and knowledge of their management; Increased income from sales of milk would lead to improved standard of living of the community in the target area; decreased consumption of firewood due to efficient use of energy saving methods; reduced bush fire burning and quarry works; reduced destructive human activities on the wet lands and when these activities are fully implemented, it is expected that there will be rejuvenation of the Flora and Fauna (environmental regeneration) on Keyo hills.

The promotion of Environmental Management and Conservation strategies by the communities is the key activity in the sustainability, extension and expansion of this project beyond its time frame and the present site on Keyo hills. It is the mobilization and awareness creation on the management and conservation of natural resources to the community that will lead to sustainability. We believe the communities outside the project area will take interest to plant trees, coffee, banana, and buy local heifers for cross breeding on their own initiative through this promo-

tion. The sensitization on environmental management strategies that involve the community pass bye-laws banning bush fire, stone quarrying, and charcoal burning and digging in wetlands will have far reaching effects on rural community environmental conservation initiatives.

Gulu University is located in the northern part of Uganda an area, which for many years has not seen much development. Right from Colonial period to date, there is no proper cash crop of significant value that has been introduced in the region. People have continued growing cotton, tobacco and food crops that have very low market value. As an institution with abundant highly trained human resources, we feel directly responsible for changing the economic plight of the rural community in the region. The role of institutions in advocating for sustainable agro-forestry practices has been described by Glenn (2001) and Thomas et al. (2001). It is the mission of Gulu University to cause economic transformation in the rural community in the region.

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