# NATIONAL BEST PRACTICES REPORT
# KENYA
# NBI / NTEAP / MGP
**September 2009**

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**Acronyms and Abbreviations:**

| | |
|---|---|
| BPs | Best Practices |
| CBO | Community-Based Organisation |
| GP | Good Practices |
| GPS | Global Positioning System |
| HIV/AIDS | Human Immunodeficiency Virus / Autoimmune Deficiency Syndrome |
| IPM | Integrated Pest Management |
| KENGEN | Kenya Electricity Generating Company |
| NB | Nile Basin |
| NEMA | National Environmental Management Authority |
| NTEAP | Nile Transboundary Environmental Action Project |
| NYADEC | Nyando Development Community Environmental Conservation Network |
| SEED | Support for Enterprises and Economic Development |
| SSB | Stabilized Soil Block |
| STDs | Sexually Transmitted Diseases |
| UNDP | United Nations Development Programme |
| VCT | Voluntary Counseling and Testing |
| WCED | World Commission on Environment and Development |

## Acknowledgement

I wish to thank the NBI/NTEAP for giving me the opportunity to participate in the noble task of validating the Kenya Country best practices. Thanks and gratitude also fully extend to my communication counterpart Mr. Godfrey Odipo (whose report is covered in the final outputs of the exercise) who worked tirelessly in spite of the challenges occasioned by the post-election violence. Impressively, I received strong support from the national coordinator as well as the micro-grant coordinator, who effectively arranged all the logistics needed to perform this task.

While in the field, I fully appreciate the participation of the various communities visited during the validation process who actively engaged in the long sessions had with them. Notable among these communities are NYADEC, SEED, Bishop Aturo Primary school and the neighboring communities. It is worth noting that some of these communities were visited at no prior notice, albeit they showed interest and enthusiasm in communicating with us.

The efforts being made by Mr. Gedion Asfaw, the Regional Project Manager, Ms. Intisar Ali Saleh, the Monitoring and Evaluation Lead Specialist and Mr. Amir Baker, the Microgrant Lead Specialist, were so valuable in leading this important exercise. Without their active involvement and guidance in all the stages of documentation, it would just be impossible to bring the selection and documentation of the best practices into a successful end.

## Executive Summary

Participation in the project, NYADEC Gully Rehabilitation, has yielded dividends to the beneficiaries. Relatively longer periods of inundation provide moisture for healthy bananas, which provide food for the communities. Also Growing *Aloe vera*, a valuable herbal remedy, which can be used directly to cure malaria and other stomach ailments (especially for HIV/AIDS patients) or can be used as an active ingredient for making antiseptic soap, facial and body creams and shampoo. The anticipated introduction of *Artemesia annua anamed* sp. will provide cure for malaria within reach. Furthermore, the introduction of bamboos is seen as an alternative solution for scarcity of building materials, and will save on moneys otherwise spent on sourcing for such materials with a high cost. Since all the materials used are locally available and the technology is simple, cheap, and easy to apply, it is possible to replicate the project in any other similar environment as long as the members choose similar high value "crops". The fact that the project availed job opportunities for many idle and loitering individuals in addition to food security and income generation, its sustainability is ensured.

The project, Sheltering the Widows With Appropriate Building Blocks, revealed that although cultural practices were originally meant to protect and care for the less advantaged groups in the society, the emerging epidemic such as HIV/AIDS entails that some of those practices have to be abandoned in order to protect lives. For example, widows initially caught by traditions realized that nothing really happened to them when they resisted being inherited. It is pre-mature to come up with the figures of how many widows escaped HIV/AIDS, who would otherwise be victimized during the pre-project situation under traditional inheritance, since only few model houses were built. What is good news is that widows have started to be self-reliant in terms of sourcing their own food, shelter and clothing, which would otherwise exposure them to the risk of HIV/AIDS. The project could have a significant impact if ever replicated in wider geographical areas of the Nile Basin.

The project Waste Recycling at Bishop Aturdu Primary School was seen to be a small-scale model of industrial ecology. Although this is being done in the rural set-up where industrialization has not picked up, it could be used as a pointer to what industrialized communities could adopt to capitalize on wastes as raw materials. It is apparent that further research and training could be done to improve the efficiency of the systems currently in use. For example, the burning efficiency of the briquettes generated from waste recycling could be improved by incorporating more suitable combustible waste materials. Conclusively, the waste recycling project proved to have a huge potential for replicability and can easily be sustained.

The Integrated Biogas System Project has direct economic, social and environmental benefits not only at the local level, but also at the global domain. However, since the initial capital investment could be unaffordable to many individuals, there is a need to explore the following:

- establish a group owned biogas unit in a designated neighborhood home and share the gas as well as the maintenance cost.
- link the households with known microfinance institutions in order to secure funding for the construction of the biogas units with a reasonable payback period.
- develop a promotion strategy targeting the private sector and interested donors agencies in order to enhance the replication of the project to reach as many households as possible.

The project Conservation of Nyandera Stream Catchments has come out as a unique conservation technology in the region more so focusing on indigenous trees and endangered species, the focus on community involvement provide an element for sustainability and as well community appreciation of the need to conserve riparian lands and degraded farmlands. There is need for the group to seek for even private partnership for up scaling of the project in terms of geographical location for the impact to be more visible.

Apiculture, as a component of Joseph Boys High School, has the potential to play a key role in the conservation of natural resources as well as in poverty alleviation interventions. This project has shown that advancing knowledge by sharing information, purchasing shared equipment and selling honey and other products can significantly contribute to conservation and poverty alleviation. However, beekeeping activities should be promoted in line with marketing promotion of bee products and the improvement of other livelihood sources to maximize its contribution to conservation and poverty alleviation

The Fish Farming P was reportedly a very successful initiative. To further consolidate and enhance its dissemination and up-scaling it is important that: (a) launching of a pre-design survey to look into overall demand for fish, seasonal market prices, number of fishermen engaged in the business and availability of feed in the local market; (b) the presence of a center of excellence to provide fish farmers with capacity support in pond construction and management, hatchery management, fertilization technique, breeding, caging, storage, small scale business management and book keeping; (c) a divergent marketing strategy has to be tailored (1.8 MT of fish reportedly produced by the pilot project, let a side dissemination and up-scaling); (d) transportation facilities with cold storage systems need to be introduced to enable farmers to tap remote marketing avenues with good prices; and (e) the presence of a robust predators management system (aquatic snakes, wild cat, etc…);

## 1. Introduction:

Certain natural and anthropogenic factors contribute to land degradation leading to drastic negative environmental and socio-economic impacts in the Nile Basin (NTEAP, 2001). Notable among such environmental threats include issues that threaten public health, social welfare, biodiversity and sustainable development (World Bank, 1993), which directly or indirectly lead to loss of natural habitats, poverty, prevalence of disease and physical injuries (World Bank, 1995).

The Nile Transboundary Environmental Action Project (NTEAP) is one of the eight projects under the Nile Basin Initiative Shared Vision Programs (SVP). The main objective of the project is to provide a strategic environmental framework for the management of the transboundary resources and environment challenges in the Nile river basin. The project specifically intends to: (a) improve the understanding of the relationship of water resources development and environment; (b) provide a forum to discuss development paths for the Nile with a wide range of stakeholders; (c) enhance basin-wide cooperation and environmental awareness; and (d) enhance environmental management capacities of the basin-wide institutions and the NBI. Operationally, the project has 5 components namely, Institutional Strengthening to Facilitate Regional Cooperation, Community-Level Land, Forest and Water Conservation, Environmental Education & Awareness, Wetlands and Biodiversity Conservation and Water Quality Monitoring.

In the above context, NTEAP has established major activities on the ground that have an impact on the environment of the basin, poverty and income generation and, as such, they remained significantly important to the NB countries. All these activities are implemented by the project in collaboration with government officials, communities, NGOs, CBOs, networks, school teachers and students. The collective objectives of these activities are to pilot successful approaches to land and water conservation measures at the national level; raise awareness on the major environmental threats that face the Nile basin and enhance technical cooperation among the NB countries..

In 2007, NTEAP embarked on a major exercise to identify, review, select and document techniques and processes that have the potential to be sustainably replicated and/or up scaled.. In support of this process a regional workshop was held in Kigali in August 2007 in order to enhance the capacity of the National Coordinators in the identification and selection of the best practices in their respective countries. Using some set parameters, established by the NTEAP project document (UNDP 2007), as well as the general principles of sustainable development (Brundtland's Report, 1987), NTEAP selected 5 projects considered to represent environmental best practices (BPs) in the NB of Kenya.

Qualifications were based on the management, technological innovation, replicability, financial viability and sustainability, as well as disease prevention and mitigation for HIV/AIDS

One of the unique projects reviewed is based in areas that suffer from deep and long gully formation. Some of the gullies can go up to 10 meters deep, running as far as seven kilometers in length. These gullies, though formed by natural processes, are aggravated by human activities such as traditional brick making practices, agricultural activities on slopes along the hill side and overgrazing. The result is enormous loss of top soil during the rainy season, leading to siltation in the rivers and wastage of agricultural lands around the Nile Basin (NB). In some cases the gullies sweep away homes, leading to loss of human habitat (see picture of house partially swept by run-off water as a gully is formed).

As to the approach followed in assessing the best practice projects, coordinates for the location of the project activities visited were taken using a Global Positioning System (GPS) and transferred to a digital map. Members of community based organizations (CBO) conducting the activities, together with their collaborators and project beneficiaries were engaged in interactive discussions to get their understanding and perceptions concerning the projects. Project activities and environmental characteristics were described and confirmed by digital capture technologies.

This report presents description of some selected best practice projects that were visited and validated. Various unpublished project documents formed the primary reference materials for this report.

## 2. Best Practice Concept: Basic Definition:

Generally, within the NTEAP, the art of best practice is defined as a visibly sustained impact of an innovative project/Programme brought about by a particular design, a technique, a process, a methodology and finally delivered with fewer problems and unforeseen complications.

Specifically, in environmental management, the concept of best practice is literally defined as the most efficient and effective series of outcomes that have proven desirable and further generate sustained impact, both on the resource base and beneficiaries. As such, they could be further replicated or up-scaled in similar ecosystems; advisably with a recorded multiplier value.

As a conduit for knowledge management, the best practice concept facilitates wide exchange of information, enhances trading of sustainable good operating systems" and promotes cross-border, transboundary and regional cooperation.

## 3. Best Practice (1): NYADEC Gully Rehabilitation:

### 3.1 Problem Statement:

Nyando District stretches along the river Nyando, which drains into Lake Victoria. In Nyando district there are two communities who live in the area directly affected by the river Nyando. They are the Kano and the Nyakach communities. The people in these communities go through two extreme seasons each year. In the rainy season the area is ravaged by floods and after that there is drought for the rest of the year.

The main problem of the area is gully formation. Usually gullies, which grow longer by about 5-6 kilometers a year, have disrupted the lives of the people living in the Nyando Basin area to a very large extent. During the rainy season a lot of topsoil is swept away and massive gullies are formed in the area. It negatively impacts on the wider Nile River Basin, manifesting itself in extensive siltation, proliferation of water weeds, as well as reduction of biodiversity. This in turn impacts on agriculture and fisheries, which are the major sources of livelihood in the region. The people lose their potential farmlands, homes, and roads. A 68-year-old Mzee Gilbert Nyangacha Okal, like many others, lamented on the destruction of his farmland by the vicious gully that did not spare his home frontage, killed his domestic animals and now poses great danger to his family especially little children.

## 3.2 Justification for Selection (innovativeness):

The technical approach adopted by the project was so innovative in firstly, trying to heel the gullies; and secondly addressing issues of food security. To construe, in addition to stone lines used to halt down the flow of water that remains the main source of erosion and soil digging, villagers planted bananas to effectively intercept the water flow. The banana herbs were found to stop siltation and provide bananas fruits to the trust members in otherwise a semi-dry environment. Also the special crops planted in the route taken by runoff water causing erosion arrested the rich top soil and provided a medium for crop production. It also retained the soil necessary for growth of grass for animals to graze on. During the planning stage of the project special crops were carefully selected so that they assist in halting soil erosion control while simultaneously remain as a source of or herbal medicine. Additional benefits have been muted by the communities, but these need training of the community members on conservation and utilization. Bamboos another soil erosion halting plants would be used to make various materials, such as chairs, tables, mugs and even chop sticks for export. The ***Aloe vera*** would further be used for making antiseptic soap, shampoo medicated creams, in addition to being used directly as medicine by the local community. Also Sisal would further be used for making ropes, mats and traditional clothes. All these would be additional sources of income for the community. It would however be important to train the communities on related activities and on financial management so that they could quantify the impacts of their activities.

## 3.3 Technical Approach: Design and Methodology:

The Nyando Development Community for Environmental Conservation Network (NYADEC) is an NGO that has set out to help the communities in the Nyando area to recover their land through environment friendly means. NYADEC- Gully Rehabilitation project was initiated as a demand-driven community-based self-help project in Nyando District of Kenya, with financial support from the Nile Basin Initiative (NBI)/Nile Transboundary Environmental Action Project (NTEAP) Micro-Grants Programme. The project, located approximately 56 km south-east of Kisumu city, covers gully rehabilitation activities along the shores of Lake Victoria and is fully run by the local communities.

Following a transect walk which was conducted in all the areas where erosion had turned previously fertile land into rugged and dangerously deep gullies, community members identified 5 gully encroachment sites directly affecting as many as 500-600 households. They organized themselves into 5 respective Gully Trusts. Each gully formed a Trust Committee with members spread within sections of the gully.

There is a general Assembly comprising of gully affected members, with committees and sub-committees where each gully member provides voluntary services to the project once every week. They use locally available materials to arrest gully encroachment by providing soil erosion barriers and reduce the velocity of the run-off water, which would otherwise create deep gullies at an estimated rate of 5-6 km per year. The trusts are all in Nyanza Province in the catchment areas of the river Nyando. Each Gully Trust has its own unique features in terms of the approach and materials used.

According to NYADEC's vision they need to see the members of the communities in the Nyando area benefit economically from their reclaimed land and using it profitably and continuously in the next ten years. In the process of reclaiming the land from the gully formation, artificial wetlands have been created to be used for varied sustainable agricultural practices. NYADEC also aims to forest the hills and use the rehabilitated woodlands for honey and fruits production

### 3.4 Partnership:

The main partners to the project include the local communities, authorities in Nyando Province, the NGO NYADEC and NTEAP/MGP.

### 3.5 Essence of the Best Practices:

The essence of a best practice porject takes into consideration three key issues namely, accrues benifits and lessons learnt, sustainability and replicability. For the Animal Traction Porject these could be further elaborated as follows:

#### 3.5.1 Benefits and lessons learnt:

#### Direct income:

Participation in the project activities has yielded dividends to the beneficiaries. Harvesting and utilizing the products for food and/or income generation ensures its sustainability. Relatively longer periods of inundation provide moisture for healthy bananas, which provide food for the communities. Also Growing *Aloe vera*, a valuable herbal remedy, which can be used directly to cure malaria and other stomach ailments (especially for HIV/AIDS patients) or can be used as an active ingredient for making antiseptic soap, facial and body creams and shampoo. The anticipated introduction of *Artemesia annua anamed* sp. will provide cure for malaria within reach. Furthermore, the introduction of bamboos is seen as an alternative solution for scarcity of building materials, and will save on moneys otherwise spent on sourcing for such materials which usually cost a lager portion of the total annual income of individual households.

**Socioeconomic Benefits:**

The project is run by the local community on a quasi-voluntary basis, with subsidies from the Micro-grant funding. The community has started realizing gains from harvesting the products, which at the end of the funded project cycle should have reached a break-even point and sustain activities. Additional income-generating activities (such as medicated *Aloe vera* soap) have been suggested, which could further enhance financial benefits.

**Food security:**

Bananas planted in the gullies serve a dual purpose in arresting soil erosion and also serving as a constant source of food to the community all year round. Sisal Terraces trap silt restoring land fertility and reclaims wastelands for agricultural production. Restoration of land fertility provides pasture, resulting in increased production of beef and milk with a net total income of US$ …. Per household per annum..

**Linkages / Collaboration with Government Departments:**

The project enjoys collaboration with various government ministries, especially the Ministry of Environment (Department of Forestry), which offers technical information on tree seedling selection and planting; National Environmental Management Authority (NEMA), providing technical information on environmental conservation; the Ministry of Agriculture and Livestock Development, offering extension services. Local and Provincial administration provide goodwill and protection for the project activities.

**Linkages with public and private organizations:**

Collaboration with KENGEN, a quasi autonomous power generating company in the area has availed the project with hundreds of thousand seedlings for afforestation in the gully encroachment areas. The company has also facilitated logistical support to the NYADEC mobilization team. A number of public and private universities have either started collaborating with NYADEC or expressed interest in working together. This creates opportunities for capacity building and networking locally and internationally.

### 3.5.2 Sustainability:

In view of the income generated from the high value crops used to heel the gullies and the local medicine extracted from various local herbs used by the project to halt soil erosion, the project can easily be sustained.

### 3.5.2 Replicability:

Since all the materials used are locally available and the technology is simple, cheap, easy to apply and generates cash income, it is possible to replicate the project in any other similar environment so long as the members choose similar high value “crops” to arrest gully erosion.

### 3.5.4 Limitations and Challenges:

The project proponents met with some resistance from a few ignorant community members, especially those not residing at home. When some came and found sisal and *Aloe vera* planted on their pieces of land, they thought their land was confiscated. These materials are normally used for land demarcation and their organized planting would, if not well explained, be misconstrued by many people. Similar involvement in future requires an aggressive rural animation programme in order to create the needed community based awareness.

## 4. Conclusion:

Since all the materials used are locally available and the technology is simple, cheap, and easy to apply, it is possible to replicate the project in any other similar environment as long as the members choose similar high value “crops”. In order to avoid conflict in similar programmes, the design of the project should include a advocacy or rural animation components. Since all the materials used are locally available and the technology is simple, cheap, and easy to apply, it is possible to replicate the project in any other similar environment as long as the members choose similar high value “crops”. The fact that the project availed job opportunities for many idol and loitering individuals in addition to food security and income generation, its sustainability is ensured.

## 5. Best Practice 2: Sheltering the Widows with Appropriate Building Blocks

### 5.1 Problem Statement:

A famous Luo Traditional Practice is that: When a husband dies the widow is supposed to be inherited by a brother- in-law. Such a man would be referred to as ***jater*** in the Luo language. If the widow has no in-laws, the closest man on the side of the in-laws would fulfill a cleansing sexual ritual with her and provide for her social-economic needs. This practice is found to serious implication on the prevalence of HIV/AIDS and other sexually transmitted diseases (STDs) in Nyanza Province, predominantly inhabited by the Luo.

The main root cause of such inheritance is rampant poverty and hence the failure of widows to address basic socio-economic needs so they remain constantly confined to these malpractices.

## 5.2 Justification for Selection (innovativeness):

The project is run from within the local community and by the community members themselves, using the bottom-up approach of administration. It was found that the project had created awareness among 150 widow-headed households and already built two of the anticipated 50 model houses in Rang'ala sub-location. The impacts of the initiative was evident from the observed changes in life styles, reduction in STDs and low prevalence of cases of HIV/AIDS, once the traditional wife inheritance practice was abandoned following the adoption of an alternative livelihood; mostly sheltering.
Provision of shelter had encouraged many women to break the traditional barrier of relying on males as shelter providers, without whom it was believed that life has reached a dead end. They would in the past be ostracized and regarded with contempt. They are currently efficiently playing the role of household heads without fear.

## 5.3 Technical Approach: Design and Methodology:

A local community-based organization (CBO) known as Support for Enterprises and Economic Development (SEED) exchanged ideas with a church group that decided to live without the cultural obstacles that ensnare poor and vulnerable widows. SEED was established in Ugunja Division of Kenya in 2002 and registered as a CBO in 2005. The project is run from the Ugunja Resource Centre based within the local community. Its linkage with the Nile Basin Initiative (NBI) started when a small grant opportunity was advertised. Its aim was to build the capacity of the community to manage the environment by equipping them with environmentally friendly technologies and offering financial assistance to construct affordable and durable houses. Initially, it was advertised through a local *baraza* (village meeting) for all women to assemble and identify the needy. They were asked to form groups of fives and identify the most vulnerable among them to be assisted first. Members' training sessions were taken to the selected widows' homes, where bricks were laid and model houses constructed. They were also given loans to start small businesses as a sustainable source of income. With basic training in bookkeeping, they could run their small businesses and keep money for loan re-payment. By targeting approximately 150 vulnerable widows in the community and planning to build 50 model houses, the project demonstrated that a widow can start a new life without the sexual cleansing ritual. This has reduced the incidence of HIV/AIDS related to wife inheritance.

The project is run from within the local community and by the community members themselves. It has raised awareness of up to 150 widow-headed households and already built two of the anticipated 50 model houses in Rang'ala sub-location using bricks. Furthermore, the bricks they use are environmentally friendly because they don't result in land degradation and deforestation. The soil used for brick making is taken from digging pit latrines and on-site excavation for leveling the construction site. The bricks stabilize without the conventional brick-burning practice, which heavily relies on fuel wood and contributes to land degradation. The practice prevents activities that contribute to gully formation and conserves trees, especially the indigenous species, some of which have almost been rendered extinct. Indigenous trees are preferred as they have better firing characteristics. According to the local community, four big trees that had been protected for over 30 years were brought down in a matter of days to be used for brick burning.

It is estimated that constructing a single house using SSB (as opposed to using the traditional burnt bricks) has the positive impact of saving the Nile catchment area from losing 4.5 tons of wood fuel per house constructed, which is directly linked to rain formation and water levels in the River Nile. Finally, the soil used for making the bricks is excavated on-site, and is supplemented by a little cement. The technology is easy to apply with just a little training of the local community labour-force in any target location. Any additional costs can easily be met by the activities initiated through the seed money provided through the project. The project could have a greater impact if it would be replicated in many parts of the Nile Basin where people engage in similar income generating activities.

## 5.4 Partnership:

The project enjoyed viable and strong linkage with various groups. The project is linked to the NBI and collaborates with St. Paul's Health Centre and Mariwa Bible Women Group. It also enjoys collaboration from various government ministries, especially the Ministry of Health for education on the effects of HIV/AIDS, and National Environmental Management Authority (NEMA) for capacity building on Environmental Conservation.

## 5.5 Essence of the Best Practices:

The essence of a best practice porject takes into consideration three key issues namely, accrues benifits and lessons learnt, sustainability and replicability. For the Animal Traction Porject these could be further elaborated as follows:

### 5.5.1 Benefits and lessons learnt:

Understanding local community needs and subsequent affirmative action has started changing the lives of the members of these communities, as is evidenced by the life-changing-story of Jennifer (see the story in the box). Although cultural practices were originally meant to protect and care for the less privileged in society, the emerging epidemics and the HIV/AIDS pandemic have rendered some of these practices out of context and must be abolished in order to conserve life. Collaboration between the CBO, church-based organization and the relevant government Ministries has a synergistic effect for achieving the project aim. For example, the initially traditional widows realized that nothing really happened to them when they resisted being inherited. They also realized women could do equally well in the male-dominated activities such as brick-laying. Incidentally, in a few communities in Kenya such as the Maasai, such activities for house construction are predominantly left for women.

**A New Lease of Life for Jennifer**

Jennifer Marende is a poor old widow who lives in Rang'ala sub-location of Ugunja District in Kenya. She was poor enough when her husband died in 1988. To add insult to injury, she was abandoned by her relatives and she led a solitary life in a tattered house. The roof was leaking to the extent that whenever it rained, she would stand at a corner to avoid the rain. With the thundering African storm, she still got wet in spite of her maneuvers whenever it was raining. Her only source of livelihood was working for people in their gardens, which would earn her less than a dollar a day after hard labour. She often went for days without food when there was no work to do.

SEED identified Jennifer as a worthy target for assistance. They made the pressed blocks with interlocking grooves and the local collaborating church provided the iron sheets for the roof. In the usual spirit, the members of the CBO got to business and constructed a cozy house for her. She shed tears of joy and the rest was smiles to date. She also got a loan from the revolving project kitty and started a small business of making and selling fried scones locally known as *mandas*. She can now earn up to $ 1.5 a day from selling *mandas*. Jennifer's life dramatically changed from the dejected quiet loner to a cheerful talking grandmother, courtesy of the NTEAP and SEED project intervention.

It was not possible to come up with the figures of how many widows escaped HIV/AIDS, who would otherwise be victimized during the pre-project situation under traditional inheritance because at the time of the reniew only two model houses had been built. It is encouraging and good news too that widows have started to be self reliant in terms of sourcing their own food, shelter and clothing, which would otherwise make them vulnerable to misuse and abuse leading to exposure to risk of HIV/AIDS.

The fact that women have started building their own houses and nothing happened to them is an encouragement to others to follow suit and not wait to be inherited before they stand on their feet again.

On the social side the style of living of vulnerable women was changed because of the additional income and consequently the index of poverty was reduced during interview with the beneficiaries. It was reported that each beneficiary household generated about US$ ….per annum as opposed to the pre-project situation. Jennifer Marende is a living example of a life changed.

On the environmental front the soil used for brick making is taken from digging pit latrines and on-site excavation for leveling the construction site. The bricks stabilize without the conventional brick-burning practice, which heavily relies on wood-fuel and contributes to desertification.

The practice prevents activities that contribute to gully formation and conserves trees, especially the indigenous species, some of which have almost been rendered extinct. Indigenous trees are preferred as they have better firing characteristics. According to the local community, four big trees that had been protected for over 30 years were brought down in a matter of days to be used for brick burning. It is estimated that constructing a single house using SSB (as opposed to using the traditional burnt bricks) has the positive impact of saving the Nile catchment area from losing 4.5 tons of wood fuel per house constructed, which is directly linked to environmental conservation, rain formation and hence rising of water levels in the River Nile.

As with regards to health, the project reduced the risk of the spread of STDs caused by the traditional wife inheritance practice and limits mosquito breeding sites that would be created by the conventional brick making practices. The 150 widows targeted by the project have a reduced chance of being abused based on the cultural practice of wife inheritance. Without the project intervention subjection to inheritance would be mandatory, with high risks of contracting or spreading sexually transmitted diseases, particularly HIV/AIDS. With the project intervention the women can make their own houses and carefully choose partners to re-settle with. The next thing would be to measure adoption rate and carry out a study to understand why women would or would not adopt these technologies. The actual figures on impact on reduction of HIV/AIDS would only be realistically achieved after a study involving the widows and interviewing them on socio-economic parameters, which has so far not been done. This would be confirmed by confirmation from VCTs that the incidence rate of HIV/AIDS has actually gone down in the area covered by the project.

**Plate (1): Jennifer Marende's House, before and after the Intervention**

### 5.5.2 Sustainability:

The project does not only offer seed money to vulnerable widows to start businesses, but also trains them on making stabilized soil blocks (SSB). They also learn the art of brick-laying to construct their own houses with minimal assistance and cost. Those who have learnt can: (a) continue making the bricks for commercial production; (b) generate additional income; (c) avoid contracting HIV/AIDS; and (d) build their own houses. All the above indicate a high potential of project sustainability.

### 5.5.3 Replicability:

The soil used for making the bricks is excavated on-site, and is supplemented by a little cement. The technology is easy to apply with just a little training of the local community labour-force in any target location. Any additional costs can easily be met by the activities initiated through the seed money provided by the project. The project could have a greater impact if it would be replicated in many parts of the Nile Basin where people engage in similar income generating activities.

### 5.5.4 Limitations and Challenges:

The challenges met include a general lack of capacity in terms of skills to provide services. Brick making is labor intensive and is normally a male dominated activity. It requires a change of the mindset for most women to get used to the idea that they are capable of performing such duties. The costs of materials sky-rocketed ever since the project started which slowed down the project activities and limited the scope and targeted impact.
For example, at the inception of the project a bag of cement was KSh. 500, but has now shot up to KSh. 820, an increase by 64%. There has been a similar increase in the cost of iron sheets.

## 6. Conclusion:

Understanding local community needs is a way towards subsequent change in the widows' general welfare, as is evident by the life-changing-story of Jennifer (see story in the box). Although cultural practices were originally meant to protect and care for the less advantaged groups in the society, the emerging epidemic such as HIV/AIDS entails that some of those practices have to be abandoned in order to protect lives. Collaboration between the CBO, church-based organization and the relevant government Ministries has a synergistic effect for achieving the project's objectives. For example, the initially traditional widows realized that nothing really happened to them when they resisted being inherited. They also realized women could do equally well in the male-dominated activities such as brick-laying Incidentally, in a few communities in Kenya such as the Massai, such activities for house construction are predominantly left for women. It is pre-mature to come up with the figures of how many widows escaped HIV/AIDS, who would otherwise be victimized during the pre-project situation under traditional inheritance, since only few model houses have been built. What is good news is that widows have started to be self reliant in terms of sourcing their own food, shelter and clothing, which would otherwise exposure them to the risk of HIV/AIDS. The project could have a significant impact if ever replicated in wider geographical areas of the Nile Basin.

## 7. Best Practice (3): Project Based Learning: Waste Recycling, Bishop Atundo Primary School

### 7.1 Problem Statement:

One of the major international concerns today is environmental degradation and global warming. Indiscriminate logging and use of firewood as a source of fuel has degraded ecosystems, caused changes in rainfall patterns and led to loss of habitat. These effects can lead to diminishing water resources and loss of biodiversity.

To address the problem there is an attempt now to practice small scale industrial ecology, where waste materials are used as raw material for alternative energy production. One of the most attractive options is the recycling of waste to make briquettes, which are used in place of firewood as an alternative source of fuel. The ultimate waste of burning the fuel briquette (ash) is normally mixed with organic wastes from yard sweepings to produce compost for vegetable production. The activity has picked up as an income generating activity, and the complementary vegetable production activity supplements the requirements for feeding orphaned children in the school.

## 7.2 Justification for Selection (innovativeness):

The Project Based Learning (PBL) model has demonstrated how to utilize waste to produce an alternative energy source within the concept of industrial ecology, where waste generated by one activity is used as raw material in another production system. This replaces the indiscriminate clearing of tree cover for domestic use as well as for commercial production purposes. The project is a learning resource for both students and the local community, which helps them to generate income and conserve the environment. Having learnt the techniques at school, many children have embarked on testing the technologies at their rural homes and thereby diffusing the information to the community. Parents, being eager to get more information, just walk in and interact with the children and teachers in a free learning environment.

## 7.3 Technical Approach: Design and Methodology:

The Waste Recycling Project was initiated as a needs-driven school-based activity run by pupils and teachers, and incorporating the local communities of Bar Ober in Kenya. The project, located approximately 130 km northwest of Kisumu, was conceived at the beginning of 2003. In 2005 the project received a boost in the form of financial and technical support from the Nile Basin Initiative (NBI)/Nile Transboundary Environmental Action Project (NTEAP) Micro-Grants Program, which provided materials worth KSh. 145,250.

The PBL model has demonstrated how to utilize waste to produce an alternative energy source within the concept of industrial ecology, where waste generated by one activity is used as raw material in another production system. This replaces the indiscriminate clearing of tree cover for domestic use as well as for commercial production purposes.

The project is a learning resource for both students and the local community, which helps them to generate income and conserve the environment. The school arranges open days for parents and other members of the community to visit and interact with students.

During such times, they learn and practice these new ideas and skills, thus enabling them to adopt the use of the alternative source of energy and how they can conserve the environment. The initiative has demonstrated the efficiency of alternative energy for cooking. The quality and quantity of organic foods produced show the benefits of the concept of industrial ecology. The waste project has improved the aesthetic value of the school and the neighboring local communities, as children try to practice what they have learnt in school at their homes. They have learnt the concept of waste separation at source and are now trying to use separate dust bins for different types of waste materials for further recycling and/or reuse.

### 7.4 Partnership:

The project works in close collaboration with the Ministry of Education, Ministry of Agriculture Extension Services and the Department of Forestry, all operating at local level. Feedback from the Ministry has been very encouraging and informative. Also the project enjoys collaboration with a local NGO called Appropriate Rural Development Agricultural Programme (ARDAP), which also operates within the local community. This helps them to network with other schools and interested partners. The original project at Bishop Atundo created a network with 9 other schools courtesy of ARDAP. Ten pupils were invited from each school to participate in interactive seminars, which resulted in the schools being sensitized to start similar activities. The schools have picked up the activities, borrowing a leaf from Bishop Atundo.
Notable among the schools that have adopted the school-based learning are Buhuma and Tingolo Primary Schools.

### 7.5 Essence of the Best Practices:

The essence of a best practice porject takes into consideration three key issues namely, accrues benifits and lessons learnt, sustainability and replicability. For the Animal Traction Porject these could be further elaborated as follows:

#### 7.5.1 Benefits and lessons learnt:

A lot of money which used to be spent on wood fuel and food is currently saved for other uses. Some of the products resulting from the project activities generate income and feed a revolving fund, which sustains miscellaneous project activities. No additional operational funds would be required at the present scale, since waste produced in one system becomes the raw material for the twin system.

### 7.5.2 Sustainability:

The fact that a lot of money which was previously spent on wood fuel and food is currently saved for other uses would encourage people to sustain the project. Moreover, the generated income was potentially used to feed into a revolving fund, which found to sustain miscellaneous project activities.

### 7.4.3 Replicability:

It was reported that once the project is fully implemented, no additional operational funds would be required, since waste produced in one system becomes the raw material for the twin system. Henceforth, the low level of the operational cost plus the accrued benefits, including environmental protection, encouraged local administration to replicate the project in other areas of similar problems.

### 7.5.4 Limitations and Challenges:

The main limitation has been land availability for proposed expanded activities where the demand has exceeded the supply. Timing of the activities has been difficult since the school has to stick to the prescribed official timetable provided by the Ministry of Education. Members of the club must therefore find their own time to carry out the activities. Most of the pupils come to school over the weekends to work on the project. Insect pests have posed a major challenge to the exotic vegetable production component of the programme. To ensure safety, it is advisable to use the Integrated Pest Management (IPM) package consisting of pest resistant varieties and natural insecticidal products.

## 8. Conclusion:

The waste paper recycling project integrated with composting for vegetable production at Bishop Aturdu Primary School was seen to be a small-scale model of industrial ecology. Although this is being done in the rural set-up where industrialization has not picked up, it could be used as a pointer to what industrialized communities could adopt to capitalize on wastes as raw materials. It is apparent that further research and training could be done to improve the efficiency of the systems currently used. For example, the burning efficiency of the briquettes could be improved by incorporating other combustible waste materials. The production of compost manure could also be improved by leaving the organic waste to decompose for longer periods than currently practiced.

## 9.1 Best Practice (4): Integrating Biogas System in Mumias Sugar Zone For Poverty Alleviation and Environmental Conservation

## 9.2 Problem Statement:

Butere-Mumias District lies in the western part of Kenya and, being a Sugar cane growing Zone, communities have concentrated much on sugar plantation with a little less attention being given to growing trees for even household's energy consumption. The few trees available were therefore over exploited for many uses, particularly fuelwood. Therefore women are usually forced to spend more hours fetching for fuelwood instead of using other economic opportunities.

## 9.3 Justification for Selection (innovativeness):

The project targets the farmers under zero grazing practices who often utilize animal dung for agricultural purposes in the form of manure. The use of the animal droppings to generate cooking gas therefore makes the zero grazing system a multi-purpose practice. The construction of the biogas system although has a relatively high initial set up cost (an average of USD 1,100) , albeit the maintenance cost is almost nil for a useful life span of over 50years. That renders the technology more durably effective and, hence any ordinary farmer can afford it. The steady rise in the cost of energy in a country like Kenya, where the LPG Gas and electricity are affordable to the middle and high income earners in the cities coupled with the high cost of fuelwood, including time spent in fetching it, makes the biogas endeavor a very innovative energy system especially in the remote rural areas. The by-products (sludge) of the system are effective in the retention of soil fertility for improved agricultural production.

## 9.4 Technical Approach: Design and Methodology:

Since the region is predominantly booked for sugar cane growing, most farmers do not plant trees even for fuelwood; henceforth an alternative source of household energy like biogas is therefore a real community need. The project strategy is three-fold: firstly, invite affected community members/farmers to participate in the project planning in order to allow them to articulate their energy needs and further fully participate in the execution arrangements and implementation of activities; secondly, pursue households that qualify for the construction of the biogas system to plant 200 trees around their homestead and farms and also they should encourage their neighbors to do the same; and thirdly, establish tree nurseries within easy reach of the interested community members and other institutions. The beneficiaries of the biogas system are required to contribute almost 55% of the total costs, especially relating to the provision of local materials and donation of unskilled labor.

One key activity is that the project also trained some youths in the construction, running and maintenance of the biogas technology so that the right skills retained within the community for future construction of more biogas units.

### 9.5 Partnerships:

Although the project is closely monitored by the District Environment Office of the Government, it has attracted a number of other government departments and other agencies, which indicates that the project became popular. Participating Government Departments include the Ministry of Energy, District Development Office, Provincial Administration, Ministry of Youth Affaires, Forestry Service, Ministry of Agriculture, Social Services, Rural Outreach Programme, Equity Bank, Western Flood Mitigation Programme, Mumias Sugar Company, GTZ and the Nile Basin Institutive - Micrograntt Programme.

### 9.6 Benefits and Lessons Learnt:

#### 9.6.1 Environmental Benefits:

Tapping and use of methane gasses, that otherwise would have been emitted, reduced the adverse danger on the climate. The sludge used in improving soil fertility enhanced eco-friendly agricultural practices. On the other hand, reduction in the use of fuelwood conserved the ecosystem and promoted general environmental health. The groups under Abalekwa Development Organization had distributed trees to their members and to the Kenya Forestry Service which resulted in the afforestation of more than 50 hectares of land that could eventually contribute to the sequestration of carbon.

#### 9.6.2 Social Benefits:

The use of biogas by the households enabled women to save time, usually used to fetch firewood (estimated at two months a year), for other economic opportunities. Also the of biogas system created a clean cooking environment and further enhanced gender sharing of cooking roles. In fact it was said by many individuals, over a number of times, that the use of biogas enhanced social coherence within the family and reduced domestic violence since meals which used to be a source of conflict between the couples are now prepared on time.

#### 9.6.3 Economic Benefits:

As one of the beneficiaries narrated, use of the biogas enabled him to save kshs 3000, (USD 39) per month which were used earlier to buy fuelwood. He went further to say that out of the monthly saving on fuelwood, he would be able to retain the initial biogas construction cost in three years (payback period).

The groups that run tree nurseries were reportedly able to earn up to kshs 350,000 (USD 4,500) in a year. The households with biogas units had established household gardens using the manure from the biogas, thus were able to be self-sufficient in fruits and vegetables with some salable surplus. Not only that, but also the use of the sludge from the biogas system was found to double the yield of various vegetable crops.

## 9.7 Sustainability:

The biogas project was designed in such a way that beneficiaries are to contribute almost 55% of the establishment cost mostly in terms of local available materials which would enhance ownership and thus promote sustainability. The project as well provide credit to households that want to construct the biogas, this enable others who could not afford the lump sum to construct the biogas system thus enabling the continuity of the project even after the funding period is over. Moreover, the project is linked to other permanent institutions like Government Departments and private organizations which will continue providing technical expertise as well as material support to the project to ensure continuity. The tree nurseries have a reasonable income which would enable the groups to run the tree nurseries in a sustainable manner. All that, added to the previously registered environmental, economic and social benefits.

## 9.8 Replication:

The project has already started getting enquiries and neighborhood communities and institutions coming to learn about the technology, which proved to be an indication for further replication. The fact that the project encouraged the use of local materials, means that it could easily be replicable in adjacent areas or even far off so long as the local conditions permit so. In addition, environmental projects that address direct benefits of individuals and households are likely to enjoy much more support, demonstrate strong elements of ownership and remain attractive to other stakeholders.

## 9.10 Limitation and Challenges:

High initial cost of constructing the biogas remains a constraint to many ordinary community members, thus negating the objective of environmental benefits. Since the project is still not widely known in the area there are still some doubts among the communities regarding the cooking efficiency of the biogas system. Moreover, not many households practice zero grazing system so they may not likely benefit from such a project.

## 10. Conclusion:

The project has direct economic, social and environmental benefits not only at the local level, but also at the global domain. However, since the initial capital investment could be unaffordable to many individuals, there is a need to explore the following:

- establish a group owned biogas unit in a designated neighborhood home and share the gas as well as the maintenance cost.
- link the households with known microfinance institutions in order to secure funding for the construction of the biogas units with a reasonable payback period.
- develop a promotion strategy targeting the private sector and interested donors agencies in order to enhance the replication of the project to reach as many households as possible.

The project can also turn into a business orientation to target primarily rich individuals who, in turn, could sell the gas to their neighbors on agreed costs.

## 11. Best Practice (5): Conservation of Nyandera Stream Catchments for Sustainable Water Supply, Food Security and Income Generation

### 11.1 Problem Statement:

The project which is being implemented by the Nyandera Green Valleys Conservation Group in Bondo District Western Part of Kenya was experiencing the following problems: typical degraded agricultural lands that hardly support subsistence farming, the land was usually patchy with vegetation, especially after the crops have been harvested. This was being aggravated by overgrazing and intensive deforestation to meet the domestic needs and settlements, which led to large scale sheet erosion, while along the roads and cattle drives gullies formed. The eroded soils were all carried to the few water sources which include ponds, small streams and open shallow wells, silting them and affecting water availability and quality. The siltation and pollution finally ended up in the Nyandera stream affecting River Yala that drains into lake Victoria.

### 11.2 Justification for Selection (innovativeness):

The project organized the farmers having land along the river bank as well as around Nyandera dam which is the river catchments, first to raise the awareness on the danger of farming along the river bank, to train the farmers on on-farm forestry as a measure of soil conservation and also raising of various tree seedlings including medicinal and the endangered species to be planted along

the river catchments and river bank to conserve river source, reduce soil erosion and river siltation. The project encourages the planting of high value fruit trees on-farms well as crop friendly trees to reduce on top soil loss as well as provide income to farmers as a motivation. They introduce back the endangered and completely extinct species that were highly regarded for their medicinal and ornamental value.

### 11.3 Technical Approach: Design and Methodology:

the project enjoy very high community participation as a result of community real need to save their degraded soil and dwindling water sources and resources, this therefore enable the strategy of on-farm forestry work as most the farmers are willing to practice the technology. An elaborate central tree nursery established is helping the farmers acquire the tree species they need at subsidized prices given that they are members, the tree nursery as well sells the tree seedlings to individuals, institutions and Government departments for sustaining their activities. The group has also incorporated the government department for technical oversight like Kenya Forestry Research Institute (KEFRI), National Environmental Management Authority, International Center for Research on Agro forestry (ICRAF) and others.

### 11.4 Partnership:

The project has strong community involvement as partners and Government departments like Kenya Forestry Service, Agriculture, District Environment office, ICRAF, KEFRI, Social Services, ministry of Water, and Nile Basin Initiative Micro-grant program as the main funding partner. The project has attracted a lot of government departments attention as it's the only one of its kind within Bondo District as a whole.

### 11.5 Benefits and Lessons Learnt:

#### 11.5.1 Environmental Benefits:

The project has rehabilitated about 6Hectares of land that was previously degraded by establishing a botanical garden and camping site where they have planted over 120 different species of plants/trees for educational and recreational purposes. They have also planted trees along the river bank and catchments stretching to about 12kilometre thus protecting the river bank erosion and as well as riparian farms.
The project has produced and sold over 1million tree seedlings to not only communities around for on-farm forestry but as well to the various Government departments, individuals and institutions from outside the project area, the seedlings wherever are planted have increased the population of the tree within

the district. The project has also contributed to the filtration of Nyandera river waters thus improved quality of water as well as protection of the catchments

### 11.5. Social Benefits:

The quality of water from the rivers have improved and especially the nyandera dam this has saved the community time in walking long distances to look for clean and safe water.

### 11.5.3 Economic Benefits:

The project established an elaborate tree nursery which have provided both direct and indirect employment opportunity to the community and especially the members of Nyandera village, Some are working in the tree nursery and earning from the sell of seedlings while others have opted to buy and sell the seedlings in other far markets and communities. So far over 1million seedlings have been produced with majority being sold earning the organization close to kshs 450,000 (USD 5,800) for the last 3 years, yet the stock of the tree seedlings is still running to about 100,000 seedlings.
Farmers have planted fruit trees which they sell to the nearby markets this fetches about kshs 10,000 ( USD 130) per season per household that planted the fruit trees and there are two major seasons of fruits in a year.
The riverine farms have improved yield as a result of the conservation intervention of the project undertaken by the group.
The tree nursery is also earning from specific tree and plant species that are sort by herbalist from within and far regions.

### Lessons Learnt:

Communities' participation in project is more envisaged when there is immediate or foreseeable direct benefits to the individuals as well as projects with external oversight like from the government Departments.

### 11.6 Sustainability:

The tree nursery is already sustainable as they are able to pay the staff employed through the sales proceeds from the nursery, and given that the project majorly focus on the tree planting as a means of conservation the tree nursery sustainability ensure steady supply of seedlings to the farmers and general community member for continuous planting.
The fruit trees that are planted by farmers are also providing income to farmers thus they are able to derive immediate benefits as a motivation to continue with the project.

## 11.7 Replicability:

Since the project started in 2006 two private tree nurseries have come up as a result of the project as the owners were trained by the project, there has also been visits by schools, colleges and other groups to learn the project and the technologies to establish tree nurseries for conservation.
The Government officers have often brought in visitors to the project site to show case of a working conservation group for replication in other regions.

## 11.8 Limitation and Challenges:

There are Weak enforcement of water conservation and land use policies to empower change agencies to restore and conserve riparian areas, the community have limited public / community land reserve for intensive afforestation. Slow pace at which communities accept and adopt new technologies thus delay in project meeting its outputs. Occasional conflicts with cattle owners and the management of the Botanic Garden over grazing land, more particularly during dry seasons.

## 12 Conclusion:

The project has come out as a unique conservation technology in the region more so focusing on indigenous trees and endangered species, the focus on community involvement provide an element for sustainability and as well community appreciation of the need to conserve riparian lands and degraded farmlands. There is need for the group to seek for even private partnership for up scaling of the project in terms of geographical location for the impact to be more visible.

## 13. Best Practice (6): Joseph Boys High School: Apiculture for Forest Conservation and Poverty Alleviation.

## 13.1 Problem Statement:

TransNzoia District in the Rift Valley province of Kenya, occupies a unique mountain ecosystem with important wetland resources. The region is endowed with varied natural resources and a rich cultural diversity. Despite this the area is characterized by poverty, resource based conflicts, rapid population growth and environmental degradation. Tree cover loss and loss of wetland habitats are widely recognized as the two most important factors responsible for environmental degradation in the district. The impacts of population dynamics and trends in the district are manifested in increasing demand for natural resources and ecological services.

The most significant impact is the unsustainable encroachment on key ecosystems like forests and wetlands. In St. Joseph's Boys is one of the wetland resources unique to TransNzoia. This wetland was being drained by the school to provide agricultural land and the tree cover in the school was reducing rapidly as the trees were cut down to provide wood fuel. This situation is typical of what is happening across the district.

## 13.2 Justification for Selection (innovativeness):

The technical approach adopted by the project was innovative in that it sought to solve two environmental threats (deforestation and wetland degradation) in its solution, while contributing to poverty alleviation the root cause of environmental degradation. St. Joseph's Boys High School started an Apiary management project to show how farmers can raise income while still maintaining tree cover and wetland habitats. They bought 20 bee hives, a centrifuge to process the honey produced and the students planted trees to increase the tree cover in the school and sunflower that would provide fodder for the bees. The Multifaceted approach has served to generate interest from the local community and the school club has served these farmers through and outreach program based on the contact farmer approach.

Using students to carry out all the set up and management aspects of the project was also a unique aspect of this projects that served to pass skills and knowledge to the younger generation.

## 13.3 Technical Approach: Design and Methodology:

Project based learning has been used as a tool in enhancing learning, especially in school environmental subjects. In the Nile transboundary Environmental Action project Environmental Education Component, the tool was used in a three prong way to combine the learning of the students with that of the local community and capacity building for teachers. NTEAP's school – community linkage was aimed at promoting collaborative efforts in solving common problems, while building community capacity to address environmental threats.

The Apiary was set up using modern langstroth beehives to maximize production and the location of the apiary close to the wetland guaranteed fresh supply of water for the bees. Wetland friendly trees and sunflower were planted to increase fodder for the bees and contribute to increased production. To increase the enterprises contribution to poverty alleviation, a processing system was selected using the centrifuge that guaranteed the quality and quantity maximization of the honey produced.

The school holds open days to share the skills and knowledge with other schools and community members living around the school. The school club hopes to live up to its vision to leave the environment in and around their school better than they found it.

### 13.4 Partnership:

The main partners to the project include the local communities living around the school and close to the selected contact farmers, Government of Kenya officers who provide technical support to the project, VI Agroforestry project who support the tree planting initiatives and NTEAP/EE.

### 13.5 Essence of the Best Practices:

The essence of a best practice project takes into consideration three key issues namely, accrues benifits and lessons learnt, sustainability and replicability. For the Apiculture Project these could be further elaborated as follows:

### 13.6 Benefits and lessons learnt:

### 13.6.1 Direct income:

Participation in the project activities has yielded dividends to the beneficiaries. Harvesting and utilizing the products for food and/or income generation ensures its sustainability. The project has been able to break even and start generating substantial profits from the sale of honey. By the second year of production the apiary was able to realize a profit of KES 65,500/=, this can only increase as production improves and other products like wax and the rent of services of the centrifuge are used.

**Table 1: Expenses and income table Year 1 and 2:**

| | **Expenses** | **Unit prize** | **Total amount** | | **Income** | | **Unit price** | **Total Price** |
|---|---|---|---|---|---|---|---|---|
| 1 | Purchase of hives (20) | 4,750 | 95,000 | 1 | Honey yr 1 | 60kgs x 10hives | Kes 90 | 54,000 |
| 2 | Equipment and tools | | 10,970 | 2 | Honey yr 2 | 75kgs x 18 hives | KEs 90 | 121,500 |
| 3 | Annual Operating costs | 2,400 | 4,800 | | | | | |
| | **Total** | | **110,770** | | **Total** | | | **175,500** |
| | | | | | **Y-E** | | | **64,750** |

### 13.6.2 Socioeconomic Benefits:

Honey is used by the local community for food medicine and for sale. Honey is added to porridge or tea as a substitute for sugar thus reducing household expenditure on sugar. It is also used as a raw material for local brews which are a ready market for the produce. Honey is sued as medicine for stomach ulcers, burns and wounds from fire and for children suffering from blood shortages. This has contributed to reduce household expenses on food and health.

Beekeeping activities involve both gender at different stages of honey and bee wax processing and marketing. The local communities indicate that it has helped to keep the unemployed youth both boys and girls busy and away from trouble while providing them with income.

### 13.6.3 Environmental Benefits:

The project intervention has helped reduce the indiscriminate cutting down of trees and encouraged planting of trees that provide fodder for the bees. The trees and shrubs planted are not only a source of nectar and reforestation but also a source of income as some of them generate fruits (passion) and oil (sunflower). Beekeeping could also strengthen the spirit of forest ownership as advanced by the Forest act in Kenya. Ownership will serve to conserve and protect forest areas and thus reverse the trends of indiscriminate deforestation.

By providing an environmentally friendly alternative source of income beekeeping has reduced the need to increase agricultural land for cultivation by drying up wetlands. As pollinating agents bees have supported increased agricultural production per unit area and again reduced the need for expansion of agricultural lands into wetlands.

### Linkages / Collaboration with Government Departments:

The project enjoys collaboration with various government ministries, especially the Ministry of Environment, Department of Forestry, which offers technical information on tree seedling selection and planting; National Environmental Management Authority (NEMA), providing technical information on environmental conservation; the Ministry of Agriculture and Livestock Development, offering extension services. Local and Provincial administration provide goodwill and protection for the project activities.

**Linkages with public and private organizations:**

Collaboration with VI Agro-forestry, a Non-governmental organization specializing in providing the correct tree species seeds and advice on tree planting to the local community has helped the school and beneficiary communities to successfully implement their activities. KAMWA SONDU a beekeeping community group based in Nyanza province also collaborate with the school and surrounding community. They provide training in apiary set up, management and harvesting as well as providing skills in constructing of the hives.

## 13.7 Sustainability:

In view of the income generated from the sale of honey and the local uses of the products, the project can easily be sustained.

## 13.8 Replicability:

The adoption of Apiculture by the local community around the school indicates that the project is replicable. With the resultant improvement in the biodiversity and natural resource base, coupled with the willingness of the beekeepers to improve their activities, makes bee keeping possible on a large-scale in TransNzoia and other districts in Kenya.

## 13.9 Limitations and Challenges:

Forest degradation remains one of the main challenges for beekeeping in the district and while some farmers are conserving the trees on their farms, the protected forest area continues to be grabbed and destroyed by unscrupulous people. With these areas being conserved the potential of beekeeping in poverty alleviation would be greatly increased.

The initial investment in the project is high and out of range for several small scale farmers. Steps have been taken to train local artisans to build the hives and other tools and equipment locally so that they are cheaper and readily available.

The disorganized market for honey and honey products means that the local farmers are exploited by middlemen and do not get the correct value for their produce.

## 14. Conclusion:

Apiculture has the potential to play a key role in the conservation of natural resources as well as in poverty alleviation interventions. This project has shown that advancing knowledge by sharing information, purchasing shared equipment and selling honey and other products can significantly contribute to conservation and poverty alleviation. However, beekeeping activities should be promoted in line with marketing promotion of bee products and the improvement of other livelihood sources to maximize its contribution to conservation and poverty alleviation. Cooperative marketing organizations that provide a convenient and honest outlet for beekeepers to sell their honey could significantly contribute to improved marketing and thus prices farmers are able to get for their produce.

Insufficient research has been done in the area of apiculture and this oversight of addressed will help fulfill the potential of Apiculture in conserving the natural resource base and alleviating poverty in Kenya. The starting point would be a study on apiculture production and consumption in Kenya. This study would provide quantitative evidence on the viability of the sector, and guidance as to how best to intervene for optimal results. It would also inform Government policy in both Agricultural production and environment.

Apiculture with the proper Policy and institutional support has the potential to become more prosperous and draw a large number of people out of poverty while fostering environmental conservation. *'If the bee disappears from the surface of the globe, human beings will have only four years to live- no bees; no pollination; no grass; no animals; no humans.' (Albert Einstein)*

## 15. Best Practice (7): SSIS Integrated Fish Farming Project

### 15.1 Problem Statement:

As the result of over fishing, pollution and outdated regulations, fish and other aquaculture resources are increasingly becoming scarce. This situation posed three implications: firstly, there reported a serious loss of biodiversity; secondly, the environment of the wetland is seriously deteriorated; and thirdly, household food security remained at stake.

### 15.2 Justification for Selection:

This project had been selected as a best practice because of its quick and high profitability within the context of a preserved environment, both the fauna and flora. Returns form this project would encourage many communities not to exploit their environment, albeit resort to rational use and conservation of the available resources.

## 15.3 Technical Approach: Design and Methodology:

In that context, the SSIS fish farming project is a pilot initiative meant to demonstrate sustainable utilization of the biodiversity in Lake Victoria, particularly Cat Fish and Common Carp (Ekisinja) in an integrated manner. In order to diversify the production base complementary porgrammes such as fruits and vegetable farming and poultry raising were injected. Following review of the project's design result based indicators on fish farming, income generation, biodiversity conservation and up-scaling were developed to catch the benefits.

## 15.4 The essence of Best Practice: Benefits and Lessons Learnt

It is evident that this project has a huge income potential generated from selling the fish, fees levied on training in pond construction and management, hatchery management, fertilization, stocking rate and the economic use of solar cookers.

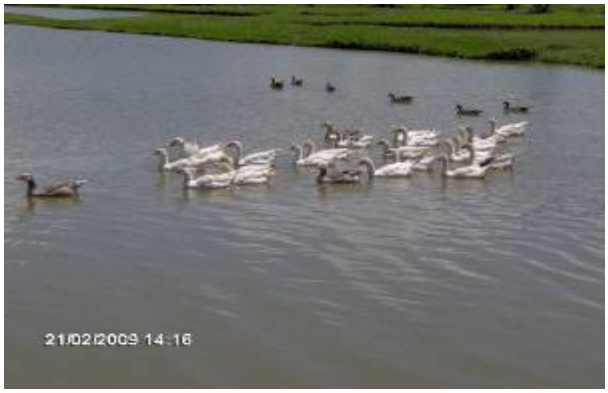


**Plate (1) Potentially Productive Pond late (2): Raising of Gees as Additional Income**

### 15.4.1 Sustainability:

The project has a good potential for sustainability, particularly generated form a number of activities such as training on hatchery management, fertilization of stock, and use of solar cooker. This in addition to selling of controlled catch of fish as well as dry fish, which will enable farmers to tap markets at remote distances.

### 15.4.2 Replicability:

It was evident during the documentation process that many people had already replicated the project and new comers were seen everyday asking for training in establishing similar porgrammes.

### 15.4.3 Limitation and Challenges:

The most outstanding challenges include fish predators in the ponds as well as those to the gees.

## 16 Conclusion:

To further consolidate and enhance dissemination and up-scaling of fish farming projects it is important that:

- launching of a pre-design survey to look into overall demand for fish, seasonal market prices, number of fishermen engaged in the business and availability of feed in the local market;
- the presence of a center of excellence to provide fish farmers with capacity support in pond construction and management, hatchery management, fertilization technique, breeding, caging, storage, small scale business management and book keeping;
- a divergent marketing strategy has to be tailored (1.8 MT of fish reportedly produced by the pilot project, let a side dissemination and up-scaling);
- transportation facilities with cold storage systems need to be introduced to enable farmers to tap remote marketing avenues with good prices;
- the presence of a robust predators management system (aquatic snakes, wild cat, etc…);

The above remarks constitute important issues when similar projects are to be newly designed, disseminated or up-scaled.

**Plate (3): Training on use of Solar Cooker**

**Plate (4): Use of Solar Cooker for Income**