

## TABLE OF CONTENTS

|   |    |
|---|----|
| TABLE OF CONTENTS .....                                 | 2  |
| 1. Introduction .....                                   | 5  |
| 1. Introduction .....                                   | 5  |
| 2. Best Practice Concept: Basic Definition .....        | 6  |
| 3. Best Practice number 1 .....                         | 6  |
| 3.1. Background .....                                   | 30 |
| 3.2. Problem Statement .....                            | 31 |
| 3.3. Justification for Selection (innovativeness) ..... | 31 |
| 3.4. Technical Approach: Design and Methodology .....   | 31 |
| 3.5. Partnership.....                                   | 32 |
| 3.6. The Essence of Best Practice.....                  | 32 |
| 3.6.1. Lesson Learnt.....                               | 32 |
| 3.6.2. Benefits .....                                   | 32 |
| 3.6.3. Sustainability .....                             | 33 |
| 3.6.4. Replicability.....                               | 34 |
| 3.6.5. Inclusiveness.....                               | 34 |
| 3.6.6. Limitations .....                                | 34 |
| 3.7. Conclusion.....                                    | 34 |
| 4. Best Practice number 2.....                          | 35 |
| 4.1. Background .....                                   | 35 |
| 4.2. Problem Statement .....                            | 35 |
| 4.3. Justification for selection (innovativeness).....  | 35 |
| 4.4. Technical Approach: Design and Methodology .....   | 36 |
| 4.5. Partnership.....                                   | 37 |
| 4.6. The Essence of Best Practice.....                  | 37 |
| 4.6.1. Lesson Learnt.....                               | 37 |
| 4.6.2. Benefits .....                                   | 37 |
| 4.6.3. Sustainability .....                             | 39 |
| 4.6.4. Replicability.....                               | 39 |
| 4.6.5. Inclusiveness.....                               | 40 |
| 4.6.6. Limitations .....                                | 40 |
| 4.7. Conclusion.....                                    | 40 |
| 5. Best Practice number 3.....                          | 41 |
| 5. 1. Background .....                                  | 41 |
| 5.2. Problem statement.....                             | 41 |
| 5.3. Justification for Selection (innovativeness) ..... | 42 |
| 5.4. Technical Approach: Design and Methodology .....   | 42 |
| 5.5. Partnership.....                                   | 43 |
| 5.6. The Essence of Best Practice.....                  | 43 |
| 5.6.1. Lesson Learnt.....                               | 43 |

|  |    |
|--|----|
| 5.6.2. Benefits .....                                  | 44 |
| 5.6.3. Sustainability .....                            | 45 |
| 5.6.4. Replicability .....                             | 45 |
| 5.6.5. Inclusiveness .....                             | 45 |
| 5.6.6. Limitations .....                               | 45 |
| 5.7. Conclusion.....                                   | 45 |
| 6. Best Practice number 4.....                         | 46 |
| 6.1. Background .....                                  | 46 |
| 6.2. Problem statement .....                           | 46 |
| 6.3. Justification for selection (innovativeness)..... | 47 |
| 6.4. Technical Approach: Design and Methodology .....  | 47 |
| 6.5. Partnership.....                                  | 48 |
| 6.6. The Essence of Best Practice.....                 | 48 |
| 6.6.1. Lesson Learnt .....                             | 48 |
| 6.6.2. Benefits .....                                  | 48 |
| 6.6.3. Sustainability .....                            | 50 |
| 6.6.4. Replicability .....                             | 51 |
| 6.6.5. Inclusiveness (Gender sensitive) .....          | 51 |
| 6.6.6. Limitations .....                               | 51 |
| 6.7. Conclusion.....                                   | 51 |
| 7. Best Practice number 5.....                         | 52 |
| 7.1. Background .....                                  | 52 |
| 7.2. Problem statement.....                            | 52 |
| 7.3. Justification for selection (innovativeness)..... | 53 |
| 7.4. Technical Approach: Design and Methodology .....  | 53 |
| 7.5. Partnership.....                                  | 54 |
| 7.6. The Essence of Best Practice.....                 | 54 |
| 7.6.1. Lesson Learnt .....                             | 54 |
| 7.6.2. Benefits .....                                  | 54 |
| 7.6.3. Sustainability .....                            | 56 |
| 7.6.4. Replicability .....                             | 56 |
| 7.6.5. Inclusiveness.....                              | 56 |
| 7.6.6. Limitations .....                               | 56 |
| 7.7. Conclusion.....                                   | 57 |
| Annex 1 : Ranking of Best Practices .....              | 59 |

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## 1. Introduction

Burundi, as many other countries of the Nile Basin, is facing a number of socio-economic and environmental challenges namely, land scarcity and land degradation due to over exploitation and soil erosion. Burundi is one of the ten poorest countries in the world with low gross domestic product largely due to civil wars. Burundi's main source of income is agriculture (90% subsistence), which accounted for 58% of the GDP in 1997. Agro-pastoral land use system dominates other economic activities and that intensives settlement by rural populations has led to deforestation, soil erosion and loss of habitat. Deforestation of the entire country is almost completely due to overpopulation, with a mere 230 square miles (600 km<sup>2</sup>) remaining with an ongoing loss of about 9% per annum.

In 2001, the Nile Basin states undertook a transboundary environmental review with the aim to guide the preparation of the Nile Transboundary Environmental Action Project (NTEAP). The NTEAP is one of the eight projects under the Nile Basin Initiative Shared Vision Programs (SVP) whose main objective is to provide a strategic environmental framework for the management of the transboundary resources and environment challenges in the Nile Basin. The project has implemented pilot activities within Nile basin countries, in collaboration with all stakeholders (local administration, NGOs, communities and schools), which positively impacted both the environment and the human wellbeing in terms of income generation and poverty reduction.

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. In September 2008, the first phase of best practice exercise had been successfully accomplished and 4 best practices were identified. These are: *(i) Improved Stoves-Beekeeping; (ii) Avocado Tree Grafting; (iii) Erosion Control and Improved Soil Fertility; and (iv) Women Mainstreaming in Participatory Forest Conservation and Reforestation.*

The second phase of best practice, conducted end of April 2009, added another 5 best practice projects, based on the fulfillment of a number of basic attributes judged through what is called the Sieve Process. These are : (i) Agro farming & Biogas installation Project (*School project*); (ii) Project of radical terraces arrangement integrated to sustainable agriculture and livestock; (iii) Restoration of Lake CohohaA biodiversity in favour of riparian population; iv) Project of water

hyacinth control integrated to the protection of the Akagera river watershed; and (iv) Project of delimitation of Ruvubu National Park. The sieving criteria used for the above best practices are:

- Contribute to environmental conservation and poverty reduction (15)
- Effectiveness/significant impact (15)
- Innovativeness (10)
- Efficiency (10)
- Replicability and up-scaling (10)
- Sustainability (10)
- Environmental education and awareness (EEA) (10)
- Inclusiveness (Gender sensitivity and vulnerable groups) (10)
- Enhance regional cooperation (10)

The table (annex 1) shows how the following best practices are ranked (out Of 100 marks) according to the applied attributed for each best practice.

## **2. Best Practice Concept: Basic Definition:**

Generally, the art of best practice asserts that it is an effective outcome (s) brought about by a particularly design, a technique, a process, a methodology and finally delivered with fewer complications. Operationally, in environmental management, the concept of BP, is literally defined as the most efficient and effective series of accomplishment that have proven desirable and sustain impact both on the resource base and beneficiaries which could further be replicated in other areas, advisably with recorded multiplier value. Specifically, as a conduct for knowledge management, the best practice concept facilitates wide exchange of information, enhances trading of sustainable good operating systems and promotes regional cooperation.

## **3. Best Practice (1): Improved Stoves /Bee-keeping:**

### **3.1 Background:**

Karuzi Province is characterised by hunger and poverty. With the objective to alleviate the effects of these problems, people initiated certain income generating activities, mostly brick manufacturing. Meeting the energy demand of brick making resulted into heavy deforestation which reportedly encroached over Ruvubu Park. Due to lack of firewood alternatives in the region, the association “**Dusanurivyasambutse**”, with the assistance of APRN/PEPB, a non-governmental organisation, initiated, in June 2006, an energy saving Project: Natural Resources Rational Management in Riverside area of Ruvubu National Park”, Karuzi Province.

This project, with NTEAP/MG Programme financial support of FBU 24 500 000 (USD 24 427), supported a number of activities namely, community based afforestation programmes, bee-keeping and improved stoves. Among these components, those relating to the “Improved stoves /Bee-keeping” were identified as best practices.

### 3.2 Problem Statement:

Karuzi Province is characterised by food insecurity and rampant poverty. In order to sustain their living, the local communities initiated certain income generating activities, mostly brick making. Meeting the energy demand of brick making forced people to resort to heavy deforestation which reportedly encroached over Ruvubu Park, further resulted into land degradation and consequently soil erosion.

### 3.3 Justification for Selection (innovativeness):

In the overall Nile Basin, deforestation ranks as a high environmental threat. Ruvubu National Park lies in the heart of this environmental threat. Reducing the pressure on this natural resource, a transboundary protected area, would positively contribute to reduced threat for the overall Nile Basin (**Table 1**). The impact of reduced wood cutting on the environment is obvious following the construction of more than 2111 improved stoves. This reduction involves, not only attenuation of the threat, but also the restoration of fertility. Stove manufacturing is a technology which was popularised and adopted in all micro-grants (MG) projects. The ‘bee-keeping’ component is an excellent integrated income-generating alternative to brick manufacturing that consumes much wood. Also this initiative made it possible for the beneficiaries to acquire knowledge and skills on stove manufacturing techniques, which enhanced further dissemination of the technology.

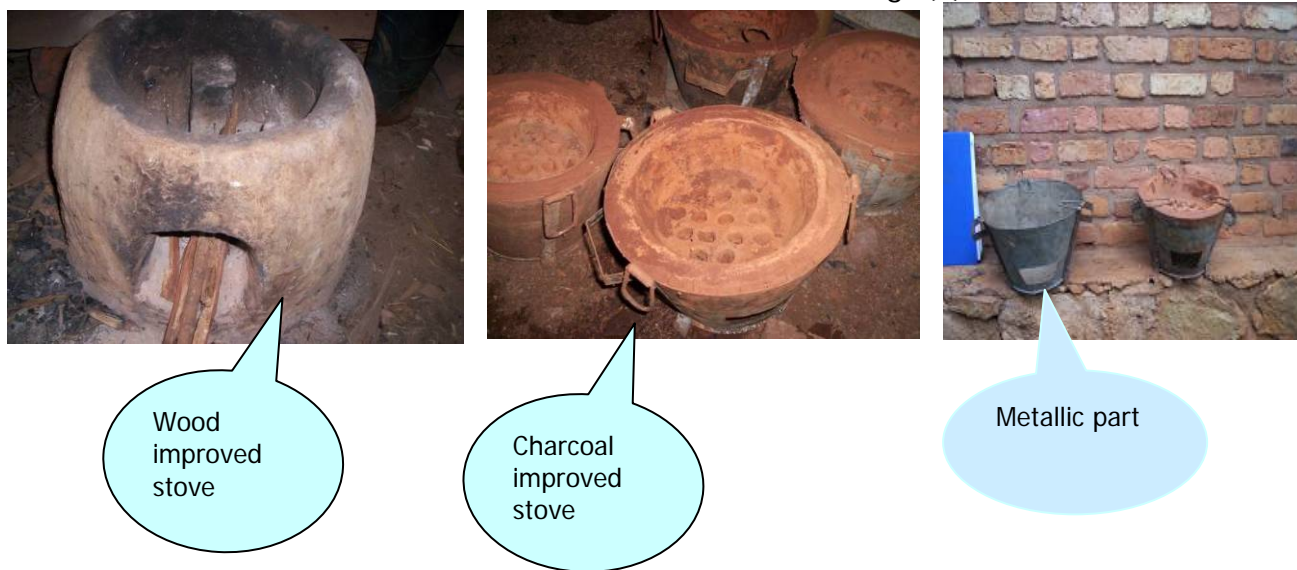
Table (2)

| Natural resources management | Transboundary nature                     | Impact  | Extent of Rreplication   | Originality                                     |
|------------------------------|--|---|--|---|
| Reduced wood consumption     | Reduced pressure on Ruvubu National Park | Improved stove manufacturing is a technology that was adopted in all NTEAP/ MG projects | Improved stove manufacturing technique is very simple and requires only local materials. The same is true for the manufacturing of modern hives. | Improved stove technology is new in the country |

### 3.4 Technical Approach: Design and Methodology:

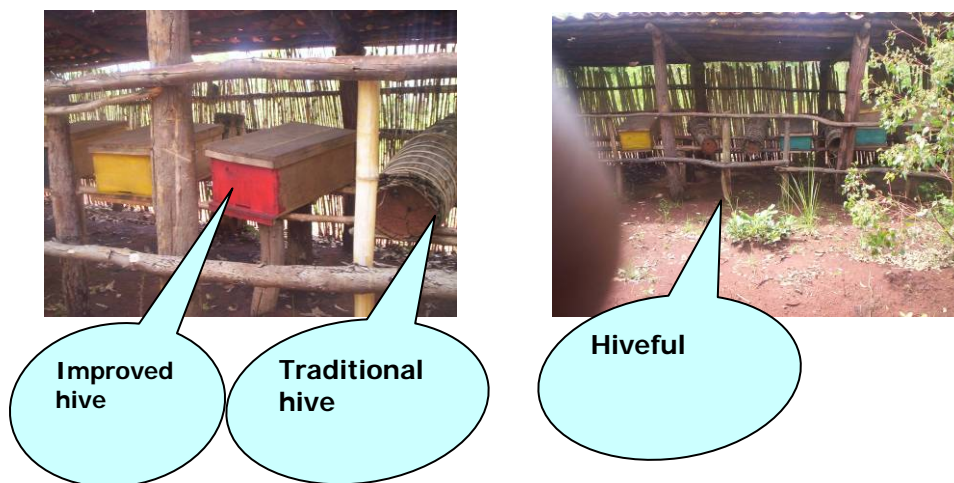
Improved stove are manufactured from local materials: clay, dung of cow, ash, grasses and mud. Even the metal part necessary in charcoal stove manufacturing is not difficult to obtain, mostly, recycled iron material (Fig 1).

Fig. (1)



The installation of hives requires only wood boards to be put together in order to manufacture them together with poles, nails and iron sheets for the construction of sheds (Fig. 2).

Fig (2)



The project's main strategy is four-fold: firstly, to enhance the capacities of beneficiaries in the manufacturing and use of alternate energy technology; secondly, to reduce tree cutting; thirdly, to increase household income through launching of new activities; and fourthly, to contribute to improved environmental quality and improved quality of life for households in Mutumba Commune. The key activities are mainly: (a) train and sensitise community members on environmental issues, bee-keeping and improved stoves; (b) carry be-keeping activities; and (c) design improved stoves; and (d) undertake farming activities. The established success indicators to assess the achievement of the immediate objectives are: 64 beneficiaries trained in the activities of improved stoves construction and bee-keeping; 2111 improved stoves constructed; and 100 improved hives built and kept functional.

### 3.5 Partnership:

The main stakeholders are: the project beneficiaries, APRP/PEPB non-governmental organisation that initiated the project, NIEWC, NTEAP/MG programme through its financial support, Provincial Directorate of Agriculture and Livestock and the Local government.

Fig (3)



Members of the  
association  
**Dusanurivyasambutse**

The Mutumba Commune conceded sites for the hives of the association and a plot of land for the construction of a warehouse / workshop.



Fig (4)



Hiveful site



Land for warehouse

### 3.6 Essence of the Best Practices:

#### 3.6.1 Benefits and lessons learnt:

The innovation, being newly introduced into the country, is built around a number of best practice key elements namely, reduced wood consumption, reduced pressure on Ruvubu National Park, improved stove manufacturing using simple materials, increased value of energy efficiency, enhanced energy conservation, generation of additional income at the household level and opening of new marketing avenues.

In the above context, following the introduction of 2,111 improved stoves, the total wood consumption at the household level for multiple uses has been reduced by 60%, which accounts for approximately 5,103 tons of wood per year. This reduction involves, not only attenuation of the threat, but also the restoration of soil fertility which results in a remarkable increase in the total production of many stable crops (..% in aggregate). Also it has been noticed that the total number of villagers getting into the park is reported to be less with time. The energy efficiency is manifested by use of less energy resource (.... Per household) and total time of cooking has been reduced from .... To... hours a day. On the other hand, brick making consumes a lot of wood: 5 tons per brick furnace. To give up brick making for three furnaces by **Dusanurivyasambutse** association members saved about 15 tons of wood per one bricks burning, which means 60 **tons** per year as **Dusanurivyasambutse** association was burning bricks four times per year. In this context, more than 201 000 trees were planted on state grounds.

The project also managed to construct 100 functional hives own by the community. As the result of the new marketing avenues for the trade of honey and selling of improved stoves, villagers have generated an additional income of approximately US\$ 750 Per household each season. This new income has significantly increased the purchasing power of households and further convinced thousands of villagers to totally abandon brick making and dwell more into the introduced environmental management innovation. Finally, a total number of .... villagers have been trained in the manufacturing, trading and efficient use of the improved stoves and the modern hives.

### **3.6.2 Sustainability:**

The accrued benefits of this project provided a good indicator for its sustainability. In order to constantly ascertain that, it is advisable to effectively explore new marketing avenues for its generated products, particularly the honey. Since that area is landlocked, such a strategy provided an incentive to engage more villagers in the business.

### **3.6.3 Replicability:**

The technique of construction of improved stoves in the rural area is very simple and cost effective since it requires only local materials. The same is true for the manufacture of the bee-keeping modern hives. It is for that reason that these two techniques can be easily replicated throughout the country. To construe, the improved stoves manufacturing was popularised successfully in all MG projects, particularly in Gatara, Kayanza, Makebuko, Muyinga, Mwaro, Kirundo, Ngozi, Muramvya, areas. The technology does not require financial expenses. Since the beneficiaries were sufficiently trained to master both techniques, dissemination through other communities is facilitated.

### **3.6.4 Limitations and Challenges:**

One of the main strengths of the project is that the Association has 100 functional modern hives and knowledgeable association members. A key limitation is that household members have no possibility of heating themselves during cold weather. As an alternative, a traditional stove was envisaged in parallel. Also there is always a sign of brittleness if the stove is exposed to the rain. Moreover, the project area is landlocked.

## **4. Conclusion:**

Consultation of various beneficiaries showed that a strategic orientation remains the role and the support to be provided by the councils of untargeted areas of Ruvubu Park in the promotion of improved stoves.

In addition, **Dusanurivyasambutse** should provide mobile training opportunities in order to curb the environmental threats to this significant zone of the basin. However, the challenge is to find a mechanism of subsistence remuneration of the staff of this training center.

## **5. Best Practice 2): Avocado Tree Grafting**

### **5.1 Background:**

At the national level, land degradation, severe deforestation and soil erosion stand as key environmental problems. The massive over cutting of forest resources resulted in a remarkable deterioration of the basin's catchment area as well as loss of farming lands. The immediate impact of these environmental problems is a strong run-off associated with increased gully erosion, loss of cultivable land, reduced soil fertility, decreased agricultural production and hence increased food insecurity.

In order to mitigate the above, the "Association Jeunesse – Providence – Agakura" initiated in February 2007, the Project: "Afforestation and Soil Restoration of Cene Watershed", which is located in Taba and Makebuko Communes, Gitega Province. The project is financially supported by NTEAP/MG programme with a total cost of BIF 23,471, 000 (USD 23, 471) and for a total duration of one year. The project adopted poverty reduction and soil management as main themes.

The main technical components of this project are: (a) forestation of CENE peak; (b) introduction of improved stoves; (c) breeding of porcine; and (d) grafting of avocado trees. Among the main technical components of the project, the innovative avocado tree grafting technique was identified as a best practice. Additionally, the technique is complementary to the forestation and the porcine breeding, since avocado fruits both improve the nutritional status and generate additional income to the beneficiaries. This has led to fast dissemination of grafted avocado tree seedlings among the population of the area. The innovative nature of the project stems from the fact that while it addresses environmental degradation, it simultaneously integrates food security and poverty reduction.

Fig (1)



Office of the  
association  
« Agakura » »

## 5.2 Problem Statement:

At the national level, land degradation, severe deforestation and soil erosion resulted in a remarkable deterioration of the basin's catchment area as well as loss of farming lands. The immediate impact of these environmental problems is a strong run-off associated with increased gully erosion, loss of cultivable land, reduced soil fertility, decreased agricultural production and hence increased food insecurity and rampant poverty.

## 5.3 Justification for Selection:

In the overall Nile Basin, soil degradation is regarded as a high threat by the Transboundary Environmental Analysis which triggers low agricultural productivity and hence food insecurity. Due to the vulnerability of the poor to environment degradation, it follows that simultaneously addressing environmental deterioration and food insecurity tends to enhance poverty reduction. To that effect, it was envisaged that production of grafted avocado tree seedlings and their dissemination among the population will make it possible in the short run to improve the nutritional level and the household income. Most importantly, the initiative allowed a significant number of young school dropouts to acquire knowledge on fruit trees grafting techniques. These young people further disseminate this knowledge in the zone and hence contribute to the wide scale adoption of improved food and nutrition. Concussively, Table (1) below shows how the "Avocado tree grafting technique" meets the selection criteria for best practices.

**Table (1)**

| <b>Natural Resources Management</b>       | <b>Transboundary Nature</b>  | <b>Impact</b>  | <b>Degree of Replication</b>  | <b>Originality</b>  |
|---|--|--|---|---|
| Poverty alleviation and soil conservation | The engagement of the youth, particularly school dropouts, in environmental management issues and awareness raising of community members in environment and food security. | Plantation throughout the country of grafted avocado trees in particular through the campaign of the Head of State | The grafting technique is very simple and does not require sophisticated materials. | The originality of the initiative lies in the integration of the young people in their own community through promoting technical approaches for better environment. |

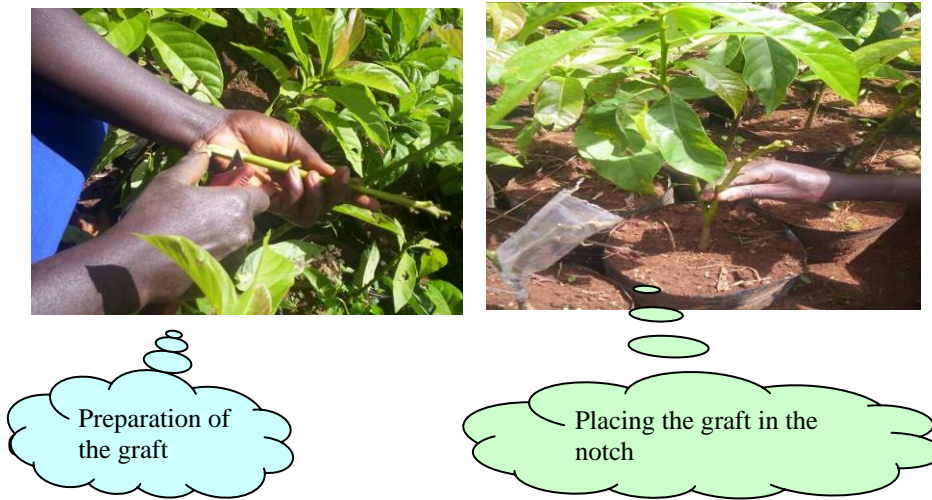
#### 5.4 Technical Approach: Design and Methodology:

Avocado tree grafting is a technique that does not require heavy and complicated inputs and materials (fig 2). It only requires shears, a knife, transparent plastic paper, an under stocks, a graft and benlate to disinfect the source material. Once these materials are available, the graft is prepared (Fig 3).

**Fig (2)**



**Fig (3)**



The association “Jeunesse – Providence – **Agakura**”, through the project of forestation and soil restoration of Cene watershed, has the global objective of contributing to the involvement of the youth of the region to get engaged in a series of activities that are meant to sensitise the members of the community to take a key role in environmental conservation and poverty reduction. A specific objective is to improve food security, conserve the environment and enhance local capacity in tree grafting. Indicators set forth to measure this immediate objective are: above 3000 avocado trees are grafted and planted; and above 100 young people are trained in avocado tree grafting technique and be able to disseminate knowledge to others.

The expected outcomes of the project include the following

- Project beneficiaries trained in avocado tree grafting techniques
- Increased food production and nutritional level of individual households
- Increased level of households income

The main activities of the grafting technique include training and sensitisation of community members on environmental issues, training of young people on grafting methodology, installation and maintenance of fruit trees seedbeds and wood park maintenance for grafts and under stocks (Fig 4).

**Fig (4)**



Demonstration session on avocado tree



Grafted avocado seedbed

In the framework of NTEAP/MG programme, in addition to grafting, the association 'Jeunesse – Providence – Agakura', through the project of forestation and soil restoration of Cene watershed, is involved in erosion control, livestock, forestation, and use of the improved stoves (Fig 5).

**Fig (5)**



Seedbeds: fruit and agro-forestry trees



Huge improved stove



**Porcine breeding**

### **5.5 Partnership:**

The main stakeholders are: The group of beneficiaries is composed of young people from Taba Zone; NTEAP/MG programme through its financial support; European Union through PREBU (Burundi Rehabilitation Programme) funding; Ministry of the Environment and Public Works; and the local government.

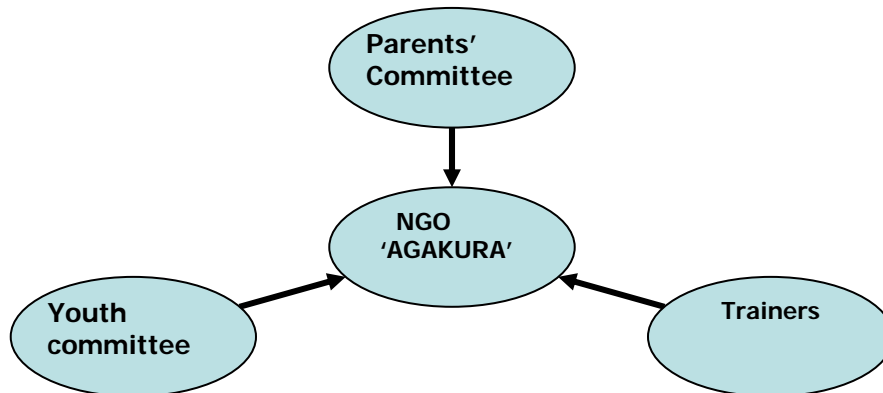


**Out-of-school youth in training**

The involved NGO benefited from a 35 hectares land for agriculture, livestock and forestry (20 hectares donated by Makebukoko Commune and 15 hectares Taba Commune). In addition a 40 ha concession on Mount CENE was availed to the NGO for afforestation. This association is managed by a legal representative and a Board of Trustees. The perceived incomes are re-injected in the Centre for the continuity of activities. For the beneficiaries, who are mainly the out-of-school young people, their major profit is the vocational training.



## Organisational Structure



### 5.6 Essence of the Best Practice:

#### 5.6.1 Benefits and Lessons Learnt:

The initiative allowed more than 100 young school drop outs from Musinga, Karuzi, Muramvya, Cankuzo and Kayanza Provinces to get engaged in the project activities and acquire knowledge and skills in fruit trees grafting techniques. Such capacity is a window of opportunity in support of rural employment in their areas. Currently, more than 3,000 grafted avocado trees were produced and disseminated to selected destinations. As a source of income, one grafted avocado tree is sold for 1, 000 Burundi francs making a total revenue of 3,000,000 Burundi francs. Avocado trees have a huge multiplier value in terms of direct income and food and nutrition if replicated in wider zones. This is evident by the reported increased demand for grafted fruit trees. Consequently, the Head of State launched a campaign encouraging people to grow more of avocado trees.

#### 5.6.2 Sustainability

The project is considered as an integrated model of environmental conservation, employment creation, food security and income generation and , as such, it can easily be sustained. However, it was envisaged that enough resources should be made available in order to sustain and replicate the outcomes of this project in many rural areas.

### **5.6.3 Replicability**

The grafting technique can be easily replicated everywhere else in the country. This is a simple technique that does not require sophisticated material. Many rural people from Musinga, Karuzi, Muramvya, Cankuzo, Kayanza Provinces benefited from training on the grafting technique and already applied the technique at home.

### **5.6.4 Limitations and Challenges**

## **6. Conclusion:**

Fruit tree grafting and adoption in many rural areas proved to be instrumental in enhancing food security and enabling households to generate additional income. An important initiative is the deployment of the school dropouts and their training in Avocado tree grafting so that they will be able to extend further skills to the rural population. The training programmes were tailored to deal with both environmental and poverty related issues.

The project proved to have a solid potential for a wide scale adoption, visible replication and can easily be sustained.

## **7. Best practice (3): Erosion Control and Improved Soil Fertility**

### **7.1 Background:**

In the catchment area of River Kagoma, Buhiga Commune, Karuzi Province, is an active zone of deforestation, erosion and hence loss of the soil fertility. As a consequence of that, sustainable livelihoods are seriously constrained. The entire population, particularly those of Rwanyinkukura are conscious that the solution to their problem lies in the use of an integrated use of the available resources in a sustained manner.

### **7.2 Problem Statement:**

The massive and continued destruction of vegetable cover following forest clearing, loss of arable land, reduced soil fertility and decline of agricultural productivity are detrimental to enhanced food security in the project area. In Karuzi Province, the deterioration of the catchment's buffer zones resulted in the loss of many farming lands hence food security has been seriously jeopardized and poverty is rampant.

### 7.3 Justification for Selection:

One of the most important factors that justified the selection of this project is the consensus among all the farmers that the solution to reduced soil fertility is the potential use of integrated farming techniques within the context of a preserved environment. Moreover, one success indicator of this technique that this initiative made it possible for the beneficiaries to acquire knowledge and skills on the integrated environment-cum sustainable technique (Table 1). As regards the environment, the adopted crop land should not exceed 4 Hectares. This reduction did not only led to the attenuation of the threat, but also the restoration of soil fertility.



Before integrated techniques



After integrated techniques

Table (1)

| Natural Reserve Management         | Transboundary Nnature  | Impact   | Extend of Replication  | Originality   |
|------------------------------------|--|--|--|---|
| Protection and improvement of soil | Reduced erosion on Kagoma catchment reduces environmental threat on Ruvubu and thus on the basin | The practice became popular in the region of Karuzi as regards protection and improvement of soils | <ul style="list-style-type: none"> <li>- Beneficiaries well trained as regards protection and improvement of soils</li> <li>- Technology can be easily applied in the country based on same integrated approach</li> </ul> | Regional demonstration centre for the rural communities |

## 7.4 Technical Approach: Design and Methodology:

In order to effectively address the above problem, the CBO “Rwanyinkukura”, initiated in June 2006, the pilot project: “Soil protection and food security”. With the NTEAP/MG programme financial support amounting to BIF 24 532 560 (USD 24, 460) for a total duration of twelve month, several components were considered namely, erosion control, soil improvement, improved stoves, seeds conservation and saving in the COOPEC. Among all the elements of the project, the component “Erosion Control and Improved Soil Fertility” was identified as a best practice. Nevertheless, this component did not remain isolated from the rest of the key design elements, albeit remained fully integrated with them. To construe, savings made it possible to purchase inputs such as essential fertilisers, seed conservation was viably linked to vegetable production and improved stoves limited the active removal of woodlots and contributed to erosion control.



The immediate objectives of the project are to: (a) reduce soil degradation; (b) enhance food security; (c) reduce poverty; and (d) perpetuate technical capacities. The indicators to measure the achievements of these objectives are: 50 beneficiaries trained in project activities; one cattle shed built; one bull and 4 cows bought; 3 calves born from initial livestock capital; 3 Hectares of potatoes planted; 3 hectares of fodder crops installed; one vegetable garden installed; and fruit and agro-forestry trees planted.

The expected outcomes include the following:

- Improved capacities of the beneficiaries
- Protection from soil erosion
- Restored soil fertility in Kagoma
- Improved cattle breeding
- Improved nutritional level for Kagoma households
- Increased incomes for beneficiary households

The main activities include: (a) installation of the contour lines; (b) planting of anti-erosive hedges containing *tripsacum laxicum* in mixture with *caliandra*, which makes it possible to control erosion and feed cattle;

(c) fertilisation of fields with organic manure and chemical fertilizer; (d) Cattle breeding for the production of manure; and (e) laying crop rotation mainly potato, corn, soybean and groundnuts.



## 7.5 Partnership:

Stakeholders are mainly: 25 association members including 13 women and 12 men.; TEAP/MG programme through its financial support; Provincial Directorate for Agriculture and Livestock; CDF (a national women organisation); WFP; FAO; INECN; Karuzi Credit Cooperative; Ministry for the Environment and Public Works.



Association members near a stock of beans

Karuzi availed to the partner NGO a four hectares land. Under the supervision of the “Burundi 2000 Plus Network” NGO, the CBO is managed by a committee of ten people. The perceived incomes are put into the account of the organisation to pay labour and maintain the animals. For the beneficiaries, who are mainly households, the profit from this association is the partial sharing of the harvested products.

## 7.6 The essence of the best Practice:

### 7.6.1 Benefits and lessons learnt:

- 50 beneficiaries trained in project activities: project management, financial management, breeding, production and use of manure' erosion control' construction and use of improved stoves and seed conservation.
- One cattle shed built



Cattle-shed

Improved-bred bull

- one bull and 5 cows purchased; 3 calves already in place
- Erosion control on 4 hectares reported
- Three hectares of potato and one hectares of corn planted
- Three hectares of fodder crops grown
- Seedbeds of fruit trees and agro-forestry trees rose.
- A seed conservation warehouse erected



The total benefits from the three hectares of potato and the same for cron generated a total income of 6, 000, 000 FBU. Moreover, increased incomes for beneficiary households, notably by selling seeds was 5, 400, 000 FBU.

#### **7.6.2 Sustainability:**

The fact that enough income is collected by farmers while the environment is kept intact guarantee the sustainability of the project.

#### **7.6.3 Replicability:**

The beneficiaries are very well trained in all soil management techniques in such a way that they can pass their knowledge to neighbouring communities. The soil management techniques used in Kagoma is easy to imitate especially that they use local materials. For all the above, the initiative became now a centre of attraction and training for rural communities and it continued to produce improved seeds for the farmers of the zone.

#### **7.6.4 Limitations and challenges:**

The main limitation is that sometimes the potential of marketing of the main products is poor.

Moreover, procurement of main inputs is constrained by lack of sufficient financial resources, probably during the peak season, despite the fact that demand for potato is high. Lastly, the cost of transporting the manure is high.

### **8. Conclusion:**

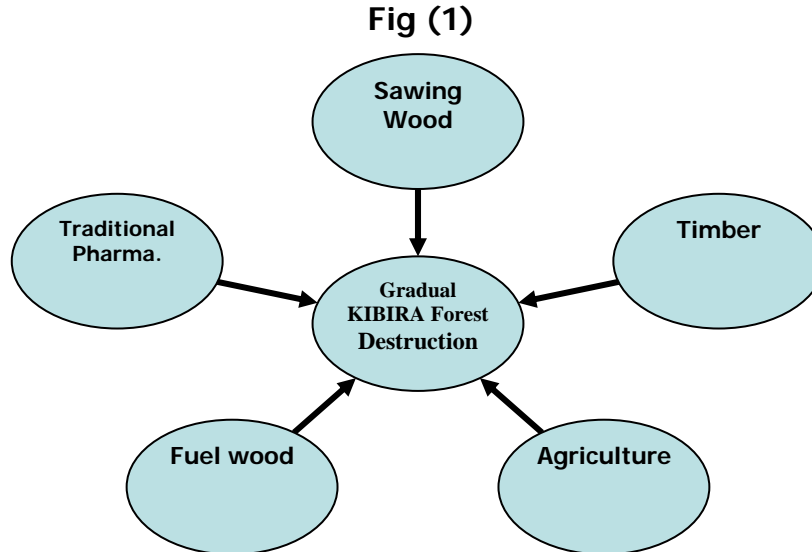
This best practice project represent a real integrated approach likely to halt erosion, restore fertility and indirectly increase agricultural production and reduce food insecurity. As a coherent group, the association seems to have sufficient assets that would enable them to sustain this project.

One key lesson is that the project represents a good example of integrated water catchment management that should be disseminated throughout the country.

## 9. Best Practice (4): Women Mainstreaming in Participatory Forest Conservation and Reforestation:

### 9.1 Background:

At the national level, the Kibira natural forest is in the heart of this environmental threat. The overexploitation of the natural resources by the population partly constitutes one of the principal causes of the progressive disappearance of this park and the degradation of the soil. This overexploitation manifested itself in many forms (diagram): (a) encroachment of agriculture on the forest belts; (b) wood cutting for construction and sawing; (c) cutting of firewood and removal of medicinal herbs (Fig 1).



The immediate symptoms /impacts of this situation are mainly deterioration of the Kibira forest cover, loss of diversity, strong run-off associated with increased erosion and loss of fertility. These symptoms are associated with non-existence of firewood alternatives, insufficient awareness or knowledge on sustainable resource use and practice and lack of reseeded of deteriorated areas.

### 9.2 Problem Statement:

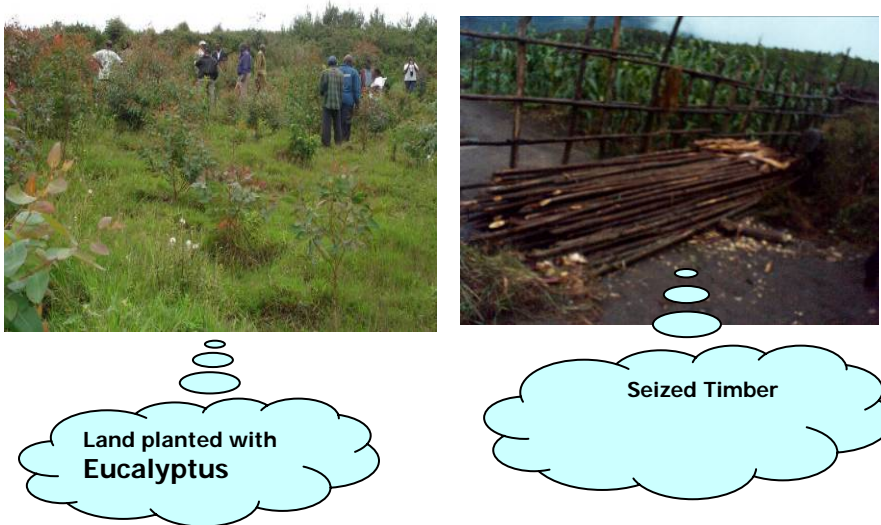


### 9.3 Justification For Selection:

In the overall Nile basin, deforestation ranks as a high environmental threat and the Kibira natural forest lies in the heart of this environmental threat. Reducing the pressure on this natural resource, a transboundary protected area, would positively contribute to reducing the threat for the overall Nile basin. In this regard, the impact of the plantation made by women of 350, 000 forest trees, particularly in the destroyed zones of Mpehe, is a good example to cite.

In connection to the above, it is not generally the habit of women to invest in afforestation, or in the monitoring of the natural forest up to the point of seizing poles cut by poachers (Fig 2).

Fig (2)



### 9.4 Technical Approach: Design and Methodology:

To help reducing the threat of the disappearance of the Kibira National Park, the Association "Dukingirikibira", (Fig 3) under the instigation of 'Association Femme Environnement du Burundi (AFEB)', initiated, in May 2006, the "Forest, Water and Soil Conservation Project on the catchments of Mubarazi River. This project, with NTEAP/MG programme financial support amounting to BIF 24 300 000 (USD 24 228) for a twelve-month period, has a number of key components namely, training and sensitisation of community members on the sustainable use of natural resources, erosion control and soil fertility restoration. The said project is located in Bugarama , Muramvya Province, on the Congo-Nile Watershed. In this project the part on: "Women Mainstreaming in Participatory Forest Conservation and Afforestation" was identified as a best practice.

**Fig (3)**

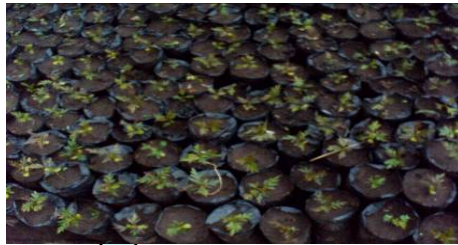


Through community public awareness of natural resource sustainable use, the main objective of this practice is to contribute to the socio-economic development of Kibira riparian population, but also to improve the protection of Mubarazi River catchment, through erosion control, soil restoration, use of organic manure and plant breeding. The immediate objectives of this initiative are to: regenerate the forest land, protect the Kibira natural resources and reduce poverty. The indicators identified to measure these immediate objectives are: 650 members of the community trained on project activities, specifically on the control of seedbeds; 400, 000 forestry and agro-forestry trees planted; 200 goats bred; two hectares of fodder were raised; and 10 cattle sheds built. The main outcomes include the following:

- Capacities of the beneficiaries improved;
- Environmental threat on the Kibira natural resources reduced;
- Kibira tree cutting halted down; and
- Soil protection attained.
- 400 000 forest trees planted. .
- 1500 members joined the Association.
- 650 association members trained on the seedbed management and erosion control (Fig 4).

The main activities of this project include, among others: (a) training and sensitisation of community members on environmental issues and forestry planting skills; (b) installation and maintenance of forest tree seedbeds; (c) plantation of forest trees; (d) construction of improved stoves; and (e) breeding of small livestock and cattle.

**FIG (4)**



### **9.5 Partnership:**

The main stakeholders include: The direct beneficiaries include the members of the association "Dukingirikibira" who are primarily women: 1400 women out of 1500 members; NTEAP/MG programme through its financial support; the Head of State for his financial support; WFP programme; NIEWC; the Ministry for the Environment and Public Works; and the local government.

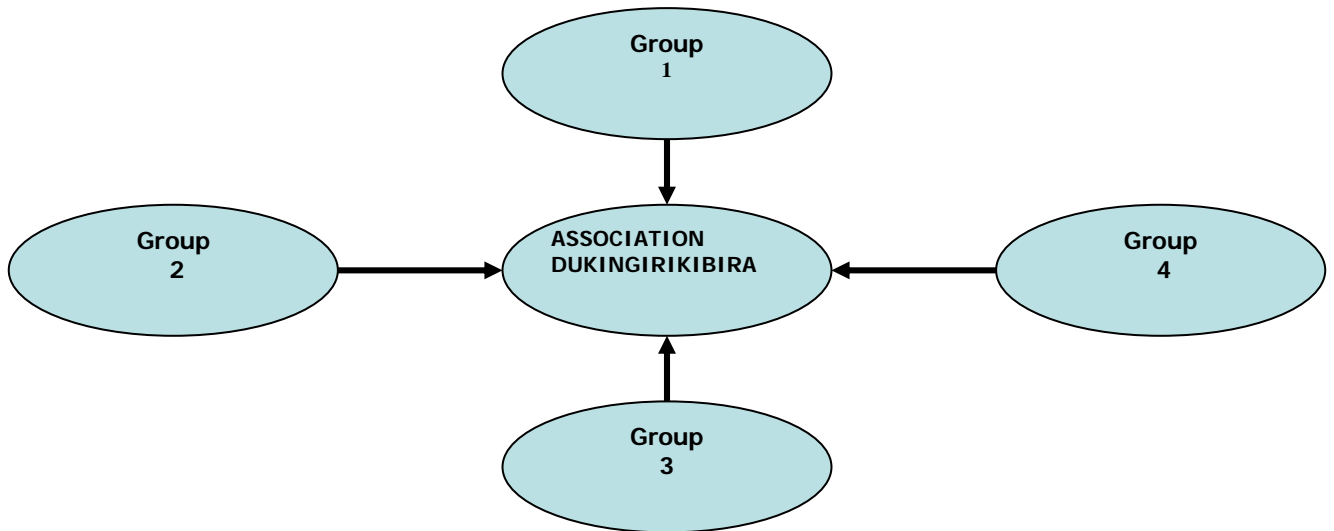
**Fig (5)**



**Members of the association "Dukingirikibira"**

This association "Dukingirikibira" consists of four community groupings and it is under the supervision of the NGO "Association Femme Environment du Burundi (AFEB)". It benefited from a piece of land and a warehouse by the Commune. A contract was drafted for the management of woodlots established on a state land between the association and the local government: 70% is done by the community, 20% by the local government and 10% by the forestry department. Management of the association is entrusted to a five member-central bureau elected by their peers, including a president and a vice-president. The structure of the organisation DUKINGIRIKIBIRA is presented in Fig (6) as follows:

**Fig (6)**



## 9.6 The Essence of the Best Practice:

### 9.6.1 Benefits and lessons learnt:

It was reported that due plantation amounted to 400, 000 viable forest trees covering a total area of 250 hectares of forest land. Moreover, the fraudulent cutting of trees in Kibira forest was reduced by 40%. Regarding the membership it was recorded that about 1500 new candidates joined the Association. Out of this number more than 650 association members were trained on the seedbed management and erosion control.

### 9.6.2 Sustainability:

The accrued benefits of this project are highly conducive for its sustainability. The fact that many other partners showed interest in the project, including WFP, the local Administration and the Head of State, entails that the project activates can easily be sustained.

### 9.6.3 Replicability:

The approach can easily be replicated elsewhere around Kibira where the forest was destroyed, since Kibira reforestation and protection is sanctioned in the national policy on environmental protection.

#### **9.6.4 Limitations and challenges:**

The main limitations and challenges include fund disbursement system is slow, few native forest or agro-forestry species were tested, lack of encouragement to disseminate the practices of forest sustainable use and too many beneficiaries to manage. Also the denunciation of the poachers is voluntary.

#### **10. Conclusion:**

The practice “Women Mainstreaming in Participatory Forest Conservation and Afforestation” relates to activities that only yield benefits in the medium or long term perspectives. This means despite the massive adhesion of most of the association members in the project activities, yet they failed to apprehend the accrued benefits of their engagement. It is not evident at this stage if the management of this project and the beneficiaries have the same vision on the protection of Kibira. It is therefore that maintaining the cohesion of such an important group remains a major challenge. Moreover, we should manage to create an area or activity of a common interest. For example, a seed manufacturing unit is likely to generate a shareable income in the short run, which could be used to maintain the mobilisation of these numerous women in order to safeguard the park. Keeping women innovatively engaged in common activities would avert the risk of being discouraged and deviated from the core mission of the Association which is environmental management by women living around Kibira.

#### **11. Best Practice (5) : Agro Farming and Biogas Installation:**

##### **11.1. Background**

The project of Gatara Secondary School is one of school projects supported by the NTEAP/EE&A in Burundi. That project is aiming at the sensitization and training of pupils and teachers on environmental conservation issues. By training pupils, the project is contributing to the national policy on environment protection as these pupils are among environmental conservation stakeholders in the future. The project is implanted in two phases. The first phase was the modern pigs breeding and was aiming at the training of pupils in improved livestock breeding and that activity is contributing to poverty reduction and soil fertilization and stabilization. The second phase is the construction and use of a biogas unit which is now contributing to the sensitization of pupils on the use of alternate sources of energy (the biogas) and training them on this new technique which enhances environmental conservation.

## **11.2. Problem Statement:**

It is well known that Kayanza Province is densely populated, leading to over exploitation and high loss of natural resources. At the school level where the project is implemented, it has been observed that there was a big quantity of remaining cooked food which was continuously thrown in the nearest valley leading to its pollution. So, pigs breeding project was identified as the appropriate way to address the issue of pollution by feeding pigs on those remains. But, at the same time excrement and urine from pigs should be used to produce biogas and manure for improving soil fertility. The utilization of Biogas contributes to reducing the use of firewood. Since the project is implemented, waste form digester is used to fertilize crops within the compound of the school.

## **11.3. Justification for Selection (innovativeness):**

Being the first one of its nature in Brundi, the integrated school project is the only one existing in the province of Kayanza. The practice of organic waste management by pigs breeding associated to biogas production is an efficient way to address the pollution problem. The benefits from the technology are two-fold: firstly, the biogas production contributes to reducing wood consumption; and secondly, the sludge is used as manure for crop production.

## **11.4. Technical Approach: Design and Methodology:**

The integrated project of biogas, as an alternative source of energy intends to enhance knowledge and awareness of school (pupils and teachers) and local communities in strategic practices that contribute efficiently to environmental conservation by reducing massive tree cutting and further controlling organic pollutants. The completed school project, funded by NTEAP, has been implemented in two phases namely, the pigs' breeding and the construction of the biogas infrastructure. Though the size of the biogas unit is very small, yet it fully saves as a demonstrative and didactic tool to train both pupils and local community on the biogas technique. People are receiving a blended practical training, combining pigs breeding and biogas techniques as an alternative source of energy. Conclusively, the project strategy is two-fold; firstly, to enhance capacity building both in pigs' breeding and alternate energy; and secondly, serves as a pilot activity in raising awareness on environmental protection. The outputs of the project are so many: (a) control of pollution; (b) enhanced capacity of both school and local communities in biogas and zero grazing; (c) improved soil fertility and crop production (banana, maize, beans, and sorghum); (d) income generated from selling pigs to local community; (e) improved food and nutrition at the school and additional energy for cooking and lighting from biogas; (vi) improved quality of local pigs breed.



**Pigs breeding fed by remaining cooked food**



**Biogas infrastructures that use pigs' manure**

### **11.5. Partnership:**

The MGP/NTEAP is providing financial support, study visits, and close follow up and monitoring; the Provincial Department of Agriculture and Livestock (DPAE) provides veterinary support for pigs treatment and breeding advises; other schools are also partners for exchanging ideas and knowledge; and local community which is benefiting indirectly from the project through the acquisition of knowledge and improved quality of pigs.

### **11.6. The Essence of Best Practice:**

#### **11.6.1. Lesson Learnt:**

The present best practice project takes into account two key issues namely, environmental education and awareness and accrued benefits. It addresses efficiently the issue of organic waste (pollution) and raises the knowledge of beneficiaries and the communities. Two main lessons learnt from the practice: firstly, the school can be used as a useful tool for transfer and dissemination of knowledge, techniques and skills without spending a lot of resources (money); and secondly, a challenge like pollutants can be changed into benefits.

#### **11.6.2. Benefits:**

The present best practice has many benefits. The first one is knowledge acquired by mass of pupils, teachers and neighborhood population. The school shelters more than 800 pupils and teachers, who are organized in the environmental club. Currently, they have good knowledge and awareness of the effective and efficient way to address pollution through the use of alternate sources of energy like biogas instead of firewood. They have been trained theoretically and practically in pigs breeding and biogas techniques. The Pupils explained how they learnt more from the associated infrastructures of biogas and pigs breeding and related benefits, namely: energy production from biogas that significantly reduced trees cutting, fertilization of soil with pigs' excrement instead of chemical fertilizers which are also a source of pollution.

The project started with 14 pigs bought with the support of NTEAP (in 2006), which multiplied and reached more than 100 pigs from which 80 had been sold for a total amount of 960,000 BF. Secondly, the school stopped buying fertilizers from outside and uses only organic fertilizer from its own stock farming which further saved 300,000 BF during each cultivation period (reported the Deputy Headmaster). Soil productivity of farming area (6 ha) increased three folds, as compared with the time before the use of waste from digester that is supplied with manure from the pigsty.



**School Fields Fertilized by Waste from Digester of Biogas Infrastructures**

Moreover the nutritional status of the pupils was improved, since they occasionally eat pigs' meat from the school pig breeding farm. In addition, remarkable improvement in the quality of the breed of pigs belonging to neighborhood communities was observed following crosses of local pigs with those males from the breeding farm. Finally, the project is contributing to reducing tree cutting and enhancing soil erosion control.

### **11.6.3. Sustainability:**

There are visible indicators of sustainability, which include, but not limited to: (a) the project is continuously generating income for self support; (b) there is a high need/demand of pigs' meat experienced by neighborhood population and others schools, which means that marketing is guaranteed; (c) as long as the school will exist, remaining food will be available for feeding pigs; consequently, pigs will feed the biogas unit and hence provides continuous organic manure for crop production; and (d) the hosting school of the best practice became a centre of excellence for training of members of other schools and communities, besides the provision of technical support during the implementation of similar practices under the same conditions.



#### **11.6.4. Replicability:**

The project will very soon be replicated in other schools, since many schools that visited the project expressed their willingness to implement such an integrated approach in their respective schools. In connection to this, Saint Pie Seminar School of Musinga Province had already replicated the project. Many pupils from the school negotiated with the headmaster of the school to get pigs at a lower price, so they could develop pig breeding and biogas in their own residence. Pupils explained that they had already convinced their parents on the importance of zero grazing practice that provides useful manure for crop production and how to make money through improved pig's breeding and the possibility of getting biogas for lighting and energy production. However, pig breeding needs appropriate equipment, technical breeding skills and disease control, since pigs are fragile vis-à-vis the diseases and need for permanent care. To increase the effectiveness of this best practice in the province or country level, the project should be up-scaled by increasing the number of pigs as well as the construction of more biogas units (digesters), particularly in all boarding schools, Hospitals and Prisons.

#### **11.6.5. Inclusiveness:**

The practice is very gender sensitive, because, among pupils and teachers are many girls. In the community, especially in rural areas women are the most involved in cultivation. Organic manure is affordable for poor people who are not able to buy chemical fertilizer.

#### **11.6.6. Limitations:**

The key limitations include: (a) insufficient veterinary medicines, (b) lack of disinfection infrastructure before reaching pigs compound to prevent diseases and contamination from outside; (c) insufficient food for pigs during the leave of the pupils; (d) carelessness of Pigsty for people who do not eat pigs; and (e) religious considerations.

### **12. Conclusion:**

The integrated school met its objectives by empowering pupils, teachers and communities both with environmental and productive skills. The project is really a best practice which can be easily replicated or up-scaled at national and regional levels. Though it is a pilot project, there are visible performance indicators which can inspire and motivate donors to provide much fund for replication and up scaling of the practice.

The sustainability of such project is guaranteed by the permanent income generated from pigs and organic fertilizers. For those who do not like pigs, they should use other domestic animals, but for boarding schools, pigs' breeding is the most appropriate approach, since it prevents pollution caused by food remains.

### **13. Best Practice (5) : Radial Terraces Arrangement For Sustainable Integrated Agriculture and livestock**

#### **13.1. Background**

The project. Radical Terraces Arrangement for Integrated sustainable Agriculture and Livestock, is located at Muyange Hill, in Kayanza Province, North of Burundi. The proponent is the Institut Catéchique Africain (ICA). The project aims at arranging and disseminating pilot and demonstrative radial terraces for integrated sustainable agriculture and livestock for the "Turimekijambere" CBO and show to the other people of the region how a high slope hill, valorized in a region with high population density, can be managed. Proposed activities are: Training and sensitization of community members on environment issues; capacity building on project management, improved cooking stoves, compost management, radical terraces arrangement and management; sustainable agriculture; cows' breeding; and forage and potatoes growing.

#### **13.2. Problem Statement:**

Kayanza Province is the most populated in Burundi, causing severe destruction of the environment which was aggravated by the war that destroyed most of the economic infrastructures, livestock and natural resources (vegetation, soil, and sources of water). The area, where the project is implemented, is characterized by a high slope and traditional agriculture practices that led to the destruction of the environment. The situation will be worsened if the existing challenges of soil erosion, loss of fertility and high acidity are not adequately addressed. Consequently, crop production will be seriously affected and the country will suffer from chronic hunger. In this respect, terraces, tree planting and integrated agriculture are the most appropriate ways to halt erosion and sustain crop production.

#### **13.3. Justification for Selection (innovativeness):**

ICA (Institut catéchique Africain) is the lonely one centre in the country where a multi-sectoral packages of improved techniques can be learnt, including soil erosion control, breeding, improved stoves, etc. ICA became the centre of acquisition of new reliable technologies and continued to promote their dissemination.

The project is attracting and inspiring many people from elsewhere, because of the remarkable achievements in terms of eradication of soil erosion and increased production from terraced fields.

#### **13.4. Technical Approach: Design and Methodology:**

The project is composed of four main integrated components of demonstrative and referral activities namely, radical terraces, agriculture, livestock and trees planting. The project strategy is two-fold: firstly, to make ICA (African Catechistic Institute) as a centre of knowledge dissemination for the development of integrated agriculture; and secondly, to enhance sustainable agricultural and livestock development through control of soil erosion. The project addressed these challenges by promoting soil erosion control activities associated with agriculture and livestock development.

Firstly, a pilot site, nearest the centre has been selected to demonstrate soil erosion control techniques. Responsible of the centre contacted NTEAP for financial support to farmers training and construction of pilots (demonstratives) radial terraces in the selected site. Local farmers were trained in terracing techniques before the commencement of terracing activities in the pilot site. After that, farmers received potatoes seeds in order to cultivate both in the pilot site and in their own fields. Secondly, trees nursery have been prepared and seedlings of forestry and agroforestry had been distributed to CBOs, Communes, Parishes, Military camps and individuals. There were fodders species among the agroforestry plants that served in feeding cows distributed to the same farmers. Through the implementation of the project, the capacity of local community was enhanced both in soil erosion control and improved integrated farming system combining agriculture with livestock breeding. Farmers had also been trained in improved stoves construction. The positive outcomes were that soil fertility was restored, agricultural production increased, the nutrition of local community improved and their productive capacity enhanced.



**ICA Compound**



**Pilot Site of Radial Terraces**

### **13.5. Partnership:**

The centre is operating under Catholic Church which provides the administrative infrastructure and framework. Other partners are MGP/NTEAP, WFP, Local administration, Others Parishes, Schools and the community.

### **13.6. The Essence of Best Practice:**

#### **13.6.1. Lesson Learnt:**

The present best practice eradicated soil erosion in the pilot site and increased crop production due to the integration of agriculture and livestock. A religious institution like ICA whose primary duty is theology teaching, became a very dynamic centre for generating and disseminating improved techniques and technologies both in soil erosion control and integrated agriculture. Finally, pilot activities that were so successful could motivate and attract many people.

#### **13.6.2. Benefits:**

The practice has many benefits for the environment, the community and the centre itself. The centre is now well known in the country as a model in transferring various skills and knowledge. In this regard, people are coming from elsewhere in the country to be trained in the centre and visiting the nearby pilot centre. At the beginning of the project, 16 local farmers had been trained in radial terraces; 15 local farmers were trained in breeding techniques, nutrition and disease treatment; 35 farmers trained in nursery tree management; and 20 persons were trained in improved stoves. Currently, most of these trained people at the first round are trainers of others farmers locally and out of the centre, so that the knowledge is being disseminated progressively around the province and the country.

Other achievements were:

- An integrated agriculture practiced in a very unfertile and marginal soil, which was later changed into a fertile and productive soil by terracing techniques and fertilization with organic manure;
- There were some good results from the improved soil: 4000 kg of sweet potatoes were produced on a ½ ha out of 300 kg of seeds;

- From the 14 cows originally distributed to farmers, a total number of 25 cows was reached through breeding and that each cow, fed with local fodders, produced up to 10 liters of milk per day with 4000 Bfr daily returns and that the monthly income of individual farmer estimated at 120000 Bfr. The households' nutrition was significantly improved and family members looked healthier. Cows also produced significant quantities dung used for crop fertilization;



**A Cow Distributed by ICA from NTEAP Funding**

- About 12,100 tree species for agroforestry had been produced and distributed to: (a) farmers from the association called in local language "DUKINGIRE ISI", means "Let us protect the land"; and (b) farmers from 4 communes (Muruta, Busiga, Gatara, Matongo); Parishes and Military camps. Really, tree planting activity effectively contributed to soil erosion control and restoration of soil fertility; and



**Trees of Kayanza Parish Distributed by ICA- NTEAP/MGP**

- The improved stoves used at the centre and by the families contributed to the reduction of tree cutting for firewood.

### **13.6.3. Sustainability:**

The sustainability of all these activities is guaranteed by: (a) the willing of ICA to expend the activities; (b) the awareness and positive change in the behavior of the community; (c) the presence of a good number of well trained technicians and farmers; and (d) the reliability of the centre vis-à-vis the donors. The fact that the centre is expending and disseminating similar activities though MGP/NTEAP funding, proved to be an indicator of the sustainability of the achievements.

### **13.6.4. Replicability:**

Since benefits from NTEAP support have been appreciated by the ICA, they decided to contact other donors for the replication and up-scaling of the pilot activities. So, ICA terraced other 2.2 ha; produced 145,000 plants for forestry and agroforestry and 5,000 of fruit plants in partnership with World Food Program (WFP). All these plants had been also been distributed in the neighborhood of the centre.

Trained farmers had implementing same activities in their own properties and they were found disseminating all good practices (terraces, zeros grazing, agroforestry, improved stoves) in the area, both by sensitization and training other farmers from the neighborhood (Butaganzwa, Kabarore and Kayanza Secondary School) and technicians form the centre were doing permanent technical follow up outside the centre.



**Radial Terraces Replicated at Kayanza High School with technical support of ICA**

At the present WFP is negotiating with the centre to implement improved stoves in all boarding schools, using the trained farmers from ICA.

Other donors like Food for the Hungry International expressed its willingness to collaborate with the centre in similar activities. Replication of this practice needs participation of many stakeholders (developers, donors, local authorities and community) and everyone has to play its role. Local authorities and community have to avail the land as their participation in kind, while developers and donors have to provide technical and financial support, respectively. A broad campaign of sensitization and mobilization is needed in order to mobilize more resources for replicating and up scaling the practice, so the impact will be more visible and effective at a broader scale.

#### **13.6.5. Inclusiveness:**

- about 60 % of trainers in terracing activity are women;
- six women out of 14 owners of cows are women; and
- priority is given to widows, orphans and other vulnerable groups in the selection of beneficiaries.

#### **13.6.6. Limitations and Challenges:**

The key limitations and challenges include, among others: (a) farmers do not have enough spaces for radical terraces implementation; (b) insufficient input (organic manure) for the valorization of terraces; (c) insufficient of veterinary services; and (d) insufficient number of cows.

#### **14. Conclusion:**

The completed project supported by MGP/NTEAP met its objectives. It is considered in the region as a real best practice, because, it transformed unusable land to very productive one and the soil erosion was effectively eradicated. Multi-disciplinary knowledge had been transferred to farmers among whom was a good number of women and other vulnerable groups. Participation of all stakeholders and mobilization of more resources are so important for the effectiveness of the practice in the province and the country at large.

## **15. Best Practice (7): Restoration of Lake Cohoha Biodiversity**

### **15. 1. Background:**

Before 19960, there was an important biodiversity in this region called Bugesera. After, that period, people come from other parts of the country and settled themselves in the region, causing destruction of natural resources (fauna and flora). Savanna with Acacia trees was destroyed and Lake Cohoha was drying progressively. The situation had been aggravated by a severe drought in 1998, when people were obliged to overexploit the wetlands and the lake banks, henceforth that the aquatic vegetation and associated fauna disappeared causing a big loss of biodiversity.

The above Microgrant project intends to protect Lake Cohoha and associated wetlands and watershed by providing support to Acacia and Phragmites tree planting activities around the Lake and improving agricultural techniques at nearest watershed of the lake. The project intends also to create environmental protection awareness within local communities of sector of Yaranda, Kirundo Province. So, the project will as well empower rural communities to put into action environmental activities that will protect Lake Cohoha and its associated wetlands and watersheds. The main planed activities to address the above challenges were: (a) organize sensitization meetings/campaign with local authorities and project beneficiaries; (b) production of *Acacia polyacantha* seedlings ; (c) planting of *Acacia polyacantha* trees ; (d) collect *phragmites* stumps ; (e) Planting of *phragmites*; (f) training of local communities on handicraft using *Cyperus papyrus* ; (g) construction of a shed for handicraft activities; and (h) erosion control activities on 20 Km on the Cohoha watershed.

### **15.2. Problem Statement:**

Lake Cohoha is threatened by riparian population, notably through agriculture activities and non appropriate fishing techniques, causing a big loss of biodiversity. The main challenges are the following : (a) uncontrolled water runoff leading to soil erosion from the surrounding uphill regions; (b) seasonal flooding, sedimentation and pollution of Lake Cohoha; (c) soil degradation due to lack of adequate vegetation cover; (d) soil and environment mismanagement emanating from poor farming techniques and general ignorance of the communities on issues of soil and environment conservation; (e) lack of alternative multi-usage wood resources for domestic and commercial requirements (construction wood, firewood, artisan purposes – basketry, carvings, furniture, food, etc); and (f) general poverty of the community characterized by malnutrition, diseases, lack of employment sources and opportunities.





Lake Cohoha banks seriously degraded by human activity

### 15.3. Justification for Selection (innovativeness):

The present project is an indicative for the ecological restoration of the biodiversity of Lake Cohoha in a sustainable manner. There are three innovative practices labeling the project: firstly, restoration of the environment by using indigenous tree species; secondly, extraction of raw for cottage industry (basketwork) without disturbing the stability of the wetland; and thirdly, restoration of fish breeding areas within the lake. All these practices are uniquely new in Burundi.

### 15.4. Technical Approach: Design and Methodology

The main objective of the project is to protect and restore the biodiversity of the lake and at the same time address the issue of food security. Specifically, the project is to: (a) sensitize local communities in the rational use of natural resources; (b) enhance sustainable agricultural production; and (c) restore the vegetation of lake banks. The Proponent of the project is an NGO called APRN, working around the whole country whose vocation is to protect natural resources for the well being of population in Burundi. The NGO, through financial support from the Microgrant project, planned the activities and organized the community members around Cohoha lake into association called "TUGARUKIRE IBIDUKIKIJE", which means let us protect the environment. The Proponent focused first on those activities which directly benefit the local community in order to motivate them to participate in the protection of the lake as well as restoration of the biodiversity. Members of the association were trained in basketworks such as bags, hats, roofs and other things made of *Cyperus papyrus* and *Typha dominguensis* material extracted from a marshland of 2 km<sup>2</sup> in a sustainable manner. A house had been constructed in order to avail a workplace for basket workers to keep and sell their products. Basketwork equipments and tools were also supplied to members of the association.

Secondly, the Proponent in collaboration with local community fit out an agricultural area of 5 km protected by contours with grass. Finally, an important activity was the production and planting of 12,000 seedlings of *acacias polyacantha* on 5 km and 168,000 cuttings of *Phragmites mauritianus* on 10 km along the lake banks.



*Phragmites mauritianus* Planted alongside the Lake      *Acacia polyacantha* Seedlings

Though some outputs like a house for handicraft activities; basketwork products and contours are yet visible, positive outcomes are expected in due course.



House for handicraft activities



Room within the house for basketwork

### 15.5. Partnership:

The main partners include APRN, MGP/NTEAP, INCN, DPAE/MINAGRI, PRASAB, local administration (Commune and Province) and the local community.

### 15.6. The Essence of Best Practice:

#### 15.6.1. Lesson Learnt

The most important output of this best practice was the restoration of lake banks and its biodiversity using indigenous species which were destroyed along time ago, so the practice contributed to saving endangered species from extinction. Added to that, *Phragmites mauritianus* planted at Lake Banks was appropriate in restoring the fish breeding area.

There were many good lessons learnt from the present best practice, these include: (a) it was possible to restore the original vegetation and save endangered species; (b) indigenous knowledge on basketwork could be valorized and improved; and (c) good example of sustainable use of natural resources following further deterioration.



*Sustainable Use of Cyperus papyrus and Typha dominguensis in Basketwork*

#### **15.6.2. Benefits:**

Ecologically, the present best practice contributed to protection of lake Cohoha and the whole wetlands around the lake from sedimentation caused by soil erosion from the nearest watershed. Vegetation surrounding the lake played the function of filter retaining soil and let pass only clear water into the lake, so that it contributed to water quality of the lake. The restoration of Phragmites' vegetation contributed significantly to the restoration of fish stock in the lake and other aquatic species, especially invertebrates. Consequently, the presence of fish and invertebrates will attract predators, especially some species of birds (ichthyovorous and insectivorous).

Economically, crops production increased within the fields protected by contours. Finally, basketwork products generated good income for the benefits of members of the association. Currently, they already produced about 25 bags with a value of 250 000 Bf; 15 heats with a value of 150000 Bf; 13 baskets with a value of 180000 Bf; 100 m<sup>2</sup> of roof with a value of 123000 Bf. Further replication and/or up-scaling of the project would generate enough resources for the women beneficiary groups. What is most important is that members of the association were well trained in basketwork. The project is just at the beginning stage and the market is guaranteed. The representative of APRN reported that that the demand is well behind the supply.

### **15.6.3. Sustainability:**

The sustainability of all these activities is guaranteed by: (a) the commitment and motivation of members of the association to expend the activities; (b) good knowledge and skills in basketwork for permanent income generation; (c) a good number of well trained people; and (d) local community behavior changed regarding the lake and associated wetlands.

### **15.6.4. Replicability:**

Technically, the ongoing project is easy to be replicated or up-scaled. The present project is just a pilot one which should be expanded around the total contour of the lake, so that the impact and effectiveness of the practice will be visible. There is a real need of financial support from donors. Local communities are committed and motivated to participate and offer their contribution in kind.

### **15.6.5. Inclusiveness:**

The execution of the project involved many women among whom were widows and orphans.

### **15.6.6. Limitations:**

The key limitations include, among others the following: (a) insufficient financial resource to cover the whole contour of the lake; (b) poverty; and (c) lack collaboration between the two neighboring countries, Rwanda and Burundi).

## **16. Conclusion:**

The ongoing project supported by MGP/NTEAP is a real best practice because it addressed both ecological aspects and social challenges. The practice will be more effective if it is replicated and up-scaled around the whole contour of the lake which means that more financial resources are needed. Collaboration between Burundi and Rwanda side is very important for a sustainable management of the Lake and the effectiveness of the conservation practices.

## **17. Best Practice (8): Integrated Water Hyacinth Control to Protection Akagera River Watershed**

### **17.1. Background:**

The Water Hyacinth is the major threat to fishing activities in the Akagera River as well as agricultural production in the marshland of Akagera. The project aims to remove the Water Hyacinth in the Akagera River and increase the value of that grass by using it as a substratum for mushroom cultivation, which would contribute to poverty alleviation of a large target community. The project will also implement erosion control and soil improvement activities and empower rural communities through sensitization, training, exchanging of experience and knowledge with communities of Rwanda, who already implemented a NTEAP/MG project on Water Hyacinth eradication. Planned activities include: (a) mobilization and sensitization of project beneficiaries on environment issues; (b) training of project beneficiaries on MG project activities; (c) Water Hyacinth removal; (d) composting; (e) mushroom cultivation; (f) erosion control activities; (g) goats breeding; (h) soil fertility improvement; and (h) project monitoring and community accountability.

### **17.2. Problem Statement:**

Two major problems encountered: firstly, the Water Hyacinth invaded Akagera River and associated wetland, so it is difficult to fish into the river and grow crops in the marshland; and secondly, People living in the area have no land for cultivation, because the watershed is very exposed to severe erosion hazards, so that crops are destroyed all the time. Consequently, there are persistent threats in and around the Akagera River, persistent chronic hunger and poverty in the area.

The appropriate ways to address these challenges is a strategic practice which is meant to use Water Hyacinth for integrated multipurpose activities namely, use it as raw material for basketwork, as substratum for mushroom cultivation and composting as crop fertilizer.



**Water Hyacinth Invading Kagera River and Wetlands**

### **17.3. Justification for Selection (innovativeness):**

The use of the noxious Water Hyacinth, both as fertilizer (compost) and substratum for mushroom cultivation is an innovative approach, which removes a key constraint to fishing, navigation and farming and simultaneously transforms that into a useful product of a monetary value. Moreover, since availability of fertilizer for agriculture is one of the main challenges that rural farmers face, Water Hyacinth availed organic fertilizer for crop production instead of costly chemical fertilizers.

### **17.4. Technical Approach: Design and Methodology**

The proponent, an NGO called Association for Sustainable Management of Biodiversity of Burundi) sensitized and organized local community into an association called “Tugwanye inkukura” whose meaning is “let us fight against the erosion” and began to discuss with local community the issue of developing agriculture on the eroded watershed and fishing within the river and wetlands colonized by Water Hyacinth. Finally, they agreed to undertake soil erosion control activities by implementing contours along the watershed and at the same time organize massive removal of Water Hyacinth from the wetland.

Local community, organized in association received financial and technical support from NTEAP/MGP for training, contours construction, hangar (workroom) construction, and Water Hyacinth physical removal.

Members of the association were trained in various themes including contours construction, mushroom cultivation, handicraft making, composting techniques and soil fertilization using compost made from Water Hyacinth. Removed Water Hyacinth is used to fertilize crops and as a substratum for mushroom cultivation.

Good results from this practice are already visible in crop production at the watershed level which is managed through 48 km of contours, soil improvement with Water Hyacinth compost and mushroom cultivation. Raw material resulted from the physical removal of the Hyacinth weeds is used to fabricate handicrafts as a source of income to households.

### **17.5. Partnership:**

Partners to the project are MGP/NTEAP for financial and technical support, WFP which provides food for work in contours activity; DPAE/MINAGRI for technical support in contours, University of Burundi as supplier of mushroom seeds, local administration (Commune and Province) and the local community.

### **17.6. The Essence of Best Practice**

#### **17.6.1. Lesson Learnt:**

The most important outcome of the practice is the restoration of the water quality of Kagera River and associated wetlands, through removal and utilization of Water Hyacinth in a set of profitable activities and the cessation of erosion at the watershed overhanging the wetland. Good lessons learnt from the present best practice are: (a) a threat like Water Hyacinth can be transformed into a useful product for income generation and social welfare; (b) the utilization of Water Hyacinth made compost as a fertilizer; and (c) cash returns from the products of transformation of the Water Hyacinth will motivate many people to get engaged in the physical removal of big quantities of the weed, hence significantly contribute to its eradication.

#### **17.6.2. Benefits:**

Ecologically, the practice contributed both to water quality improvement within the river and associated wetlands through the removal of Water Hyacinth and associated soil erosion control activities at the nearest watershed. Add to that, the aquatic biodiversity was restored, especially fish, invertebrates and birds. Form an economic point of view there were many accrued benefits:

- members of the association acquired knowledge in mushroom cultivation, soil erosion control and handicraft making;
- fish production significantly increased (more than three fold);
- the watershed overhanging the river valley was well protected against erosion by implementing contours which later ensured safe exploitation of the watershed;



**Contours on Watershed Overhanging Kagera River**

- soil erosion had been completely recessed and unfertile soil turned into a productive one where beans, Soya beans, maize, peanuts and banana were successfully cultivated;
- maritime navigation improved;
- some agroforestry and fruit trees were grown in association with the crops;
- for most of the crops, the harvest was two times a year and the production was increased by 30%, because of use compost;



**Composting Water Hyacinth for Crop Fertilization**

- regarding results from the utilization of Water Hyacinth as fertilizer, there was a great difference between plants fertilized with compost and those with zero fertilization; and





**Banana Plant Fertilized by Compost**



**Banana Plant non Fertilized**

- mushroom cultivation was generating continuous income of 22,000 Bf from a weekly production of 5 kg for each member of the association.



**Substratum for Mushroom**



**Cultivation of Mushroom on Substratum**

### **17.6.3. Sustainability:**

The sustainability of the practice is guaranteed by the following aspects: (a) the availability of raw material (Water Hyacinth) in huge quantities; (b) the commitment and motivation of members of the association to expand the activities; (c) good knowledge of all techniques related to Water Hyacinth transformation and use such as substratum preparation for mushroom preparation, compost for crop fertilization and handicraft making; (d) activities are lucrative.

#### **17.6.4. Replicability:**

The replicability and up scaling of all best practices identified by the project are very easy and each member of the association is committed to adopt at the family level, particularly mushroom cultivation and Water Hyacinth composting for agriculture. The project management had been told that people from Kirundo Province and Rwanda visited the practice and expressed their willingness to execute such activities related to potential use of Water Hyacinth. Regarding contours, there is already a programme to implant hundreds of kilometers along the watershed overhanging the Kagera River. The development of many kilometers of contours need more support either in kind (food for work) or in cash to pay the manpower. For mushroom cultivation, people should be trained in seeds production, because the insufficiency of mushroom seeds is one of the key limitations of massive production of edible mushroom. There is also a need of having enough and large canoes for extracting big quantity of Water Hyacinth for multipurpose use.

#### **17.6.5. Inclusiveness (Gender sensitive):**

Most of people involved in mushroom cultivation and basketwork were women who had been given the needed technical training to perform such activities.

#### **17.6.6. Limitations:**

The key limitations include insufficiency of funds for contours construction, insufficiency of mushroom seeds, insufficiency of canoes and lack of collaboration with community living on the other side of the river (Rwanda).

### **18. Conclusion**

The completed project supported by MGP/NTEAP is a real best practice because it addressed an important impediment to sustainable livelihoods which is the noxious Water Hyacinth and its further transformation into useful products. The replication and up scaling of the practice will increase its effectiveness both environmentally and economically. Albeit, it needs very heavy investment since there is a huge quantity of the weeds within the whole Kagera wetlands from up to down stream. Regarding mushroom cultivation, beneficiaries should be trained in seed production techniques for them to remain totally independent from the provider of seeds (National University of Burundi). It is also important to develop a regional cooperation framework, especially between Burundi and Rwanda in Water Hyacinth control in order to increase the effectiveness and sustainability of the practice.

## **19. Best Practice (9): Delimitation of Ruvubu National Park**

### **19.1. Background:**

The Ruvubu National Park is now threatened by riparian rural population who are cutting trees for firewood, hunting animals and destroying other natural resources inside the Park. It is then the project of Delimitation of the Ruvubu National Park is intended to erect a life fence around Ruvubu National Park with appropriate species to: (a) reduce the incidents of escaping of the wild animals from the park; (b) breed goats in order to provide meat to riparian population, including former poachers; (c) restore the forestation around the park; (d) implement erosion control activities; and (e) use improved cooking stoves in order to reduce trees cutting in that Ruvubu National Park. The proponent of the project is an NGO "Dukingiribidukikije": Let Us Protect Our Environment" is entrusted undertake following activities: firstly, training and sensitization of community members on environment issues; secondly, afforestation and erosion control techniques; thirdly, improved goats breeding; and fourthly, production and dissemination of improved cooking stoves. The expected outputs are: 200 project beneficiaries trained on project activities; 10 km of natural fence installed around the park; construction and dissemination of 200 improved cooking stoves; breeding of 400 goats; 200,000 forestry plantations, agroforestry and fruits trees planted on 37 hectares and adoption of some erosion control activities.

### **19.2. Problem Statement:**

There were serious threats facing Ruvubu National Park due to poaching activities from riparian population. Most of these poachers were arrested and their properties were usually sold in order for them to be able to pay charges. Outside the Park, most of people were repatriated from Tanzania without enough means for them to survive, so they were obliged to encroach over the resources of Ruvubu National Park. Consequently, fauna and flora of the Park had been severely degraded and/or lost. The erection of the life fence along the contours of the park and the implementation of some income generating activities for the benefits of riparian communities, through participatory approach proved to be the most effective ways to address the environmental challenges within the Park.

### 19.3. Justification for Selection (innovativeness):

Theoretically, the approach of community participation in protection of reserved areas, is well known in Burundi, but it has not yet been realized in an integrated manner where environmental protection is usually enhanced through economic incentives to beneficiaries. Not only that, but also Poaching has been eliminated and that former poachers changed into active protectors of the National Park. That why the practice is labeled to be innovative in nature.

### 19.4. Technical Approach: Design and Methodology:

Most of the park riparian residents were repatriated people from Tanzania among whom are the potential poachers who are always arrested by the local administration. The proponents of the project (Dukingiribidukikije/Local NGO) discussed with local administration and NTEAP/MGP the issue of framers and poachers who became more vulnerable and the simultaneously trying to protect the biodiversity of Ruvubu National Park. So, an integrated project had been identified, its activities were defined and NTEAP provided the financial support. The proponent began to sensitize and trained local community in various components related to environmental protection and sustainable use of natural resources. Training was followed by the implementation of activities like, contours sustained with grass; reforestation; composting; goats breeding and fabricating improved stoves.



Grasses on Contours for Erosion Control Goats Potential Source of Manure for Fertilization

So, former poachers changed their behavior and attitudes towards Ruvubu National Park and currently are effectively participating in its protection, especially the erection of the life fence around the Park.

## **19.5. Partnership:**

The Partners to the project are MGP/NTEAP for financial and technical support; FAO is provided seeds of maize and cassava; CARITAS for fruits seeds and nursery garden of agroforestry trees; WFP for food for work; DPAE/MINAGRI for technical support in contours; PRASAB in irrigation; Local administration (Commune and Province) and local community in facilitating sensitization and training.

## **19.6. The Essence of Best Practice:**

### **19.6.1. Lesson Learnt:**

Good lesson learnt from the present best practice, is that farmers poachers and the whole community can be changed into motivated and devoted protectors of the National Park, through the implementation of some income generation activities that provide cash incentives to the target groups.

### **19.6.2. Benefits:**

Ecologically, the practice (project) contributed to: (a) biodiversity conservation by and elimination of poaching through the erection of a thorny fence that made a thickly clump preventing animal from exiting; (b) soil erosion control; (c) reduction of deforestation through the promotion of improved stoves.



**Improved Stove Contributing to Low Consumption of Woods**



**Life Thorny Fence Around Ruvubu National Park**

Economically, many benefits resulted from the practice: (a) members of the association acquired knowledge in soil erosion control through contours construction, improved stoves making and goats breeding; (b) food security through food for work; (c) availability of protein and manure from goats; (d) increased crop production within terraces protected by contours and grasses; (e) acquisition of improved stoves which proved very efficient in terms of wood consumption and time saving; and (f) crop protected from destruction by wild animals. It was reported that before the delimitation of the National Park with the life fence, at least, 40 hectares of crops were destroyed each cropping season by animals from the park. At least, 200 families participated and benefited from the project achievements and that 190 families received food for work. There were 40 trained people in various discipline namely, environment and biodiversity conservation, tourism, contours lines, zero grazing breeding and improved stoves. Participants of this training were 20 local leaders, agronomy technicians and agronomy monitors. More than 200 farmers were trained in contours lines and in improved stoves making; 20 responsible of hills committee were trained in nursery management; four meeting for sensitization of local community in fire bush protection, contours management and protection of the fence around Ruvubu National Park; 400 goats distributed to farmers, they bred and the current total number of goats in the community is around 1200 with multiple advantages namely, meat, income generation, manure for crop fertilization and social cohesion; 10 km of fence; 120 km of contours; 1 hectare of grass (French Cameroon); 350,000 tree seedlings planted; 80 hectares of reforestation; 40,000 plants distributed and planted in family plots; 320 composting infrastructures; and manufacturing and distribution of 300 improved stoves.

The above achievements contributed positively both to the conservation of Ruvubu National Park biodiversity and the community wellbeing. Members of the association testified that they were making revenue generated either from selling goats or crops production.

One of them reported that during the last season he made a profit of 300,000 Bf by selling products from his field protected by contours and fertilized with manure. So that he was able to take care of his respective family and pay school fees for his children.

### **19.6.3. Sustainability:**

The sustainability of the best practice is guaranteed by following elements: (a) beneficiaries acquired multidisciplinary knowledge; (b) the commitment and motivation of beneficiaries to expend the practice; (c) people are still ensuring the maintenance of existing contours and planted trees, planting other trees and grass and preparing new documents for fund mobilization from potential, although the NTEAP/MGP supported project is completed; (d) beneficiaries are fully conscious of the importance of environment and biodiversity conservation and their responsibility towards the protection of Ruvubu National Park.

### **19.6.4. Replicability:**

The replicability and up scaling of the best practice is very easy. The proponent NGO (Dukingiribidukikije) is planed to extend the fence for more than 7 km., albeit the practice should be replicated and up scaled in all hills surrounding the National Park and in Tanzania side, in order to increase the effectiveness of the practice. All residents of hills surrounding the National Park and people living on the other side (Tanzania) of the Park should be sensitized, trained and supported in similar income generating activities which need more funding from the Government and Donors. Good signs are already observed in the area, members of the proponent NGO are committed to undertake similar practices at their family level; yet, they are doing contours in their own land, making improved stoves and buying themselves more goats and cows in order to get more manure, more protein for improved nutrition of their families and making money from selling domestic animals and crops products.

### **19.6.5. Inclusiveness:**

The practice is very inclusive, because, among 200 direct beneficiaries there were 80 women, 30 widows, 15 orphans, 11 old men, 7 former soldiers and 30 Twa (pygmy) where about 60% of them were repatriated people from Tanzania.

### **19.6.6. Limitations:**

The main limitations include the following:

- inadequate funding to fence the whole contour of the National Park and construction of contours;
- incapacity of controlling Tanzania side of Ruvubu National Park;
- availability of termites which destroy trees and fodders; and

- insufficient care and medicine for the treatment of goats

## **20. Conclusion:**

The completed project supported by MGP/NTEAP proved to be a real best practice because it addressed both the environmental threats and livelihood challenges. The replication and up scaling of the practice around the whole park will increase its effectiveness. The implication of local leaders and collaboration between Burundi and Tanzania is very important for the success of the conservation of Ruvubu National Park.



| Best practices for the benefits of riparian population  | Sieve Criteria                             |                |                 |                 |                                |                     |                                       |                    |                          | Total marks |
|---|--|----------------|-----------------|-----------------|--------------------------------|---------------------|---------------------------------------|--------------------|--------------------------|-------------|
|   | Envir. Conserv. and poverty reduction (15) | S. Impact (15) | Innovative (10) | Efficiency (10) | Replicability /up-scaling (10) | Sustainability (10) | Envir. Educat. & Awareness (EEA) (10) | Inclusiveness (10) | Regional cooperation (5) |             |
| Restoration of lac Cohoha Biodiversity  | 10   | 8              | 9               | 9               | 8                              | 8                   | 8                                     | 9                  | 3                        | 72          |
| Project of delimitation of Ruvubu National Park   | 13   | 13             | 8               | 9               | 9                              | 9                   | 8                                     | 8                  | 3                        | 80          |
| Project of radical terraces integrated agriculture and livestock                              | 13   | 13             | 8               | 9               | 9                              | 8                   | 9                                     | 9                  | -                        | 78          |
| Agro farming & Biogas installation Project (School project)                                   | 13   | 10             | 9               | 9               | 8                              | 8                   | 9                                     | 8                  | -                        | 74          |
| Project of water hyacinth control integrated to the protection of the Akagera river watershed | 10   | 8              | 9               | 9               | 8                              | 8                   | 8                                     | 9                  | 3                        | 72          |

## **Annex 1 : Ranking of Best Practices**