Nile Equatorial Lakes Subsidiary Action Program

MARA TRANSBOUNDARY INTEGRATED WATER RESOURCES MANAGEMENT AND DEVELOPMENT PROJECT

Final Report – Annex 4

Cross-cutting activities

***Final Version* – December 2012**

Document Quality Information

General information

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Project title	Feasibility Study for Integrated Watershed Management and Preparation of Investment Project Proposal for the Mara River Basin
Document title	Final Report – Annex 4 – Cross-cutting activities
Date	December 2012
Reference	RED 123009 H

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History of modifications

Version	Date	Written by:	Review by:
Version 1	27th Dec 2012	Jean-Marc ROUSSEL, Team Leader France BAILLY-MARION, Environmentalist	Emmanuel DAVAL, Project Director
Version 2	31st Dec 2012	Jean-Marc ROUSSEL, Team Leader France BAILLY-MARION, Environmentalist	Emmanuel DAVAL, Project Director

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List of Abbreviations and Acronyms

a.s.l.	above sea level
AI	Artificial insemination
IWM	Integrated Watershed Management
IWMP	Integrated Watershed Management Project
LGA	Local Government Authorities
MRB	Mara River Basin
NELSAP	Nile Equatorial Lakes Subsidiary Action Program
NGO	Non-Governmental Organisation
PDO	Protected Designation of Origin
PGI	Protected Geographical Indication
PMU	Project Management Unit
SWM	Sustainable Wetland Management
SWOT	Strengths, Weaknesses, Opportunities and Threats

1. INTRODUCTION

EGIS has been committed by the Mara River Basin Project – Project Management Unit to provide a preliminary investment project for Integrated watershed management through feasibility type studies.

The present document is the fourth annex of the Final Report for Mara River Basin IWMP.

FINAL REPORT	
Main report	Investment Project Proposal
Annex 1	Watershed Management and Investment Plan
Annex 2	Sustainable Wetlands Management and Investment Plan
Annex 3	Water quality and Sanitation and Investment Plan
Annex 4	**Cross-cutting activities**

2. GENERAL PRESENTATION

2.1. GENERAL CONTEXT

The Mara River Basin (MRB) Management Project is one of the three transboundary integrated water resources management and development projects being implemented within the framework of the Nile Equatorial Lakes Subsidiary Action Program (NELSAP), an investment program of the Nile Basin Initiative. The MRB project targets economic growth opportunities through co-operative management of the shared water resources amongst Nile Equatorial Lakes countries, to alleviate poverty, enhance economic growth and reverse environmental degradation. It also contributes towards the wider Nile Basin Initiative (NBI) goal of achieving sustainable socio-economic development through equitable utilization of, and benefit from, the common Nile Basin water resources.

The MRB basin originates from the Mau escarpment and upper swamps in Kenya and drains into Lake Victoria. This catchment have experienced significant land use changes over the past years due, in particular, to increasing population pressure, as local inhabitants continue to clear forests and drain wetlands to create new agricultural land and establish new settlements.

The fast population growth in the MRB basin has led to excessive land fragmentation and has pushed farming activities into marginal areas that are vulnerable to soil erosion and nutrient loss; it has also led to increased encroachment of ecologically fragile areas such as wetlands and springs, riverbanks and protected forests (Mau forest and woodlands on hills) for farming purposes, charcoal making and illegal lumbering.

These trends threaten the future livelihood of the people and livestock as well as biodiversity and wildlife in the Maasai Mara/Serengeti Reserves. The current degradation of the basin, notably through deforestation and wetland degradation arises new challenges, like the steadily decline of average discharge in rivers during the dry seasons over the years and increased flash floods and high sediment transport during rainy seasons. Water scarcity and growing food insufficiency are some of the major issues facing these basins and the situation is expected to get worse as the population increases and as demand by the different water use sectors outmatches the existing supply and is exacerbated by the imminent effects of climate change.

Further, several sources of pollution like poorly controlled effluent discharges from mining industry (including small scale miners), sewage outflows and solid wastes from the few fast-growing urban centres, the nutrient and agro-chemical pollution from diffuse sources, have negatively impacted surface water and groundwater quality.

The Mara River Basin is also home to the World Renowned Maasai Mara-Serengeti ecosystem. Sustainable wildlife management and tourism development are central to the economic development of the Mara river basin, as well as the countries at large. Without effective and sustainable watershed conservation efforts, there will be inadequate water for wildlife and tourism services thus threatening these conservation areas, with negative consequences on revenue from tourism that supports the economic development of the countries. The ecosystems have potential livelihood opportunities especially for the communities to improve their socio economic standards through strengthening the Wildlife Management Areas (Serengeti) and Wildlife Conservancies Areas (Maasai Mara) in the context of integrated watershed management. Promoting investments in the basin will improve the current living standards of the basin population and allow the poor to tap the benefits from the resources endowment of the Mara River Basin.

An Integrated Watershed Management Project is therefore necessary to address the above issues and contribute towards reversal of the current trend of catchments degradation, without losing sight of the need to ensure livelihood for the whole population and also water of good quality and quantity.

The proposed project will address critical trans-boundary problems of pollution, soil erosion and loss of biodiversity and share of water resource, but also enhance collaboration between communities across the common border between Kenya and Tanzania and more so strengthen regional cooperation.

The present report on Cross-cutting activities, as a part of the investment proposal, needs to be read in conjunction with the Main Report, which presents the project components.

2.2. CROSS-CUTTING ISSUES

Three sector projects have been defined and presented in detail in Annexes 1 to 3; they relate to Watershed management, Wetland management and Sanitation & Water quality. The Consultant considers that important activities should be included in the investment program, even if they cannot be included in one of these sector projects in particular, because they have cross-cutting characteristics which make them act in synergy with the sector projects and affect, and be affected by, the outcomes and outputs of these projects.

The most relevant “transversal” types of activities that have come to light during the project preparation and are not yet taken for study or implementation under other projects/programs are:

- Energy saving, because currently the main and almost only source of energy is biomass, used as wood or as charcoal;
- Market research for watershed products and development of a Mara river label
- Cattle breeding, because improving the breeds and the livestock farming methods will have a strong impact on watershed management and on poverty reduction, both in upper hill areas and in lower plains.

2.3. CONSTRAINTS

Energy saving is a topic that reaches far beyond Watershed Management; measures proposed in the present report will not be a full and definitive answer to the energy issue in the Mara River Basin, but intends only to bring some relief on the biomass production pressure. Other elements may bring stronger impact: diversification of energy sources through rural electrification programmes, national incentives for renewable energy generation, large national energy saving campaigns… These possible actions are not considered in the current report, which concentrates on what can be done within the scope of an Integrated Watershed Management Plan aimed at sustainable reduction of poverty.

Cattle breeding, under different forms and practices according to the local conditions and traditions, has an important role, not only in economic terms but also in social terms. This is why introduction of new breeds of cows, goats and sheep, which is required by local government officers and by community leaders, can also be resisted because of long established traditions. Moreover, the number of cattle heads is so high that the transition period towards selected breeds will be long, in any case, and impacts will take time before they are clearly perceived by the stakeholders.

Similarly, the efforts to establish a Mara River label for a number of selected items (dairy products, honey, fruit, vegetables…) cannot be acknowledged in a short time: it will take years before the quality and quantity of the products are sufficiently established as good and stable to be rewarded with a quality label.

3. JUSTIFICATION OF THE CROSS-CUTTING ACTIVITIES

The Integrated Watershed Management Plan is built around the main projects of Watershed Management, Wetlands Management and Sanitation & Water Quality. Yet, to make the plan complete, other activities which are transversal to these projects need to be mentioned.

As an example, Watershed Management includes activities to avoid deforestation and to promote tree plantation in key locations (hilltops, river banks…). But the need for fuel for cooking and other purposes cannot be proscribed, and cannot be reduced significantly in a context of fast population increase. To support the general requirement of watershed protection, which explicitly means avoiding to have more trees cut than growing, it is then necessary to investigate the ways towards other sources of energy, or towards obtaining the same amount of energy out of the same amount of biomass (wood or charcoal).

Similarly, the total number of cattle heads per square kilometer in the hill slopes or in the flood plains has a natural limit, above which the livestock will suffer from insufficient alimentation, or cause over-grazing with long term effects on soil cover and erosion risks. If within the acceptable number of cattle heads the production can be improved (mostly production of milk in the hills and of meat in the plains) by farming improved breeds, then poverty reduction can be coupled with correct watershed management and protection of soil cover.

4. PROJECT PRESENTATION

4.1. PROJECT OVERALL OBJECTIVE

The Overall Objective of the Integrated Watershed Management Plan (IWMP) is to «*improve the living conditions of people while protecting the environment*».

In this it is crucial that watershed management activities are focused on the communities involved and that they in turn are willing contributors to the activities. An Integrated Watershed Management Plan needs to be supported, to a large extent, by a community development plan.

The main outcomes of the IWMP could be:

- To halt or mitigate the erosion process;
- To halt encroachment of forested areas;
- To improve the quality of water flowing downstream;
- To reach enhanced rural production through environmental good practices;
- To develop alternative sources of livelihood;
- To ensure capacity building for Community to implement proposed alternative livelihood options.
- To improve technical resources and extension services
- To improve structure for planning and monitoring catchment rehabilitation activities, and for sensitization, training and mobilization of communities

4.2. PROJECT SPECIFIC OBJECTIVES

The specific objectives of the cross-cutting activities are the followings:

- Alleviate the pressure on land and forest for production of wood to be used as fuel;
- Create the conditions for obtention of a Mara River label for products of rural areas;
- Implement livestock breeding centres for cows, goat and/or sheep to avail of better breeds for milk and/or meat production

4.3. KEY OUTPUTS

The project key outputs are the followings:

A. Energy efficient stoves are developed or made available in the catchment;

B. Alternative sources of energy not depending on biomass are explored;

C. Biogas production at small scale is developed as demonstration plot;

D. Livestock breeding centres are created and operating with improved breeds satisfying local demand (milk or meat production improvement);

E. Conditions for marketing of local products, and particularly under a local quality label, are explored and awareness is created on this opportunity.

5. DESCRIPTION OF ACTIVITIES

5.1. ACTIVITY N°4A: ENERGY SAVING AND ALTERNATIVE ENERGY TECHNOLOGIES PROMOTION

The main source of energy in households in the MRB is firewood and charcoal. This implies cutting trees and clearing of forests. As a first response to this issue in terms of Watershed Management, Project n° 1.A includes awareness of population towards forest and woodlands usefulness, and promotes afforestation activities.

Yet in the context of fat population increase, this may not be sufficient to avoid overexploitation of forests. The promotion and dissemination of energy saving or alternative energy technologies is a complementary action that will address both forests/woodlands conservation and livelihood and welfare improvement.

Indeed, promotion of fuel wood energy saving methods and alternative energy technologies to communities is expected to conserve the forest by reducing the amount of fuel wood collected.

It is expected to also improve livelihoods and enhance productivity, because less time will be spent on fuel wood collection, an exercise normally performed by women and children. It could be implemented directly by individuals or through small scale private or community business.

Under this cross-cutting activity, the project will review the opportunity for developing different technologies and, beside the well known but somehow costly alternatives of wind and solar energy generation, will promote several alternative technologies:

- Improved stoves
- Biomass briquettes
- Biogas digesters

5.1.1. Promotion of improved stoves

Cutting down trees for the purposes of provision of firewood and charcoal is an unsustainable practice, which leads to soil erosion, land degradation and loss of habitats. Looking for firewood is time consuming and is not economically sound. Time and labour resources spent collecting fuel wood and burning charcoal could be better spent doing other things that would bring in more revenue to the families. There are many advantages of using improved types of stoves known as jikos, which include:

• It is time efficient enabling resources such as time and labor to be deployed to other income generating activities. The cooking needs less supervision as the jiko holds heat for longer, enabling one to boil drinking water after cooking which is healthier.

• It is cost effective as less fuel wood is needed to prepare the same amount of food. This in turn enables preservation of trees as fewer are needed to support the venture.

• Smoke in the kitchen is reduced significantly making the cooking experience enjoyable and the cooking environment healthier. The ash is restricted within the stove; this is easy to dispose of keeping the kitchen clean.

• It is safer method of cooking compared to exposed fires.

• Stoves can be produced at low costs, from locally available materials such as clay.

- The method of cooking using the jiko are basically the same and one does not need to learn new cooking skills.

Introducing of models of firewood saving stoves can be favorably combined with use/marketing of biomass briquettes; this is included in another activity as part of the SWM project.

People with access to modern energy services save money, enjoy better health and have more opportunities for education and self-development. The productive use of energy enables small businesses to be set up and creates employment. The main source of energy in households in the MRB is firewood and charcoal. This leads to clearing of forests. More efficient use of fuel wood would therefore lead to less destruction of forests. This together with use of more efficient charcoal kilns/stoves would significantly reduce the deforestation in the MRB.

Making of the Jikos is a skill in which local groups can be trained, thus offering an opportunity for earning an income though making, selling and installing the jikos. If modified to include an oven, these jikos can be used for baking further opening up opportunities for income generation and employment creation.

5.1.2. Briquettes making

At present, fire for cooking and other home needs is made, in a wide majority of the cases, out of wood or charcoal. This is obtained by cutting certain varieties of trees which yield good quality wood; minor twigs, bark and saw dust are also left out of the process and lost for energy production, as well as all non-wood plants. Low quality wood trees and bushes are frequently used but are not efficient in calories production.

To sort out this issue, a technology has been developed to make small blocks of compressed biomass that can be used for burning in stoves instead of wood or charcoal. These blocks, known as briquettes, give an opportunity to make use of currently unused material; and the process uses a simple technology: the press can be operated and maintained by young men or boys after a short training.

In urban or semi-urban areas, wood chips and saw dust from factories (furniture, lumbers…) can be collected and recycled into briquettes. In rural areas, plants with quick growth and limited use should be explored and tested for the quality of briquettes they would form: in particular, papyrus and other wetland plants, once dried, would probably be a valid raw material for briquettes. The possibility of making briquettes out of the invasive weed *Chromolaena odorata* should also be explored.

5.1.3. Promotion of biogas digesters

Biogas typically refers to a gas produced by the biological breakdown of organic matter in the absence of oxygen.

Organic waste such as animal manure, kitchen waste, crop wastes, can be converted into a gaseous fuel called biogas. Biogas is produced by the anaerobic digestion or fermentation of biodegradable materials such as biomass, manure, sewage, green waste, plant material, aquatic weeds and crops. Biogas comprises primarily methane (CH_4) and carbon dioxide (CO_2) and may have small amounts of hydrogen sulphide (H_2S), moisture and siloxanes.

The gases (methane, hydrogen, and carbon monoxide) can be combusted or oxidized with oxygen. This energy release allows biogas to be used as a fuel for any heating purpose, such as cooking.

Biogas can be produced using anaerobic digesters. Basic technology for biogas digesters has been widely developed in developing countries and particularly in Nepal, and is frequently used in small scale dairy stables in Gujarat, India. Dung from several nearby stables is collected through pipes, then slowly agitated in absence of air to induce anaerobic digestion. The gas that forms in the upper part of the digester can be directed towards the kitchens of the participant families for immediate burning. Alternatively, the gas can also be kept in low pressure bottles to avoid the need to use it out at the time of elaboration and to extend the time availability.

5.2. ACTIVITY N°4B: MARKET RESEARCH AND DEVELOPMENT OF MARA RIVER LABEL

This measure is aimed at ensuring the possibility for the farmers and community groups to sell their products under favorable conditions al all moments of the year. This means, in a first step, to identify the potential buyers and the local products most required in the national market on each side of the border. Current constraints to access of products to the market will also be spotted and solutions will be drafted for further discussion, because some of them may fall outside the reach of the current programme (for example the lack of year-round motorable roads). Marketing products within the Mara River Basin is meant as a priority, taking advantage of the specific needs of the tourism industry, within and around the two National Reserves of Maasai Mara and Serengeti.

In a second step, the study should aim at finding a further value added for local products under a protected designation of origin (PDO) or protected geographical indications (PGI), which are particularly important for vulnerable rural regions.

The products covered by this label will be selected according to the capacity of local organizations to ensure a stable high quality and expected quantity (depending on the season in most cases) of a given product. Possible candidates would be: cheese and other processed dairy products, processed meat products, tree fruit, garden fruit (watermelon for instance), vegetables, herbs and aromatic plants…

The milk sector allows actors in the dairy supply chain to dialogue and to carry out a number of activities. These joint activities concern, among others, promotion, research, innovation and quality improvement, for a better knowledge and transparency of production and the market. In a similar form, examples of protected local products will be sought for and experiences will be shared to evaluate the steps to be given and the time frame necessary for it.

5.3. ACTIVITY N°4C: LIVESTOCK IMPROVEMENT

Livestock is of high importance in the whole basin, as an economic good for production or as a basic social asset. Livestock in the Mara River Basin comprises of cattle, goats and sheep, and produces meat, milk, wool and leather. Local breeds are the result of a natural selection process, and correspond to animals well adapted to the local conditions of temperature, food and water availability. Yet they are not highly productive, and integrating new breeds would help increase the production level. Whether inter-breeding with local animals is a relevant part of the solution is an issue to be discussed.

Although cows are considered as the most valuable livestock for farm breeding, other alternatives permitting a faster income generation must be taken into account, such as dairy and meat Galla goats, that could be associated with cows within a same breeding centre.

The main goal is to increase the productivity of meat and milk in the community. Improved goats and cattle grow faster and have higher milk production rates than the local breeds. They are also less susceptible to drought and diseases. Coming up with such a project will in turn enable better livelihood and social welfare of the people. To get such a project moving, it is important to ensure that the farmers have the required infrastructure to support a cross breeding program. There is also need to form farmer organizations or self help groups which would be responsible for the organization, coordination and sustainability of the program. The cut-and- carry system used in improved dairy goat production can be successful under smallholder production systems. Feeds can be generated from improved tree fodder or through irrigation of fodder.

It would be beneficial to encourage farmers on the importance of keeping dual purpose goats such as the Galla goats. These goats are larger than the indigenous small East African goats and produce both milk and meat at economically beneficial rates to the farmer. Proper housing for the goats would ensure their safety and preserve their health. Low cost houses make up of cheap, locally available materials such as sticks, mud and iron sheets could be set up. Breeding programs should ensure they have the right ratio of Does to Bucks i.e. 20:1 initially which will later be improved to 30:1 as availability of fodder and other feed become more accessible. The ratio of bull to cows is 1:50 under good nutrition. Each site should form a common interest group with 50 members. Each member should have an identified cow and two does for breeding. Therefore two bulls and three bucks will be requires per site.

There would be need to discourage inbreeding by restricting the mating of either full or half siblings. Timely removal of bucks after attaining the age of one to one and a half years and bulls after eighteen to twenty four months should be observed strictly. Artificial insemination (AI) breeding program should be put in place and encouraged although natural way of breeding between bulls and cows, and bucks and does could also be done.

A possible scheme for a breeding centre based on a recent experience in Kenya is shown below.

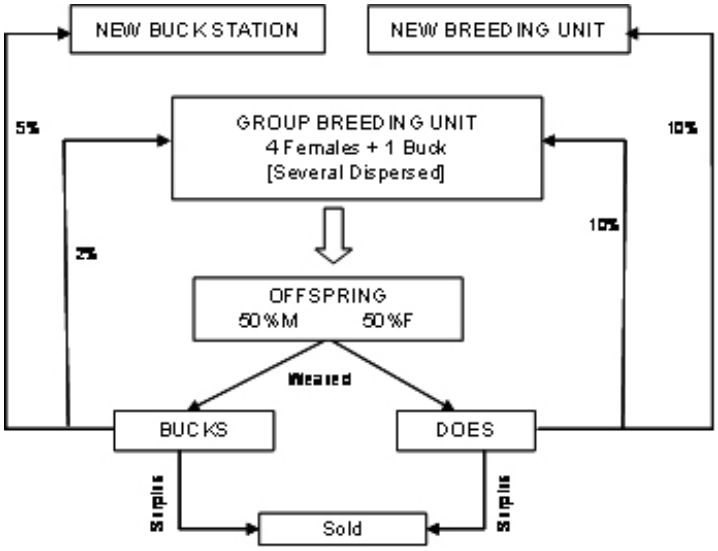

Figure 1: Farmers based breeding set-up (source: AGTR, ILRI & SLU, 2010)

Concretely, the aim is to create two livestock centres, tentatively one in Narok South District in Kenya (possibly at Lemek), and one in Serengeti District in Tanzania. The actions to be performed during the first five years of the project would include at least:

- Selection of breeds of cows, goats and possibly sheep that would combine higher productivity with capacity to adapt to the local conditions of climate and alimentation,
- Interaction with farmers (and particularly with local leaders) to refine the selection,
- Set-up of support services and Capacity Building of farmers groups on specific aspects of care to new breeds to optimize results: veterinarian services, fodder and grazing requirements, animal husbandry…
- Construction or adaptation of buildings for the centres, including water supply and waste management,
- Fencing of premises including buildings and neighbouring fields,
- Purchase of animals,
- Operation of the centres,
- Evaluation of progress and results after each year.

The centres should retain pure breed animals, whereas farmers may opt for cross-breeding their local breed cows and does with pure breed bulls and bucks, and results of cross-breeding should be carefully monitored and evaluated.

Similar actions have been undertaken recently in Kenya with support from the International Livestock Research Institute (ILRI) centre in Nairobi and from the London-based NGO FARM-Africa. Collaboration with these experiences should be sought at time of implementation.

6. PROVISIONAL PROJECT BENEFITS

6.1. ENVIRONMENTAL CONSERVATION

Watershed conservation: Energy saving is directed to reducing pressure on wood as fuel for all purposes, therefore acting on watershed conservation. Livestock breeding may also lead to positive impact on watershed conservation by limiting the number of animals depending on a same catchment area, but this means that fodder production should also be improved in parallel, by a better selection of plants and areas for fodder production.

Climate Change adaptation: Improvement of cattle breeding participates in diversification of income sources, thence in adaptation to climate change. Definition of a Mara River label would act in the same way.

6.2. INCOME GENERATION

Poverty reduction: Improvement of cattle breeding for a higher level of milk and meat production will have a double positive impact in terms of poverty reduction, by increasing financial income and by opening the way for better nutrition, particularly for children and ill or weak persons. A Mara River label would also ensure a more stable price and a surer market for local products, thus improving financial conditions.

Market access: The main aim of a Mara River label is to ensure an access to market for local products under fair conditions.

6.3. INSTITUTIONAL STRENGTHENING

Access to technical advice and professional network: The exploration of carbon market opportunities will be a case for receiving technical advice. Establishing a Mara River label will need professional networking with groups having similar experience, then between groups with similar aim within the MRB.

Promotion of local activity groups: Cattle breeding centres, groups developing new energy technologies and those advancing towards a local label will form local activity groups with strong activity and impact on watershed management.

7. INTERVENTION AREAS

The activities presented in this Annex, because of their cross-cutting characteristics, will not have specific intervention areas; on the contrary, they will be implemented in parallel with the sectoral projects, in the same place where these are implemented.

8. IMPLEMENTATION FRAMEWORK

Cross-cutting activities 4A and 4B will be implemented through contracts with consulting companies or NGOs which will be requested to develop their activities in close cooperation with the beneficiaries. The outputs of their work will include the formation of groups to follow up the actions after the end of the contract, and the capacity building of these groups.

Each of these activities should be the object of a separate contract extending on both countries, to ensure trans-boundary links in common activities. The entity in charge of the contract will necessarily be originated from one of the Mara River basin countries, and will demonstrate its capability to work on the other side by hiring local staff or associating with a local company/NGO.

The contracts will be issued and monitored by the MRB-PMU, to whom all reports will be directed. The PMU may delegate the technical follow up on public officers with adequate technical experience, if required.

For Activity 4C, implementation will begin with a study phase and continue with the physical creation of the breeding centres and related services, in one contract.

- The contractor will be a company of relevant experience in cattle breeding and genetics, which will have proven experience of similar projects for improvement of cattle at regional level through introduction of new breeds;
- The study phase will lead to: selection of new breeds in consultation with the LGA and village groups, confirmation of optimum location for breeding centres (preferentially one in the upper Kenyan basin and one in the lower Tanzanian basin) , precise estimate of the physical size of each centre in terms of human resources, animal input and equipment, and mapping of local institutions that can be involved in the set-up and further operation of the breeding centre;
- The physical implementation phase will comprise of setting up the infrastructure (building or rehabilitating a stable to accommodate the adequate number of cows/bulls, ram/ewes and bucks/does), supporting the process of selecting the basic personal to work in the centre, and acquiring the animals;
- A veterinarian service, attending the breeding centre but also available part of the time to attend the needs of other breeders, will be set-up;
- The operation and maintenance of the breeding centre will be under the responsibility of a local institution (an existing one, as far as possible, but a specific one may be created if necessary)

9. PROJECT MONITORING

9.1. INDICATORS

Performance indicators have been proposed to reflect the progress of the sub-project implementation and impacts of activities undertaken under the different components of the sub-project.

The Performance indicators for sub-project progress and outcomes are presented below in Table 1.

9.2. SCHEDULE

According to the general schedule proposed for monitoring and evaluation, indicators will be informed to allow drafting of monthly and quarterly reports.

Table 1 – Performance indicators

KEY OUTPUTS	PERFORMANCE INDICATOR SUB-PROJECT PROGRESS/OUTCOMES	PERFORMANCE INDICATOR SUB-PROJECT IMPACTS
A Energy efficient stoves are developed or made available in the catchment	▪ Number of communities receiving energy-efficient stoves	▪ Number of energy-efficient stoves in operation
B. Alternative sources of energy not depending on biomass are explored.	▪ Consultant report detailing the possibilities (based on a SWOT analysis) for development of renewable energy sources: solar, eolian, micro-HP…	
C. Biogas production at small scale is developed as demonstration plot	▪ Number of community groups equipped with biogas digester	▪ Number of community using biogas instead of wood/charcoal for cooking or other purpose
D. Conditions for marketing of local products are explored within and around the Mara River Basin.	▪ Number of new market deals between farmers groups and distributors/consumers	
E. Conditions for marketing of local products under a local quality label are explored and awareness is created on this opportunity.	▪ Selection of local products that may be granted a quality label ▪ Awareness campaign in producing communities towards quality label requirements	▪ Number of commercial deals based on labelling
F. Livestock breeding centres are created and operating with improved breeds satisfying local demand (milk or meat production improvement)	▪ Number of breeding centres created	▪ Number of improved breed animals (cattle, goats, sheep) installed in the breeding centres by the community groups

10. ROUGH COST ESTIMATES

The duration and estimated cost of the different consulting contracts for cross-cutting activities are summarized below:

Activity	Duration (months)	Cost (USD)
Energy saving and alternative energy technologies promotion	12	720 000
Market research and development of Mara river label	6	180 000
Livestock improvement	60	1 413 000
Total		2 313 000

Details on the estimate of costs for Activity 4C are presented in the table below. For Activities 4A and 4B which are studies, no detailed cost estimate has been elaborated.

Cost estimate for Activity 4C: Livestock improvement

Activity	Unit	Quantities						Unit Cost	Totals USDx'000					
		year 1	year 2	year 3	year 4	year 5	Total	($x'000)	year 1	year 2	year 3	year 4	year 5	Total
4C: Livestock improvement														
1 Field staff costs														
Project Animal husbandry officers /extension staff 2 per centre / 2 centres	pmonth	48,00	48,00	48,00	48,00	48,00	240,00	2,00	96,00	96,00	96,00	96,00	96,00	480,00
Veterinary 1 persons /centre/2 centres	pmonth	24,00	24,00	24,00	24,00	24,00	120,00	2,00	48,00	48,00	48,00	48,00	48,00	240,00
Subtotal 1									144,00	144,00	144,00	144,00	144,00	720,00
2 Equipment/Material/Animals														
Equipement set for staff	unit	6,00					6,00	1,50	9,00	0,00	0,00	0,00	0,00	9,00
Building/Adaptation/Rehabilitation	Lumpsum	1,00	1,00				2,00	50,00	50,00	50,00	0,00	0,00	0,00	100,00
Cattle Truck	unit	2,00					2,00	30,00	60,00	0,00	0,00	0,00	0,00	60,00
4WD	unit	2,00					2,00	30,00	60,00	0,00	0,00	0,00	0,00	60,00
Motorbikes	unit	2,00			1,00		3,00	3,00	6,00	0,00	0,00	3,00	0,00	9,00
Fencing & premises organization	Lumpsum	1,00	1,00				2,00	10,00	10,00	10,00	0,00	0,00	0,00	20,00
Purchase of female animals	head		80,00				80,00	0,60	0,00	48,00	0,00	0,00	0,00	48,00
Purchase of male animals	head		4,00				4,00	0,80	0,00	3,20	0,00	0,00	0,00	3,20
Equipement for breeding centre operation	lumpsum	2,00			2,00		4,00	15,00	30,00	0,00	0,00	30,00	0,00	60,00
Subtotal 2									225,00	111,20	0,00	33,00	0,00	369,20
3 Workshops & meetings														
Workshops and meetings	lumpsum	4	2	2	2	2	12	1,75	7,00	3,50	3,50	3,50	3,50	21,00
farmers visits costs by FFS	lumpsum		6	6	6	6	24	0,50	0,00	3,00	3,00	3,00	3,00	12,00
Subtotal 3									7,00	6,50	6,50	6,50	6,50	33,00
4 Transport & other operation costs														
Animal feeding and care	lumpsum		2	2	2	2	8	10,00	0,00	20,00	20,00	20,00	20,00	80,00
Vehicles operating costs (2 trucks + 2 4WD + 2 motorbikes)	month	12	12	12	12	12	60	1,20	14,40	14,40	14,40	14,40	14,40	72,00
Other operating costs	month	12	12	12	12	12	60	0,90	10,80	10,80	10,80	10,80	10,80	54,00
Subtotal 4									14,40	34,40	34,40	34,40	34,40	152,00
5 Consultancies														
Preliminary survey and implementation plan	pmonth	6					6	10,00	60,00	0,00	0,00	0,00	0,00	60,00
Capacity Building specialist	pmonth	3	1	1	1	1	7	2,00	6,00	2,00	2,00	2,00	2,00	14,00
Training extension specialist	pmonth	3	3	3	3	3	15	2,00	6,00	6,00	6,00	6,00	6,00	30,00
Subtotal 5									72,00	8,00	8,00	8,00	8,00	104,00
6 Environmental and social monitoring														
Subtotal 6	percent							2,50%	11,56	7,60	4,82	5,65	4,82	34,46
Subtotal 4C: Livestock Improvement									473,96	311,70	197,72	231,55	197,72	1 412,66