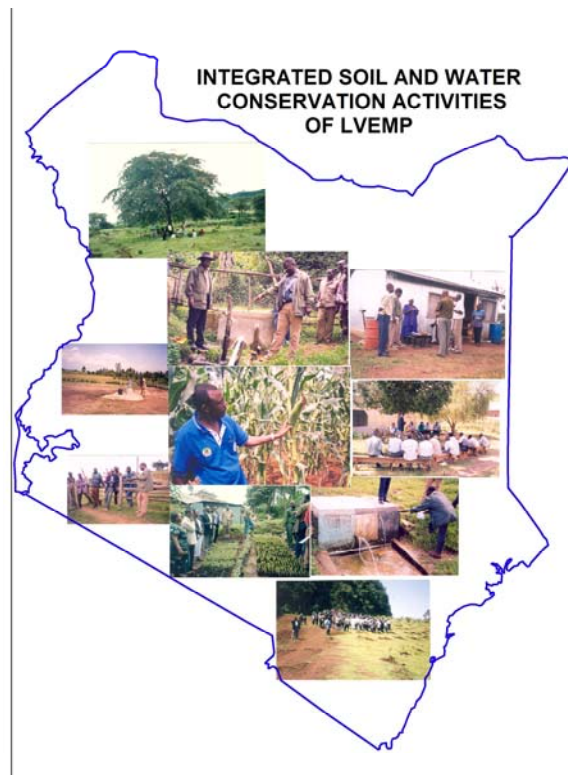


**LAKE VICTORIA ENVIRONMENTAL MANAGEMENT
PROJECT(LVEMP) - KARI**

SWC DRAFT FINAL REPORT

**LESSONS LEARNT
FROM
LAND USE MANAGEMENT THROUGH
INTEGRATED SOIL AND WATER
CONSERVATION (ISWC)**



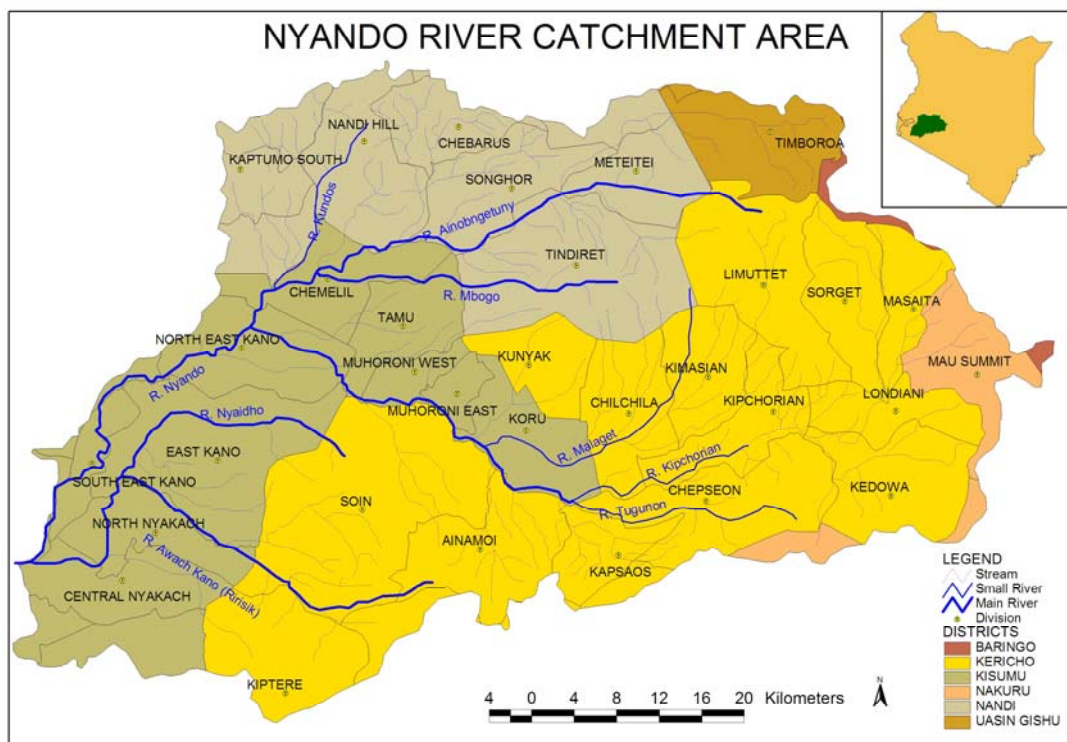
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1. INTRODUCTION

1.1 The Nyando River Catchment Area.

River Nyando is one of seven major rivers within the Kenyan side of the Lake Victoria Drainage Basin. The other six rivers are Sio, Nzoia, Yala, Mara, Sondu-Miriu and Kuja-Migori. The Nyando and Nzoia rivers have been the main sources of seasonal flooding in downstream areas before their waters enter Lake Victoria.

The Nyando has its tributaries originating from the Nandi and Tindiret Hills in South and North Nandi Districts and Londiani, Tindiret and West Mau Forests in Kericho and Nakuru Districts. River Nyando has a total length of 170 km and a catchment area of 3450 km². The Nyando Drainage Basin consists of five main sub-catchment areas namely:- Nyando-Nandi; Nyando-Kericho; Awach-Kano; Nyaidho-Kano; and Nyando-Kano. More than 50% of the total water discharge of the Nyando comes from the Nyando-Nandi sub-catchment area.

River Nyando traverses Londiani, Kipkelion and Sigowet areas of Kericho District and Koru, Muhoroni, Chemelil, Lower Nyakach and Kano Plains areas of Nyando District. Londiani, West Mau, Kipkelion, Sigowet and Koru areas form the highlands zone whereas Muhoroni, Chemelil, Lower Nyakach and Kano Plains form the lowlands zone of the drainage basin. The highlands zone is characterized by a very rugged terrain particularly in Kipkelion, Aldai, Kaptumo, and Tindiret Divisions. The mean annual rainfall ranges between 1000 mm (in Tindiret Forest) and 1600 mm (in Kipkelion). The total land areas covered by West Mau Forest, Kipkelion and Londiani are 573 km², 441 km² and 238 km² respectively. The average annual rainfall for these areas is 1660 mm, 1390 mm and 1250 mm respectively. The dominant soils in the highlands zone include Nitisols, Phaeozems, Luvisols and Cambisols. These soils are well drained, deep and dark reddish brown sandy clay loam to clay. The Phaeozems and Cambisols are dominant in Kipkelion and have a rocky or stony surface. The Nitisols are found in the West Mau Forest area. Most of the soils in the highlands are overlain by humic topsoil.

The lowlands zone is characterized by gentle slopes and flat lands that are prone to flooding and waterlogging during the rainy seasons. This lowlands zone forms a trough of low rainfall. In Muhoroni and Chemelil areas, the mean annual rainfall ranges between 1300 mm to 1400 mm. Within the Kano Plains area, the average annual rainfall ranges between 1000 mm to 1200 mm. Whereas the rainfall is bimodal, the most reliable rains are the long rains which occur between March and June. Due to the unreliability of the short rains, there is no cultivation of annual crops during this season. The dominant soils in the lowlands zone include:- Vertisols, Gleysols, Planosols and Fluvisols. The Vertisols and Planosols are poorly drained, deep and of sandy clay to clay texture. The Gleysols of Nyando are very poorly drained, very deep clay soils with acid humic topsoil. They have variable fertility and are found in marshy and swampy areas common around the Nyando river delta(s). The Vertisols with a sodic phase are found in Lower Nyakach and are associated with the gully erosion that is prevalent in the area. Planosols are found in the upper reaches of Awach-Kano, Songhor, Mbogo, Chemelil and eastern parts of Muhoroni. These are alluvial soils of moderate to low fertility. Between Awasi and Awach-Kano are Cambisols of sandy clay loam to gravely clay texture. The Fluvisols are found in riverine floodplains and have variable fertility.



The most dominant land use types within the Nyando drainage basin vary with topography and agroclimatic conditions. In the highlands zone of Londiani, West Mau, Kipkelion, Sigowet and Koru (ACZs I and II), more than 50% of the land is under fallow/grazing, woodlots and cultivation. Forest land is less than 10%. In Tindiret, grazing land is over 40%, forest land over 30% and maize cultivation over 20%. In Londiani and Kipkelion, fallow/grazing land occupies more than 50% of the land, forest land over 10% and maize cultivation over 30%. Sugarcane cover occupies less than 5% of the three areas and is grown in the Koru area. In West Mau Forest, fallow/grazing/woodlot land occupies over 30%, maize cultivation over 30% and forest cover over 40%. In the lowlands zone of Muhoroni (ACZs I & II), Chemelil (ACZ II) and Kano Plains (ACZ III), the dominant land use types include fallow/grazing land (40%), bushes and woodlands (20%), sugarcane (20%), hedges and bare ground (10%), marshes/swamps (5%) and rice (5%). Overstocking of livestock within Nyando District is a problem and has resulted in overgrazing. This is the major cause of severe sheet erosion in the Kano Plains area.

1.2 Lake Victoria Environmental Management Project (LVEMP)

Lake Victoria is the second largest freshwater lake in the world and has the largest freshwater fishery in the world, largely based on the introduced Nile perch which supports an important export fishery for the three riparian countries. The Lake had experienced a serious decline in water quality since the 1960's. There was an increase in phosphorus concentration leading to emergence of water hyacinth, which adversely affected the ecology and the economic activities of Lake Victoria including the hydro generation at Owen Falls Dam.

The three riparian countries around Lake Victoria of Kenya Uganda and Tanzania, with funding from the Global Environment Facility and the International Development Agency of the World Bank responded to these issues and other fisheries, land use and socio-economic issues of concern on Lake Victoria by establishing the Lake Victoria Environment Management Project (LVEMP) in 1997. LVEMP is a comprehensive project conducted by the three countries of East Africa and is aimed at the rehabilitation of the lake ecosystem for the benefit of the 30 million people who live within the basin area, their national economies and the global community.

The overall objectives of the LVEMP is to maximize the sustainable benefits to riparian communities from using resources within the basin to generate food, employment and income, supply safe water, and sustain a disease free environment, to conserve biodiversity and genetic resources for the benefit of the riparian communities and global community and to harmonize national management programs in order to achieve, to the maximum extent possible, the reversal of increasing environmental degradation.

Of the eight (8) components that were formed to address the wide range of issues that were identified, the Integrated Soil and Water Conservation (ISWC) component was mandated to address the issues of proper land use management so as to reduce sediments and nutrient loads in the Nyando river arising from point and non point source pollution from the water catchment area.



1.3 Integrated Soil and Water Conservation (ISWC) Component

The Integrated Soil and Water Conservation (ISWC) Component is implemented by the Department of Agriculture of the Ministry of Agriculture (MoA) in four districts: Kericho, South Nandi, Nyando and Kisumu. Currently, the component activities are in 63 focal areas whose waters directly drain into river Nyando and its tributaries that include Kundos and Orobo in South Nandi District and Kipchorian and Malaget in Kericho District and Mbogo and Nyaidho in Nyando District. As of the time of this evaluation of lessons learned, this ISWC component has been up scaled to include North Nandi, Vihiga and Marakwet Districts through which rivers Yala and Nzoia-Moiben drain into Lake Victoria.

The ISWC component has since been working with the communities to promote better land use practices geared towards enhanced soil fertility, for increased and sustained agricultural production, through mobilization, sensitization, demand driven training and support to the initiatives meant to reduce the flow of nutrient and sediment loads flowing into Lake Victoria through the Nyando river.

The overall objective of ISWC component is to ensure through improved land management practices a reduced flow of sediment and nutrient loads from the Nyando river arising from point and non point source pollution from the water catchment area. The specific objectives are: To quantify soil erosion and nutrient loss from different land covers and uses; To design remedial measures and sustainable agricultural practices; To develop systems to promote soil and water conservation; and To establish demonstration units to disseminate successful soil and water conservation measures.

The ISWC Component in trying to achieve the above objectives has been carrying out the following activities in the Nyando Catchment Area:

1. Conducting Participatory Rural Appraisals (PRAs) and preparing Community Action Plans (CAPs) and resource maps. In this processes, the communities are assisted to identify their problems, prioritizing them and coming with suggested solutions to solve the problems
2. Formation and training of Focal Area Development Committees (FADCs) on their roles in leadership, environmental concerns and management of projects
3. Training of Common Interest Groups (CIGs), which are formed after flagging of opportunities by the staff of the component
4. Development of Farm Specific Action Plans (FSAPs) with farmers in order to improve on the management of the farms
5. Designing and laying contour conservation structures and gully control measures to reduce soil erosion from cultivated and pasture lands.
6. Establishment of community and individual run small-scale fruit/agro-forestry tree nurseries.
7. Spring protection in order to reduce erosion and protect bio-diversity while availing safe drinking water to the community.
8. Water pans construction and rehabilitation for runoff water harvesting and conservation.
9. Dissemination of successful soil and water conservation measures through field days and radio programs and excursion tours.



10. Support relevant micro projects, to improve community livelihoods, as an incentive to undertake environmental conservation more vigorously.
11. Assisting farmers to diversify their farming systems in order to achieve food security
12. Organize farmers and extension staff exchange visits as part of capacity building.
13. Conducting scientific research studies in collaboration with other stakeholders and academic institutions
14. Training of technical personnel at post graduate level.

1.4 Rationale, Objectives and Scope of Consultancy

1.4.1 Rationale of Consultancy

The Lake Victoria Basin has in recent years experienced some proliferation of agricultural and industrial activities that have impacted negatively on the Lake environment and ecology. The deterioration in the stability of the lake ecosystem is exemplified by the development of the water hyacinth menace in the lake. The encroachment of the water hyacinth has been attributed to the high inflow of sediments, nutrients and wastes (sewage and industrial effluents) into the lake and hence causing massive eutrophication.

Environmental degradation therefore is the major cause of the increase in diffuse or non-point source pollution loads (sediment and agro-chemicals). Point source pollution is attributed to agro-industries such as Chemelil and Muhoroni Sugar Companies and Agro-Chemical and Food Company. The pollutants from these industries include heavy metals, sulphates, phosphates, and nitrites.

In order to ameliorate the causes of environmental degradation and restore a safe and clean catchment environment within the Nyando drainage basin the Lake Victoria Environmental Management Project (LVEMP) established an Integrated Soil and Water Conservation (ISWC) Component that is implemented by the Department of Agriculture, Ministry of Agriculture (MoA) in selected micro catchments or focal areas within the Nyando river catchment area.

Within the realm of LVEMP's Phase I, LVEMP with support from the World Bank has commissioned a lessons learned consultancy on all the eight components of the project. The lessons learned consultancy involves all the LVEMPs of the three riparian countries and is a prerequisite to the formulation of the phase II of LVEMP.

1.4.2 Objectives of Consultancy

The Integrated Soil and Water Conservation Component has been implementing activities under LVEMP phase I since 1997, which comes to an end on 31st December 2005. Under the circumstances, the Component intends to carry out an assessment of its performance for the period 1997 to date, thereby pinpointing the strengths and weaknesses and further make recommendations that would help in shaping the proposed LVEMP phase II. In addition, the "lessons learnt" report is expected to form a strong benchmark for LVEMP phase I's Implementation Completion Report, due latter in the year.



1.4.3 Scope of Consultancy

The consultancy shall cover four administrative districts, viz Kericho, South Nandi, Nyando, and Kisumu Districts, with specific attention to the Nyando Catchment Area, which is about 3,450 km². The contact to the target communities shall be through the respective District Agricultural Officers, whereas the coordination office in Kericho will plan the field itinerary for the consultant.

The pertinent issues to be addressed by this ISWC consultancy are spelt out in the Terms of Reference and will also emerge from the field visits and interviews with common interest groups, key informants and ISWC staff. The issues that will be evaluated include:

Concept and Design of ISWC

- To assess the appropriateness of project design, strategies, methodologies and interventions (process, outputs, accomplishments versus objectives and sustainability).
- To evaluate the shortcomings of project design in realizing the stated objectives.

Situation Analysis of ISWC

- To assess the internal strengths and weaknesses, and external opportunities and threats of ISWC. This situation analysis will be expected to look into the activities implemented during the program period of 9 years (1997-2005).

Relevance and Effectiveness of ISWC

- To assess the relevance and effectiveness of ISWC. The relevance could be established by examining the approaches used to identify the priorities and needs of CIGs in Focal Areas of Kericho, South Nandi, Nyando and Kisumu Districts. The effectiveness of ISWC could be established by assessing to what extent ISWC has through implementation of activities met the stated objectives of project.

Performance and Efficiency of ISWC

- To examine the extent to which the financial and human resource allocations were utilized to achieve planned outputs.
- To establish if ISWC achieved the intended objectives in quantitative terms.

Impact and Sustainability of ISWC

- To determine the indicators of ISWC impact and sustainability after the expiry of the ISWC implementation period.
- To ascertain the ISWC benefits to CIGs (beneficiary farmers) and other stakeholders and ISWC's effectiveness/impact in terms of cost effectiveness and sustainability the grassroots level.

Attitudinal Changes due to ISWC

- To evaluate the attitudinal changes arising from ISWC implementation. The attitudinal changes observed in the Focal Areas were expected from the extent of participation in ISWC activities by CIGs farmers.

Issues of Concern to ISWC

- To examine the issues of concern to FADCs and CIGs in the Nyando Catchment Area.

Analysis of Activities, Outputs, Results and Organization and Management of ISWC



1.4.4 ToR of Consultancy

1. Review the extent to which the component has achieved its original objectives.
2. Review the approach/methodology applied in achieving the objectives.
3. Review achievements made by the component.
4. Assess the impact of the project in relation to the Lake Basin environment, community livelihoods and stakeholder expectations.
5. Assess sustainability of interventions in terms of personnel, equipment, institutional set up and financial issues.
6. Assess the cost/benefit analysis of the interventions per dollar invested.
7. Review problems encountered in the implementation of the component activities.
8. Give a list of other programs related to the component activities in the Lake Basin.
9. Based on the above, draw lessons of experience (both positive and negative) and their underlying factors.
10. Propose possible replication of the approaches, methods or technologies to other areas within or outside the Lake Basin, and why.

2. APPROACH AND METHODOLOGY FOR ISWC CONSULTANCY

2.1 Gathering of Information

Preparatory meetings will be held with the National Lead Consultant during an Inception Workshop (May 19, 2005), ISWC Component Coordinator and key informants at the beginning of the assignment. This will include the National Coordinator of LVEMP and organizations/individuals involved in the preparation and facilitation of the consultancy

2.2 Data Collection and Analysis

During the consultancy, some comprehensive data on inputs and outputs of ISWC will be collected. The consultant will spend 14 days of field work visiting 19 focal areas (5 in each of the four Districts of Kericho, South Nandi, Nyando and Kisumu) and 8 days of review of reports and consultations with key informants. The evaluation process will be based on pre-determined parameters/indicators expected in an evaluation exercise and acceptable participatory methodologies used in information gathering consultations with the Component Coordinator, District Task Coordinators (Kericho, South Nandi, Nyando, and Kisumu Districts), Divisional Agricultural Extension Officers, Frontline Extension Workers (FEWs) and the farmers. Data collection techniques will include observations, discussions with CIGs, key informants, and assessment of outputs and activities of ISWC. The data collected will be processed to establish the past and expected impacts and above all the lessons learnt from the implementation of ISWC activities.

Based on the proposed ToR, approximately 30 working days will be required to accomplish this ISWC Consultancy. The National Consultant should prepare the work plan for a maximum of thirty (30) days ending not later than 30th June, 2005. This length of time is considered modest for this ISWC Consultancy.



2.3 ISWC Consultancy Reporting

The consultant will be expected to produce four reports namely: Inception report; Draft final report; National Workshop Report; and a Final Report on “lessons learnt”. The dates of submission of these reports are given in the Forms of Contract for the ISWC Consultancy. For instance, the Inception Report is due by May 23, 2005 and the Draft final Report is expected by June 30, 2005. There will be time for the reports to be read and corrections suggested. After comments are received, the National Consultant will be expected to submit one bound copy and a floppy (soft) copy of a Draft Final Report to KARI/LVEMP through the Component Coordinator and National Lead Consultant..

WORK SCHEDULE FOR KARI/LVEMP’s ISWC CONSULTANCY

30 Days Work Schedule of KARI/LVEMP’s ISWC Consultancy.

ISWC Consultancy Task	Days of ISWC Consultancy							Responsible Person
	4	4	4	3	3	4	8	
Review existing documents on ISWC and other related literature – 4 days								One Consultant.
Field Data collection and analysis – 14 days								One Consultant.
(1) Kericho District – 4 days								One Consultant.
(2) South Nandi District – 4 days								One Consultant.
(3) Nyando District – 3 days								One Consultant.
(4) Kisumu District – 3 days								One Consultant.
Report writing (all reports) – 4 days								One Consultant.
All meetings/Workshops as arranged by client/National Lead Consultant – 8 days								One Consultant.

There will be one National Consultant for this ISWC Consultancy.

3. MAIN FINDINGS ON ISWC INTERVENTIONS

3.1 Performance of ISWC Micro Projects

Four Micro Projects (2 in Kericho District and 2 in South Nandi District) have been implemented by the Integrated Soil and Water Conservation (ISWC) Component. In Kericho District, the evaluation consultant visited Siwot Focal area, Chilchila Division, Kericho District and was informed of a micro project on the development of a water supply system that would convey and distribute water to the local community for livestock and domestic water uses and irrigation water supply for horticultural crops. For this project, LVEMP provided Kshs. 900,000.00, Kipsigis County Council contribute Kshs. 350,000.00 and the local community has contributed Kshs. 304,000.00 (in terms of labour, materials, ballast and hardcore). The whole project will cost Kshs. 8,000,000.00 to complete. So far the community has constructed the intake weir and connected the main steel pipeline of 6 inches diameter and 4 inches PVC pipelines connected to the main line. Currently there is a problem of crossing the railway line. The community is looking for more money to complete the conveyance, distribution and treatment of the water. The community is officially registered with Departments of Social Services and Water Development as a group. The World Bank mission’s visit to the site in March, 2005 recommended the completion of the



project and promised Kshs. 1,000,000.00. As a follow up to this promise, the local community has already written a proposal which has been forwarded to the LVEMP Coordination Office in Kisumu. The community has also applied to CDTF and CDF for additional funding and has filled forms with the Water Services Board, Kericho for funding for a water treatment plant. The community to be served by this water facility comprises of 85 member families. Another Micro project visited was that of Orobo Development Group (30 members) in Aldai Division, South Nandi District. This project started in 2002 and received Kshs. 900,000.00 from LVEMP for the establishment of one tea and tree nursery and buying of 46 bee hives for beekeeping. The group contribution was 9% (labour, materials and land for the nursery) of the total project cost. The Orobo group has so far produced 240,000.00 tea seedlings, 3,000.00 tree seedlings and 28 litres of honey harvested. Of the money received, the group had a balance of account of Kshs. 148,489.00 as of the time of this consultancy. The group requires some training in financial management and group dynamics and development so as to operate efficiently. Otherwise, the impact of the initiative was evident as members had began to receive payments for their tea. One member who had planted 2 acres of tea had already received a bonus payment for tea of Kshs. 35,000.00 besides the monthly payments he had received. The same farmer is now planning to increase his acreage under tea to 3 and to 5 acres eventually.

During the period of this lessons learned consultancy, the National Consultant observed some significant community participation and contribution with immediate environmental impacts especially where the support went towards spring protection and the establishment of tea and tree nurseries. Some high output of tea and tree seedlings was very evident in the sites visited by the National Consultant. The National Consultant was also informed that the total funding for each micro-project had been decreased from Kshs. 900,000.00 to Kshs. 300,000.00 so as to expand the number of micro projects within a district. For the sustainability of all micro-projects, the beneficiary communities must be trained on financial management and group dynamics and management.

3.2 ISWC Component Extension Approach

From inception up to May, 2004, the extension approach adopted by the ISWC Component was based a micro-catchments approach. This approach involved: the selection of micro-catchments on the basis of relief; the establishment of catchment committees; carrying of a needs assessment using the participatory rural appraisal (PRA) methodology; training of farmers in group dynamics and management, nursery and land management; establishment of tree nurseries; the construction of contour ridges; participation in the development of an agro-chemical use inventory for the Nyando catchment; and the development of community action plans (CAPs) and resource maps.

However, in June 2004, ISWC Component introduced the National Agriculture and Livestock Extension (NALEP) focal area extension approach. Under this approach, the focal areas for ISWC interventions are identified on the basis of physical rather than water catchment boundaries. The criterion used in selecting the focal areas by LVEMP is that they should be adjacent to permanent tributaries that drain into the Nyando river. When the focal areas have been identified and the community is sensitized and mobilized, the focal area community's priorities and needs are identified using the participatory rural appraisal (PRA) methodology. During this PRA process, community action plans (CAPs) and resource maps are prepared and the findings presented to the community in a Baraza meeting. In the Baraza



meeting, the focal area development committee (FADC) and common interest groups are formed. The FADC comprises of 11 members, three of whom are women. Following this is the training of FADC members and common interest groups (CIGs). Then on a demand driven basis, Farm Specific Action Plans (FSAPs) are prepared showing the agreed ISWC interventions for the farmer. In the implementation of their activities, LVEMP-ISWC uses the existing government extension staff at the district and divisional offices except for the frontline extension worker (FEW) in each focal area. The frontline extension worker (FEW) – one per focal area is a direct appointee of LVEMP. The total time spent in one focal area doing ISWC activities is one year. Of this one year period, approximately 7 months are spent on planning and the other 4 months are for implementation. This is because LVEMP is using the NALEP approach and has no year round calendar of ISWC activities.

During this consultancy, the informants interviewed observed that the one year period per focal area is not enough to realize some meaningful achievements of planned ISWC activities. Instead they were of the view that a period of 2 to 3 years would suffice.

3.3 Soil and Water Management Techniques

In the four districts’ (Kericho, South Nandi, Nyando and Kisumu) focal areas visited, available agro-techniques included fanya juu terraces, level and graded terraces, contour stone lines, plain ridges, grass(Napier) and unploughed strips, retention ditches, double digging trenches and cut off drains (diversion ditches). These techniques are aimed at minimizing soil erosion, improving soil moisture storage, soil fertility and hence modifying the microclimate of a focal area. Most of the agro-techniques within the focal areas are not traditional but introduced by agricultural extension workers. Other techniques have been introduced by the farmers themselves due to the prevailing soil, water and nutrient problems. For instance, a farmer in the Kambi Awendo Focal Area, Muhoroni Division, Nyando District avoided planting maize with chemical fertilizers but used organic manure at planting instead so as to conserve soil moisture in the drought prone area. Likewise, a farmer in Kibwareng Focal Area, Nandi Hills Division, South Nandi District is practising some excellent conservation tillage (strip/spot tillage) in a maize and beans field. The farmer did this without being introduced to the new farming technique by the frontline extension worker (FEW).

Generally, the agro-techniques in the 19 focal areas visited in the four districts, could be categorized into two broad categories namely: techniques oriented towards in-situ moisture conservation by reducing runoff, improving infiltration and the storage capacity of the soil; and techniques aimed at improving water and fertilizer use efficiencies. Retention ditches or tied ridging and double digging (“Tumbukiza” in Kiswahili) are two techniques used by farmers to collect excess runoff water and store for crop and fodder production.

During the field visits to the 19 focal areas in the four districts, the Consultant saw agro-techniques that have proven to be effective and sustainable in managing soil erosion on steep slopes (e.g. cut off drains and fanya juu terraces on steep slopes to control soil erosion in Kimatkei Focal area, Tindiret Division, South Nandi District; Kapsaos Focal Area, Kaptumo Division, South Nandi District; and Lelu/Mtaragon Focal Area, Kipkelion Division, Kericho District), plain ridges for the establishment of sweet potatoes (e.g. Kapsaos Focal Area, Kaptumo Division, South Nandi District; and Kambi Awendo Focal Area, Muhoroni Division, Nyando District); conservation tillage practices – strip/spot tillage in Kibwareng Focal Area, Nandi Hills Division, South Nandi District; circular micro catchments for banana establishment (e.g. Kambi Awendo Focal Area, Muhoroni Division, Nyando District; and Dago Mkendwa



Focal Area, Winam Division, Kisumu District), gully erosion control (e.g. Omanyi Gully, Ramanda Focal Area, Miwani Division, Nyando District), Double digging and retention trenches for napier and banana establishment (e.g. Dago Mkendwa and Dago Nyahera Focal Areas, Winam Division, Kisumu District), and surface and subsurface tanks for rainwater conservation (e.g. Dago Mkendwa and Got Nyabondo Focal Areas, Winam Division, Kisumu District), water pans for runoff water conservation (e.g. Kanyagilo Focal Area, Kadero Division, Kisumu District).

3.4 Soil Erosion Control on Cultivated Steep Lands

The landscape of the highland zone of the Nyando Catchment Area is characterized by very steep slopes (e.g. Kipkelion and Ainamoi Divisions, Kericho District; Tindiret, Nandi Hills and Aldai Divisions, South Nandi District; and Winam Division, Kisumu District). In this highland zone, diffuse or non-point source pollution through soil and nutrient losses is a major ecological degradation problem especially where steep slopes have been opened up for cultivation. This underscores the importance of soil erosion control to check surface runoff water and improve water quality within the newly established farmlands.

Some of the erosion control practices that the consultant was exposed to during the field visits included terracing (e.g. fanya juu terraces, cut off drains, and retention ditches), the introduction of perennial crops (e.g. catchment tree crops, fruit tree crops, tea and fodder crops) into existing farming systems that have significantly reduced soil erosion through better canopy, groundcover and higher crop water use efficiency especially where tea has been planted. The consultant was informed by frontline extension workers in focal areas visited, that tea and fodder crops (especially Napier grass) are recommended for terraced sloping lands lying between 30% and 55% slopes. The Consultant observed the positive attitudinal changes among farmers towards conservation arising from the inclusion of food security crops like sweet potatoes, cassava, pumpkin and banana crops that are planted on gentle slopes and along terrace embankments. The inclusion of food security crops into farming systems has encouraged farmers to protect their lands through terracing and thus check soil erosion and improve the quality of water flowing into the Nyando River.

3.5 Improvement of Soil Fertility on Cropped Lands

Although soil erosion, soil compaction, drought (low soil moisture) and flooding (water logging) are major limitations to increased crop production in the Nyando Catchment Area, the very low grain production levels have been attributed to poor soil fertility in some focal areas. The poor soil fertility is due to the occurrence of soil compaction where murrum soils are dominant (e.g. Dago Mkendwa, Winam Division, Kisumu District) and also due to the occurrence of the Striga Weed (“Kayongo” in local languages). In most of the midland and lowland focal areas visited, there is some high deficiency of nitrogen and phosphorus and yet most farmers cannot afford chemical fertilizers like DAP and CAN. The problem of soil compaction is being overcome through double digging and circular micro catchments when planting fodder crops and when establishing bananas in homesteads. Where chemical fertilizers combined with new hybrid maize and vegetable crop varieties have been introduced, and soil moisture is not limiting, some good crop harvests are expected this season (e.g. Dago Mkendwa, Winam Division, Kisumu District). To overcome the problem of poor soil fertility due to Striga Weeds, the application of organic manure is recommended. Thus farmers are now being encouraged to practice zero grazing and composting for there to be sufficient amounts of



organic manure to apply on their farms. With time, the practice could be improved by introducing a combined organic manure-chemical fertilizer application for both annual and tree crops. Where these practices, food security crops and soil erosion control are in place, farmers are realizing immediate economic benefits in terms of improved crop yields and incomes.

3.6 Institutional Collaboration and Linkages

During this exercise, the Consultant noted that the ISWC Component of LVEMP had undertaken five studies in collaboration with institutions such as the University of Nairobi, Moi University, Tea Research Foundation of Kericho, Kenya Soil Survey of KARI - Nairobi, and KARI-Kibos, Kisumu. The research studies undertaken by the ISWC Component are as presented herebelow:

Period (Year)	Research Topic	Collaborating Institution
1999/2000	Suitable soil and water conservation techniques for Kericho and Nyando Districts	University of Nairobi.
2003	Quantitative assessment of the effects of soil conservation on crop yields and the bio-physical environment in Siwot Focal Area, Kericho District	Moi University.
2003	Bio-physical baseline soils information on the Nyando River Catchment Area	Kenya Soils Survey, KARI - Nairobi.
2004	Tea growing potential at Got Nyabondo Focal Area, Kisumu District	Tea Research Foundation of Kenya, Kericho.
2005	Quantifying sediment and nutrient losses from different land covers and uses, Siwot Focal Area, Kericho District.	KARI-Kibos, Kisumu

In as much as there have been a number of research studies conducted on the Nyando River Catchment Area (e.g. ICRAF-University of Nairobi studies on the greater Nyando Catchment and Awach Kano sub-catchment and other institutional studies), there has been no exchange of research information with the ISWC Component. This is a major shortcoming to the development of a baseline information database for the Nyando River Catchment Area. This exchange of research information requires immediate attention and possible redress.

On other collaborators, the Consultant observed that at the focal area level, there were a number of local and International CSOs that were supporting local initiatives especially in Nyando and Kisumu Districts. As one of the Divisional Agricultural Extension Officers in Kisumu District observed, “Where collaboration is strong, sustainability of supported activities is assured”. That remark by this officer reflects the general view of a majority of local farmers who believe and associate the sustainability of project activities with continuing financial support from collaborators. This perception is however changing as farmers have realized that continued aid is not necessarily a panacea to the continuity of project activities.

During a debriefing session with the DAO, Nyando District, the Consultant underscored the importance of collaboration among the stakeholders in addressing common farmer problems. In the districts covered by the ISWC Component of LVEMP, there is the need for harmonization of agricultural extension services so as to develop and extend joint extension messages for identified farmers’ problems. This is of particular concern when it comes to the development of calendars of activities for NALEP as well as LVEMP. Within



the focal areas, there is also the need to adopt an integrated/ multi-disciplinary approach to the implementation of LVEMP activities so as to minimize any wastage of time and inconveniences caused to farmers.

3.7 Adoption of New Farming Technologies in ISWC Focal Areas

During the field visits to ISWC focal areas, the Consultant was informed of the significant role that excursions tours/exchange visits and demonstrations during on-farm field days have played in the transfer of new farming technologies to farmers. Focal area farmers benefited a lot through focal area to focal area, district to district and country to country excursion tours/exchange visits organized by ISWC and LVEMP. Also they participated in on-farm demonstrations during extension field days in selected focal areas. NALEP agricultural extension staff and LVEMP's frontline extension worker (FEWs) have ably introduced new conservation technologies to farmers during such demonstrations. In collaboration with the NGO, Africa Now, ISWC has had demonstrations on production, preservation and processing technologies for food security crops like sweet potatoes, cassava and indigenous vegetables and energy saving cooking stoves or "jikos" to women farmers((e.g. Kambi Awendo, Muhoroni Division, Nyando District); and beekeeping and poultry production technologies to many farmers and constructed tanks for rainwater conservation in primary schools (e.g. Got Nyabondo Focal Area, Winam Division, Kisumu District), production, preservation and processing of food security crops. During the field visits by the ISWC Consultant, farmers from ISWC focal areas expressed their gratitude to LVEMP for organizing the field days and the country to country exchange visits to riparian countries like Tanzania. These exchange tours/visits and field days have served as eye openers to many farmers who on return have immensely improved their farming techniques.

3.8 Progress in the Implementation of ISWC Activities

Ever since the ISWC Component operationalized its activities in 1997/98, some remarkable progress has been made with regard to the expansion of extension focal areas (previously referred to as micro-catchment areas) and conservation practices. For example, among the first micro-catchments identified for conservation by ISWC Component was the Nyando Micro-catchment in Kipkelion Division, Kericho District. During this lessons learnt study, the ISWC Consultant visited the Nyando Micro Catchment Area, Kipkelion Division, Kericho District which was the first micro catchment started by ISWC in 1997/98. In this micro catchment covering an area of 100 acres with 70 households and an average household farm size of 2 to 3 acres, the conservation practices introduced included: cut off drains; stone terracing; unploughed strips; grass strips (using Napier grass), semi zero grazing, bee keeping and agro-forestry. Agro-forestry was introduced in 1998/99 with tree crops like Grevillea robusta, Eucalyptus spp., citrus, avocados and pawpaw. Also food security crops such as sorghum, finger millet, sweet potatoes and pumpkin have since been introduced to date. An excursion visit to Kisii in 1998 for selected farmers exposed them to dairy and banana farming technologies. This example of Nyando does illustrate the learning process that the ISWC Component went through as it implemented project activities.

When the World Bank undertook its mid term review mission in mid-1999, it was reported in their Aide Memoire of June 16, 1999 that the component had indeed "entered into an enthusiastic and ambitious set of activities covering a large part of the Nyando River Catchment Area of Lake Victoria Basin". It was the view of this mission that the component rationalizes



the scope of activities, prioritize work into specific geographic areas and jointly coordinate Component activities with those of other related components such as Catchment Afforestation and Water Quality. The World Bank Mission gave a number of recommendations that were to chart the way forward in subsequent years. The areas of intervention emphasized by the mission included: assessment of soil loss in micro catchments; improvement of water quality in rivers/streams; pilot gully control and the introduction of funded ISWC micro projects alongside those of the Fisheries Department. The World Bank Mission noted that the ISWC Component was constrained by transport facilities and recommended that LVEMP Secretariat provide one Pajero station wagon vehicle and at least two motor bikes to the ISWC Component.

There were seven World Bank Missions to evaluate the ISWC Component. Their observations are presented in detail in Appendix 1. However, here below is a summary of their observations:

- In July 2000, the WB Mission noted that the ISWC Component was collaborating with Catchment Afforestation, Wetlands and Water Quality Components. That the ISWC activities were being conducted at four spatial scales namely: the farm scale, the micro catchment scale, macro catchment scale and the basin scale. At the farm scale, ISWC was expected to conduct studies using soil erosion plots to determine the effect of slope and vegetation on runoff and soil loss. Whereas at the micro catchment scale, ISWC and collaborating Components were to agree on interventions and evaluation of the effect on water quality after PRA with micro catchment committees.
- .In May, 2001, the WB Mission commended the ISWC Component for its high level of activities. The Mission felt that If ISWC Component was to achieve the intended objectives and better document the impact of the project on the Nyando Catchment, sufficient data on discharge and water quality should be collected so as to be used in the development of a hydrology/erosion model for the Nyando Catchment.
- In June, 2002, the WB Mission observed that despite administrative difficulties, the ISWC Component has and continues to manage field activities successfully and with very modest costs. The Mission recommended that ISWC Component get the Land Use Components to agree on the *modus operandi* of establishing a GIS-based data bank. They observed that the Component's concept note on Natural Resource Information and Database presented was commendable and should be expanded further in consultation with the Secretariat and other Land Use Components.
- In June, 2003, the WB Mission noted that despite cash flow constraints, some remarkable achievements have been made by the ISWC Component. The Mission recommended that the ISWC Component should initiate a study to quantify the loss of nutrients and sediments from different land covers in collaboration with KARI; collect baseline information on Nyando Catchment for planning various activities in focal areas; establish a GIS based data bank on land use around the Nyando Catchment as soon as possible; and that there was the need to monitor soil loss under different soil conditions in the project area
- In April, 2004, the WB Mission noted that the ISWC Component continues to perform well in its catalytic efforts to stimulate adoption of soil and water conservation measures. The Mission observed that most of the activities planned as stated in the last Aide Memoire had been achieved; that the main project inputs were training, technical advice



and community mobilization; that the main incentives for adopting land use changes were increased crop production and incomes; and that reduced sediment and nutrient flows into the tributaries of river Nyando was a side benefit of on farm productivity benefits.

- In October, 2004, the WB mission noted that the ISWC Component continues to register good progress as most activities planned during the one year have been achieved and others surpassed. Also there is potential for up scaling successful interventions on other river catchments of the Lake Victoria Basin. This was to be included in the work plan for October, 2004 to December, 2005. There was also the need to prepare national and regional lessons learnt report – plan by October 31, 2004 and final report ready by September 15, 2005.
- In March, 2005, The WB Mission commended the ISWC for the good collaboration with land use components as well as other stakeholders operating under the NALEP Focal Area approach. With respect to the development and promotion of soil and water conservation systems in the year, performance was rather unsatisfactory. This was attributed to the demand driven approach of the new NALEP system. The rate of success depends on how fast the community responds. The Mission noted that the component had continued to perform comparatively well having achieved a number of notable achievements. They also noted that community demand for micro-projects (i.e. on spring protection and tree nurseries) was very high and continues to grow but lack of sufficient component funding and delayed disbursements have slowed down the progress.

3.9 Achievements of the ISWC Component

The Consultant reviewed eight Aide Memoire and six annual progress reports on ISWC Component activities and made field visits to 19 focal areas. During the eight years (1997 to 2005) period of LVEMP's existence as a World Bank funded project, the ISWC Component's achievements have been rated highly by the World Bank during their periodic evaluation missions (see summaries of Aide Memoire of 2001 to 2005). From these reports and after field verifications, the Consultant summarizes the achievements made by the ISWC Component in the table presented here below.



Distribution by districts of achievements under the ISWC Component.

Output /Activity	ISWC Achievements in four Districts				Total
	Kericho	South Nandi	Nyando	Kisumu	
PRA Reports, CAPs and Resource Maps (one of each)	45	30	63	51	189
FADC Members Trained	180	120	252	204	756
Demand Driven Training of CIGs	18	13	13	14	58
On Farm Field Days	8	9	7	6	30
Other Demonstrations	12	14	12	16	54
FSAPs	1698	1581	1825	1632	6736
Protected Springs	2	10	2	1	15
Conservation Structures in km	76	88	49	52	275
Fruit/Tree Nurseries	7	7	6	9	29
Water Pans	4	-	1	2	7
Radio Programs in Luo and Kalenjin	Kalenjin - 1		Luo - 1		2
ISWC Micro Projects	2	2	-	-	
Exchange Tours/Visits					
Focal Area Visits	68	80	65	65	278
Country Tours/Visits	4	4	3	3	14
ISWC Staff Regional Tours	2	2	2	2	8
No of ISWC Staff Trained					
Msc Courses	1	-	-	1	4
Short Courses	15	10	12	16	53

4. LESSONS LEARNED AND CONCLUSIONS

From a review of ISWC Component’s Annual Progress Reports, World Bank Mission Aide Memoires, research study reports and observations and discussions with ISWC Component staff, District and Divisional Extension Officers, Frontline Extension Workers and farmers during the 14 days of field visits to 19 focal areas in Kericho, South Nandi, Nyando and Kisumu Districts, the Consultant was exposed to the existing problems and constraints affecting implementation of ISWC activities. From these reports, observations and discussions, the following are the lessons learned from the planning and implementation of ISWC Component activities:

1. Whereas the LVEMP project concept was good, the design was weak due to the lack of a Logical Framework Approach (LFA). The lack of a strategic plan resulted in the Component being implemented without clearly identified ISWC Component’s outputs and activities. Thus many WB Missions had to be introduced to strengthen the monitoring and evaluation processes and streamline the planning of yearly activities. Because of this major shortcoming in project design, the ISWC Component has had to adjust its areas of coverage from two to four districts first and now again has had to upscale to seven districts.



2. The Component has also had to change its extension approach from the initial micro catchment approach to the NALEP Focal Area approach. The NALEP extension approach is demand driven and hence the success in the implementation of conservation activities will depend on how fast a community responds. Because of this, Component's performance in the promotion of soil and water conservation activities is affected and below expectations. This problem will persist until an amicable solution is sought by LVEMP.
3. Right from inception, the ISWC Component has lacked the necessary capability and capacity of handling a project of this magnitude. The capacity building done through post graduate (Msc) training of 4 did not improve the situation as all of them did not return back to work for the Component. Of the 4 persons trained 2 were previously working with the project Component. The other two persons were external beneficiaries and hence should not have been trained using the limited ISWC Component funds. Because of this shortcoming, there is a shortfall in the core staff at the ISWC Component Coordination Office. Thus the Component Coordinator is currently overstretched by the amount of work that he has to handle. It is even more critical now that the Component's activities have been up scaled to seven districts.
4. Deforestation of forest lands and increased cultivation of steep lands due to an increase in population pressure, have exacerbated the soil erosion problem in highland areas of the Nyando. These highland areas of Londiani, Tindiret, Kipkelion Sigowet, Aldai, Nandi Hills are now the main sources of diffuse or non-point source pollution in the river. The highlands of Tindiret and South Nandi contribute more than 50% of the total water discharged by the Nyando. This increase in total runoff volume is often accompanied by a high sediment load and turbidity in the river. The soil lost in the Nyando Catchment is approximately 26 tons/ha/year (based on the Universal Soil Loss Equation).
5. Indigenous knowledge and skills like the conservation of shade trees, medicinal trees, shifting cultivation and shifting of cattle bomas to spread the manure are useful in the management of soil and water and Striga weed ("Kayongo"). River bank cultivation is also traditionally prohibited and this has helped to conserve the river banks. Also some forests are sacred and hence have not been affected by deforestation.
6. The level of community participation in conservation activities is generally average. However, participation varies with the ACZ, soils and the slope. The farmers with very sloppy farms participate in conservation more than those with land on less sloppy areas. The participation of farmers has therefore enhanced the sustainability of conservation activities in the catchment area.
7. It is evident that differences in conservation techniques are identifiable by gender, suitability and sustainability. Financial constraints and cultural practices are the main factors dictating the techniques applied by women. They will therefore tend to choose techniques which are not labor intensive, easily sustainable and are inexpensive like the use of grass strips and unploughed strips. Men on the other hand opt for labor intensive techniques like fanya juu and fanya chini terraces. Capital is not a problem to men because customarily they control family income.



8. Farmers in the Nyando catchment area are aware about the effects of environmental degradation on soil and crop productivity. The farmers have tried to conserve the soil, water and nutrients in the catchment area by carrying out conservation measures like conservation tillage, grass strips, stone lines, unploughed strips, graded terraces and agro-forestry. The farmers also use manure, and inorganic fertilizers to improve on soil fertility. Communal conservation activities are also carried out especially in the control of gullies.
9. Gully erosion which is quite common in lowland areas of the Nyando Catchment is mainly caused by erosion of cattle tracks/paths and accelerated by sodicity (examples of Katuk Odeyo Gully in Nyakach and Ramanda Gully in Miwani).
10. The funds allocated to the ISWC Component were limited when compared to other LVEMP Components' allocations and yet the Component was expected to undertake more conservation activities. The WB Mission in June, 2003 noted that despite these cash flow constraints, the ISWC Component has made some remarkable achievements of planned conservation activities. Thus World Bank Missions have had to intervene by requesting for reallocation of funds by LVEMP to this Component.
11. During the eight years of the implementation of ISWC activities, an estimated 7.5% of the Nyando Catchment Area (0.4% of the entire Lake Victoria Basin) is now conserved. A lot of this conservation work was realized through the micro catchment extension approach.
12. Of the total Nyando Catchment population, approximately 82% are fully or partially aware of the effects of environmental degradation on soil and crop productivity. This statistics are based on a survey carried by the ISWC Component.
13. According to the Water Quality Experts, the Nyando river's ranking in terms of sediment loads and water pollution has shifted from the second to the fifth most highly polluted river (1997- 2004).
14. The major environmental degradation problems in the Nyando river catchment area are soil erosion in cultivated steplands, flooding and associated waterlogging in the lowlands, deforestation of water catchment areas, and to a lesser extent riverbank erosion in the lowlands and overgrazing. Pollution caused by chemical effluents from sugar and ACFC factories. These problems are stratified according to slope, agro-climatic zones, soil types and land use.
15. The major land use practices in the Nyando Catchment Area are crop and livestock production. However, many farmers are now engaging in serious agro-forestry in view of the increasing demand for fuel wood and construction timber.
16. Communal grazing on adjudicated individual landholdings in lowland areas has frustrated soil conservation efforts due to frequent damages and high cost of maintaining soil conservation structures.
17. The lack of a sound land use planning policy in Kenya is a major hindrance to the adoption of effective conservation measures in the Nyando Catchment. The land owners with small parcels of land are more involved in conservation techniques than land owners with large parcels of land. On average 60% of the FSAPs are implemented by farmers.



18. Women's representation and participation in catchment conservation committees like FADCs is about 30% and increases to 45% in CIGs. The women are now more actively involved in conservation through the production of food security crops like sweet potatoes, cassava, bananas, and pumpkin.
19. Water spring protection has impacted positively to catchment conservation as it has not only saved time for fetching water by women but also improved the health of nearby communities. It has been reported that water borne diseases have reduced by as much as 80% and that a community of 200 households can realize daily savings of up to Kshs. 2,000.00 on fetching water. Multiple benefits of protected springs include disease free water, more even flow, improved biodiversity and habitats around the springs.
20. In some of the ISWC focal areas visited farmers are more than 200% increase in maize crop yields due to better crop productivity due to the new crop varieties introduced and also the application of chemical fertilizers. Improved crop productivity has also resulted from the application of farmyard manure from composting. This has eliminated the Striga weeds ("Kayongo") and hence the good crop yields. From a study done by the Component, maize crop yields have on average increased by 119% and the biomass by 140% after two years of continuous conservation.
21. The introduction of micro-projects and food security crops as incentives for conservation activities have resulted in remarkable achievements and impact on catchment conservation. The main incentives for adopting conservation technologies are increased crop production and incomes. Reduced sediment and nutrient flows into the tributaries of river Nyando is a side benefit of on farm productivity benefits. As observed by World Bank Mission of October, 2004, micro projects have very high community participation and contribution and evident positive environmental impacts.
22. Some of the key indicators for soil and water conservation identified by World Bank Missions include the number of FSAPs prepared annually, the number of CAPs developed annually, and the number of constructed and protected soil and water conservation measures – gully control, contour terraces, and springs.

5. RECOMMENDATIONS

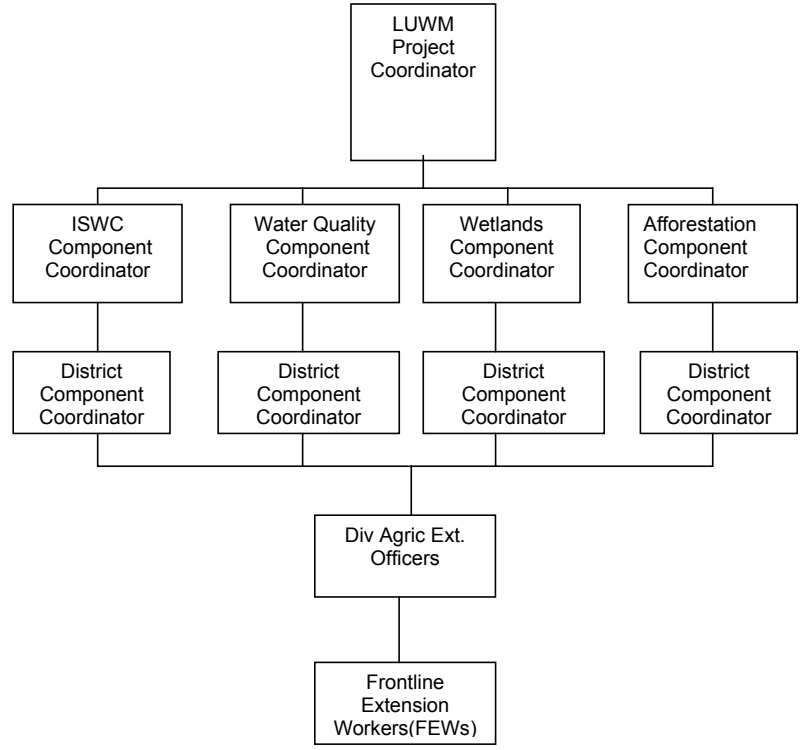
1. The second phase of LVEMP must be properly planned so as to enable identified components to prepare their strategic plans at the outset. It should be planned as a program with a duration of 5 to 10 years and a planning horizon of 20 to 30 years. Thus a strategic plan for LVEMP as a program is necessary so as to develop a log frame. This Logical Framework Approach would clearly identify the intervention strategies with well defined outputs and activities. It would also put in place in-house monitoring and evaluation systems that would help to correct and redesign project interventions.
2. In as much as the current NALEP Focal Area approach is a sustainable way of carrying out conservation activities, the time of one year spent in a focal area is not sufficiently long to realize the expected impact. Infact of that one year period, approximately 7 months are spent on planning and the other 4 months are for implementation. In order to keep the FADCs active and sustainable a minimum period of 2 to 3 years per focal area was recommended by farmers and field extension personnel.



3. The World Bank Mission of October, 2004 recommended up scaling of ISWC activities in other river catchments within the Lake Victoria Basin. This was included in the work plan for October, 2004 to December, 2005 and already some activities have started in the Yala (North Nandi and Vihiga Districts) and Nzoia Catchments (Marakwet District). From the lessons learned in the implementation of ISWC activities in the Nyando Catchment, successful conservation interventions should be replicated in the other catchments.
4. Due to the very high community participation and contribution and evident positive environmental impacts of ISWC and Catchment Afforestation micro projects in the current LVEMP, there is the need to expand. Already the previous funding allocations for each micro project have been scaled down to accommodate more projects. However, the micro projects should be made competitive and should use a demand driven approach in consultation with divisional extension staff to choose the micro projects. The beneficiary communities should be trained in group dynamics and management and financial management so as to utilize the received financial resources well. Micro projects cash withdrawals by CIGs should be properly arranged so as to minimize any misappropriation of funds by the officials.
5. The World Bank Mission of October, 2004 also recommended up scale community-based sensitization on ISWC activities and the establishment of 15 micro projects, and support of tree nurseries with materials where required in Nyando, Yala and Nzoia Catchments by September 30, 2005. The budget was to be revised to reflect the additional activities by March 31, 2005. The support of tree nurseries with materials should be improved and increased so as to reach out to more CIGs.
6. There can be no conservation without incentives. In the focal areas visited in this consultancy, farmers had ranked their priorities such that what came first was not necessarily directly related to ISWC activities. Yet without the realization of those farmer preferences there would be no conservation. It is prudent that these farmer preferences be given due consideration in future ISWC activities and be supported as entry points to conservation. Examples of these entry points include, construction of access roads, construction of dips and cattle troughs, support of community pharmacies, support of rural water supply systems and support of zero grazing systems. In other focal areas rainwater harvesting systems were a priority and should be supported. The World Bank Mission of October, 2004 recommended the construct livestock troughs around protected water springs by September 30, 2005. Also they earmarked some money for the completion of a community water supply system.
7. Catchment conservation should be interactive including a causal analysis of ecological problems (identification of problems and constraints), choosing an appropriate focal area for planning, defining the objectives of possible interventions and establishing institutional mechanisms for channelling resources to priority areas. In this view there is a need to continue with the integrated or multi disciplinary approach to catchment conservation. The current components of ISWC, Catchment Afforestation, Wetlands and Water Quality should be elevated to a fully fledged project called "Land Use and Water Management Project". Thus other components would have to be treated likewise.



8. The ISWC Component of LVEMP had undertaken five studies in collaboration with institutions such as the University of Nairobi, Moi University, Tea Research Foundation of Kericho, Kenya Soil Survey of KARI - Nairobi, and KARI-Kibos, Kisumu. Whilst striving to maintain these linkages, the Component should establish other collaborative research linkages with other Institutions like ICRAF and Maseno University that have carried out extensive studies in the Lake Victoria Basin.
9. Ecologically sustainable agriculture involving agro-silvo-pasture (crops, trees and livestock) should be introduced to farmers with small landholdings. This would promote organic or conservation farming, double digging, and biogas production in households as part of the energy conservation activity.
10. Community capacity building through on farm demonstrations, field days and exchange visits is crucial to a rapid adoption of conservation technologies. Coupled with this is a well planned extension staff training program that would enable them understand the applications of new conservation techniques.
11. There can be no successful implementation of project activities without adequate transport facilities. It is recommended that in phase II, LVEMP should provide one vehicle for each district and the project coordination office. Also each district should receive 3 to 4 motor cycles for the frontline extension workers.
12. The elevation of the four components of ISWC, Catchment Afforestation, Wetlands and Water Quality into a Land use and Water Management Project (LUWMP) requires a new organization and management structure. The recommended structure is shown here below:



Organization and Management Structure for LUWMP Project.



APPENDICES

Appendix 1: Summaries of Seven World Bank Missions Aide Memoires.



APPENDIX 1: SUMMARIES OF SIX WORLD BANK MISSIONS AIDE MEMOIRES

The tables below are summaries on the observations on ISWC Component activities, general remarks and recommendations for six short-term World Bank Missions Aide Memoire.

World Bank Mission's Aide Memoire on ISWC Component Activities in 2000.

Date of Aide Memoire	Observations on ISWC Component Activities
July, 2000	<ul style="list-style-type: none"> • ISWC to evaluate the effects of current land use on water quality. • ISWC to evaluate the potential of management interventions to improve catchment water quality. • ISWC activities being conducted at four spatial scales: the farm scale, the micro catchment scale, macro catchment scale and the basin scale. • At farm scale, ISWC expected to conduct studies using soil erosion plots to determine the effect of slope and vegetation on runoff and soil loss. • At micro catchment scale, ISWC and collaborating Components to agree on interventions and evaluation of the effect on water quality after PRA with micro catchment committees. • In the Orobo-Ombeyi catchment, the WB Mission visited sampling points and examples of land use and water use conflicts within the catchment.
<p>General Remarks and Recommendations: WB Mission noted that the ISWC Component was collaborating with Catchment Afforestation, Wetlands and Water Quality Components. That the ISWC activities were being conducted at four spatial scales. The WB Mission therefore recommended:</p> <ul style="list-style-type: none"> • That prior to initiating the soil loss and water quality monitoring, ISWC should visit the parallel activities in Uganda to compare and harmonize methodologies. • Develop a sampling design for soil loss, nutrient yields and water quality measurements in consultation with the Pollution Loading subcomponent. • Water quality to incorporate water sampling at appropriate points (upstream and downstream) of micro catchment interventions. • In the Orobo-Ombeyi Catchment, ISWC, Catchment Afforestation, Wetlands and Water Quality to collaborate in the demonstration of how land use progressively modifies water quality as water traverses the land surface. • Under the Pollution Loading subcomponent should document and eventually model the integration of processes at all the four scales for the determination of observed nutrient water quality. • Water Quality Component to do surveys to establish fertilizer and agro-chemical application rates within Nyando Catchment so as to evaluate the water quality of river Nyando. This exercise to be done in collaboration with ISWC who have the extension workers to conduct extensive surveys in the field. Detailed planning of the survey to be completed by December, 2000. • A suitable laboratory for analyzing agro-chemical residues in soil, water and biota should be identified. • Funds earmarked for international consultancy and equipment should be reallocated to meet the costs of these expensive analyses. • Integrate all the investigations in the four scales through the creation of GIS analysis and modelling. The Pollution Loading subcomponent and Wetland Component assigned the task of collecting all the baseline information for this exercise. The availability of map information should be determined by September, 2000 and suitability of available GIS based models to predict water quality should be assessed by June, 2001. • If mapping information is available, then consider a consultancy to put all the information in digital format and to apply the models for predicting water quality. 	



World Bank Mission's Aide Memoire on ISWC Component Activities in 2001.

Date of Aide Memoire	Observations on ISWC Component Activities
May 21, 2001	<ul style="list-style-type: none"> • Selection of more micro catchments for PRAs and CAPs. • Establishment of catchment committees. • Training on various aspects of conservation. • Establishment of tree nurseries. • Construction of terraces, water pans and access roads. • Protection of springs.
<p>General Remarks and Recommendations: The WB mission commended the ISWC Component for its high level of activities and recommended as follows:</p> <ul style="list-style-type: none"> • Collaboration with the Water Quality Component in river gauging and sampling. • Protect and monitor water quality in springs. • Protect and monitor water quality in springs. • Implement at least two funded micro projects. • Quantitatively assess the effects of conservation on crop yields and the biophysical environment. • Establish runoff and soil loss plots and analyze the data collected – KARI to conduct this study. • Collaborate with the Wetland and Water Quality Components in rehabilitating dams, canals and wetlands. • Develop GIS or digital elevation maps agrochemical use, land use, soil type, vegetation cover and climate of Nyando. • To achieve the intended objectives and better document the impact of the project on the Nyando Catchment, sufficient data on discharge and water quality should be collected so as to be used in the development of a hydrology/erosion model for the Nyando River Catchment Area. • Organize a short course in GIS and hydrology/erosion modelling so as to strengthen the capacity and capability of staff in catchment modelling. • Focus activities in defined areas where maximum impact of conservation can be realized and monitored. • Future ISWC micro projects should be focussed on headwater catchments so as to monitor the effects of conservation on water quality. Such micro projects should be approved after consultations with the ISWC, Wetland Water Quality and Catchment Afforestation Components. 	



World Bank Mission's Aide Memoire on ISWC Component Activities in 2002.

Date of Aide Memoire	Observations on ISWC Component Activities
June 21, 2002	<ul style="list-style-type: none"> • ISWC Component has organized a joint work plan and activities with Wetlands, Catchment Afforestation, Water Quality, Water Hyacinth and Community Participation Component Experts. • Various joint activities are in different stages of implementation. • Work on studies on crop yields, baseline information, soil losses not yet completed. • Repair and construction of water pans and canals continuing. • Focus still on transfer of ownership to farmers and development of self reliance among them. • The continuity of land management practices has the highest chance of success once LVEMP is completed.
<p>General Remarks and Recommendations: Despite administrative difficulties, the ISWC Component has and continues to manage field activities successfully and with very modest costs. The WB Mission recommendations were:</p> <ul style="list-style-type: none"> • During the next implementation period, continue to focus on the Nyando River Catchment and produce a report on the successes and failures of implemented activities. • Training program should be demand driven and take the form of a combination of at work training and limited excursion/exchange visits to other areas for exposure. • Component to continue offering technical advice to various micro projects on spring protection and tree nurseries. • Strengthening of collaborative work in co-management of water resources in accordance with the joint management plan of the Land Use Components. • Undertake a study to quantify the loss of nutrients and sediments from different land covers. • Complete the baseline information study and the quantitative assessment of the effect of soil and water conservation practices on crop yields and the bio-physical environment. • Get the Land Use Components to agree on the modus operandi of establishing a GIS-based data bank. The Component's concept note on Natural Resource Information and Database is commendable and should be expanded further in consultation with the Secretariat and other Land Use Components. 	



World Bank Mission's Aide Memoire on ISWC Component Activities in 2003.

Date of Aide Memoire	Observations on ISWC Component Activities
June 13, 2003	<ul style="list-style-type: none"> • Activities concentrated in 8 focal areas directly draining into the river Nyando and its tributaries. • Four tree nurseries with over 6,800 agro-forestry trees and 340 fruit trees raised and planted within one year. • A total of 23 km of terraces and 2.25 km of artificial water ways completed. • Continued support of 4 micro-projects with co-financing from local authorities. • Completion of a study on impact assessment of soil and water conservation measures on crop yields and the bio-physical environment.
<p>General Remarks and Recommendations: The WB mission noted that despite cash flow constraints, some remarkable achievements have been made and recommended as follows:</p> <ul style="list-style-type: none"> • Open up at least one new focal area in each of the four districts and intensify community support services in spring protection, gully control, construction and rehabilitation of water pans and canals. • Should initiate a study to quantify the loss of nutrients and sediments from different land covers in collaboration with KARI. • Baseline information on Nyando River Catchment Area is required for planning various activities in focal areas. • Establishment of GIS based data bank on land use around the Nyando Catchment is an essential activity that should be initiated and concluded as soon as possible. • There is the need to monitor soil loss under different soil conditions in the project area. 	



World Bank Mission's Aide Memoire on ISWC Component Activities in 2004.

Date of Aide Memoire	Observations on ISWC Component Activities
April, 2004	<ul style="list-style-type: none"> • Most of the activities planned as stated in the last Aide Memoire have been achieved. • The main project inputs are training, technical advice and community mobilization. • The main incentive for adopting land use changes are increased crop production and incomes. • Reduced sediment and nutrient flows into the tributaries of river Nyando is a side benefit of on farm productivity benefits. • Thirty percent participation by women in community mobilization to prepare CAPs in each of the two focal areas established in two different divisions. • A review of 10 CAPs showed that communities continued with their planned activities but also new issues emerged. • 178 farmers and 70 staff members benefited from inter-catchment, inter-district or inter-country exchange visits that exposed them to new technologies. • Upto 2003, 1151 FSAPs completed, 9 springs protected in one year with 70% co-financing from the communities. • Multiple benefits of protected springs include disease free water, more even flow, improved biodiversity and habitats around the springs. • Eight tree nurseries established with technical assistance and limited provision of material assistance. • 21 Common Interest Groups (181 men, 138 women and 17 youth) were formed in one year focussing on soil conservation, bee keeping, banana production, poultry production, energy conservation, zero grazing, tree nurseries, agro-forestry and land use planning.
<p>General Remarks and Recommendations: WB Mission noted that the ISWC Component continues to perform well in its catalytic efforts to stimulate adoption of soil and water conservation measures. Therefore the WB Mission recommended as follows:</p> <ul style="list-style-type: none"> • Up scaling at a much larger scale of pilot activities carried out under the ISWC Component. 	



World Bank Mission's Aide Memoire on ISWC Component Activities in 2004.

Date of Aide Memoire	Observations on ISWC Component Activities
October 4, 2004	<ul style="list-style-type: none"> • ISWC as from June, 2004 adopted NALEP's "Focal Area" Approach • Main focus has been on mobilization of farmers and dissemination of soil and water conservation technologies. • Over 1,100 farmers attended field days. • 490 FSAPs prepared. • Training of farmers on various conservation technologies. • Fencing of 800 m of gully. • Involvement of schools in afforestation. • Selection of 8 new focal areas as part of up scaling.
<p>General Remarks and Recommendations: WB mission noted that the ISWC Component continues to register good progress as most activities planned during the one year have been achieved and others surpassed. Also there is potential for up scaling successful interventions on other river catchments of the Lake Victoria Basin. The WB Mission therefore recommended as follows:</p> <ul style="list-style-type: none"> • Up scaling of ISWC activities in other river catchments within the Lake Victoria Basin and included in the work plan for October, 2004 to December, 2005. • ISWC and Catchment Afforestation micro projects be expanded due to the very high community participation and contribution and evident positive environmental impacts of these projects. • Prepare national and regional lessons learnt report – plan by October 31, 2004 and final report ready by September 15, 2005. • Key output indicators for soil and water conservation were proposed as the number of FSAPs prepared annually and the number of CAPs developed annually • Key outcome indicator of soil and water conservation was proposed as the number of constructed and protected soil and water conservation measures – gully control, contour terraces, and springs. 	



World Bank Mission's Aide Memoire on ISWC Component Activities in 2005.

Date of Aide Memoire	Observations on ISWC Component Activities
March 9, 2005	<ul style="list-style-type: none"> • ISWC Component has trained 96 FADCs as originally planned. 30% of FADC members are women. • Training topics included group dynamics, leadership and management; women empowerment, HIV/AIDS; Government policies and the new NALEP Focal Area approach. • ISWC Component has trained 16 CIGs of 280 members of which 45% were women. The training covered cassava bulking, energy conservation, tree nursery management, commercial tree farming and dairy goat keeping. • Of the planned review of 8 CAPs, five were covered, active FADCs identified and new issues incorporated into the work plans. • Four ISWC component staff visited Tanzania, 26 farmers and 4 ISWC staff toured Baraka Farmers Training Centre in Nakuru. • Of the planned 400 FSAPs only 226 were achieved and 1469 meters of terraces were made. • Established 5 out of the 8 planned agro-forestry tree nurseries. Inadequate nursery tools and materials like poly tubes have hampered expansion initiatives • Constructed an additional 200m fence and planted trees around Ramanda gully in Nyando District. Prepared a joint action plan for the severely affected Katuk Odeyo gully in Nyakach, Nyando District. • Installation of 8 silt traps out of the planned 12 in collaboration with the Water Hyacinth Control Component and KARI-Kibos. • Establishment of 4 cassava bulking plots, hosting of Kenya and Tanzania Mps and 2 journalists and completion of Orobo Catchment Study by the Kenya Soil Survey (KSS).
<p>General Remarks and Recommendations: The WB Mission commended the ISWC for the good collaboration with land use components as well as other stakeholders operating under the NALEP Focal Area approach. With respect to the development and promotion of soil and water conservation systems in the year, performance was rather unsatisfactory. This was attributed to the demand driven approach of the new NALEP system. The rate of success depends on how fast the community responds. The Mission noted that the component has continued to perform comparatively well having achieved a number of notable achievements. They also noted that community demand for micro-projects (i.e. on spring protection and tree nurseries) is very high and continues to grow but lack of sufficient component funding and delayed disbursements have slowed down the progress. The WB Mission therefore recommended as follows:</p> <ul style="list-style-type: none"> • Up scale community-based sensitization on ISWC activities and establish 15 micro projects, and support tree nurseries with materials where required in Nyando, Yala and Nzoia Catchments by September 30, 2005. Revise the budget to reflect the additional activities by March 31, 2005. • Construct livestock troughs around protected water springs by September 30, 2005. • Provide community capacity building training on relevant technical and business management aspects to FADCs and CIGs by September 30, 2005. During the next implementation period, continue to focus on the Nyando River Catchment and produce a report on the successes and failures of implemented activities. • Prepare for a lessons learned consultancy for LVEMP Kenya, Tanzania and Uganda by May 30, 2005. 	



