supporting the preparation of participatory village land use plans..

- Soil and water conservation measures will include terraces, grass strips and where required radical terraces over an estimated 21,150ha (Biharamulo District) and 49,910ha (Muleba District. As well as improved farm incomes there will secondary positive impacts on reducing food insecurity.
- The primary approach in fertility enhancement will involve short-rotation nitrogen fixing or phosphorus mobilizing shrubs and herbs, to develop a large biomass during a short period (6-12 months). Organic matter and soil nutrients will be enhanced, while soil pH will also improve.
- The plant species to be used include *Tephrosia vogelii*, *Mucuna pruriensis*, *Sesbania sesban*, *Calliandra callothyrsus*, *Leucaena* species, and *Tithonia diversifolia*. The bigger shrubs (*Calliandra* and *Leucaena* species) will also be used to stabilize terrace risers. Herbaceous plants (e.g. *Mucuna pruriensis*) and small shrubs (e.g. *Sesbania sesban* and *Tephrosia vogelii) w*ill be planted as temporary cover, while bigger shrubs will be planted as hedges on terrace risers.
- The fodder trees or shrubs to be introduced are those which can tolerate drought and termites; grow fast and coppice; and produce quality fodder which can adequately supplement elephant grass. The sites selected would support *Calliandra callothyrsus* and various species of *Leucaena*, especially *Leucaena diversifolia* and *L. leucocephala*. The niches for planting include boundaries, hedgerows between crops, buffer zones around lakes, marshlands and rivers, along public roads, or possibly as woodlots.
- Both the soil fertility improvement and the increased fodder production sub-components utilise tree species such as *Calliandra callothyrsus* and various species of *Leucaena*, especially *Leucaena diversifolia* and *L. leucocephala* that will also provide bio-fuels and contribute to the re-forestation on farmland sub-component.

Country: **UGANDA**

Project Name: Project U-01: Land Rehabilitation in Kikagate Sub-County, Isingiro District

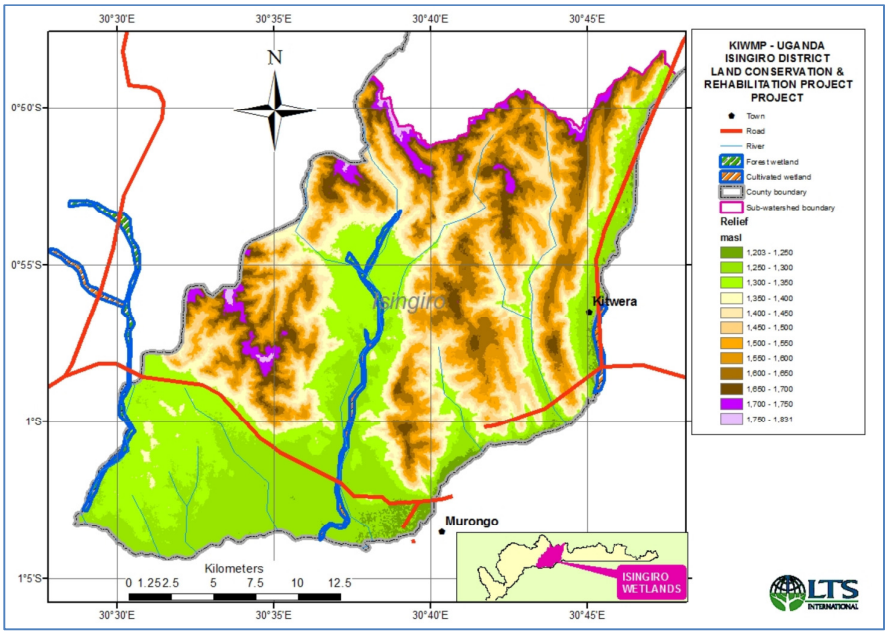
Total Project Cost: US$ 10.13 million (Foreign 15%)

Total Duration: Five years in Phase 1:

Project Area: The project area involves the Isingiro sub-catchment of the Kagera River in Isingiro District, Kikagate sub-county.

Formerly part of the Mbarara District, Isingiro borders the Districts of Rakai in the east, Kiruhura and Mbarara in the north, Ntungamo in the west, and the United Republic of Tanzania in the south. The total area of Kikagate Sub-county is 161km^2 with a total population of about 3,500 households The District enjoys an equatorial climate and receives an average rainfall of 1,200mm; temperatures range from 17 to 30^{o}C. The region has two main rainy seasons during the months of March to April, and September to November. The District has a high potential in terms of mining and lumber, and also hosts the Government refugee resettlement programme. See Figure on the land cover and degraded areas.

Kikagate Sub-County: Dominant Landcover



Project Activities

Project activities will include:

(iii) Soil Conservation

- Raising awareness of the importance of restoring degraded landscapes, using video, theatre, newsletters and other media.
- The provision of technical training to show farmers which native species to choose for planting and restoration, enhancing their own benefits.
- Close liaison with village governments and environmental committees, as well as with traditional institutions and the community assemblies that lay down customary law and

support to the development of Participatory Land Use Plans.

- Soil and water conservation measures will include terraces, grass strips and where required radical terraces on slopes exceeding 15 percent over an estimated 7,500ha[33]. As well as improved farm incomes there will secondary positive impacts on reducing food insecurity.
- The primary approach in fertility enhancement will involve short-rotation nitrogen fixing or phosphorus mobilizing shrubs and herbs, to develop a large biomass during a short period (6-12 months). Organic matter and soil nutrients will be enhanced, while soil pH will also improve. This will be undertaken over an area of 12,800ha on slopes exceeding 5 percent.
- The plant species to be used include *Tephrosia vogelii*, *Mucuna pruriensis*, *Sesbania sesban*, *Calliandra callothyrsus*, *Leucaena* species, and *Tithonia diversifolia*. The bigger shrubs (*Calliandra* and *Leucaena* species) will also be used to stabilize terrace risers. Herbaceous plants (e.g. *Mucuna pruriensis*) and small shrubs (e.g. *Sesbania sesban* and *Tephrosia vogelii) w*ill be planted as temporary cover, while bigger shrubs will be planted as hedges on terrace risers. It is estimated 5 tree nurseries will be able to produce 0.5million seedlings per year.
- The fodder trees or shrubs to be introduced are those which can tolerate drought and termites; grow fast and coppice; and produce quality fodder which can adequately supplement Napier grass. The sites selected would support *Calliandra callothyrsus* and various species of *Leucaena*, especially *Leucaena diversifolia* and *L. leucocephala*. The niches for planting include boundaries, hedgerows between crops, buffer zones around lakes, marshlands and rivers, along public roads, or possibly as woodlots. Napier grass with leguminous tree leaves as a Nitrogen supplement will be used for stall feeding cows for increased milk production.
- Both the soil fertility improvement and the increased fodder production sub-components utilise tree species such as *Calliandra callothyrsus* and various species of *Leucaena*, especially *Leucaena diversifolia* and *L. leucocephala* that will also provide bio-fuels and contribute to the re-forestation on farmland sub-component.

(iv) Restoration of Abandoned Mining Areas

- the determination of the acreage of abandoned mining areas;
- community sensitization and awareness on environmental conservation and land rehabilitation (6 Parish demonstration sites);
- training in appropriate agricultural practices;
- community training on land rehabilitation;
- the establishment of tree nurseries (6 nurseries);
- land rehabilitation activities on degraded mining areas e.g. afforestation, terracing,
- river bank protection activities (24 kms – 40ha);
- rural income diversification -Bee keeping (10% households – 2,700).

[33] See Appendix 5 for estimation methodology.

Country: **UGANDA**

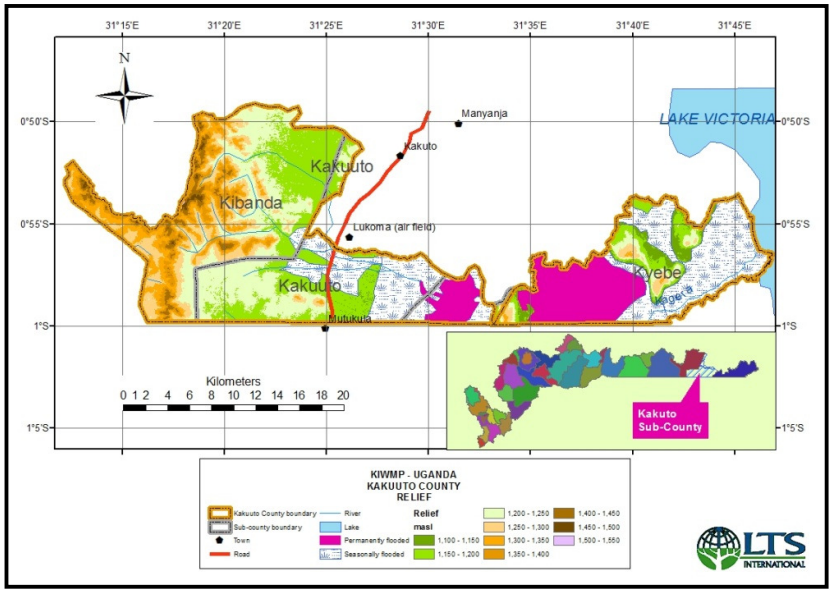
Project Name: Integrated Water Resource Management (IWRM) project, Kakuuto County in Rakai District, Uganda

Total Project Cost: US$ 15.90 million (Foreign 19%)

Total Duration: Five years in Phase 1:

Project Area: The Project is located in Rakai District, Kakuto County, Uganda. This is where the Kagera River enters Lake Victoria. The area is relatively flat between 1,100 and 1,200 metres above sea level, with deeply dissected hills along the western border of the sub-county (Figure).

Kakuto County, Rakai District: Relief



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Project Activities

The project components and activities are envisaged as follows:

- River bank rehabilitation and protection (70kms with 30 meter closed zone = 420ha);
- Wetland zoning, rehabilitation and protection (20,500ha);
- Capacity building in IWRM at County, Sub-county and Parish levels;
- Construction of SWC measures on 1,730ha of upland cultivated land;
- Water harvesting dams and irrigation 500ha);
- Wetland supplementary irrigation: weirs and drainage (500ha);
- Homestead fodder banks and leguminous trees for improved livestock feed for increased milk production 10,000 households x 0.2ha);
- Promotion of alternative livelihoods (Improved bee hives;
- Afforestation of bare hills, to control run-off into the Kagera River basin (10,000 households x 0.1ha);
- Capacity building on sustainable agricultural practices (10 x Parish Demonstration Plots;
- the development of an IWRM Catchment Land Use Plan;
- Capacity building of water user associations and catchment management associations (10 Parish WUA's).
- Construction/rehabilitation of roads (50kms) and water supplies (40 village supplies).

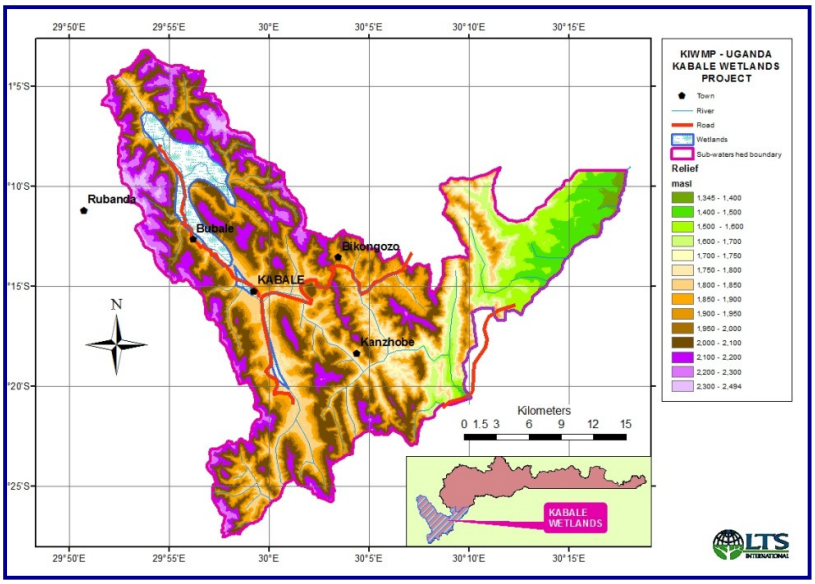
Country: **UGANDA**

Project Name: U-03: Integrated Water Resource Management Project, Maziba River catchment, Kabale District.

Total Project Cost: US$ 16.85 million (Foreign 17%)

Total Duration: Five years in Phase 1:

Project Area: The Maziba River catchment is located in Kabale District in southwest Uganda. It lies mainly between 1,800 and 2,500 metres above sea level, and is deeply dissected. In the upper catchment there is evidence of reversed drainage due to crustal warping (Figure).



Maziba Catchment in Kabale District, Uganda: Relief

Project Activities

The project components are envisaged as follows:

- Development and rehabilitation of soil and water conservation measures on agricultural land (13,620ha);
- Soil fertility enhancement on already conserved land (35,440ha);
- River bank rehabilitation and protection 80kms: (480ha);
- Sustainable development of Wetlands with improved drainage (3,916ha);
- Promotion of alternative livelihoods – 500 Improved Bee Hives);
- Afforestation on bare hills in Maziba County (40,000 Household Woodlots (0.1ha per household);
- Capacity building in IWRM at the District, sub-county and community levels (86 Parishes);
- Capacity building on sustainable agricultural practices;
- Capacity building of water user associations and catchment management associations (86 Parishes);
- Support to the development of Participatory Community Land Use Plans.
- Design of a payment for ecosystem services programme, in liaison with the hydroelectric project.

5.3 Prioritized Wetlands Management and Restoration Plan and Sub-projects

5.3.1 Prioritised wetlands sub-projects

The prioritisation of the wetland sub-projects followed a similar process to the prioritization of the watershed sub-projects with emphasis on IWRM and RAMSAR principles. This section therefore gives a summary of the prioritised projects per country with two sub-projects being trans-boundary. Detailed fiches can be found appended to Annex A and further details on the wetlands assessment can be found in Annex B.

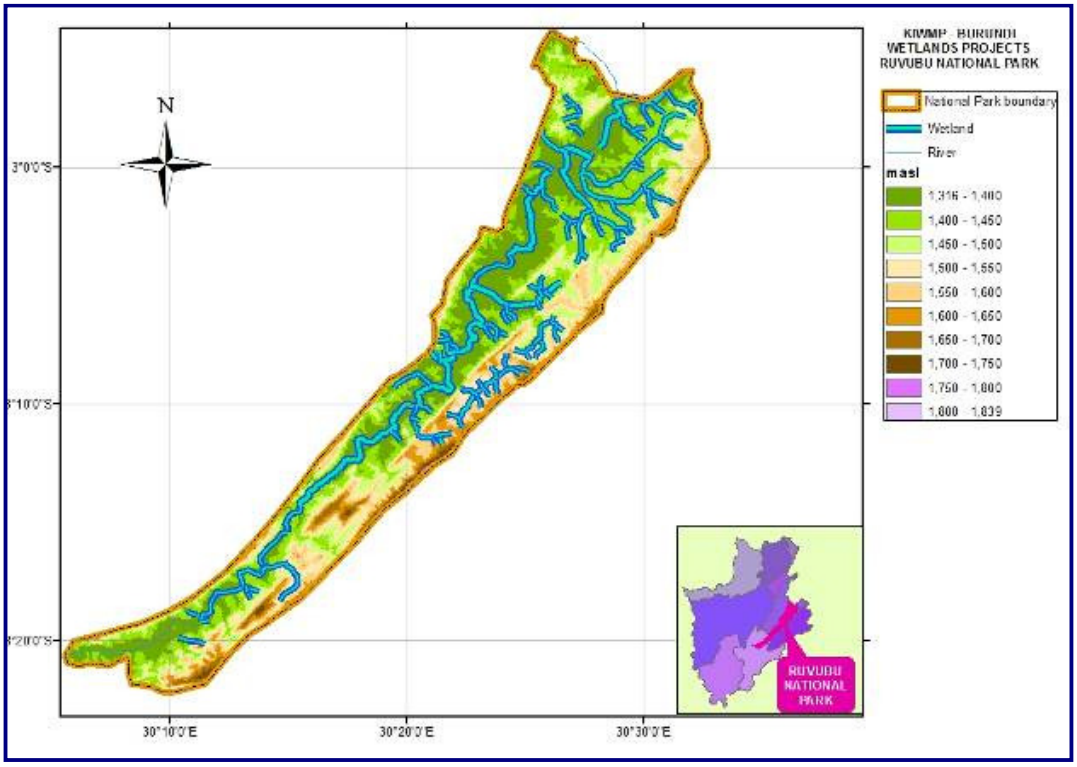
Country: **BURUNDI**

Project Name: Project BW-01: Protection of Ecosystems through Environmental Flows.

Total Project Cost: US$ 730,000 (Foreign 46%)

Total Duration: Five years in Phase 1

Project Area: In Burundi, it is proposed that the wetlands of the Ruvubu National Park, in the Ruvubu 3 sub-catchment be the location for the Project (see Figure). The area covers some 595km^2. The Park is sparsely populated with settlement located along the eastern border.



Project Activities

The objective is to maintain/restore suitable hydrological regimes in wetlands. Rivers and marshlands provide important ecosystem services, but there is often a trade-off in these services; for example, building a dam may enhance water supply and hydro-power production, but may degrade natural ecosystem services such as fisheries.

Sub-Component 1: Environmental flows: It is important to identify the water needs of downstream ecosystems, such that an appropriate balance is achieved between services that compete for water. The estimation of environmental flows seeks to define the water requirements of natural ecosystems, such that their services can be conserved and used wisely.

Sub-Component 2: Sustainable abstractions and licensing: Methods for estimating how much water can be sustainably abstracted from a wetland will be developed concurrently with the creation and implementation of licensing systems for abstractions from and discharges to surface and groundwater bodies, where such systems do not already exist. Legislation to enforce licences and prosecute violators must also be agreed and brought into law in the four riparian countries.

This will be achieved by:

- Reviewing the existing approaches for the estimation of the environmental flow requirements of ecosystems in the Kagera sub-basin;
- Reviewing experience from Tanzania and elsewhere on the issues related to environmental flow assessment and implementation;
- Developing guidelines on environmental flows appropriate to the Kagera sub-basin;
- assessing and comparing the current systems for awarding abstraction and discharge Licences and monitoring adherence to the licence conditions;
- Reviewing the existing approaches for determining abstraction and discharge permits and the estimation of sustainable abstractions;
- Developing guidelines on evaluating applications for licences, issuing licences and monitoring licences, where possible harmonising approaches for the Kagera sub-basin as a whole;
- Identifying demonstration sites for the maintenance or restoration of suitable hydrological regimes in conjunction with joint capacity building and management activities; and
- Assessing the wider ecosystem implications of environmental flows and sustainable abstractions.

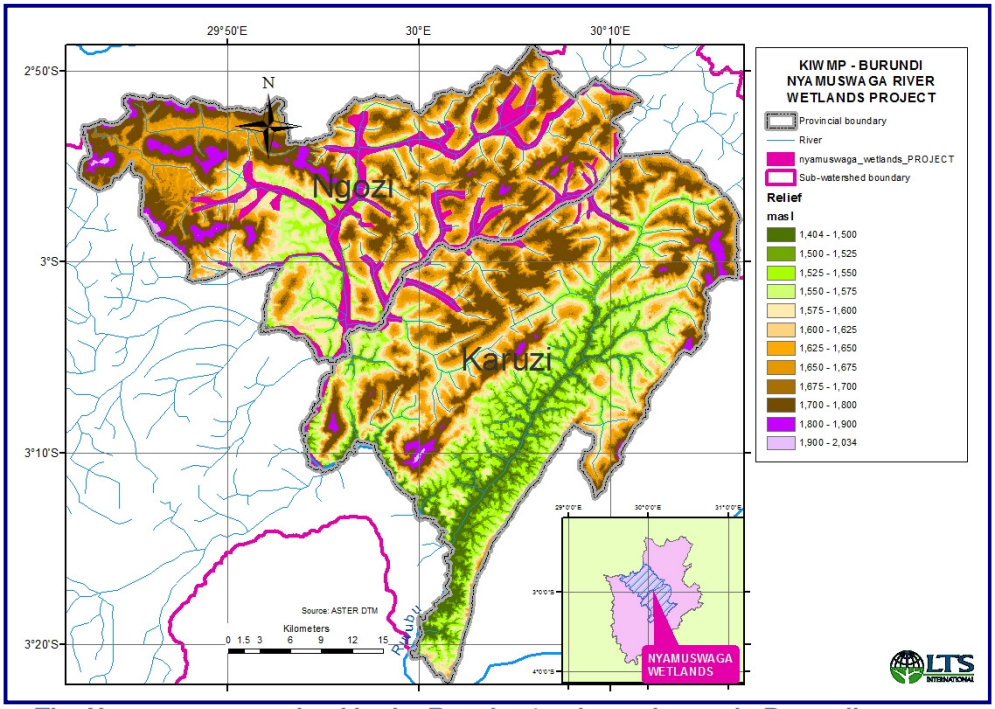
Country: **BURUNDI**

Project Name: Project BW-02: Alternative Livelihoods for Wetland Communities through an Ecosystem Approach.

Total Project Cost: US$ 1,133,000 (Foreign 30%)

Total Duration: Five years in Phase 1:

Project Area: It is proposed that this component would be the subject of study in the Nyamuswaga wetland in the Ruvubu 1 sub-catchment in Burundi (Figure). The area of wetlands encompasses some 19,700ha. It lies within two provinces: Ngozi and Karuzi.



The Nyamuswaga wetland in the Ruvubu 1 sub-catchment in Burundi.

Project Activities

On essential element of project implementation will be the involvement of local communities in the detailed planning and implementation. This will be undertaken at the *Sous Colline* level focussing on micro watersheds within each *Sous Colline* (figure 6). Elected watershed planning committees would be established in each Sous Colline to organise planning and implementation with the support of the agricultural extension service.

The objective is to assess alternate livelihoods for wetland communities, through an ecosystem approach. In the Kagera sub-basin, traditional wetland-based livelihoods are related to cultivation and/or grazing. Poor land use practices and inadequate soil and water conservation in both the wetlands and the surrounding hillsides are the cause of the majority of negative impacts on the Kagera wetlands. Whilst there are many management interventions that can improve this situation, 'wise-use' approaches can facilitate the sustainable utilisation of wetlands to the benefit of local wetland users and the environment. The majority of these minimise physical modifications to the catchment, and so avoid further damage to wetland ecosystems. Examples include community-based ecotourism, apiculture, and sustainable fisheries. In each case, it is necessary to assess the requirements of the livelihood option and the threats to it and impacts of it, in order to minimise adverse effects.

This will be achieved by:

- Implementing simple sustainable wetland management interventions such as drainage and improved soil management on existing cultivated wetlands (5,000ha);
- assessing the opportunities for wetland livelihood activities that minimise physical modifications to the wetland and maximise benefits to local communities, e.g. bee-keeping, ecotourism, fish farming, etc.;
- facilitating the acquisition of any necessary equipment, and providing the required guidance through grants, extension services, etc.;
- implementing alternate livelihood trials including improved bee hives (1,000) and small group fish ponds of 400m^2 (500);
- monitoring and evaluating the alternate livelihood schemes, including the quantification of the financial benefits of traditional and alternate livelihoods to both stakeholders and the environment;
- producing guidelines for full-scale alternate livelihood schemes;
- holding joint capacity building and management activities;
- Assessing the wider ecosystem benefits of alternate livelihood schemes, and
- Coordination with the proposed Wetlands Conservation Project for the Nyamuswaga Wetlands.

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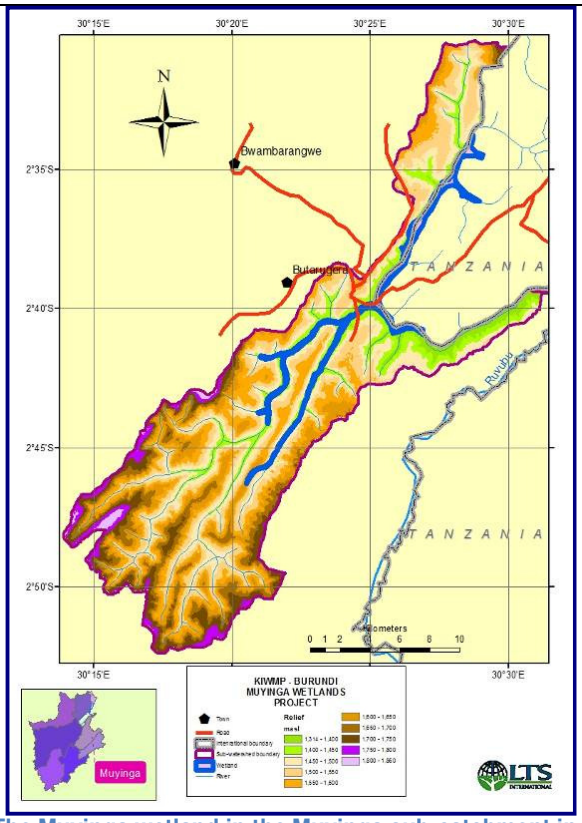
Country: **BURUNDI**

Project Name: Project BW-03: Assessing Impacts on Wetlands of Water Harvesting and Development on Groundwater Resources.

Total Project Cost: US$ 819,000 (Foreign 38%)
Total Duration: Five years in Phase 1:

Project Area: It is proposed that this component would be the subject of study in the Muyinga wetland in the sub-catchment of the same name, in Burundi (see Figure). The sub-watershed covers some 313km2. Wetlands within the Sub-watershed are 800ha in extent. It is located within Muyinga and Butihinda Communes in Muyinga Province.



The Muyinga wetland in the Muyinga sub-catchment in Burundi.

Project Activities

Farmers are increasingly searching for ways to supplement their traditional irrigation schemes with water from alternative sources, such as small farm dams storing surplus surface water and groundwater boreholes, which are usually used only for the supply of potable water. Whilst occasional or minor use of these alternative water sources may have minimal impact, the effects of any long-term or large-scale use are more uncertain. This is particularly relevant to wetlands, which are sustained by surface water and/or groundwater, especially where surface water-groundwater interactions are poorly understood (which is the case in many parts of the Kagera sub-basin). Hence, the use of multiple small farm dams or the greater exploitation of aquifers may have negative impacts on wetland ecosystems. Research is necessary to improve the current understanding of wetland hydrology.

On essential element of project implementation will be the involvement of local communities in the detailed planning and implementation. This will be undertaken at the *Sous Colline* level focussing on micro watersheds within each *Sous Colline* (figure 6). Elected watershed planning committees would be established in each Sous Colline to organise planning and implementation with the support of the agricultural extension service.

The objective of this component is to assess the impacts on wetlands of alternative water sources for irrigation, such as water harvesting and groundwater.

This will be addressed by:

- reviewing the existing small farm dams and the use of groundwater boreholes for purposes other than providing potable water in the Kagera sub-basin;
- selecting paired demonstration sites for monitoring the impacts on wetlands of interventions such as small farm dams and the increased use of boreholes for irrigation;
- implementing alternative water sources in one of each pair of sites;
- monitoring the impacts on wetlands of interventions compared to control sites;

- comparing the impacts across different pairs of sites;
- producing guidelines for rainwater harvesting and the use of boreholes for supplementary irrigation;
- holding joint capacity building and management activities; and
- Assessing the wider ecosystem implications of water harvesting and the development of groundwater resources.

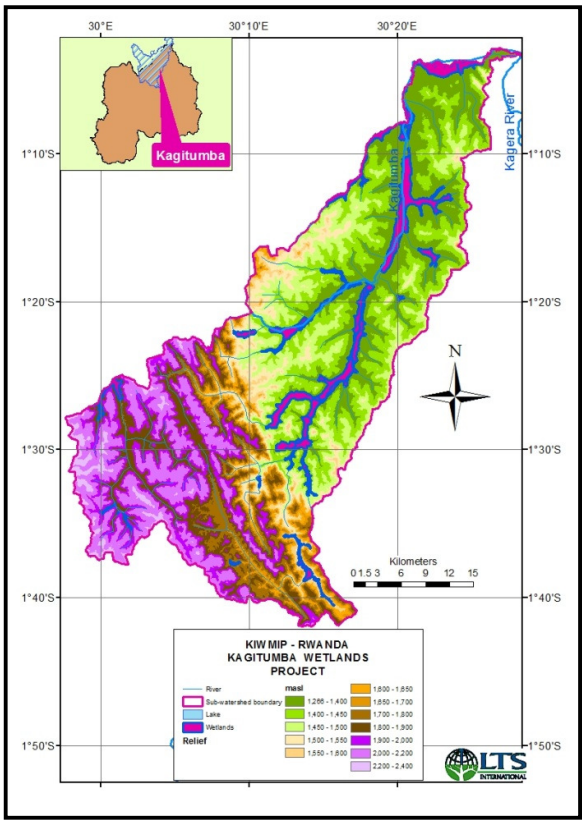
Country: **RWANDA**

Project Name: Project RW-01: Protection of Wetland Ecosystems through Maintaining Environmental Flows.

Total Project Cost: US$ 0.73 million (Foreign 46%)

Total Duration: Five years in Phase 1:

Project Area: In Rwanda, it is proposed that the project would be the wetlands of the Kagitumba Sub-watershed (Figure).



Wetlands of the Kagitumba Sub-watershed in Rwanda.

Project Activities

The objective is to maintain/restore suitable hydrological regimes in wetlands. Rivers and marshlands provide important ecosystem services, but there is often a trade-off in these services; for example, building a dam may enhance water supply and hydro-power production, but may degrade natural ecosystem services such as fisheries.

Component 1: Environmental flows: It is important to identify the water needs of downstream ecosystems, such that an appropriate balance is achieved between services that compete for water. The estimation of environmental flows seeks to define the water requirements of natural ecosystems, such that their services can be conserved and used wisely.

Component 2: Sustainable abstractions and licensing: Methods for estimating how much water can be sustainably abstracted from a wetland will be developed concurrently with the creation and implementation of licensing systems for abstractions from and discharges to surface and groundwater bodies, where such systems do not already exist. Legislation to enforce licences and prosecute violators must also be agreed and brought into law in the four riparian countries.

This will be achieved by:

- Reviewing the existing approaches for the estimation of the environmental flow requirements of ecosystems in the Kagera sub-basin;
- Reviewing experience from Tanzania and elsewhere on the issues related to environmental flow assessment and implementation;
- Developing guidelines on environmental flows appropriate to the Kagera sub-basin;
- assessing and comparing the current systems for awarding abstraction and discharge Licences and monitoring adherence to the licence conditions;
- Reviewing the existing approaches for determining abstraction and discharge permits and the estimation of sustainable abstractions;
- developing guidelines on evaluating applications for licences, issuing licences and monitoring Licences, where possible harmonising approaches for the Kagera sub-basin as a whole;
- Identifying demonstration sites for the maintenance or restoration of suitable hydrological regimes in conjunction with joint capacity building and management activities; and
- Assessing the wider ecosystem implications of environmental flows and sustainable abstractions.

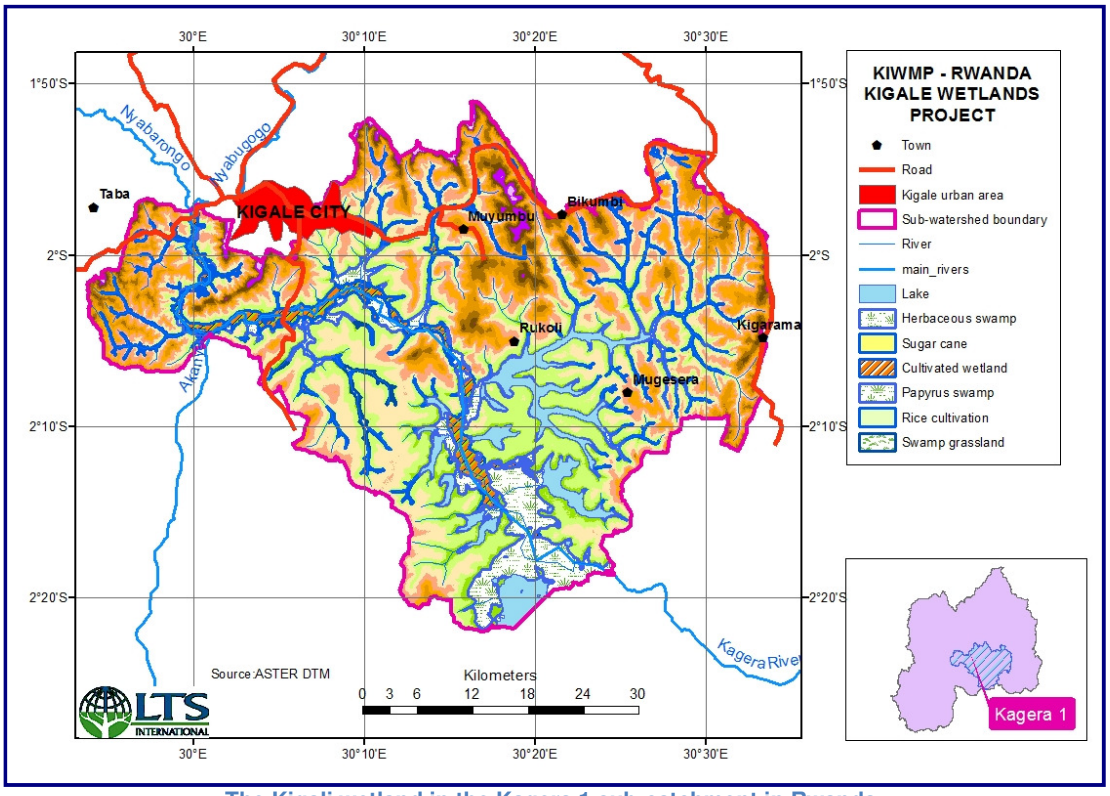
Country: **RWANDA**

Project Name: Project RW-02: Artificial Wetlands for Sustainable Urban Drainage.

Total Project Cost: US$ 1.15 million (Foreign 37%)

Total Duration: Five years in Phase 1:

Project Area: In Rwanda, it is proposed that study of the Kigali wetland in the Kagera 1 sub-catchment would be involved in this component (see Figure).



The Kigali wetland in the Kagera 1 sub-catchment in Rwanda.

Project Activities

- Reviewing the drainage and solid waste management approaches in towns/cities in the Kagera sub-basin;
- Implementing reduction, reuse and recycling (RRR) initiatives and improving the management of landfill sites;
- Selecting demonstration sites for SUDS in two or more countries e.g. Kigali, Gitega;
- Implementing trial versions of SUDS;
- Monitoring and evaluating the RRR initiatives, landfill management and SUDS trials;
- Producing guidelines for a full-scale SUDS effort;
- Holding joint capacity building and management activities; and
- Assessing the wider ecosystem benefits of artificial wetlands.

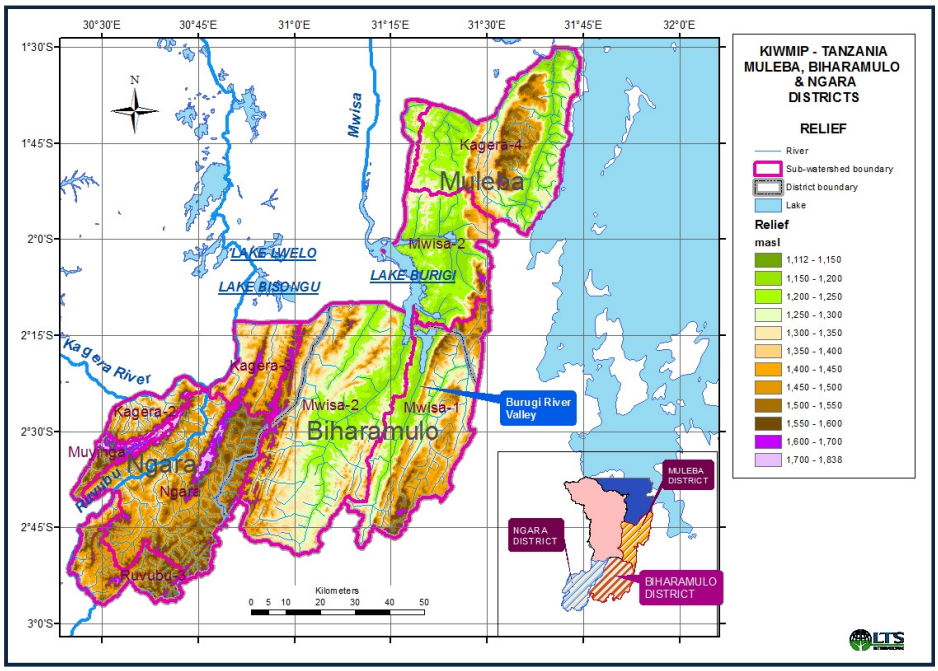
Country: **TANZANIA**

Project Name: Project TW-01: Flood Management in the Bigomba and Burugi Valleys: Ngara, Biharamulo & Muleba Districts.

Total Project Cost: US$ 20.85 million (Foreign 14%)

Total Duration: Five years in Phase 1:

Project Area: The project is located in the Muleba (Burigi river) and Ngara (Bigomba river) Districts (Figure).



Flood Management Project Location: Muleba, Biharamulo and Ngara Districts: Relief

Project Activities

One essential element of project implementation will be the involvement of local communities in the detailed planning and implementation. This will be undertaken at the Division level focussing on micro watersheds within each Division. Elected watershed planning committees would be established in each Division to organise planning and implementation with the support of the agricultural extension service.

- Soil erosion and run-off control using soil bunds and grass strips (6,300ha);
- improved farming techniques with fertiliser and improved seed (4,200ha);
- Reforestation/agroforestry with multi-purpose trees such as *Grevillea robusta, Calliandra calothyrsus, Casuarina equisetifolia, Senna* sp., etc. in household woodlots (0.1ha per household: 30% of households);
- Intensive animal husbandry (zero grazing) integrated with erosion control and agroforestry with fodder banks of Napier grass (30% of households);
- Wetland management for growing rice and other food crops (simple drainage 8,000ha);
- Wetlands improvement: irrigation weir and canals other food crops(3,000ha)
- Rainwater harvesting techniques annual crops (500ha);
- Fuel wood saving techniques to reduce wood consumption – improved stoves 30% households);
- Rural infrastructure development (100 Village potable water supplies).
- Rural infrastructure development (rural road rehabilitation: 500kms)

Country: **TANZANIA**

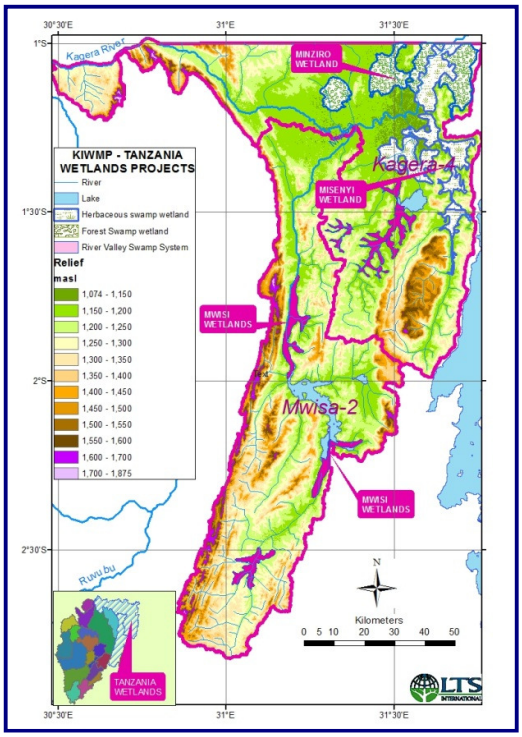
Project Name: Project TW-02: Robust evidence base to inform management decision-making

Total Project Cost: US$ 4.08 million (Foreign 35%)

Total Duration: Five years in Phase 1:

Project Area: The project will cover the whole of the Kagera sub-basin within Tanzania. The main wetlands are indicated in the Figure.

The main wetlands in the Tanzanian portion of the Kagera sub-basin, with highlights for specific wetlands for study.



Project Activities

- Developing programmes to monitor the ecological character of wetlands, ecosystem services, the uses of wetlands, the impacts of those uses, etc.;
- Assembling inventories of key flora and fauna and their habitat requirements and threats, the hydro-ecological character of wetlands, the impacts of wetland users, etc.;
- Assessing the economic value of wetland ecosystem services, including the benefits of wise use;
- Developing standard techniques for measuring and recording information in the four riparian countries;
- Developing indicators of wetland health for an annual 'State of the Wetlands' report and ensuring that the necessary information is being collected;
- Comparing indicators for recent years to identify trends in any aspect of wetlands, and the analysis of trends and implications for wetlands;
- Publishing and disseminating a 'State of the Wetlands' report; and
- Reviewing wetland management plans in the light of information obtained, at least on an annual basis.

It is intended that Tanzania would join the other three riparians of the Kagera sub-basin in collaborative work on the project.

Country: **TANZANIA**

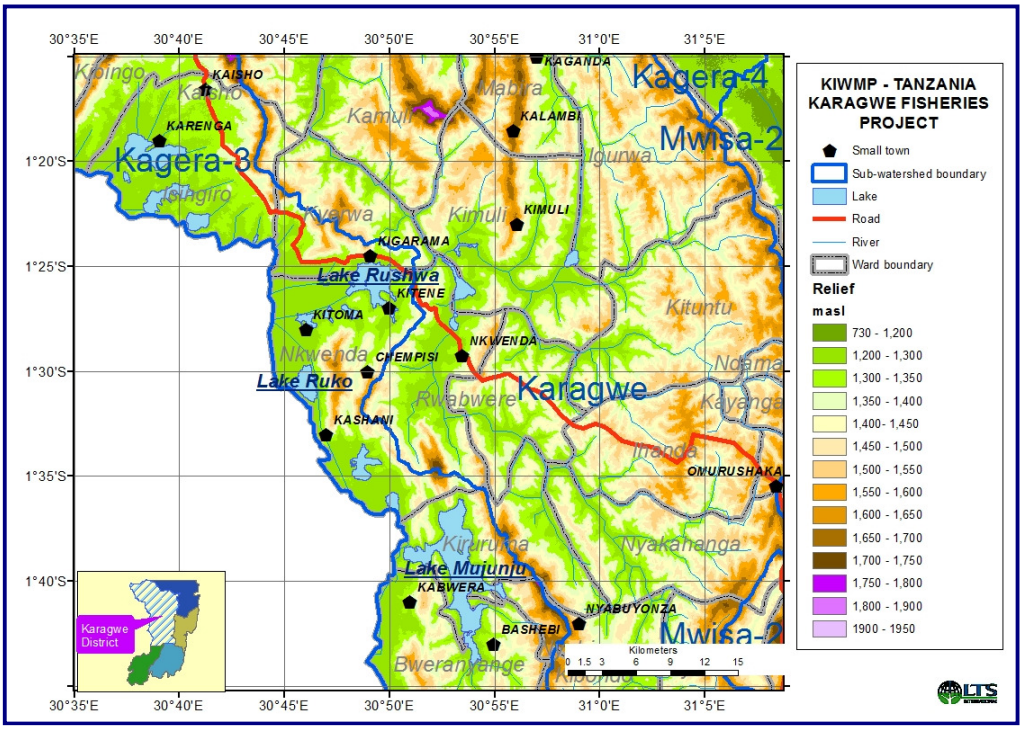
Project Name: Project TW-03: Feasibility Study for Fisheries in Karagwe District

Total Project Cost: US$ 4.31million (Foreign 31%)

Total Duration: Five years in Phase 1:

Project Area: The Karagwe District is characterized by mountain ranges, which are separated by swampy valleys and wetlands. The altitude ranges between 1,500 and 1,800 meters above sea level, while the valley bottoms and wetlands are 1,150 meters to 1,450 meters above sea level. Most of the District has a tropical highland climate, and the annual average temperature is 26°C. The rainfall distribution is bi-modal, with peak rains from September to December and from March to May. Figure 1 shows the project area.

Karagwe Fisheries Project Area



Project Activities

- The project components shall include the hydrological and chemical study of all the lakes
- An investigation of the preferred fish species.
- A pilot study on the introduction of fish to one of the lakes, selected on the basis of the findings of the investigations.
- The construction of fish ponds in wetlands will be piloted.
- Participatory development of sustainable fishery management systems will be developed to help to restore and increase fish stocks. Fisheries cooperatives will be promoted to develop strong market linkages and provide adequate storage facilities.

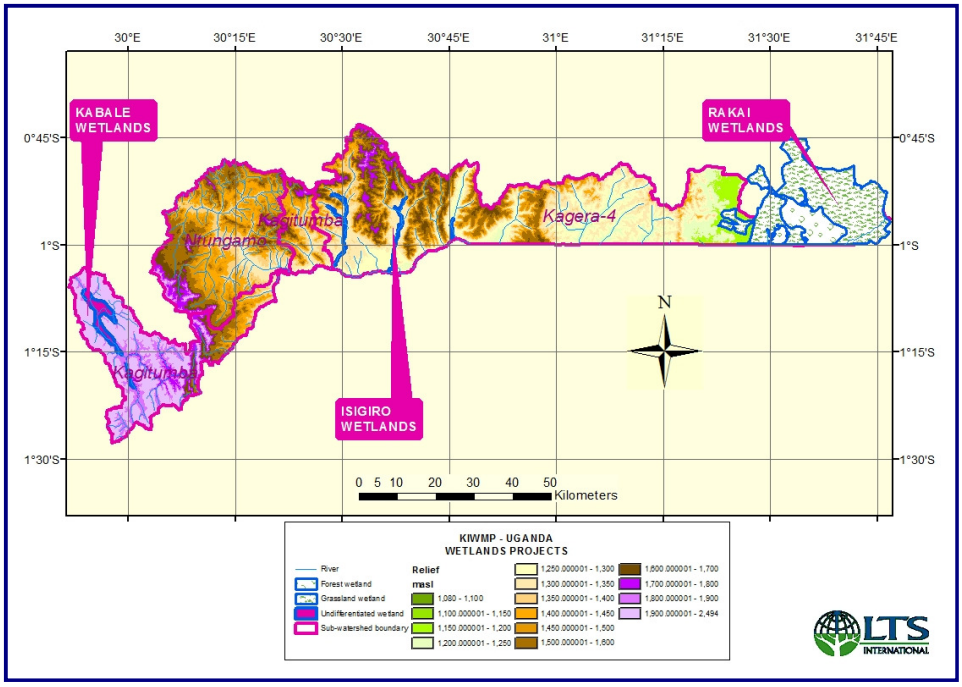
Country: **UGANDA**

Project Name: Project UW-01: Robust Evidence Base for Sustainable Wetland Management Decision Making.

Total Project Cost: US$ 1.02 million (Foreign 35%)

Total Duration: Five years in Phase 1:

Project Area: The project will cover the entire sub-basin of the Kagera River. Figure shows the main wetlands in the portion of the Kagera sub-basin in Uganda, with the specific wetlands noted in the list above being highlighted.



The main wetlands in the portion of the Kagera sub-basin in Uganda, with highlights for specific wetlands for study.

Project Activities

- Developing programmes to monitor the ecological character of wetlands, ecosystem services, the uses of wetlands, the impacts of those uses, etc.;
- Assembling inventories of key flora and fauna and their habitat requirements and threats, the hydro-ecological character of wetlands, the impacts of wetland users, etc.;
- Assessing the economic value of wetland ecosystem services, including the benefits of wise use;
- Developing standard techniques for measuring and recording information in the four riparian countries;
- Developing indicators of wetland health for an annual 'State of the Wetlands' report and ensuring that the necessary information is being collected;
- Comparing indicators for recent years to identify trends in any aspect of wetlands, and the analysis of trends and implications for wetlands;
- Publishing and disseminating a 'State of the Wetlands' report; and
- Reviewing wetland management plans in the light of information obtained, at least on an annual basis.

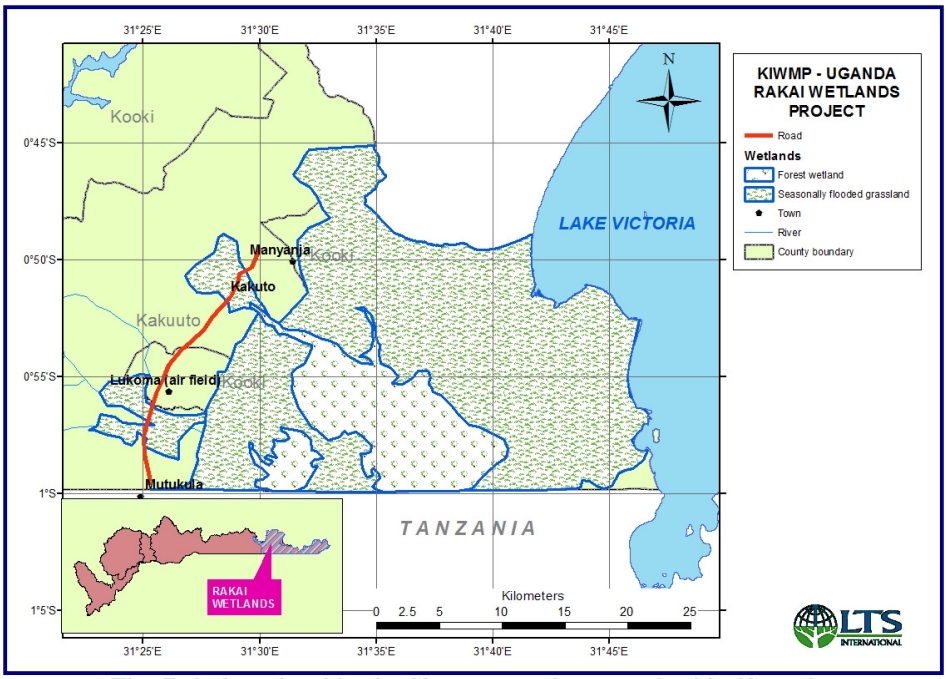
Country: **UGANDA**

Project Name: Project UW-02: Payments for Wetland Environmental Services.

Total Project Cost: US$ 0.79 million (Foreign 30%)

Total Duration: Five years in Phase 1:

Project Area: The Rakai wetland in the Kagera 4 sub-watershed of the Kagera sub-basin has been proposed for study under Component 4, in Uganda (Figure).



The Rakai wetland in the Kagera 4 sub-watershed in Uganda.

Project Activities

- Assessing the obstacles to the implementation of PES schemes in the Project area;
- Identifying prototype buyers and sellers of ecosystem services in the Project area;
- Working with buyers and sellers in the project area to implement the agreed measures and monitor the social, environmental and economic impacts;
- Producing guidelines for later full-scale PES schemes;
- Holding joint capacity building and management activities; and
- Assessing the wider ecosystem benefits of PES.

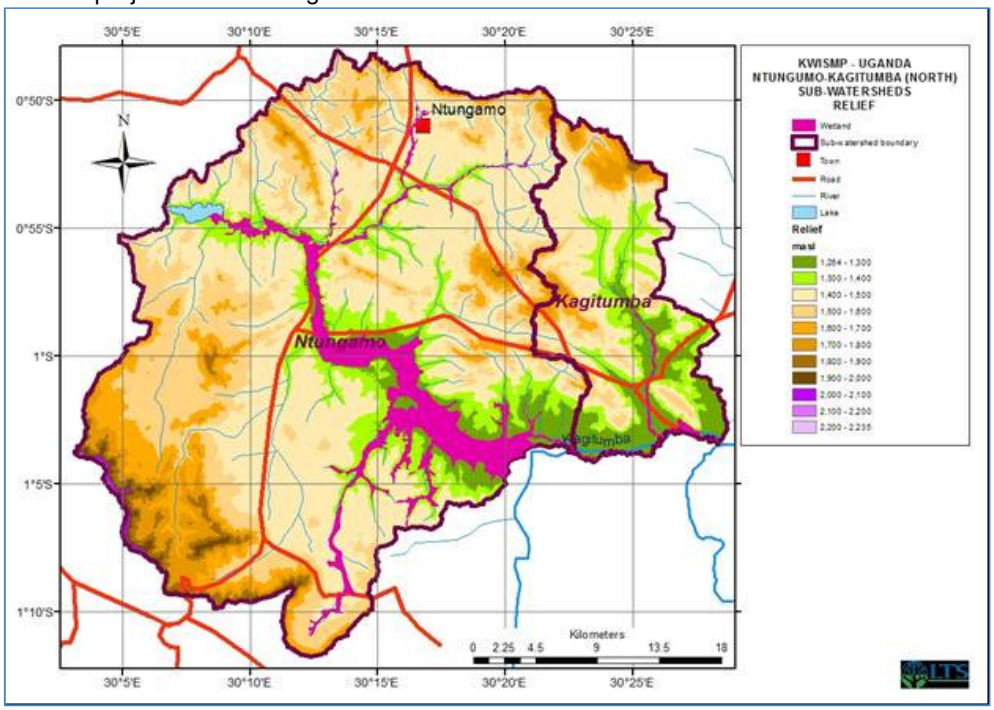
Country: **UGANDA**

Project Name: Project UW-03: Soil Conservation and Rehabilitation, Sustainable Wetlands Management and Alternative Livelihoods for Wetlands Communities through Ecosystem Approach, Ntungamo and Kagitumba (North) Sub-watersheds.

Total Project Cost: US$ 1.13 million (Foreign 30%)

Total Duration: Five years in Phase 1:

Project Area:
The Ntungumo and Kagitumba (North) Sub-watersheds have been proposed for study under Wetlands Sub-project UW-03 in Uganda



Ntungumo and Kagitumba Sub-watersheds in Uganda.

Project Activities

The objectives are to reduce soil erosion, improve soil fertility, improve wetland management for sustainable agriculture and promote alternate livelihoods for wetland communities, through an ecosystem approach. In the Kagera sub-basin, traditional wetland-based livelihoods are related to cultivation and/or grazing. Poor land use practices and inadequate soil and water conservation in both the wetlands and the surrounding hillsides are the cause of the majority of negative impacts on the Kagera wetlands. Whilst there are many management interventions that can improve this situation, 'wise-use' approaches can facilitate the sustainable utilisation of wetlands to the benefit of local wetland users and the environment. The majority of these minimise physical modifications to the watershed, and so avoid further damage to wetland ecosystems. Examples include community-based ecotourism, apiculture, and sustainable fisheries. In each case, it is necessary to assess the requirements of the livelihood option and the threats to it and impacts of it, in order to minimise adverse effects.

This will be achieved by:

(i) Soil Conservation and Soil Fertility Improvement

Soil and water conservation measures will include terraces, grass strips and where required radical

terraces over an estimated 9,600ha and improved soil fertility enhancement on 24,700ha. It is estimated that some 25,000 households will benefit from increased crop yields and farm incomes. There will secondary positive impacts on reducing food insecurity.

The primary approach in fertility enhancement will involve short-rotation nitrogen fixing or phosphorus mobilizing shrubs and herbs, to develop a large biomass during a short period (6-12 months). Organic matter and soil nutrients will be enhanced, while soil pH will also improve. The plant species to be used include *Tephrosia vogelii*, *Mucuna pruriensis*, *Sesbania sesban*, *Calliandra callothyrsus*, *Leucaena* species, and *Tithonia diversifolia*. The bigger shrubs (*Calliandra* and *Leucaena* species) will also be used to stabilize terrace risers. The germplasm of these plants will be procured from the Rwanda Agricultural Board. Herbaceous plants (e.g. *Mucuna pruriensis*) and small shrubs (e.g. *Sesbania sesban* and *Tephrosia vogelii) w*ill be planted as temporary cover, while bigger shrubs will be planted as hedges on terrace risers.

The fodder trees or shrubs to be introduced are those which can tolerate drought and termites; grow fast and coppice; and produce quality fodder which can adequately supplement elephant grass. The sites selected would support *Calliandra callothyrsus* and various species of *Leucaena*, especially *Leucaena diversifolia* and *L. leucocephala*. The niches for planting include boundaries, hedgerows between crops, buffer zones around lakes, marshlands and rivers, along public roads, or possibly as woodlots.

Both the soil fertility improvement and the increased fodder production sub-components utilise tree species such as *Calliandra callothyrsus* and various species of *Leucaena*, especially *Leucaena diversifolia* and *L. leucocephala* that will also provide bio-fuels and contribute to the re-forestation on farmland sub-component. Assuming 40 percent of households will own one cow these 40,000 households will benefit from increased milk supplies and sales and thus farm incomes.

(ii) Sustainable Wetland Management

- Implementing simple sustainable wetland management interventions such as drainage and improved soil management on existing cultivated wetlands (7,500ha);

(iii) Promoting and Supporting Alternative Livelihood Strategies

- facilitating the acquisition of any necessary equipment, and providing the required guidance through grants, extension services, etc.;
- implementing alternate livelihood trials including improved bee hives (1,000) and 500 fish ponds of 400m^2 ;
- monitoring and evaluating the alternate livelihood schemes, including the quantification of the financial benefits of traditional and alternate livelihoods to both stakeholders and the environment;
- producing guidelines for full-scale alternate livelihood schemes;
- holding joint capacity building and management activities; and
- Assessing the wider ecosystem benefits of alternate livelihood schemes.

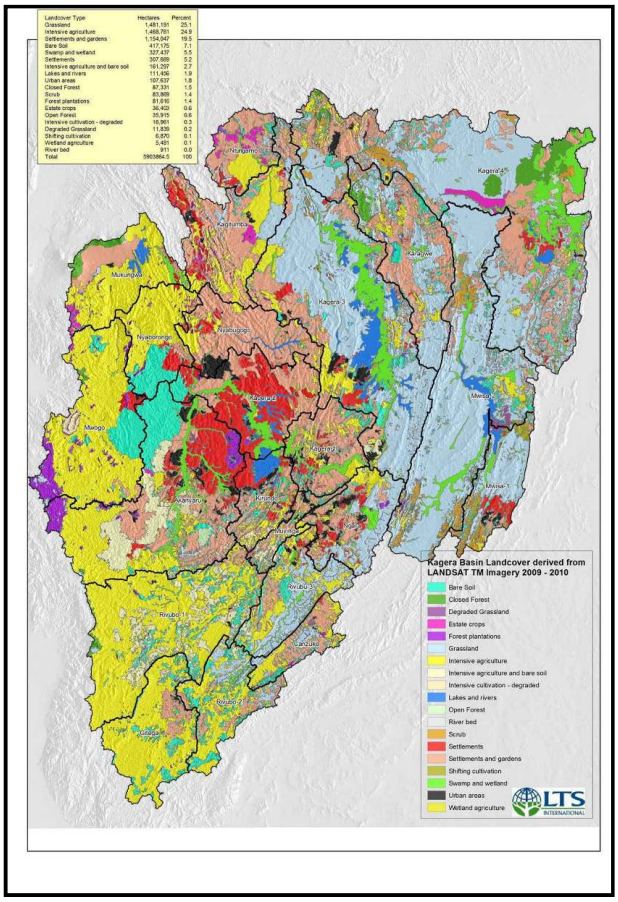
Country: **Basin wide**

Project Name: KIWMP-01: Strategic Wetlands Classification for the Kagera sub-basin

Total Project Cost: US$ 8.09 million (Foreign 48%)

Total Duration: Five years in Phase 1:

Project Area: Land use in the Kagera sub basin



Project Activities

- Development of a wetland classification system for the Kagera sub-basin;
- Classification of Kagera wetlands;
- Development of wetland management plans; and
- Project coordination and management.

Country: **Uganda and Tanzania**

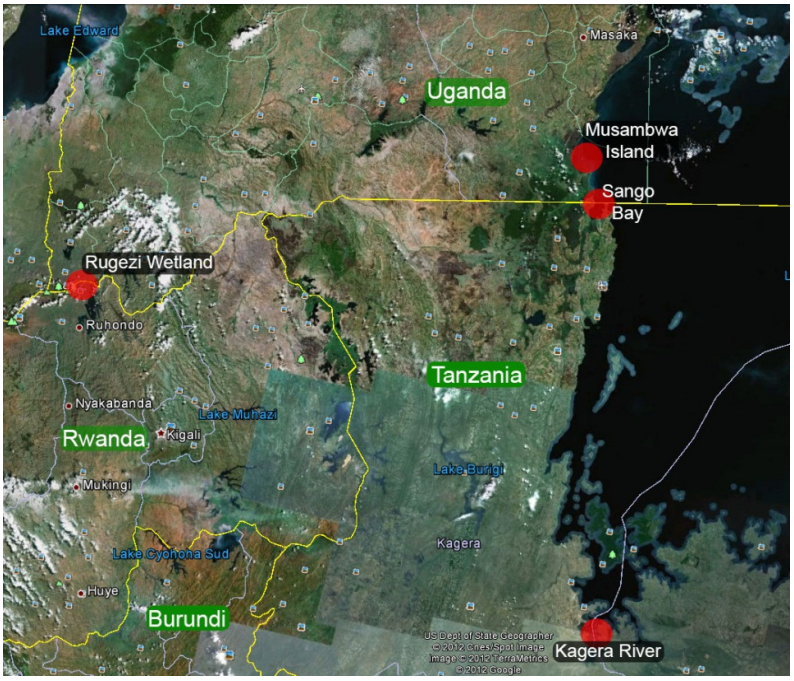
Project Name: KIWMP-02: Management of Transboundary Ramsar Sites in the Kagera sub-basin

Total Project Cost: US$ 5.99 million (Foreign 40%)

Total Duration: Five years in Phase 1:

Project Area: The Project will be based in Uganda SAMUKA Ramsar site (Sango Bay – Musambwa Island – Kagera Wetland and Floodplain – shown below in figure 1) and adjacent Tanzania wetlands, but will also involve the Rugezi Ramsar site in Rwanda. The SAMUKA Ramsar site in Uganda is about 55,100 ha and the SAMUKA+ extension into Tanzania is about 25,000 ha, so about two thirds of the SAMUKA+ expenditure will be in Uganda and the other one third in Tanzania.

Location of Sango Bay and Rugezi wetlands



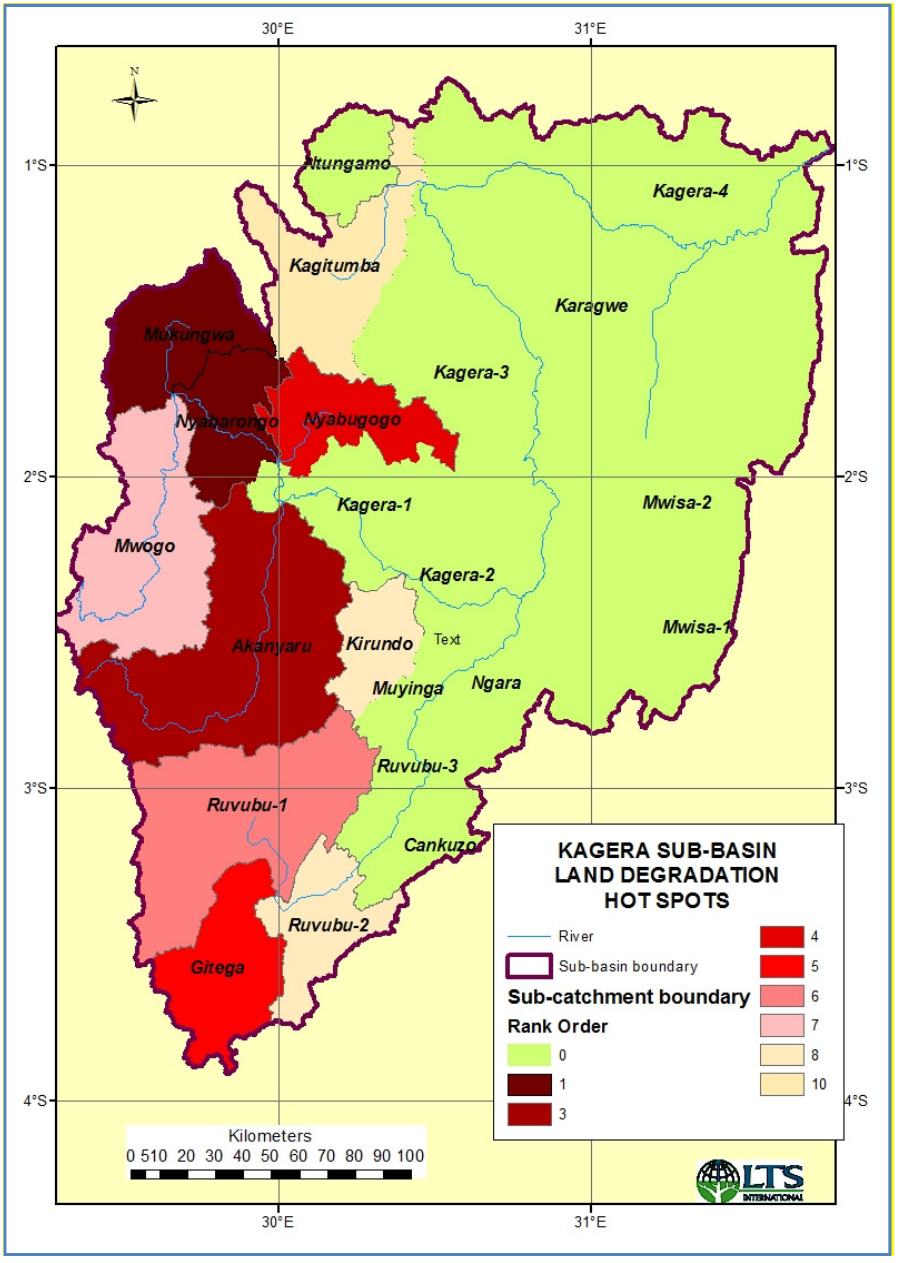
Project Activities

- Development of a management plan for the SAMUKA+ wetland;
- Implementation of the management plan for the SAMUKA+ wetland;
- Scaling-up to other wetlands;
- Project coordination and management.

5.4 Projects in the Context of the Sub-watershed Prioritisation

Map 22 shows the Sub-watersheds ranked highest in terms of the severity of the land degradation status and are thus the 10 “hot spot” Sub-watersheds out the 22 Sub-watersheds. These are clearly located in the western side of the Sub-basin. All watershed management projects within Burundi and Rwanda are located in one of the top 10 hot spot Sub-watersheds. All Projects located within Burundi and Rwanda have positive tranbs-boundary implications in reducing sediment loads, reducing pollution and reducing flood peaks downstream for Tanzania and Uganda. Those located in Uganda and Tanzania also have trans-boundary positive impacts in reducing sediment and pollution loads into Lake Victoria.

Map 22. Kagera River Basin: “Hot Spot” Sub-watersheds for Land Degradation



The order of priority of Projects in terms of their potential impact on reducing land degradation is shown in table 17.

Table 17. Kagera Sub-basin: Order of priority of Projects in terms of reducing land degradation

LAND DEGRADATION			
Rank	Project	Sub-watershed	Sub-watershed rank
1=	R -01: Soil & Water Conservation, Soil Improvement, Improved Fodder Production and Re-forestation, Akanyaru Sub-watershed, Nyaruguru District, Rwanda	Akanyaru	3
1=	B-01: Project B-01: Integrated Watershed Management, Akanyaru Sub-watershed, Burundi	Akanyaru	3
3	Project RW-02: Artificial Wetlands for Sustainable Urban Drainage.	Nyabugogo, Kagera-1	4, 15
4	R-03: Feasibility study on sustainable fishing at Lake Muhazi.	Nyabugogo	4
5	B-02: Stabilisation of Banks of Watercourses and Hillside Afforestation to reduce erosion and siltation, Ruvubu-1, Ruvubu-2 and Gitenga Sub-watersheds	Gitega, Ruvubu-1, Ruvubu-2	5, 6, 8
6	BW-02: Alternative Livelihoods for Wetland Communities thru' Ecosystem Approach in the Nyamuswaga Wetlands.	Ruvubu-1	6
7	UW-03: Soil Conservation and Rehabilitation, Sustainable Wetlands Management and Alternative Livelihoods for Wetlands Communities through Ecosystem Approach, Ntungamo and Kagitumba (North) Sub-watersheds	Kagitumba (north), Ntungama	10, 16
8=	U-03: Integrated Water Resource Management Project, Mazimba catchment, Kabale District.	Kagitumba	10
8=	R-02: Soil Conservation, Rainwater water harvesting, small-scale irrigation, Fruit and Fodder trees, Kagitumba Sub-watershed, Rwanda	Kagitumba	10
8=	RW-01: Protection of Wetland Ecosystems thru' Maintaining Environmental Flows.	Kagitumba	10
11	U-01: Land Rehabilitation in Kikagate Sub-County, Isingiro District	Kagera-4	17
12	U-02: Integrated Water Resource Management (IWRM) project, Kakuuto County in Rakai District, Uganda	Kagera-4	17
13	T-03 Protection and Conservation of Water Sources in Muleba and Biharamulo Districts, Tanzania	Kagera-4, Mwisa-1, Mwisa-2, Ngara	17, 18=, 18=, 21
14	UW-01: Robust Evidence Base for Sustainable Wetland Management Decision Making.	Kagitumba, Ntungama, Kagera-4	10, 16, 17
15	UW-02: Payments for Wetland Environmental Services.	Kagera-4	17

Map 23 shows the Sub-watersheds ranked in terms of their severity of soil moisture deficits with the top 10 Hot Spots clearly identified. The proposed projects cover 8 out 10 of the Soil Moisture Hotspots. Two that are not covered are covered by the NELSAP supported Bugesera Project.

The order of priority of Projects in terms of their potential impact on reducing the negative impacts of soil moisture deficits is shown in table 18.

Map 23. Kagera River Basin: "Hot Spot" Sub-watersheds for Soil Moisture Deficits

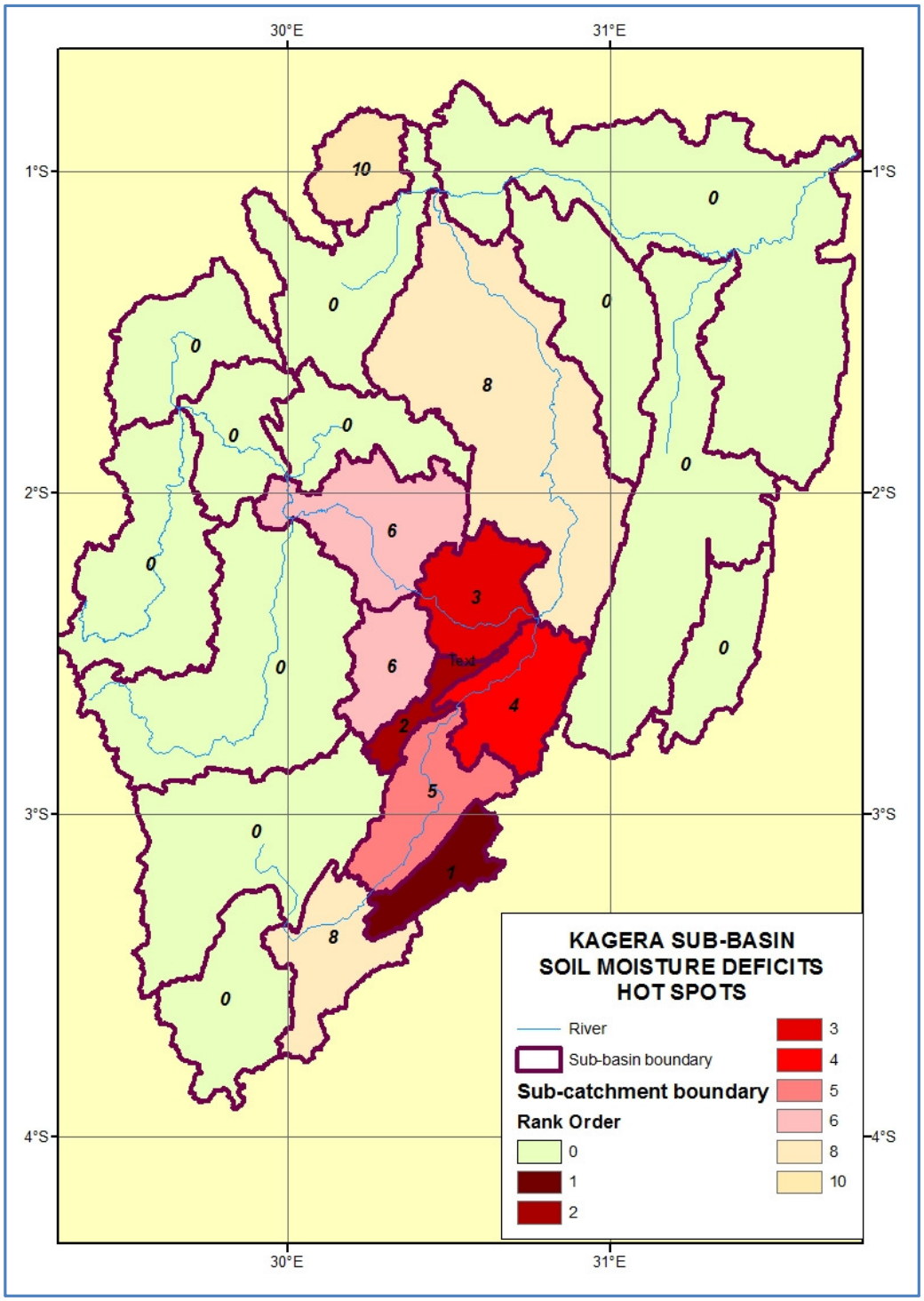


Table 18. Kagera Sub-basin: Order of priority of Projects in terms of reducing land degradation

SOIL MOISTURE DEFICIT			
Rank	**Project**	**Sub-watershed**	**Sub-watershed rank**
1	B-03: Hill irrigation and rainwater harvesting in Cankuzo, Karuzi, Kirundo, Muyinga and Ruyigi Provinces	Cancuzo, Muyinga, Kagera-2, Ruvubu-3, Kirundo	1, 2, 3, 5, 6
2	BW-03: Assessing Impacts on Wetlands of Water Harvesting and Development on Groundwater Resources.	Muyinga	2
3	BW-01: Protection of Ecosystems through Environmental Flows, Ruvubu National Park.	Ruvubu-3	5
4	TW-01: Flood Management in the Bigomba and Burugi Valleys: Ngara, Biharamulo & Muleba Districts.	Kagera-2, Ngara, Mwisa-1, Kagera-4, Mwisa-2,	3, 4, 12, 16, 17
5	T-02: Feasibility Study for supplying potable water to 15 villages, Kayanga, Bunazi and Kyaka Townships in Karagwe and District.	Mwisa-2, Karagwe	17, 18
6=	T-01: Soil Conservation in Karagwe and Ngara Districts	Karagwe	18
6=	TW-03: Feasibility Study for Fisheries in Karagwe District	Karagwe	18
8	TW-02: Robust evidence base to inform management decision-making	Kagera-2, Ngara, Mwisa-1, Kagera-4, Mwisa-2,	3, 4, 12, 16, 17

6. ENVIRONMENTAL AND SOCIAL ANALYSIS

6.1 Preliminary Examination of Environmental and Social Impacts of Sub-projects

Preliminary environmental and social impacts of the individual sub-projects are presented in Table 17 below. It should be noted that the study was only meant to identify potential environmental risks and impacts and recommend the next steps or suggest alternatives to the sub-project. The feasibility study was not meant to conduct full EIAs. The detailed environmental analysis suggested per sub-project will be able to elaborate all potential positive and negative impacts and their respective mitigation measures. The table therefore identifies WB environmental and social safeguards that will be triggered if the sub-project is to be implemented and suggests steps or measures that need to be undertaken to mitigate any negative impacts that may arise. The details of the Environmental and Social Safeguards are presented in the Annex D.

Sub-Projects were categorized according to World Bank Categories of A, B and C.

Category "A" projects potentially cause significant and irremediable environmental impacts; the sub-projects require a full, detailed EIA, which needs to be approved before the Bank can give its support.

Category "B" projects cause lesser impacts, which are often essentially remediable or can be mitigated; the sub-projects require the implementation of an Environmental Impact Evaluation (EIE), which requires fewer details than an EIA.

Category "C" projects have little or no environmental impact; the sub-projects do not require an EIE or EIA.

Table 17. Environmental and Social Safeguards of sub-projects and activities

BURUNDI		
Sub-Project Name and Category	Category Description	Environmental and social safeguards triggered, environmental impacts
B0-1. Integrated Watershed Management, Akanyaru Subwatershed	Category A	OP 4.01 (Environmental Assessment). The proposed interventions of irrigation, agroforestry, rainwater harvesting and rural infrastructure will have both positive and negative environmental impacts. OP 4.04 (Natural habitats). The project activities will impact on natural habitats through the rural infrastructure proposed. OP 4.09 (Pest management). Improving agricultural practices may require that pesticides are used. OP 4.11 (Cultural Property). The proposed infrastructure development of rural infrastructure, may affect cultural, archaeological, historical and religious sites. OP 4.12 (Involuntary Resettlement). The project will require land for construction of rural infrastructure which will impact on community livelihoods as it may lead to households who are internally displaced OP 7.60 (Projects in international waterways). The project is of a transboundary nature, and will involve drawing/use of water from shared water courses between two or more countries through the construction of the irrigation dam. An EIA will be required for the project with the use of the environmental and social checklists provided in the ESMF.
B-02. Stabilisation of watercourses and hillside afforestation to reduce erosion & siltation in Ruvubu 1,2, Gitega subwatersheds	Category B	Proposed interventions will trigger OP 4.04 (Natural habitats) as the construction of SWC structures may cause riverine biodiversity loss. The use of pesticides and fertilizers will trigger OP 4.09 (Pest Management) as their use may also cause biodiversity loss or water and soil pollution. The Bank finances pest management through Integrated Pest Management approaches and thus pest management plans will be required as specified under the ESMF implementation tools and procedures. Thus the checklists in the ESMF should be used to also conduct an EIE in order to identify mitigation measures against any negative impacts, avoid damage or compensate for it.
B0-3. Hill irrigation & rainwater harvesting in in Cankuzo, Karuzi, Kirundo, Muyinga and Ruyigi Provinces	Category A	This Project falls under Category A of the World Bank i.e. It has the potential to cause significant and irremediable environmental impacts. It will thus require a full, detailed environmental impact assessment EIA with the use of checklists on the ESMF before the Bank can give its support. This project will trigger a the operationalisation of a number of World Bank Safeguards as follows: OP 4.01 (Environmental Assessment). The proposed interventions of irrigation, agroforestry, rainwater harvesting and rural infrastructure will have both positive and negative environmental impacts. Thus the checklists in the ESMF should be used to conduct a thorough environmental impact assessment before the project begins in order to identify mitigation measures against the negative impacts. OP 4.04 (Natural habitats). The project activities will impact on natural habitats through the rural infrastructure proposed. Thus the checklists in the ESMF should be used to conduct a thorough

		environmental impact assessment before the project begins in order to identify mitigation measures against the negative impacts, avoid damage or compensate for it. OP 4.09 (Pest management). Improving agricultural practices may require that pesticides are used. The Bank finances pest management through Integrated Pest Management approaches and thus pest management plans will be required as specified under the ESMF implementation tools and procedures. OP 4.11 (Cultural Property). The proposed irrigation dams may affect cultural, archaeological, historical and religious sites. To address this concern, the ESMF provides appropriate checklist tools, resource sheets and planning methods to identify any potential impacts of projects on cultural properties and to develop appropriate mitigation measures to minimize or avoid damage, or compensate for it. OP 4.12 (Involuntary Resettlement). The project will require land for the establishment of the irrigation dams which will impact on community livelihoods. To ensure that current landowners are properly compensated, Resettlement policy frameworks will be undertaken and will guide the mode of compensation. OP 7.60 (Projects in international waterways). The project is of a trans-boundary in nature, and will involve drawing/use of water from shared water courses between two or more countries through the construction of the irrigation dam. If the dam is constructed across one of the Kagera tributaries, this safeguard will need to be operationalised. However if it is a purely a water harvesting structure which does not affect the volume of flow to the Kagera tributaries the safeguard will NOT be operationalized. In case of the former scenario the project will follow the Nile Basin Initiative project notification procedures to notify riparian countries where the intervention is proposed about the Project and the anticipated scale of withdrawals.
BW 1. Protection of wetland ecosystems through environmental flows, Ruvubu National Park	Category C	The project is of an academic nature with a few demonstration interventions on a small scale. Thus it will cause minimal negative impacts, which are often essentially remediable or can be mitigated. It will trigger OP 4.01 (Environmental Assessment) and OP 4.04 (natural habitats). Thus it may not require an EIA
BW2. Alternative Livelihoods for Wetland Communities through an ecosystem approach in the Nyamuswaga Wetlands	Category B	The project will have improved agriculture on 5,000ha, beekeeping and fish farming. Thus it may cause some negative impacts such as soil and water pollution from fertilizers and pesticides and will trigger OP 4.01 (Environmental Assessment) and safeguard OP 4.04 (natural habitats) because some livelihood activities (fish farming) may interfere with natural habitats and biodiversity especially if the fish introduced are new species. An EIA is therefore advised before the beginning of the project to ensure that any potential negative impacts are addressed.
BW3. Assessing impacts on wetlands of water harvesting & development of ground water resources	Category B	The project will trigger safeguard OP 4.01 (Environment Assessment), OP 4.04 (natural habitats) and OP 4.09 (Pest Management). The proposed activities will impact on natural habitats through the provision of alternative water sources and the increased use of boreholes for irrigation. Drilling of boreholes will require an EIA as the environment is disturbed during the construction and usage of the borehole.

RWANDA		
R-01. Soil & Water Conservation, Soil Improvement, improved Fodder Production and Re-forestation, Akanyaru Sub-watershed, Nyaruguru District	Category A	This is a Category A project as it will entail radical terracing on 36,330 ha. Small irrigation dams and feeder roads will also be constructed. This will result in environmental disturbance that will affect the biodiversity in natural habitat. The use of fertilizer and pesticides may also result in water and soil pollution. With the construction of dams, the water flow downstream and downstream benefits may also be affected in one way or another. This project will trigger OP. 4.01 (Environment Assessment), 4.04 (Natural habitats) and 4.09 (Pest Management). The construction of small dams for irrigation may interfere with water flow downstream and may trigger OP 7.60 (Projects in international waterways). Thus an EIA will be required before implementation. The ESMF has provided appropriate checklist tools, resource sheets and planning methods to identify any potential negative impacts of the project in order to develop appropriate mitigation measures to minimize or avoid damage, or compensate for it.
R-02. Soil Conservation, Rainwater harvesting, small-scale irrigation, Fruit and Fodder trees, Kagitumba Sub-watershed	Category A	This is a Category A project as it will entail construction of 50 dams covering an area of 1,250 ha, road construction and terraces over 39,000 ha. This will result in environmental disturbance that will affect the biodiversity in natural habitats. The use of fertilizer and pesticides may also result in water and soil pollution. With the construction of dams, the water flow downstream and downstream benefits may also be affected in one way or another. This project will trigger OP. 4.01 (Environment Assessment), 4.04 (Natural habitats) and 4.09 (Pest Management). The construction of small dams for irrigation may interfere with water flow downstream and may trigger OP 7.60 (Projects in international waterways). Thus an EIA will be needed before implementation. The ESMF has provided appropriate checklist tools, resource sheets and planning methods to identify any potential negative impacts of the project in order to develop appropriate mitigation measures to minimize or avoid damage, or compensate for it.
R-03. Sustainable fishing at L. Muhazi.	Category A	This project can only be undertaken at feasibility level because of the serious potential environmental impacts if a full scale project is implemented. Thus the implementation of this project is not advised in Phase 1 of the programme. However a soil restoration and management and pollution control project can be implemented in the area with further investigation into the high concentrations of lead and a thorough EIA being conducted before any fishery activities are conducted. This is to mitigate the negative impacts of biological magnification of heavy metals in fish and ultimately humans.
RW-01: Protection of Wetland Ecosystems through Maintaining Environmental Flows.	Category C	The project is of an academic nature with a few demonstration interventions on a small scale. Thus it will cause minimal negative impacts, which are often essentially remediable or can be mitigated. It will trigger OP 4.01 (Environmental Assessment) and OP 4.04 (natural habitats). Thus it may not require an EIA.
RW-02: Artificial Wetlands for Sustainable Urban Drainage.	Category A	OP 4.01 (Environmental Assessment). The proposed interventions of the construction of the artificial wetlands OP 4.04 (Natural habitats). The project activities may negatively impact on natural habitats through the

		infrastructure proposed. OP 4.11 (Cultural Property). The proposed development of artificial wetlands in two sites, may affect cultural, archaeological, historical and religious sites. OP 4.12 (Involuntary Resettlement). The project will require land for construction of infrastructure which may negatively impact on community livelihoods as it may lead to households who are internally displaced. Thus an EIA will be required with the use of the checklists provided in the ESMF.
TANZANIA		
T-01 Soil and water conservation in Karagwe and Ngara districts.	Category A	This project is a category A project because it will entail the construction of radical terraces over 68,000 ha in Karagwe and Ngara. Their construction will interfere with the soil structure and may lead to loss of biodiversity as their natural habitats are disturbed. During construction soil erosion may also take place and this will need to be addressed. Thus this project will require an EIA due to the expansive area that is targeted for radical terracing. It will also trigger OP 4.04 (natural habitats) and OP 4.09 (Pest management) as improving agricultural practices may require that pesticides are used. The Bank finances pest management through Integrated Pest Management approaches and thus pest management plans will be required as specified under the ESMF implementation tools and procedures. The environmental and social checklists in the ESMF should be used for the EIA to determine the appropriate mitigation measures To address this concern, the ESMF has provided appropriate checklist tools, resource sheets and planning methods to identify any potential impacts of projects on natural habitats, reserves or protected areas, and to develop appropriate mitigation measures to minimize or avoid damage, or compensate for it.
Project T-02: Supply of potable water to 15 villages, Kayanga, Bunazi and Kyaka Townships in Karagwe and District.	Category A	This is category A project as it will require construction of the potable water supply system which will disrupt natural habitats, may cause biodiversity and cultural property loss and people may be displaced. In addition there may be water and air pollution that may be emitted by the pump and this will need to be addressed during implementation to ensure that the type and or fuel used by the pump do not cause damage to the natural resources near it. An EIA has already been planned and budgeted for. The checklists in the ESMF and the resettlement framework outlined in the ESMF should be used to identify mitigation measures before the project is implemented. It will trigger OP 4.04 (Natural habitats) and OP 4.09 (Pest management) improving agricultural practices may require that pesticides are used. It will also trigger OP 4.11 (cultural property) and 4.12 (Involuntary resettlement). To address this concern, the ESMF has provided appropriate checklist tools, resource sheets and planning methods to identify any potential impacts of projects on natural habitats, reserves or protected areas, and to develop appropriate mitigation measures to minimize or avoid damage, or compensate for it. The Bank finances pest management through Integrated Pest Management approaches and thus pest management plans will be also be required as specified under the ESMF implementation tools and procedures. A resettlement action plan framework will also be required if people have to be resettled and this has been provided for in the ESMF.

T-03 Protection and Conservation of Water Sources in Muleba and Biharamulo, Kagera sub-basin in Tanzania	Category A	This project is a category A project because it will entail the construction of radical terraces over 70,000 ha in Muleba and Biharamulo. Their construction will interfere with the soil structure and may lead to loss of biodiversity as their natural habitats are disturbed. During construction soil erosion may also take place and this will need to be addressed. Thus this project will require an EIA due to the expansive area that is targeted for radical terracing. The environmental and social checklists in the ESMF should be used for this EIA to determine the appropriate mitigation measures. It will trigger OP 4.04 (natural habitats). The proposed activities will impact on natural habitats through land rehabilitation, afforestation activities. To address this concern, the ESMF has provided appropriate checklist tools, resource sheets and planning methods to identify any potential impacts of projects on natural habitats, reserves or protected areas, and to develop appropriate mitigation measures to minimize or avoid damage, or compensate for it. It will also trigger OP 4.09 (Pest management). Improving agricultural practices may require that pesticides are used. The Bank finances pest management through Integrated Pest Management approaches and thus pest management plans will be required as specified under the ESMF implementation tools and procedures.
TW-01: Flood Management in the Bigomba and Burugi Valleys, Ngara & Mulemba Districts.	Category A	It has the potential to cause significant and irremediable environmental impacts. It triggers the following safeguards: OP 4.01 (Environmental Assessment). The proposed interventions of constructing the storage and supply infrastructure will have both positive and negative environmental impacts. OP 4.04 (Natural habitats). The project activities will impact on natural habitats through the portable water infrastructure proposed. OP 4.09 (Pest management). Improving agricultural practices may require that pesticides are used. OP 4.11 (Cultural Property). The proposed development of rural infrastructure, may affect cultural, archaeological, historical and religious sites. OP 4.12 (Involuntary Resettlement). The project will require land for construction of the storage water structures and this will impact on community livelihoods as it may lead to households who are internally displaced. OP 7.60 (Projects in international waterways). The project may impact on the volume of water flowing across international borders through the construction of dams.
TW-02: Robust evidence base to inform management decision-making	Category C	This is an academic/research project with no direct interventions. It will not trigger any safeguards or any environmental impacts.
TW-03: Feasibility Study for Fisheries in Karagwe District + fish ponds	Category B	The project is likely to have potential adverse environmental and social impacts on site and downstream due to the construction of fish ponds and introduction of new species of fish. Impacts are expected to be on the biodiversity of wetlands and any other natural habitat along the water course downstream. The project will thus trigger OP 4.01 (Environmental Assessment). It will also trigger OP 4.04 (Natural habitats). The project activities will impact on natural habitats of wetland biodiversity.

UGANDA		
U-01: Land Rehabilitation in Kikagate Sub-County, Isingiro District,.	Category A	This is a rehabilitation project and falls in Category A as it proposes to construct radical terraces over an area of 7,500 ha. This may cause soil erosion during construction and water pollution. Thus an EIA will be required and checklists provided for in the ESMF can be used for this. It is will trigger the following safeguards. OP 4.04 (natural habitats). The proposed activities will impact on natural habitats through land rehabilitation, afforestation activities. To address this concern, the ESMF has provided appropriate checklist tools, resource sheets and planning methods to identify any potential impacts of projects on natural habitats, reserves or protected areas, and to develop appropriate mitigation measures to minimize or avoid damage, or compensate for it. The project will also trigger OP 4.09 (Pest management). Improving agricultural practices may require that pesticides are used. The Bank finances pest management through Integrated Pest Management approaches and thus pest management plans will be required as specified under the ESMF implementation tools and procedures.
U-02: Integrated Water Resource Management (IWRM) project, Rakai District, Uganda	Category B	The project is likely to have potential adverse environmental and social impacts on site and downstream due to the construction of water storage facilities for supplementary irrigation. Impacts are expected to be on human populations or environmentally important areas including wetlands, forests, grasslands and any other natural habitat along the water course downstream. These impacts may be site specific, few or none of them are irreversible, and most of them are mitigated more readily than impacts from category A projects. The proposed interventions of afforestation with multipurpose trees agroforestry will have more positive than negative environmental impacts. It will also trigger OP 4.04 (Natural habitats). The project activities will impact on natural habitats. OP 4.09 (Pest management). Improving agricultural practices may require that pesticides are used.
U-03: Integrated Water Resource Management Project, Maziba River catchment, Kabale District.	Category B	This is a Category B project as it will require construction or rehabilitation of SWC structures covering 29,000 ha which may interfere with natural habitats. This will thus require an EIA due to the planned construction over a large area of SWC structures. During rehabilitation soil erosion may occur and cause pollution in water sources and wetlands and this will need to be addressed. It will also trigger OP 4.04 (Natural habitats) as project activities will impact on natural habitats with the introduction of irrigation and OP 4.09 (Pest management) as improving agricultural practices may require that pesticides are used. The Bank finances pest management through Integrated Pest Management approaches and thus pest management plans will be required as specified under the ESMF implementation tools and procedures.
UW-01: Robust Evidence Base for Sustainable Wetland Management Decision Making.	Category C	This is an academic/research project with no direct interventions. It will not trigger any safeguards or any environmental impacts
UW-02: Assessment of Potential for Payments for Environmental Services from polluting sources, Kagera 4 Sub watershed.	Category C	This project is of an academic nature with a few demonstration interventions on a small scale. Thus it will have lesser impacts, which are often essentially remediable or can be mitigated. It may trigger safeguard OP 4.04 (natural habitats) depending on the activities proposed for the demo sites.
UW-03: Soil conservation and rehabilitation,	Category A	This project is a category A project because it will entail the construction of radical terraces over 9,600 ha in Kagitumba and Ntungamo. Their construction will interfere with the soil structure and may lead to loss

Sustainable wetlands management and alternative livelihoods for wetland communities through an ecosystem approach, Ntungamo and Kagitumba (North) Sub watersheds Communities through Ecosystem Approach		of biodiversity as their natural habitats are disturbed. During construction soil erosion may also take place and this will need to be addressed. It will trigger OP 4.04 (natural habitats). The proposed activities will impact on natural habitats through land rehabilitation, afforestation activities. Biodiversity will also be affected with the introduction of fish ponds and new species of fish. To address this concern, the ESMF has provided appropriate checklist tools, resource sheets and planning methods to identify any potential impacts of projects on natural habitats, reserves or protected areas, and to develop appropriate mitigation measures to minimize or avoid damage, or compensate for it. It will also trigger OP 4.09 (Pest management). Improving agricultural practices may require that pesticides are used. The Bank finances pest management through Integrated Pest Management approaches and thus pest management plans will be required as specified under the ESMF implementation tools and procedures. Thus this project will require an EIA due to the expansive area that is targeted for radical terracing. The environmental and social checklists in the ESMF should be used for this EIA to determine the appropriate mitigation measures.
Strategic Wetlands Classification for the Kagera sub-basin	Category C	This is a project that is developing guidelines for management and has no direct interventions. It will therefore not trigger any safeguards or any environmental impacts
Management of Transboundary Ramsar Sites in the Kagera sub-basin	Category C	This is project that is developing guidelines for management and has no direct interventions. It will therefore not trigger any safeguards or any environmental impacts

6.2 Environmental and Social Management Framework

The Environmental and Social Management Framework (ESMF), has been developed for the KIWMP (Annex D). The framework contains baseline information on the Kagera, national, regional and international policies with relevant environmental and social aspects for the programme, World Bank safeguard policies, proposed country programmes, environmental and social implications of the proposed sub-projects, the project approval and screening process, monitoring plan, institutional framework and capacity development.

It is meant to be used a management tool during project implementation. It describes the steps to be undertaken in the final selection and implementation of projects to be supported under KIWMP so that potential negative environmental and socio-economic impacts can identified and mitigation measures implemented.

The ESMF also provides a framework to enable communities/beneficiaries to screen sub-projects and institutional mechanisms and responsibilities to address adverse environmental and social impacts.

Information for the ESMF has been derived from secondary sources such as the Preliminary NELSAP ESMF, NELSAP Trans-boundary Cooperative Framework and Management Strategy and from outputs of the FS-KIWMP which this ESMF is an Annex. Information has also been derived from the Rwanda ESMF for the Lake Victoria Environmental Management Programme Phase II.

The aim of this ESMF is to provide an overall framework for environmental and social management of the planned programme activities under the KIWMP of the Kagera sub-Basin shared by Burundi, Rwanda, Tanzania and Uganda.

The ESMF seeks to:

- Enhance positive and sustainable environmental and social outcomes associated with project preparation and implementation;
- Integration of environmental and social aspects associated with the numerous projects into the decision making process;
- Minimize environmental degradation as a result of either proposed individual projects or their cumulative effects and;
- Minimize impacts on ecosystems.

The objectives of the ESMF include the following:

- To establish clear procedures and methodologies for the environmental and social planning, review and approval of the sub-projects under country programmes to be prepared under NELSAP;
- To specify roles and responsibilities, and outline the necessary reporting procedures, for managing and monitoring environmental and social concerns related to sub-projects;
- To determine the training, capacity building needed to successfully implement the provisions of the ESMF.

The sub-project identification exercise under the overall FS-KIWMP involved numerous stakeholders from district, national and regional levels during various stages of sub-project identification. Consultations on sub-project identification took place at district level in the four countries. Meetings were held with government technical departments and civil society actors who work directly with communities. Other views on project identification were solicited from four regional workshops attended by representatives from district and national governments and civil society.

This ESMF has been designed for the NELSAP Project Management Unit (PMU), the National Liaison Officers (NLOs) in each country and the project implementers who will be government technical departments at national and district levels and other stakeholders such as civil society and community based organisations. It will assist these stakeholders in identifying and mitigating the potential environmental and social impacts of the potential future investment watershed and wetland sub-projects during the preparation and implementation stages. It will also be useful to development partners who will be interested in financing the different sub-projects under the country programmes.

6.3 Vulnerable Groups and Gender Issues[34]

The majority of the rural people in the sub-basin are very poor (few tools, poor housing, small land area, little disposable income); they are unable to invest in improved resources management or education. They have limited access to improved technologies, information and services (research, credit, reliable markets, inputs and dispensaries). In upland areas, water is scarce both for domestic use and livestock as wells and watering points are mostly in lowland areas, or is sold from kiosks at prices most people cannot afford. In large areas of the basin, fuel-wood is also in increasing short supply and alternatives such as paraffin or electricity are only accessible in the few urban centres.

In terms of gender roles there are more women than men but they are economically weaker than men. The majority of the population lives in the rural areas where agriculture and livestock rearing are extensive and where women are neither landowners nor livestock owners. In urban areas, they are in the minority among salaried workers and their jobs are usually the least paid ones. The woman is only expected to play her biological roles whilst the man is expected to meet all the needs of his family. Because of this men have more access to education than women. Thus combination of biological, social, cultural and economic factors contributes to women's increased vulnerability.

Water fetching for domestic use is the responsibility of women and girls. The lack of water or the distance of homes from sources of water make women's lives difficult, have a strong influence their availabilities for other tasks and limit their ability to take part in other activities such as accessing professional health care. For girls absenteeism in schools is high if the distance to water points is further away from their homes.

Boys are usually in charge of small livestock grazing and sometimes gathering fuel-wood. Both of these activities can be done in the afternoon after school. Boys usually find it harder to attend school regularly when they have to look after livestock or when they are older pupils and are chosen to go fishing, drive the livestock to their pastures or take products to market.

Generally children under 15 represent 45.6% of the Kagera sub-basin's population. If the 3.5% representing the over 65 age group are added, the community burden is 49.1% of the population. The young and the old indeed represent a heavy burden in terms of basic needs, including education and health. In addition this population faces challenges such as HIV, agricultural land fragmentation, illiteracy and lack of professional qualifications.

6.4 Measures to Address Vulnerability in the Sub-projects

With respect to household targeting, the proposed sub-projects should use community based targeting systems in liaison with community based groups and local leaders. The use of these targeting systems should ensure that the vulnerable households such as (poor,

[34] Adapted from NELSAP (2010). Development of Kagera Integrated River Basin Management and Development Strategy. Report by SWECO.

single headed, widowed, child headed, houses affected with HIV, households headed by the elderly) will be the first to benefit from the interventions proposed in the various watershed and wetland sub-projects in the KIWMP.

Education is the first step in improving water resources management and schools are potential partners and players who can promote good use of water "management" because the concept can be integrated in the learning process from a very early age: respecting water, learning about hygiene and how to use water properly. Schools should also be some of the first infrastructures to benefit from rain water collection systems, taps, so that they can teach children to wash their hands frequently and toilets that are up to modern sanitary standards. Thus the rain water harvesting sub-projects suggested under the IWMP should actively target learning institutions from the onset.

In addition water related diseases can be avoided or reduced through better wetlands management through the wetlands sub-projects suggested in the KIWMP in the four countries. In the Kagera sub-basin, populations living close to marshlands are the most affected by malaria or other water related diseases.

Women are responsible for providing water for domestic use thus they should be the key targets to be involved in potable water supply related activities. The promotion of women's rights and their integration at different decisional levels (from water committees to higher levels) must therefore be consolidated when implementing the sub-projects concerned with availing potable water e.g. the KIWMP is proposing to supply 15 villages in Tanzania with potable water.

Education of men will also be essential in the KIWMP because men are responsible for provision of agricultural water for crops and animals, but also the related land and water resources conservation problems resulting from deforestation for charcoal production among others uses. They will therefore need to understand their responsibilities in terms of sound management of water and land resources under their control.

7. FINANCIAL AND ECONOMIC ANALYSIS

7.1 Methodology

The financial and economic analysis for the Feasibility Study covered four main components:

- Assessment of the Kagera sub-basin Regional Gross Domestic Product (RGDP)
- Cost estimate of KIWMP
- Benefits estimation
- Financial and economic Analysis

For the details, see Annex C Economic and Financial Investment Plan.

7.1.1 Kagera sub-basin RGDP

The RGDP estimate is the first time that the RGDP value for the Kagera Sub-basin has been calculated. This will assist planning of interventions to improve natural resource use. The RGDP provides a base on which to characterize basin economic activity and enables projections to be made of future growth rates. Integrated watershed management will plan to improve the sustainability of resource use and environmental quality in the basin in the context of changing RGDP. This assessment was presented in the Baseline Chapter (2).

Much of the work required for RGDP estimates was done using publically available statistical sources, notably from country statistical offices and sector statistical reports containing country data. The RGDP estimates are included as part of the baseline.

7.1.2 Cost estimate of KIWMP

Cost estimations used COSTAB to prepare financial cost estimates of each of the components. Basic data was entered into COSTAB as numeric unit costs of the resources required for implementation. These were then allocated to project components according to the phased quantities of resources required.

Because sub-projects will be implemented in each riparian state, separate COSTAB files have been created for each sub-project to reflect their different currencies, exchange rates and economic conversion factors. These are supplied to the Client as electronic files, for use as the projects are refined.

Nearly all of the sub-projects identified by stakeholders as “Priority 1” sub-projects require more investigative work during the project design phase. The additional work required was costed and included in Component 1. The scope of the sub-projects and the costs and quantities of sub-project resources required for implementation presented here are indicative, and assumptions have been made on sub-project financing which will require further detailing at sub-project design stage. The use of COSTAB for programme financial formulation will assist these discussions because it is easily revised and provides consistent cost formats.

7.1.3 Benefits estimation

Ecological services are part of the indirect benefits offered by wetlands and watersheds. They include nutrient retention, water filtration, flood control and groundwater re-charge. One of the important out turns of the interventions will be an explicit calculation of the value of the ecological services benefits different types in locations in the Kagera sub-basin. Once these values are established and accepted, the natural outcome will be to increase them through improved management.

The physical interventions proposed for the Watershed Management Programme were identified from the COSTAB tables, listed by sub-project reference number and subcomponent and classified according to the generalised activities. Since the sub-project locations are known by sub-watershed it was possible to disaggregate these generalised activities by sub watershed.

Full benefits from SWC, land reclamation, irrigation and rural roads were assumed to be attained in project year 8. Full benefits from other interventions are expected on completion of investment in project year 5. Benefits are realised approximately linearly.

No benefits were calculated for market centres, input supply and credit: these have financial benefits but have a minor impact on benefits in economic prices. For lack of data, no benefits were assigned to incremental fish production.

To calculate financial benefits, the economic values of electricity and water are substituted by the tariff values. The financial cost of electricity in Burundi in 2011 was only US$ 0.05 per kWh. The rural water tariff for all riparian states was assumed to be US$ 20 per household per annum.

The values of these ecological services provided were calculated by sub-watershed. The resulting estimate is only partial, and focusing on the contribution of wetlands in handling rural, urban and manufacturing effluent, solid waste and flood control. There is considerable variability, depending on the area of wetland within a sub-watershed, its population and economic activity.

7.1.4 Financial and economic analysis

Financial costs have been presented by year and are estimated in US$. These costs are converted into economic prices by following the steps below:

- Distinguish sub-project costs incurred annually in foreign exchange, local currency and taxes (already available as an input to and output from COSTAB).
- Estimate the annual proportion of unskilled labour in local costs (sometimes specified as an input to COSTAB but a proportion also has to be estimated from SWC and other civil engineering unit costs).
- Multiply costs incurred in foreign exchange by the standard conversion factor to eliminate the premium paid on foreign exchange.
- Subtract taxes and the value of unskilled labour from local costs.
- Multiply the cost of unskilled labour by the shadow exchange rate (accurate estimates of the shadow wage rate are not available for any of the riparian states: given the high rate of rural under-employment 0.75 has been assumed for the sub basin).
- Sum the adjusted cost of foreign exchange, the adjusted cost of unskilled labour and local costs less taxes to arrive at an estimate of economic costs.

7.2 Financial analysis for the sub-projects

7.2.1 Financial costs per sub-project and component

KIWMP financial costs per sub-project have been presented by year in Table 18 and are as estimated as US$ 614.72 million in total. Of this, 6% of costs are attributed to Component 1, Programme Coordination and Management, while a further 1% of costs are allocated to Programme Capacity Building and Policy Development. About 83% of total costs are

incurred on Watershed Management (WSM) Country sub-projects, and 10% are incurred on wetlands sub-projects. Of this percentage, about 22% is on basin wide wetland sub-projects.

Table 18. KIWMP costs by component and project, 2013-2017, US$ '000

Component number	Component Title	Country	Project Number	Project type	Project Title	Total Costs in US$ '000						Component Costs
						2013	2014	2015	2016	2017	Total	
1	Programme Coordination and Management	Basin wide				11,316	10,245	4,317	4,209	4,063	34,149	34,149
2	KIWMP Country Projects	Burundi	B1	WSM	Integrated Watershed Management, Akanyaru Sub-watershed	15,741	20,354	33,757	36,227	39,331	145,410	557,393
		Burundi	B2	WSM	Stabilisation of banks of Watercourses and Hillside Afforestation	8,329	9,627	16,012	16,671	17,327	67,968	
		Burundi	B3	WSM	Hill irrigation & rainwater harvesting in Cankuzo, Karuzi, Muyinga and Ruyigi Prov.	6,998	8,087	13,523	15,005	16,469	60,083	
		Burundi	BW1	WETLANDS	Protection of wetland ecosystems thru environmental flows	156	144	145	145	145	736	
		Burundi	BW2	WETLANDS	Alternative Livelihoods for Wetland Communities thru ecosystem approach	235	225	229	230	227	1,145	
		Burundi	BW3	WETLANDS	Impacts on wetlands of water harvesting & development of G-water resources	192	159	159	159	159	828	
		Rwanda	R1	WSM	SWC, Improved Fodder Production and Reaforestation, Nyaguru District in Akanyaru	5,799	6,262	10,623	12,898	15,125	50,707	
		Rwanda	R2	WSM	Rainwater harvesting, SSI, fruit & fodder trees, Kagitumbu sub watershed	7,681	7,745	13,077	16,204	18,334	63,041	
		Rwanda	RW3	WSM	Feasibility Study for Improved Fisheries in Lake Muhazi	363	213				576	
		Rwanda	RW1	WETLANDS	Protection of wetland ecosystems thru environmental flows	157	144	145	145	145	737	
		Rwanda	RW2	WETLANDS	Artificial wetlands for sustainable urban drainage	240	211	225	240	233	1,149	
		Tanzania	T1	WSM	Soil conservation in Karagwe and Ngara District	5,037	5,201	7,515	7,900	7,799	33,453	
		Tanzania	T2	WSM	Feasibility Study (15 villages) Kayanga + Bunazi (new) & Kyaka (New) Townships	3,513	2,056	4,534	5,067	4,661	19,831	
		Tanzania	T3	WSM	Protection & conservation of water sources in Muleba and Birhamulu Districts	3,731	3,711	5,236	5,472	5,413	23,562	
		Tanzania	TW1	WETLANDS	Ruwakajunju, Ngoma and Rshwa Lakes Fisheries Project	819	945	1,251	727	645	4,388	
		Tanzania	TW2	WETLANDS	Robust evidence base to inform management decision-making	749	800	855	826	850	4,081	
		Tanzania	TW3	WETLANDS	Flood management in Bigomba & Burigi Valley, Ngara & Muleba Districts	2,722	2,810	4,664	5,249	5,653	21,098	
		Uganda	U1	WSM	Land rehabilitation in Isingiro District	1,387	1,506	2,266	2,402	2,567	10,128	
		Uganda	U2	WSM	IWRM Project, Rakai district	2,462	2,612	3,679	3,759	3,391	15,903	
		Uganda	U3	WSM	IWRM Maziba Sub watershed	2,303	2,698	4,063	4,019	3,770	16,852	
		Uganda	UW1	WETLANDS	Robust evidence base to inform management decision-making	187	200	214	207	213	1,020	
		Uganda	UW2	WETLANDS	Payments for wetland environmental services	146	161	162	162	161	792	
		Uganda	UW3	WETLANDS	Alternative Livelihoods for Wetland Communities thru ecosystem approach	1,902	2,099	3,177	3,289	3,439	13,906	
3	KIWMP Basin Projects	Basin wide	KIWMP 1	WETLANDS	Strategic Wetlands Classification	1,114	1,338	1,878	1,898	1,862	8,090	14,128
			KIWMP 2	WETLANDS	Management of Transboundary RAMSAR Sites	788	514	2,427	1,176	1,133	6,039	
4	Programme Capacity Building and Policy Development	Basin wide				967	1,607	2,061	2,256	2,154	9,045	9,045
Total KIWMP Costs						85,034	91,677	136,195	146,542	155,268	614,715	614,715

The largest share of total cost expenditure goes to Burundi, which has a 45% share of total costs. Rwanda has 19%, Tanzania 17% and Uganda 10%. Basin wide projects have 2% of the total costs, with Components 1 and 4 accounting for the balance of 7%.

Considering expenditure within the Kagera sub-basin as a whole, the programme costs suggest an expenditure of about US$ 40 per capita on the sub basin population and US$ 102 per sub basin hectare over Phase 1 of the programme.

A summary of expenditure under procurements was made (and presented in Annex C) and this calculated that the largest proportion is for civil works (SWC) and infrastructure (59%) of which a significant proportion has been assumed to be funded under parallel finance. International and regional consultancy costs are similar to expenditure required on local staffing.

A financial analysis of total programme staffing requirements shows that these account for 42% of programme expenditure. About 50 person years of internationally funded consultancy is envisaged, 240 person years of regional consultancy, 1,030 person years of national staff and 490 person years of NGO staff. This does not include office staff and casual labour.

7.2.2 Costs of the Watershed Management Sub-programme

The total financial cost estimated for all watershed management components and sub-components is estimated to be US$ 533 million[35] during the period 2013-2017, or about 87% of total sub-programme costs. The breakdown by component is shown by riparian state in Table 19 below.

Table 19. Total Financial Cost (2013-2017) of Watershed Management Programme by sub-project and riparian state, US$ million

Ref no.	Description	Burundi	Rwanda	Tanzania	Uganda	Total
B1	Integrated Watershed Management, Akanyaru Sub-watershed	145.41				145.41
B2	Stabilisation of banks of Watercourses and Hillside Afforestation	67.97				67.97
B3	Hill irrigation & rainwater harvesting in Cankuzo, Karuzi, Muyinga and Ruyigi Prov.	60.08				60.08
R1	SWC, Improved Fodder Production and Reaforestation, Nyaguru District in Akanyaru		50.71			50.71
R2	Rainwater harvesting, SWC, SSI, fruit & fodder trees, Kagitumbu sub watershed		63.04			63.04
RW3	Feasibility Study for Improved Fisheries in Lake Muhazi		0.58			0.58
T1	Soil conservation in Karagwe and Ngara District			33.45		33.45
T2	Supply of potable water to 15 villages, Kayanga, Bunazi and Kyaka Townships in Karagwe and			19.83		19.83

[35] This figure includes TW1 and TW3, the former a fisheries sub-project dealing with lake fisheries, the later with strong components of WSM to control flooding. The figure also includes most of the costs of U2 and U3, less the costs already included in the wetlands management programme.

Ref no.	Description	Burundi	Rwanda	Tanzania	Uganda	Total
	District.					
T3	Protection and Conservation of Water Sources in Muleba and Biharamulo Districts			23.56		23.56
TW1	Flood Management in the Bigomba and Burugi Valleys: Ngara, Biharamulo & Muleba Districts.			21.10		21.10
TW3	Feasibility Study for Fisheries in Karagwe District, + Fish Ponds			4.39		4.39
U01	Land rehabilitation in Isingiro District				10.13	10.13
U02	IWRM Project, Rakai district				15.90	15.90
U03	IWRM Maziba Sub watershed				16.85	16.85
		273.46	114.32	102.33	42.88	533.00

[17] Rounding errors may be present

Watershed management components and sub-components are more heterogeneous than those of the wetlands management programme. The proportion of expenditure is reasonably distributed between activities with 73% directed to soil and water conservation, water storage, re-afforestation and irrigation. Some 14% is allocated to rural infrastructure and a small percentage is allocated to fisheries. The proportion of expenditure on project management and administration is relatively small, but sub-basin costs of this activity (coordination, procurement, training, M&E etc. as distinct from local office costs) are included in Components 1 and 4.

7.2.3 Costs of the Wetlands Management Sub-programme

The total financial cost estimated for all wetlands components and sub-projects is estimated to be US$ 38.48 million[36] during the period 2013-2017, or about 6% of total sub-programme costs. The breakdown by component is shown by riparian state in Table 20 below.

[36] This figure excludes TW1 and TW3, the former a fisheries project dealing with lake fisheries rather than wetlands, the later with strong components of WSM to control flooding. Both sub-components have relatively large costs. However, the figure includes part of the costs of U2 and U3, both of which have specific wetland interventions.

Table 20. Total Financial Cost (2013-2017) of Wetlands Management Programme by sub-projects by Riparian State, US$ million

Ref no.	Description	Burundi	Rwanda	Tanzania	Uganda	Total
KIWMP2	Development of a Management Plan for Samuka+			0.22	0.46	0.68
KIWMP2	Implementation of a Management Plan for Samuka+			0.76	1.52	2.28
KIWMP2	Project Coordination and Management of Samuka+			0.35	0.69	1.04
KIWMP2	Scaling up Management Plans to Other Trans boundary Wetlands	0.33	0.33	0.33	0.33	1.32
KIWMP2	Project Coordination and Management of Scaling up Transboundary Management Plans	0.17	0.17	0.17	0.17	0.68
KIWMP1	Development of a Wetlands Classification System	0.75	0.75	0.75	0.75	3.00
KIWMP1	Classification of Kagera Wetlands	0.42	0.42	0.42	0.42	1.68
KIWMP1	Development of Wetlands Management Plans	0.55	0.55	0.55	0.55	2.20
KIWMP1	Project Coordination and Management	0.30	0.30	0.30	0.30	1.20
TW2/UW1	Robust Evidence Base to Inform Management Decision Making			4.08	1.02	5.10
BW1/RW1	Protecting Wetland Ecosystems through Environmental Flows and Sustainable Extractions	0.74	0.74			1.48
RW2	Artificial Wetlands for Sustainable Urban Drainage		1.15			1.15
UW2	Payment for Wetland Ecosystems Services (PET)				0.79	0.79
BW2/UW3	Alternate livelihoods in Wetlands	1.15			13.91	15.05
BW3	Impacts on Wetlands of Water Harvesting and Development of Groundwater Resources	0.83				0.83
Total[1/]		5.23	4.41	7.93	20.91	38.48

[1/] Rounding errors may be present

7.3 Economic analysis for the sub-projects

This section looks at the economic costs and the benefits that would accrue from the implementation of the sub-projects.

7.3.1 Economic costs

The economic costs of KIWMP per sub-project are given in Table 21 and are estimated to be US$ 505.40 million in total. This is about 82% of financial costs; a result of eliminating the premium on foreign exchange, eliminating taxes and adjusting unskilled labour by an estimated shadow wage rate.

7.3.2 Benefit estimation

Wetland benefits

The Kagera wetland area covers about 273,000 ha, of which the project impact area will be about 90,000 ha, which is about 1.5% of the land area of the sub-basin and 35% of the sub-basin's wetland area. If the contribution of wetlands to the RGDP now is about US$ 100 per ha per annum (agricultural land in Kagera contributes about US$ 600 per ha per annum, which is relatively high due to double cropping and irrigation) then this would have to increase by 80% in the impact area to achieve an annual increment of US$ 7.6 million. An annual benefit of US$ 7.6 million would generate an increase of about 0.2% of the present estimated RGDP of US$ 4,336 million. The RGDP is considered to be an under-estimate (see section 1.3) and further the sub-basin economy is expected to grow, so the required percentage increase in future RGDP to justify improved wetland health is small. This increase is substantial to generate from direct benefits (crops, other plant and animal products, fish, tourism etc.) alone. However, the main thrust of the wetlands management programme is towards improving wetland quality, and therefore increasing wetland indirect benefits from environmental goods and services (nutrient retention, water filtration, flood control, groundwater recharge etc.).

Table 21. KIWMP Economic Cost Summary, 2013-2017 US$ '000 (this is 82% of the financial cost summary)

Component number	Component Title	Country	Project Number	Project type	Project Title	Total Economic Costs in US$ '000						Component Costs
						2013	2014	2015	2016	2017	Total	
1	Programme Coordination and Management	Basin wide				7,376	6,790	2,895	2,861	2,757	22,679	22,679
2	KIWMP Country Projects	Burundi	B1	WSM	Integrated Watershed Management, Ngozi Province	12,702	17,923	30,001	32,293	35,159	128,077	467,222
		Burundi	B2	WSM	Stabilisation of Water-courses to reduce erosion & siltation	6,285	8,197	13,766	14,384	15,000	57,632	
		Burundi	B3	WSM	Hill irrigation & rainwater harvesting	5,469	7,054	11,973	13,377	14,759	52,632	
		Burundi	BW1	WETLANDS	Protection of wetland ecosystems thru environmental flows	94	96	96	96	97	479	
		Burundi	BW2	WETLANDS	Alternative Livelihoods for Wetland Communities thru ecosystem approach	149	161	165	166	164	805	
		Burundi	BW3	WETLANDS	Impacts on wetlands of water harvesting & development of G-water resources	120	108	107	107	107	549	
		Rwanda	R1	WSM	SWC on terraces, soil improvement, increased fodder & re-forestation	3,919	5,110	8,808	10,605	12,369	40,811	
		Rwanda	R2	WSM	Rainwater harvesting, SSI, fruit & fodder trees	5,064	6,224	10,697	13,124	14,841	49,949	
		Rwanda	RW3	WSM	Increased fish production (aquaculture)	213	132	0	0	0	345	
		Rwanda	RW1	WETLANDS	Protection of wetland ecosystems thru environmental flows	90	92	92	93	93	460	
		Rwanda	RW2	WETLANDS	Artificial wetlands for sustainable urban drainage	148	142	155	174	168	786	
		Tanzania	T1	WSM	Soil conservation in Karagwe District	3,691	4,388	6,554	6,911	6,800	28,344	
		Tanzania	T2	WSM	Feasibility Study (15 villages) Kayanga + Bunazi (new) & Kyaka (New) Townships	2,031	1,553	3,612	4,040	3,728	14,965	
		Tanzania	T3	WSM	Protection & conservation of water sources in Kagera Basin in Tanzania	2,684	3,107	4,539	4,765	4,708	19,804	
		Tanzania	TW1	WETLANDS	Feasibility study for fisheries Karagwe District + fish ponds in wetlands (new)	537	636	864	537	464	3,039	
		Tanzania	TW2	WETLANDS	Robust evidence base to inform management decision-making	458	537	580	561	577	2,713	
		Tanzania	TW3	WETLANDS	Flood management in Bigomba & Burigi Valley, Ngara & Muleba Districts	1,679	2,182	3,742	4,413	4,761	16,777	
		Uganda	U1	WSM	Land rehabilitation in Isingiro District	980	1,223	1,926	2,088	2,326	8,543	
		Uganda	U2	WSM	Pilot IWRM Project, Rakai district	1,650	2,028	2,989	3,138	3,037	12,841	
		Uganda	U3	WSM	Pilot IWRM Maziba Sub watershed	1,682	2,227	3,465	3,520	3,460	14,355	
		Uganda	UW1	WETLANDS	Robust evidence base to inform management decision-making	106	129	139	135	138	646	
		Uganda	UW2	WETLANDS	Payments for wetland environmental services	81	106	107	108	107	509	
		Uganda	UW3	WETLANDS	Alternative Livelihoods for Wetland Communities thru ecosystem approach	1,379	1,796	2,815	2,999	3,173	12,162	
3	KIWMP Basin Projects	Basin wide	KIWMP 1	WETLANDS	Strategic Wetlands Classification	672	863	1,222	1,235	1,213	5,205	9,588
			KIWMP 2	WETLANDS	Management of Transboundary RAMSAR Sites	493	354	1,968	789	779	4,383	
4	Programme Capacity Building and Policy Development	Basin wide				575	949	1,239	1,406	744	4,914	4,914
Total KIWMP Costs						60,326	74,106	114,518	123,926	131,528	504,404	504,404

The values of these ecological services provided by wetlands were calculated by sub-watershed. There is considerable variability, depending on the area of wetland within a sub-watershed, its population and economic activity. Overall, the total value of services for effluent and solid waste processing is about US$ 126 per ha, which is commensurate with RAMSAR estimates for freshwater wetlands based on international data. Sub watersheds with smaller proportions of wetland areas tend to have higher values of ecological services per total wetland hectare than larger ones.

Table 22 below shows the estimated annual direct and indirect benefits from the Wetlands Management Programme at full development. Following the methodology, the annual total benefit is about US$ 10.40 million.

Table 22: Estimate of Annual Benefits of Wetland Management Programme, US$ '000

Intervention	Benefits		Total	% of total benefits
	Direct	Indirect		
Robust Evidence base	0	0	0	0%
Environmental flows	0	203	203	2%
Artificial wetlands	0	799	799	8%
Ecosystem services	0	741	741	7%
Alternative livelihoods	682	0	682	7%
RWH and Groundwater	0	150	150	1%
Samuka RAMSAR	2,772	0	2,772	27%
Other RAMSAR	1,386	0	1,386	13%
Wetland Management Plans	0	0	0	0%
Flood damage	1,985	992	2,977	29%
Downstream impacts	0	641	641	6%
Totals	6,825	3,527	10,352	

Watershed benefits / avoided costs

Without the projects, the depreciation costs of soil loss and unsustainable use of dry matter and woody biomass may be in the order of US$ 335 million per annum and if included in the sub basin accounts would reduce the estimate of RGDP by about 9%, lowering the observed growth rate and implying (since the costs of environmental depreciation are not borne equally throughout the sub basin) that some members of the population, particularly those dependent on primary production may be becoming absolutely disadvantaged in terms of RGDP per capita.

A proposed KIWMP expenditure of about US$ 500 million in economic cost terms, over five years appears an appropriate response to the problem. In addition, the final value of the programme costs will be added to the sub-basin economy, as well as the final value of the year on year benefits, resulting in an increase in RGDP in the order of 1-2% of its estimated 2011 value annually.

Direct and indirect benefits (and surrogate values, such as carbon trading) were used to estimate values for watershed quality. This included the use of tariff values to estimate economic values of electricity and water. The financial cost of electricity in Burundi in 2011 was only US$ 0.05 per kWh. The rural water tariff for all riparian states was assumed to be US$ 20 per household per annum. The financial and economic benefit estimate for watershed values is summarized in Table 23.

Table 23 Benefit Estimate for Watershed Management subproject activities at Full Development, US$ million per annum

	Financial benefits		Economic benefits	
	US$ m	%	US$ m	%
Soil and Water Conservation	31.79	28%	31.79	25%
Reforestation and agroforestry	6.90	6%	6.90	5%
Water storage	0.45	0%	0.45	0%
Irrigation Development	43.34	38%	43.34	34%
Rural Roads	26.44	23%	26.44	21%
Rural Water Supply	3.40	3%	12.10	10%
Rural Electrification	0.30	0%	6.07	5%
Farmer Support, Marketing and Input Supply	0.00	0%	0.00	0%
Total benefits	112.61		127.08	

7.4 Detailed economic and financial analysis for the Programme

7.4.1 Detailed financial and economic cost benefit analyses

Table 24a & b presents the financial and economic cost benefit analysis for the programme as a whole. A discount rate of 10% has been used and analysis is taken over a 20 year period. This adds in the management costs of Component 1 and 4. There may well be benefits, especially from research, training and basin outreach included in Component 4, but quantification has not been attempted.

The results of the financial analysis show positive NPV and an IRR of 17%. Estimates of financial IRR in earlier reports, based on projects with different characteristics showed poor financial returns. This was because of an expansion in the area of SWC and reforestation as a result of discussion with stakeholders and a resulting relative decline in the proportion of benefits from water supply and electricity, which have negative financial benefits. KIWMP is a major investment programme, originally intended to be costed over 10 years. It is inevitable that the start-up costs will be high relative to the benefits, particularly when a high discount rate is used. Further, benefit estimation has been conservative.

The results of the economic analysis are also satisfactory. These include the important downstream ecosystem service benefits, suggests that the programme will bring substantial welfare benefits to the Kagera sub-basin. The NPV is positive, US$ 397.50 million and the IRR is 26%. The BCR is positive. The cost and benefit streams are also robust: it would require a doubling of costs to drive NPV zero, or a halving of expected benefits.