MINISTRY OF ENVIRONMENT
Rwanda Environment Management Authority

Building resilience of communities living in degraded forests, savannahs and wetlands of Rwanda through an Ecosystem based Adaptation (EbA) approach project

LDCF II Project

BASELINE ASSESSMENT REPORT

Revised version after incorporation of validation workshp comments

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LIST OF ABBREVIATIONS AND ACRONYMS

EbA	Ecosystem based Adaptation
GGCRS	Green Growth and Climate Resilience Strategy
GoR	Government of Rwanda
LDCF	Least Developed Countries Fund
Meteo Rwanda	Rwanda Meteorology Agency
MIDIMAR	Ministry of Disaster Management and Refugee Affairs
MINAGRI	Ministry of Agriculture and Animal Resources
MINALOC	Ministry of Local Government
MINECOFIN	Ministry of Finance and Economic Planning
MINEDUC	Ministry of Education
MINEMA	Ministry in charge of Emergency Management
MININFRA	Ministry of Infrastructure
MoE	Ministry of Environment
MoH	Ministry of Health
NISR	National Institute of Statistics of Rwanda
REG	Rwanda Energy Group
REMA	Rwanda Environment Management Authority
RHA	Rwanda Housing Authority
ROR	Republic of Rwanda
RSB	Rwanda Standards Board
RTDA	Rwanda Transport Development Agency
RWFA	Rwanda Water and Forestry Authority
UNEP	United Nations Environment Program
WASAC	Water and Sanitation Corporation

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1. INTRODUCTION

In recent years, climate variability and climate change, including increased mean temperature and erratic rainfall have increasingly affected negatively the landscapes and livelihoods of the population of Rwanda (ROR, 2018). For example, while on one hand frequent short but heavy storms often result in landslides and flooding events in the central, north and western parts of the country, rainfall shortage and drought are frequent in the eastern and southern regions of Rwanda (MIDIMAR, 2015). The intensity and recurrence of these extreme events are projected to increase in the future in these regions as a result of climate change (ROR, 2018).

Meanwhile, Rwanda is blessed with several ecosystems such as wetlands, forests and savannahs which provide a wide range of services. These ecosystems contribute remarkably to the resilience of local communities to the impacts of climate variability and climate change. Indeed, they not only contribute to mitigating floods and prolonged droughts, but also provide several products and services to the local communities. Nevertheless, these ecosystems are at risk of regression and degradation throughout the country. The most prevalent threat to these valuable ecosystems is the unsustainable use of natural resources by local communities in search of improving their livelihoods. The major drivers of ecosystem degradation include:

i) the ever increasing demand for food that triggers extension of agricultural land by majority of the population who practice subsistence agriculture;
ii) the construction of settlements for an ever increasing population; and
iii) the reliance of local communities on natural resources for subsistence and income.

The resulting degradation of these ecosystems enhances exposure and vulnerability of local communities to the impacts of climate change (ROR, 2018; REMA, 2015).

In attempt to reduce the pressure and degradation of forests, savannah and wetland ecosystems and build resilience of local communities to impacts of climate change, the Rwanda Environment Management Authority (REMA) is implementing a project entitled "*Building resilience of communities living in degraded forests, savannahs and wetlands of Rwanda through an ecosystem-based adaptation (EbA) approach*" abbreviated as **LDCF-II project**. The project is funded by the Global Environment Facility (GEF) under the Least Developed Countries Fund (LDCF) focal area for duration of four years through the United Nations Environment Programme (UNEP) as an implementing agency. This project is being implemented in seven districts including Kayonza, Kirehe, Bugesera, Gasabo, Kicukiro, Musanze and Ngororero (Figure 1).

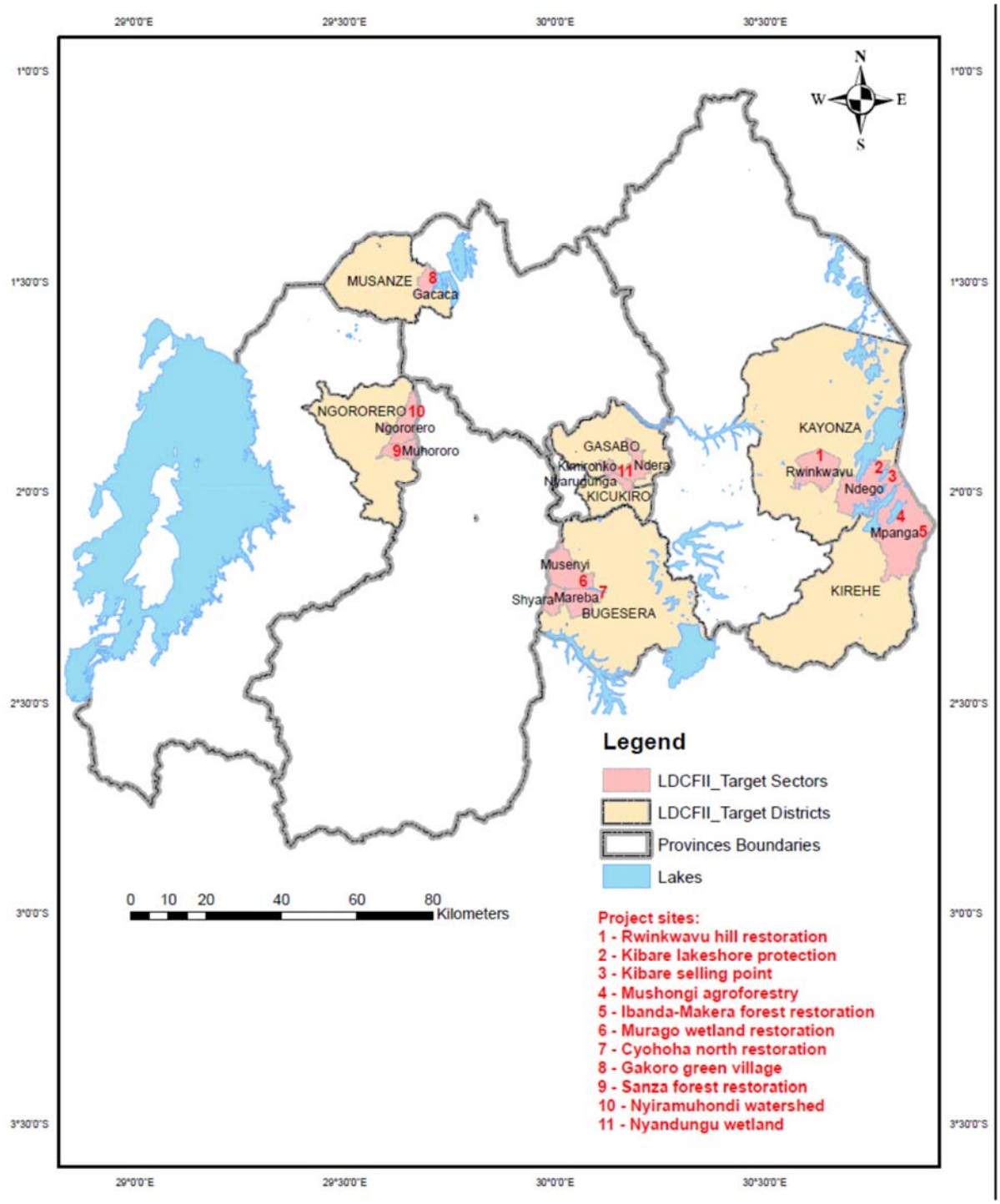

Figure 1. LDCF II project intervention zones

2. BRIEF OVERVIEW OF THE LDCF II PROJECT

2.1. Project goals

The overall goal of LDCF II project is to increase the capacity for adaptation to climate change in Rwanda. The project aims at increasing the capacity of Rwandan authorities and local communities to adapt to climate change by implementing EbA interventions in wetlands, forests and savannahs. The project focuses on vulnerable communities living adjacent to degraded forests, savannahs and wetlands, using Ecosystem-based Adaptation (EbA) approach in order to build their resilience to climate change impacts.
Agriculture and water are the major sectors affected by climate change in Rwanda. Some of such effects include: i) decreased agricultural production because of soil erosion, reduced soil moisture and water availability; ii) decreased agricultural yields because of crop damage from flooding and landslides; and iii) decreased quality and quantity of water as a result of flooding and droughts, respectively. The project problem tree which illustrates different problems and issues that are expected to be addressed through successful implementation of LDCF II project is shown in Figure 2.

The LDCF II project include four areas of interventions (UNEP, 2015):

(i) Strengthening the technical capacity of National and Local authorities to plan and implement EbA;
(ii) Strengthening the policy and strategy framework in Rwanda to promote ecosystems restoration and management;
(iii) Restoring ecosystems to increase their resilience to the effects of climate change;
(iv) Promoting sustainable and climate-resilient livelihoods.

It is anticipated that the EbA restoration activities will be combined with:

(i) bio-physical interventions to increase the climate resilience of local communities; and
(ii) green technologies that promote the sustainability and resilience of restoration activities.

These interventions will likely further increase adaptation and resilience of local communities in Rwanda particularly in the project intervention areas to the predicted impacts of climate change.

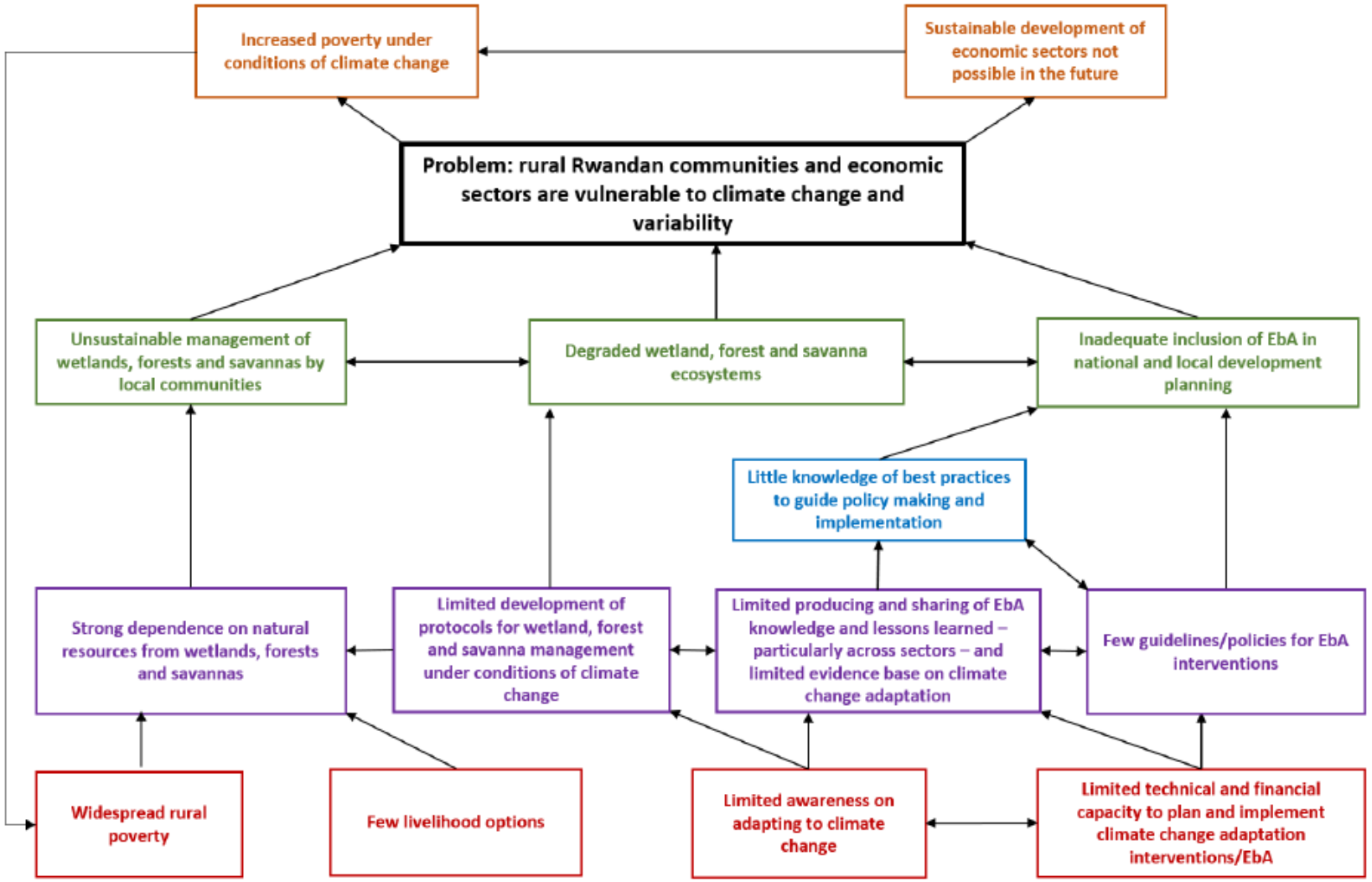

Figure 2. The problem tree for LDCF II project

2.2. Project components and expected outcomes

The LDCF II project components and outputs are well described in the project document (UNEP, 2015). The project has three components and three outcomes.

2.2.1. Component 1: National and local institutional capacity development for the use of an EbA approach.

This component is to strengthen the institutional and technical capacity of national and local institutions and participating local communities to plan and implement EbA in Rwanda. In order to achieve this, Component 1 will:

i) increase the technical capacity of the members of the National Steering Committee (NSC) for the Rio conventions to develop large-scale EbA programmes;
ii) increase the technical capacity of environmental committees, local authorities, relevant private sector actors and user groups on EbA planning and implementation;
iii) update and increase the availability of technical knowledge on EbA best-practices and complementary green technologies;
iv) increase awareness and knowledge of local communities, and school and university students on EbA and climate change; and
v) increase the scientific knowledge base on EbA through the support of research projects.

Outcome 1: *National and local authorities have increased capacity to plan and implement EbA interventions.*

Output 1.1. A National Steering Committee (NSC) mobilised as a platform to promote large-scale EbA programmes in Rwanda.

Output 1.2. Training events organized for local authorities, environmental committees and other target groups – with an emphasis on women and youth – to plan, budget and implement EbA interventions.

Output 1.3. Technical EbA guidelines developed and distributed to environmental committees and local authorities.

Output 1.4. Educational resources on EbA developed for communities living near project sites and school and university students.

Output 1.5. Scientific studies prepared and forum for dissemination of knowledge on EbA effects created.

2.2.2. Component 2: Policies, strategies and plans for adaptation to climate change.

The project focuses primarily on restoring ecosystems to increase the resilience of local communities to climate change. This will be achieved by integrating EbA into Rwanda's policy, strategy and plans. These revisions will be proposed at national and local levels.

Outcome 2: *Sectoral and local policies, strategies and plans strengthened to promote the restoration and management of degraded ecosystems for EbA.*

Output 2.1. Revisions to national ecosystem management and development policies and strategies to promote EbA proposed and submitted for government validation.

Output 2.2. A national upscaling strategy developed to promote EbA.

Output 2.3. Policy-makers and decision-makers trained to integrate and promote upscaling of EbA interventions.

Output 2.4. District Development Plans (DDPs) of pilot sites revised to promote the use of EbA.

2.2.3. Component 3: EbA interventions that reduce vulnerability and restore natural capital.

In Component 3, the project will: i) restore wetlands, forests and savannahs to be climate resilient and provide additional benefits to local communities; and ii) diversify local communities' livelihoods to increase their resilience to climate change. These interventions are designed to collectively increase the resilience of local communities to prolonged drought, frequent floods and landslides.

Outcome 3: *EbA implemented by local communities to restore degraded ecosystems in forest, wetland and savannah ecosystems and establish climate-resilient livelihoods.*

Output 3.1. EbA implemented to restore wetland ecosystems in Kimicanga to increase resilience of local communities to floods and droughts.

Output 3.2. EbA implemented to restore forest ecosystems in Sanza to increase resilience of local communities to floods and landslides.

Output 3.3. EbA implemented to restore savannah ecosystems in Kayonza District to increase resilience of local communities to droughts.

Output 3.4. Training events, equipment and technical support for the establishment of climate-resilient livelihoods in wetlands, forests and savannahs to enhance local communities' resilience to the effects of climate change.

The general distribution of LDCF II project budget among the above listed component and outcomes was as shown in Table 1 (UNEP, 2015).

Table 1. LDCF II project estimated budget for each component and outcomes

Component	Outcome	Major activities	Estimated budget (US$)
National and local institutional capacity development for the use of an EbA approach	National and local authorities have increased capacity to plan and implement EbA interventions	i) promote cross-sectoral dialogue on EbA at a national level; ii) train local level authorities, NGOs and CBOs on EbA implementation and green technologies; iii) increase local community awareness on EbA; and iv) generate and improve the availability of scientific knowledge related to EbA	879,496
Policies, strategies and plans for adaptation to climate change	National and district policies, strategies and plans developed to promote the restoration and management of degraded ecosystems to increase the resilience of local communities to climate change	i) guide future revisions of national ecosystem management and development plans; ii) develop a national upscaling strategy; iii) guide the integration of EbA into sectoral plans; and iv) promote the integration of EbA into local development planning	587,684
EbA interventions that reduce vulnerability and restore natural capital	Improved resilience and reduced vulnerability of local communities to climate change impacts, including increased mean temperature, increased frequency of	i) establish climate-resilient and multi-use ecosystems in degraded landscapes; ii) reduce erosion, regulate water flow and increase water availability despite erratic rainfall, floods and droughts; iii) reduce the climate vulnerability of local	3,491,640

Component	Outcome	Major activities	Estimated budget (US$)
	drought, and increased frequency of high-intensity rainfall events, through strategic restoration of degraded ecosystems	communities living near the intervention sites; iv) promote the use of complementary green technologies which improve the efficiency of resource use in local communities and/or improve the climate-resilience of the livelihoods of communities; and v) promote alternative livelihoods based on the restored ecosystems.	

The LDCF II project is set to demonstrate EbA activities and therefore increase the climate-resilience of local communities living near intervention sites. These interventions will result in evidence-based restoration protocols for different degraded ecosystems. Some of the climate change risks to be addressed include:

i) increased frequency and severity of drought and reduced rainfall;
ii) excessive soil erosion and landslides; and
iii) increased frequency of extreme rainfall events.

Table 2 provides LDCF II project pilot field interventions and targeted climate change risk. Some sites were not included in the initial project documents but were introduced after project inception. Some interventions were dropped after noting the existence of other projects operating in the same area with similar objectives. Table 3 shows the sites originally proposed which were dropped, the new project sites and the reasons for the changes in piloting sites.

Table 2. LDCF II project pilot field interventions and targeted climate change risk

No.	District	Intervention site	Major climate risk	Activity	Budget (Rwf)	Budget (US $)*
1	Kayonza	Kibare lakeshore	Floods and drought	Restoration of Kibare lakeshores with bamboo plantation and agroforestry on 80 ha and fruit trees on 32 Km	34,541,965	41,187
2	Kayonza	Kibare lakeshore	Floods	Relocation of market activities from Kibare buffer zone (Construction of selling point and storage hall at Kibare)	103,438,307	123,337
3	Kayonza	Rwinkwavu Hill	Drought	Restoration of Savannahs by plantation of indigenous trees on 200 Ha at Rwinkwavu Hill	130,669,118	155,807
4	Kirehe	Ibanda-Makera	Drought	Restoration of degraded savannah and forests by planting by planting 250 ha with agroforestry trees; 68 ha with indigenous species and 20 ha with fruit trees.	92,473,824	110,263
5	Kirehe	Rwampanga Lakeshores	Floods & drought	Restoration of 50 Ha of Rwampanga Lakeshores	-	-
6	Musanze	Gakoro	Floods & strong winds	Gakoro Green Village (Construction of 11 houses of 4 in 1; and 1 house of 2 in 1)	647,815,591	772,439
7	Ngororero	Sanza natural forest	Landslides	Restoration of Sanza natural forest	38,358,090	45,737
8	Ngororero	Nyiramuhondi watershed	Floods, soil erosion, landslides	Restoration of Nyiramuhondi watershed (construction of radical terraces on	314,977,528	375,571

No.	District	Intervention site	Major climate risk	Activity	Budget (Rwf)	Budget (US $)*
				100 ha, rehabilitation of 5 ha Gihe hill forest; river bank protection on 19 ha)		
9	Bugesera	Murago wetland	Floods & drought	Restoration of Murago wetland buffer zone (52 ha) and Agroforestry on 34 ha.	32,132,835	38,314
10	Bugesera	Cyohoha North lake	-	Rehabilitation of lake Cyohoha North (115 ha) through removal of water hyacinth and other invasive species	287,237,647	342,495
11	Gasabo and Kicukiro	Nyandungu wetland	Floods & Drought	NUWEP (Nyandungu wetland landscape restoration)	-	500,000

***** *Average exchange rate in 2017: 1 US $=838.6623 Rwf (https://www.exchangerates.org.uk /USD-RWF-spot-exchange-rates-history-2017.html)*

Source: *LDCF II MoUs with Districts; Concept notes for subprojects; Field visits (key informants)*

Table 3: Justifications of changes in project intervention sites

No.	Original Site	District	New site	District	Activities	Reasons for change of site or for new site
1	Kimicanga	Gasabo	Nyandungu wetland	Gasabo and Kicukiro	To support NUWEP project in landscaping and restoration of Nyandungu wetland into an eco-tourism park	The funds were judged to be too small to achieve meaningful results
2	Satinsyi watershed (hosting Sanza natural forest)	Ngororero	Nyiramuhondi watershed	Ngororero	Restoration of Nyiramuhondi watershed (construction of radical terraces on 100 ha, rehabilitation of 5 ha Gihe hill forest; river bank protection on 10 ha)	Satinsyi watershed was covered by other projects (e.g. Water for growth project)
3			Gakoro Green Village	Musanze	Construction of 11 houses of 4 in 1; and 1 house of 2 in 1 and restoration of Ruhondo islands	Restoration of Ruhondo islands and improve livelihoods of communities who had formerly settled on them
4			Byimana	Kayonza	Solar pumping irrigation scheme on 15 ha (Rwakigeli lake)	Increase resilience of local communities to climate change (coping strategy against recurrent drought)
5			Rwinkwavu hill	Musanze	Restoration of Savannahs by plantation of indigenous trees on 200 Ha at Rwinkwavu Hill (Nyarunazi)	Restoration of Rwinkwavu and improve livelihoods of local communities and increase their resilience to climate change
6			Ibanda-Makera and	Kirehe	Restoration of 68 ha with indigenous species and fruit trees on 20 ha at Ibanda-Makera	Restoration of Ibanda-Makera and improve livelihoods of local communities and increase their resilience to climate change
7			Mushongi	Kirehe	Restoration with agroforestry on 250 ha along Rwampanga Lakeshore	Restoration of Rwampanga lakeshore and improve livelihoods of local community and increase their resilience to climate change

3. METHODOLOGY FOR BASELINE ASSESSMENT

3.1. Deskwork review of project documents, work plans and other resources

Existing project documents, detailed work plans and reports and other similar projects initiative documents available at REMA were thoroughly reviewed in order to familiarize with the project objectives, outcomes and indicators. In addition to publications provided in the reference section, the list of major documents consulted during the baseline assessment is provided in Annex 3.

3.2. Key informants' interviews

Interviews with key informants was conducted using checklist of issues and questions relevant for the baseline studies in the project intervention districts to collect qualitative information and estimates of quantitative information (using local expert judgment). The checklist of questions/issues for Key informants and Focus groups is provided in Annex 1, while the list of major key informants and participants in focus group discussions is contained in Annex 2.

3.3. Focus group discussions

Due to time limitation and timing of the baseline study, we opted for focus group discussion instead of a comprehensive questionnaire survey in the project areas. In each district, the LDCF II project staff organise a meeting in which representatives of project beneficiaries and local key informants were invited for discussion on relevant baseline issues such as the state of agricultural and land use practices, pastoral activities and other land related issues such as soil erosion and drought effects before the project implementation. Other issues of discussion during the focus group meetings were related to livelihood status of the communities in the project intervention areas, focusing on their socio-economic status prior to project implementation and expected socio-economic benefits from LDCF-II project. Efforts were made to collect estimates of relevant data (based on local expert judgment and National Institute of Statistics of Rwanda (NISR) surveys results including the annual agricultural surveys and the EICV 5 results) to feed into the project results framework. The checklist of questions/issues for Key informants and participants in Focus groups are provided in Annexes 1 & 2.

3.4. Visualization of bio-physical status of project intervention areas

In order to visualize the bio-physical status of the project intervention areas, sketch maps of project intervention sites prior to project implementation were generated using

historical Google satellite images. In some sites, point sampling was used to estimate tree density on farms in project intervention sites. Some photos of the field interventions sites were also taken to support the satellite image sketch maps. The results from this exercise are presented in section 4.

3.5. Direct field observation of project intervention sites

During field surveys, it was an opportunity to observe the bio-physical status, the agricultural and land use practices, pastoral activities and other land related issues (e.g. soil erosion and drought effects) in project intervention sites. Such direct observations in the field have greatly helped in interpreting correctly the results from key informants and focus discussions in different sites. The field visits plan and dates of actual visits are provided in Annex 3.

3.6. Screening of project targets and indicators

Targets and indicators for the project results framework were reviewed and revised using the Updated Results-Based Management Framework for Adaptation to Climate Change under the Least Developed Countries Fund and the Special Climate Change Fund (LDCF/SCCF) project tracking tool. LDCF II project indicators and targets for each outcome and output based on the adaptation results to be generated were reviewed and revised to keep only those that are SMART (Specific, Measurable, Achievable, Results-based, and Time-bound), gender-sensitive, and easy means of verification.

The suitability of the indicators was assessed based on whether:

(i) The indicator describes how the achievement of the result will be measured;
(ii) The indicator is clear and easy to understand;
(iii) Each and every variable mentioned in the indicator statement is measurable with reasonable cost and effort;
(iv) The indicator can be disaggregated according to gender, age and social condition where necessary;
(v) A baseline (current) value can be provided for each and every variable in the indicator statement (apart for Yes/No indicators); and
(vi) There is a target within a specified timeframe for each and every variable in the indicator statement (apart for Yes/No indicators).

Any existing indicator which did not meet the above criteria was either amended, removed or reworded (rephrased). The results for the screening of project indicators and targets are provided in section 5.

3.7. Assessment of data gaps for the project

Data gaps for LDCF II project were assessed and the methods used to fill the identified data gaps are provided in Table 4. A consolidated summary of results on data gathered from fieldwork visits, focus group discussions and key informants is provided in Annex4.

Table 4. Data gaps for the project baseline assessment

Data gaps for LDCF II project baseline assessment	Methods used to fill the data gaps
Soil characteristics of project pilot sites	Key informant interviews & Focus group discussions
Average farm size per household (ha) at project sites	
Farming practices % (rain fed agriculture; irrigated land; consolidated farms) at project sites	
Major crops (both food and cash crops) grown at project sites	
Level of use of fertilizers and types (%)at project sites	
Average number of trees on farms at project sites	Key informant interviews & Focus group discussions; Point sampling on some sites
Major agroforestry species and major uses at project sites	Key informant interviews & Focus group discussions
Major challenges in planting and maintaining trees on farm at project sites	
Wetland uses at project sites	
Livestock keeping – Households with cattle (%)at project sites	
Soil erosion – level at project sites	
Soil erosion control measures at project sites	
Landslides occurrence and trend at project sites	
Flooding occurrence and trend at project sites	
Heavy storms and winds occurrence and trend at project sites	
Drought occurrence and trend at project sites	
Village settlement type (Clustered houses (%); Scattered (%))	
Percentage of households below poverty level at project sites	
Major economic activities at project sites	
Major alternative source of income at project sites	

3.8. "*Ubudehe*" concept and its categories

The "*Ubudehe*" (social support) concept was used during focus group discussion sessions to assess poverty levels in the project pilot sites. During, these sessions participants estimated the average percentage of households living below poverty line classified as those in the *Ubudehe* category 1.

Ubudehe is a long-standing Rwandan practice and culture of collective action and mutual support to solve problems within a community. The traditional Ubudehe focused mostly on cultivation. This was carried out by local communities, working on neighbors' farms on a rotating basis. The practice was, however, eroded by colonization, which introduced a cash-based economy in which individuals could afford to pay others to do similar work. After the Genocide against the Tutsi in 1994, the Government of Rwanda drew on some aspects of *Ubudehe* to help in the social and economic reconstruction (RGB, 2016).

Today, the concept has been translated into a home grown development program whereby citizens are placed into different categories with the aim to uplift poor families' living standards and improve social welfare. In principle, these categories are to inform the level of support families should receive through government social protection programs.

The current *Ubudehe* categories scheme was created in 2014 by the Local Administrative Entities Development Agency (LODA) but it became operational in 2016. Under the program, households are put in categories based on their social-economic status, and their property, in terms of land and other belongings, and what the families' breadwinners do to earn a living. The current *Ubudehe* categories (although the process of revising them is on-going) are as follows:

- ✓ **Category 1**: Families who do not own a house and can hardly afford basic needs.
- ✓ **Category 2**: Those have their own houses or can afford to rent a house; mostly get food and earn a wage but rarely get full time jobs.
- ✓ **Category 3**: Those who have a job and farmers who go beyond subsistence farming to produce a surplus which can be sold. It also includes those with small and medium enterprises who can provide employment to dozens of people.
- ✓ **Category 4**: Those who own large-scale business; who earn high incomes; who own houses; who can afford a luxurious lifestyle.

The *Ubudehe* categorisation process involves local leaders and communities. The community gathers and a representative from each household gives details on the families' social and economic status. The details are provided through a questionnaire designed by the Ministry of Local Government. After each household has filled in the questionnaire, the community gathers at the cell level to crosscheck the accuracy of the information. When the community approves the information as accurate, the categorisation process begins. The data collected is sent to the district level which sends it to the Ministry of Local Government for validation.

4. BASELINE BIO-PHYSICAL AND SOCIO-ECONOMIC CHARACTERIZATION OF PROJECT INTERVENTION SITES

4.1. Administrative location of LDCF II project intervention sites

The fieldwork for gathering bio-physical and socio-economic characterization of project intervention sites was carried out with the support of LDCF II project staff based in the districts with pilot field interventions. The administrative location of LDCF II project intervention sites is shown in Table 5.

Table 5. Administrative location of LDCF II project and planned activities

Nº	District	Sector	Cell	Villages	Activity
1	Kayonza	Ndego	Isangano	Kanyana & Kibare	Restoration of Kibare lakeshores with bamboo plantation and agroforestry on 80 ha and fruit trees on 32 km
				Kibare	Construction of a selling point and storage hall at Rwakibare lakeshore
			Byimana	-	Solar pumping irrigation scheme on 15 ha (Rwakigeli lake)
		Rwinkwavu	Mbarara, Gihinga	Gacaca, Nyarunazi	Restoration of Savannahs by plantation of indigenous trees on 200 Ha at Rwinkwavu Hill (Nyarunazi)
2	Kirehe	Mpanga	Nasho & Mushongi	Nyawera & Gitoma, Ngugu I & II	Restoration of 68 ha with indigenous species and fruit trees on 20 ha at Ibanda-Makera
					Restoration with agroforestry on 250 ha along Rwampanga Lakeshore
3	Musanze	Gacaca	Gakoro	Murora	Gakoro Green Village (Construction of 11 houses of 4 in 1; and 1 house of 2 in 1) and restoration of Ruhondo islands
4	Ngororero	Muhororo	Sanza	Mubuga & Sanza	Restoration of Sanza natural forest (20ha)
		Ngororero	Nyange & Torero	Gihe, Nyakariba,	Restoration of Nyiramuhondi watershed (construction of radical terraces on 100 ha, rehabilitation of 5 ha Gihe hill forest; river bank protection on 10 ha)

Nº	District	Sector	Cell	Villages	Activity
5	Bugesera	Mareba	Rugarama	Keza & Gasagara	Restoration of Murago wetland buffer zone (52 ha) and Agroforestry on 34 ha. Solar power pumping irrigation scheme at Murago wetland on 10 ha (Rugarama cell)
		Musenyi	Nyagihunika	Rugarama	
		Shyara	Gicaca	Gihari, Ngarama & Kavumu	
		Mareba	Bushenyi & Rugarama	Runyonza, Kagogo, Gasagara& Ruduha	Rehabilitation of lake Cyohoha North (115 ha) through removal of water hyacinth and other invasive species
6	Gasabo	Ndera	Masoro	-	Support to NUWEP project for the landscape restoration of Nyandungu wetland.
		Kimironko	Bibare	-	
	Kicukiro	Nyarugunga	Rwimbogo; Nonko	-	

Source: *Field visits and Key informants*

4.2. Description of project intervention sites

4.2.1. Kayonza intervention sites

4.2.1.1. Rwankwavu hill (Nyarunazi)

(a) Baseline description

The savannah on Rwankwavu hill (Nyarunazi) has been degraded due to several drivers including mining, grazing and collection of fuelwood and other wood products. Previous attempts to reforest the hill with Eucalyptus species have failed due to termites and harsh drought conditions (Figure 3).

The savannah was previously hosting a number of indigenous species such as Combretum species, Albizia sp., Acacia sp. and many other savannah species. However, now most of the trees have been cleared and the hill remains mainly with grassland and lantana species (Akateye!).

Figure 3. Satellite image of the hill to be restored by planting of indigenous tree species (July 2017)

Rwinkwavu hill has rocky soil but the foothill and the valleys have black loam soils which are fertile. The average farm size per household is around 0.5ha. About 90% of agriculture is rain fed and only 10% is irrigated for rice and vegetable cultivation. Major crops include: coffee, maize, beans, banana and rice. About 40% of households using chemical fertilizers. The most common fertilizers are Urea, DAP & NPK which are mainly used to fertilize maize, coffee, rice and vegetables.

There are about 20 trees on farms (agroforestry) in Rwinkwavu area. The major tree species planted on farms include Eucalyptus, *Grevillea robusta, Markhamia lutea, Mangifera indica, Senna spp., Ricinus communis. Citrus spp., Persea americana and Albizia spp.* The purpose of planting or retaining trees on farms include among others to get the

provisioning services such as timber, fuelwood, fruits and bean stakes. Major challenges in planting and maintaining trees on farm include lack of sufficient desired seedlings; long drought and heavy infestation of termites.

In Kayonza, many wetlands are used for agricultural purpose and at Rwinkwavu where farmers cultivate rice, tomatoes, vegetables and fruit trees. The erosion is moderate and farmers create erosion control ditches along which they plant trees and fodder grasses to check erosion and soil loss. On average, 60% of households around Rwinkwavu hill (Nyarunazi site) own cattle and mainly practice zero grazing because there are no grazing areas set aside for the village.

In terms of occurrences of harsh climate events, there are no landslides in the area but flooding is frequent in the valley particularly in April causing important damages. Heavy storms and winds are also frequent in March and April damaging houses with an increasing trend. Drought is the most critical hazard which affect agriculture in Eastern Province and people at Rwinkwavu have argued that drought period is becoming longer and longer over the years.

During focus group discussion (Photo 1), participants agreed that households leaving below poverty level in the area are around 12%. These households are generally in the category 1 of Ubudehe and are prioritised in getting support from the Government including sponsoring payment of health insurance. The major economic activities in the area are agriculture and livestock keeping. The main alternative source of income is mining which occupies around 20% of households in the area. A consolidated summary of results from fieldwork visits, focus group discussions and key informants is provided in Annexes 4 &5.

Photo 1: A picture with focus group participants at Rwinkwavu hill (just behind) (April 2019)

(b) Major objectives of the sub-project at Rwinkwavu hill

The global objective of the project is to restore the savannah ecosystem in order to increase resilience of local communities living adjacent to Rwinkwavu hill to the observed and anticipated effects of climate change. The restoration of savannah ecosystem at Rwinkwavu hill will be of regional importance because it will contribute to the regulation of climate in Rwanda and in neighbouring Western Tanzania and increase the availability of forest resources, improve agricultural productivity and hence increase food security (LDCFII/REMA & Kiyonza District, 2018).

The specific objectives are:

(i) To mobilize and sensitize the local population on the use of Ecosystem-based Adaptation (EbA) approach to restore degraded savannah and environmental and forest regulations in general.
(ii) Restoration of savannah ecosystem at Rwinkwavu hill by planting indigenous species on 200 ha.

4.2.1.2. Kibare lakeshore

(a) Baseline description

Lake Rwakibare (Kibare) is one of several lakes of Akagera complex and Akagera River. It is characterized by colluvial soils at the base of the valley. The water supply for this lake derives from Nyabarongo/Akagera river which then continues towards Lake Victoria. The lake Kibare is highly affected by human activities such as local market held on the lake, agriculture, cattle grazing, cutting of plants for animal feeding and construction purpose. Some invasive plants, especially the water lilies/hyacinth are major threat to the natural vegetation around the lake. Just on the lakeshore in Isangano cell, there is a local market held where the buying and selling of goods such as banana, cassava, maize, Irish potatoes, chicken and goats and services between businesses in Isangano cell and neighbouring western parts of Tanzania.

Lake Kibare looks always dirty due to the inflow of the Akagera river which passes through the northern part of the lake (Figure 4). However, the water of this lake is very important for the livelihoods of local communities for the fishing and farming activities taking place in and around the lake. According the people in the focus group, about 5% of the household in Kibare village practice fishing as alternative income generating activity. Furthermore, through the lake there is a flourishing exchange of goods with communities from neighbouring parts of Tanzania.

Figure 4. Satellite image of Kibare lakeshore protection band (May 2017)

Contrary to the instructions of the Environmental law of 2005 revised in 2018, Rwakibare lakeshore was not protected because agricultural activities were taking place even within the 50 m buffer protection band set by the law (Photos 2&3). Even market activities were taking place just on the lakeshore (Photos 4-6). A consolidated summary of biophysical and socio-economic characteristics gathered from fieldwork visits, focus group discussions and key informants at Lake Kibare (Rwakibare) and other project sites is provided in Annexes 4 & 5.

Photos 2&3. Farming &business in 50 m buffer zone of lake Kibare (June 2017)

Photos 4&5. Market place on Rwakibare (Kibare) lakeshore (June 2017)

Photo 6. Fishing facility at Rwakibare (Kibare) lakeshore (June 2017)

(b) Major objectives of the sub-projects in Ndego sector

There are three sub-projects in Ndego sector including the restoration of Kibare lakeshore; the construction of the selling point and storage hall (hangar) near Kibare lakeshore and the solar power irrigation scheme at Byimana cell.

The global objective of the restoration of Kibare lakeshore is to restore the lake Kibare ecosystem in order to increase resilience of local communities living adjacent to the lake to the observed and anticipated effects of climate change. The restoration project of Kabare lake will be of regional importance as the project interventions will contribute to the regulation of the river flow of Rwanda's hydrological system and that of western Tanzania. The project will likely increase the availability of aquatic resources including fish and thus increase food security in the region (LDCFII/REMA & Kiyonza District, 2017).

Specific objectives of the restoration project of the Kibare lakeshore include (LDCFII/REMA & Kiyonza District, 2017):

(i) To mobilize and train the local population on the use of Ecosystem-based Adaptation (EbA) approach to restore degraded lake ecosystems and environmental law in general;
(ii) Restoration of lake Kibare buffer zone on 80 ha with bamboo plantation and agroforestry trees;
(iii) Planting fruit trees on 32 km.

The construction of modern selling point and storage hall (hangar) near Kibare lakeshore will enable the relocation of the market place which was formerly located at Kibare lakeshore within its legal protection buffer zone (50 m). This intervention will also facilitate the restoration of the wetland ecosystem around the lake to increase resilience of local communities living in Ndego Sector to the observed and anticipated effects of climate change.

The solar pumping irrigation scheme project at Byimana on 15 ha will increase the resilience of affected local communities to drought as they will be able not only to farm during dry seasons but also increase agricultural productivity during normal cropping seasons and thus food security.

4.2.2. Kirehe intervention sites

4.2.2.1. Lake Mpanga (Rwampanga) (Nasho and Mushongi cells)

(a) Baseline description

Like lake Kibare (Rwakibare), the waters of lake Mpanga (Rwampanga) are also affected by Akagera river and look muddy even on the satellite image (Figure 5). The major economic activities are agriculture and livestock keeping but a few households do fishing in the lake. Some agroforestry trees have been planted on farms (e.g. Photo 7).

Figure 5. Satellite image of Rwampanga lakeshore (May 2017)

Photo 7. Mpanga agroforestry site (note the lake in the background) (June 2017)

(b) Major objectives of the sub-project at Mushongi Cell (Mpanga lakeshore)

The agroforestry intervention will take place along the lakeshore of lake Mpanga on an area of 250 ha in Mushongi cell, Mpanga Sector, Kirehe District. In addition to exotic agroforestry trees, indigenous and fruit tree species will be produced and distributed to farmers in project sites. The overall objective is the restoration of degraded savannah ecosystems in the area and the protection of the wetland along Mpanga lakeshore which will increase resilience of local communities to the observed and anticipated effects of climate change.

4.2.2.2. Ibanda-Makera

(a) Baseline description

Makera forest is a remnant forest which has remained almost intact despite pressure from farmers farming around it. Makera natural forest makes part of the complex of Ibanda-Makera made of two forests, Ibanda (a woodland savanna type located in the East) and Makera (a gallery forest located in the South-West) (Figure 6 and Photo 8). Makera forest is contiguous to the Akagera wetland associated to Akagera River in the South-East on the border with Tanzania.

Makera remnant forest hosts some typical gallery forest species. Dominant plant species include *Teclea nobilis, Bridellia micrantha, Rhus* divsp, *Grewia trichocarpa, Ficus thonningii, Ficus vallis-choudae, Acacia polyacantha, Dracaena afromontana, Markhamia lutea, Phoenix reclinata, Cyperus papyrus* (along the Akagera wetland), *Allophylus africanus, etc.*

A stream called Nyampongoroma crosses the forest and is source to water used by many local people. The papyrus swamp contributes to the reduction of water loss by evaporation. Local people obtain different goods from the Ibanda-Makera forest including firewood, medicinal plants, fodder, water. A consolidated summary of biophysical and socio-economic characteristics gathered from fieldwork visits, focus group discussions and key informants at Ibanda-Makera and lake Mpanga (Mushongi and Nasho Cells) and other project sites is provided in Annexes 4 & 5.

Figure 6. Satellite image of Ibanda-Makera savannah and forest (May 2017)

Photo 8. Ibanda-Makera site (note part of Makera trees and the savannah in the background) (June 2017)

(b) Major objectives of the sub-project at Ibanda-Makera site

The sub-project aims to restore degraded savannahs and forest ecosystems in Kirehe District using EbA approach to increase resilience of local communities to the observed and anticipated effects of climate change. The project interventions will be of regional importance because they will contribute to the regulation of climate and hydrological system in Rwanda and western Tanzania (LDCFII/REMA & Kirehe District, 2017).

The specific objectives include (LDCFII/REMA & Kirehe District, 2017):

(i) To mobilize and sensitize the local population on the use of EbA approach to restore degraded savannahs and forest ecosystems at Ibanda-Makera and on environmental policy and law in general;
(ii) Restoration of degraded savannahs and forests at Ibanda-Makera on 68 ha with indigenous species and on 20 ha with fruit trees.

4.2.3. Bugesera intervention sites

4.2.3.1. Murago wetland

(a) Baseline description

Part of Murago wetland is protected while another part is exploited by local communities for cultivation of rice and vegetables. The protected part of the wetland (Figure 7) is not well protected as it is regularly burnt and farmers do cultivate just beside even encroaching on the protected zone of the wetland (Photo 9). Farmers in the area cultivate mainly maize, rice, banana, beans, Ground nuts, Cassava and vegetables (onion, cabbage, tomatoes, etc.). About 60% of farmers use chemical fertilizers including mainly Urea, DAP & NPK.

Figure 7. Satellite image of Murago wetland (September 2017)

Photo 9. Farming takes place just on the edge of Murago wetland without any buffer zone (June 2017)

On the side where agroforestry interventions are planned (Rugarama Cell), there are about 18 trees on average on farms. Major species observed include *Grevillea robusta, Eucalyptus spp., Senna spp., Markhamia lutea, Mangifera indica, Persea americana* and *Calliandra sp.* The trees are planted on farms for different purposes including timber, fuelwood, fodder, fruits and erosion control.

The major economic activities are agriculture and livestock keeping (about 70% of households own cattle for milk and manure production) but some households also seek alternative sources of income from Business, fishing and casual labour. A consolidated summary of biophysical and socio-economic characteristics gathered from fieldwork visits, focus group discussions and key informants at Murago wetland and other project sites is provided in Annexes 4 &5.

(b) Major objectives of the sub-project at Murago wetland

The main objective of the project is to restore Murago wetland ecosystem to increase resilience of local communities living adjacent to the wetland to the observed and anticipated effects of climate change. The project is of regional importance because planned interventions will contribute to the regulation of the river flow of hydrological system in Rwanda and neighboring north eastern Burundi and increase the availability

of aquatic resources including fish and hence increase food security across country borders (LDCFII/REMA & Bugesera District, 2017)

The project specific objectives include (LDCFII/REMA & Bugesera District, 2017):

(i) To mobilize and sensitize the local population on the use of EbA approach to restore degraded wetland ecosystems and on environmental policy and law in general;
(ii) Restoration of Murago wetland on 52 ha;
(iii) Planting agroforestry trees on 34 ha
(iv) Solar power pumping irrigation scheme on 10 ha.

4.2.3.2. Lake Cyohoha North

(a) Baseline description

Lake Cyohoha North is located in Bugesera district ($2^0$15'0''; $30^0$7'59'') at about 1344 m above sea level. The Bugesera region is one the regions mostly impacted by rainfall fluctuations and prolonged droughts in the country. Lake Cyohoha North is near drying due not only to recurrent droughts but also to conversion of surrounding feeder wetlands (including part of Murago wetland) into farming. In fact, due to high population density and increasing demand for arable land, natural forests and savannahs have been cleared leading to severe erosion and siltation of the lake. Water quality has subsequently deteriorated due to eutrophication and the fish catch has dropped which affected negatively the nutrition and the livelihoods of local communities.

Probably due to increasing sedimentation, the lake has been invaded by water hyacinth and other invasive plant species (Figure 8 and Photos 10 & 11) which have considerably reduced its capacity for fish production. Yet, fishing is one of the major alternative sources of income in the area. The rehabilitation of the lake will likely increase fish catch and improve livelihoods and nutrition of local communities.

Figure 8. Satellite image of rehabilitation of Cyohoha North (March 2017)

Photos 10 & 11. Invasive plant species in Cyohoha North Lake need to be removed (June 2017)

(b) Historical records of water levels of Lake Cyohoha North

There are no recent data on historical records of water levels of lake Cyohoha North. The only available data were reported by MINITERE (2005) for the period 1974 to1981 at Gitagata station (Figure 9). Interestingly, in this report, it was revealed that the water levels of the lake are directly related to the water levels of the Akanyaru river. Indeed, as it can be observed in Figure 10, Lake Cyohoha North loses water until Akanyaru river water levels reaches 2.9 m height beyond which the lake start refilling up.

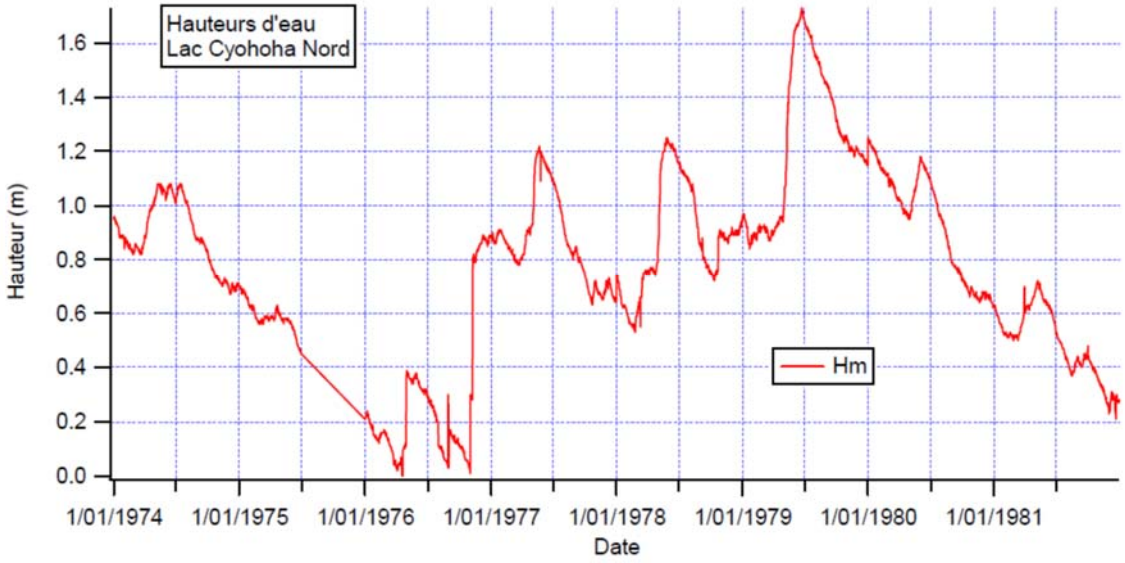

Figure 9: Water levels of Lake Cyohoha North at Gitagata station (MINITERE, 2005)

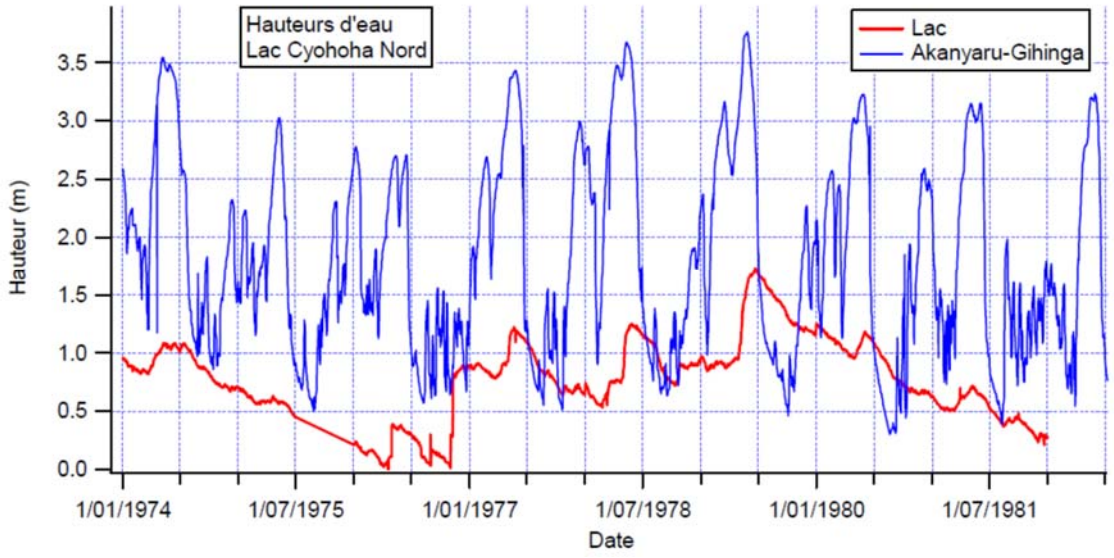

Figure 10: Water levels of Lake Cyohoha North and Akanyaru river at Gitagata and Gihinga stations respectively (MINITERE, 2005)

(c) Major objectives of the sub-projects at Cyohoha North

The project objective is to restore the lake Cyohoha North ecosystem using EbA approach to increase resilience of local communities living adjacent to the lake to the observed and anticipated effects of climate change. Project interventions are of regional importance because they will contribute to the regulation of the river flow of hydrological system in Rwanda and neighboring north eastern Burundi and increase the availability of aquatic resources including fish and hence increase food security across country borders (LDCFII/REMA & Bugesera District, 2017)

The project specific objectives include (LDCFII/REMA & Bugesera District, 2017):

(i) To mobilize and sensitize the local population on the use of EbA approach to restore degraded wetland ecosystems and on environmental policy and law in general;
(ii) Restoration of Cyohoha North by removing invasive plants including water hyacinth on 115 ha;
(iii) Making organic compost using the water hyacinth removed from the lake.

4.2.4. Musanze intervention site

(a) Baseline description

Gakoro green village will be built by LDCF II to host forty-six households which will be translocated from Ruhondo Islands (Figure 11). The households staying in these Islands are vulnerable to climate hazards including frequent storms and heavy winds, poor Water transport to the island (no boats with engine) and increasing population density on with the risk of exceeding the carrying capacity of the islands. The Ruhondo islands are densely populated and the average farming area per household was estimated to be only 0.3 ha. Farmers don't use chemical fertilizers and agricultural production is low. Fishing is one of the important alternative sources of income and it occupies about 7% of households. A consolidated summary of biophysical and socio-economic characteristics gathered from fieldwork visits, focus group discussions and key informants at Ruhondo islands and other project sites is provided in Annexes 4 & 5.

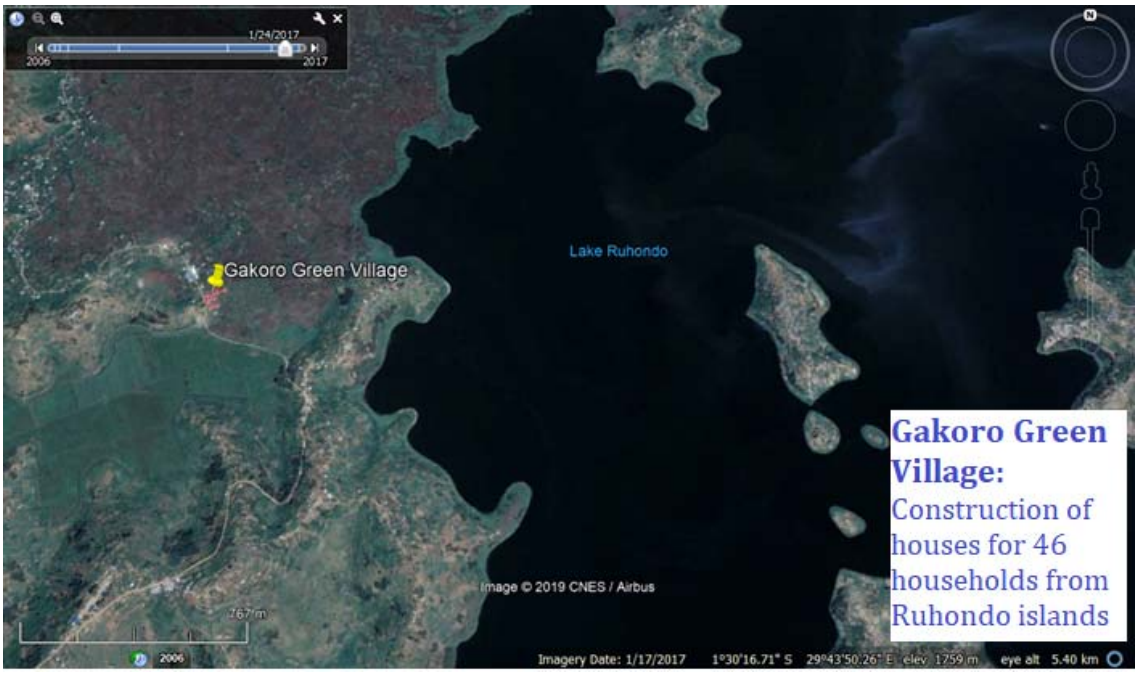

Figure 11. Satellite image of Ruhondo islands and location of Gakoro green village (January 2017)

Photo 12. Focus group participants after discussion at Ruhondo lakeshore (Note one of the Ruhondo islands in the background) (April 2019)

(b) Major objectives of the sub-project at Gakoro cell (Musanze district)

The project aims to construct 11 houses (4 in 1), 1 house (2 in 1), 12 collected Biogas systems (canvas sheets) with elevated biolatrines, 46 rainwater tanks, 12 collected cowsheds and 46 cows supply for the households that will be relocated from Lake Ruhondo islands to Gakoro Green Village, Gacaca sector, Musanze district. The ultimate objective is to improve so-economic conditions of the relocated families, make the village more environmental friendly and restore the Rohondo islands and buffer zone.

4.2.5. Ngororero intervention sites

4.2.5.1. Sanza natural forest

(a) Baseline description

Sanza is a natural remnant forest located at around 2000m of altitude in Ngororero district, Muhororo sector, Sanza Cell. The forest cover around 20 hectares. Sanza forest also called Nyabitukuru natural forest was much degraded by anthropogenic activities including illegal tree cutting, farming (encroachment), grazing and mining. The most devastated area by illegal mining activities (mainly cassiterite and coltan) is the central part of the forest (Figure 12). The most common tree species are *Syzygium parvifolium, Macaranga kilimandscharica*, *Pittosporum mildbraedii, Myrica kandtiana, Dodonea viscosa, Psychotria mahonii, Polyscias fulva, Neoboutonia macrocalyx, Myrianthus holstii*, *Galiniera saxifraga, Rhus vulgaris* and *Albizia gummifera* (close to the river). The exotic species such as *Alnus glutinosa, Pinus patula, Grevillea robusta* and *Eucalyptus div. sp.* were planted in the buffer zone. The animal diversity is very low (Bizuru et al. 2011).

The local communities in Sanza Cell rely on agriculture and livestock for their livelihood. But the high density of the population (around 500 people/km^2) coupled with land scarcity, steep slopes exacerbated by poor farming practices expose the area to severe impacts of climate change such as soil erosion and landslides. This has led to the deforestation and degradation of Sanza natural forest by local communities in search for agricultural land, pasture and firewood and illegal mining activities (Figure 12) as alternative source of income. A consolidated summary of biophysical and socio-economic characteristics gathered from fieldwork visits, focus group discussions and key informants at Sanza Natural Forest and other project sites is provided in Annexes 4 & 5.

Figure 12. Satellite image of Sanza Natural forest (note the degraded mining site inside the forest) (July 2017)

(b) Major objectives of the sub-project at Sanza natural forest

The main of objective of the project is to restore the degraded Sanza natural forest ecosystem using EbA approach in order to increase resilience of local communities to the observed and anticipated effects of climate change. The project interventions will contribute not only to preserving the rich natural biodiversity in this forest but also to the regulation of climate and hydrological system in Rwanda. In fact, a number of streams from the forest flow into Satinsyi river which contours the forest downhill.

The specific objectives include (LDCFII/REMA & Ngororero District, 2017):

(i) To mobilize and sensitize the local population on the use of EbA approach to restore degraded forest ecosystems and on Rwanda environmental policy and law in general;
(ii) Restoration of degraded forest areas by rehabilitating illegal mining sites, enrichment of bare spaces in the forest using indigenous species, protection and guarding of Sanza natural forest.

4.2.5.2. Nyiramuhondi watershed and Gihe forest

(a) Baseline description

Ngororero District is among the districts mostly affected by the impacts of climate change such as landslides, flooding and high soil erosion which directly impact on agricultural

production in the district. Nyiramuhondi watershed is located in Nyange and Torero cells. The watershed is characterised by steep slopes which are highly vulnerable to soil erosion (Figure 13 and Photo 13) and terracing could be the best option to reduce soil erosion and maintain soil fertility longer. There is also no buffer protection band along the river bank (Photo 14). Gihe forest is located in Nyiramuhondi watershed and has been excessively degraded (Photo 15) through repeated harvesting.

According to participants in the focus group discussion, soils of Nyiramuhondi are infertile brown and clayey soils. The average farm size per household is very small estimated to about 0.4 ha. Agriculture is 100% rain fed and the major crops are maize, Sweet potatoes, banana, coffee, soya and sugar cane. About 80% of the households use chemical fertilizers including Urea, DAP & NPK to fertilize mainly maize, coffee and soya crops.

The number of trees on farms (agroforestry) is around 16 trees per ha. The main tree species planted on farm include Eucalyptus, Persea Americana, *Ficus thonningii, Markhamia lutea, Calliandra* and *Vernonia amydalina*. The trees are mainly planted on farms for timber, fuelwood, bean stakes, fruits, medicines and erosion control. However, farmers face challenges in planting and maintaining trees on farms including shortage of land and lack of desired seedlings. A consolidated summary of biophysical and socio-economic characteristics gathered from fieldwork visits, focus group discussions and key informants at Nyiramuhondi watershed and other project sites is provided in Annexes 4&5.

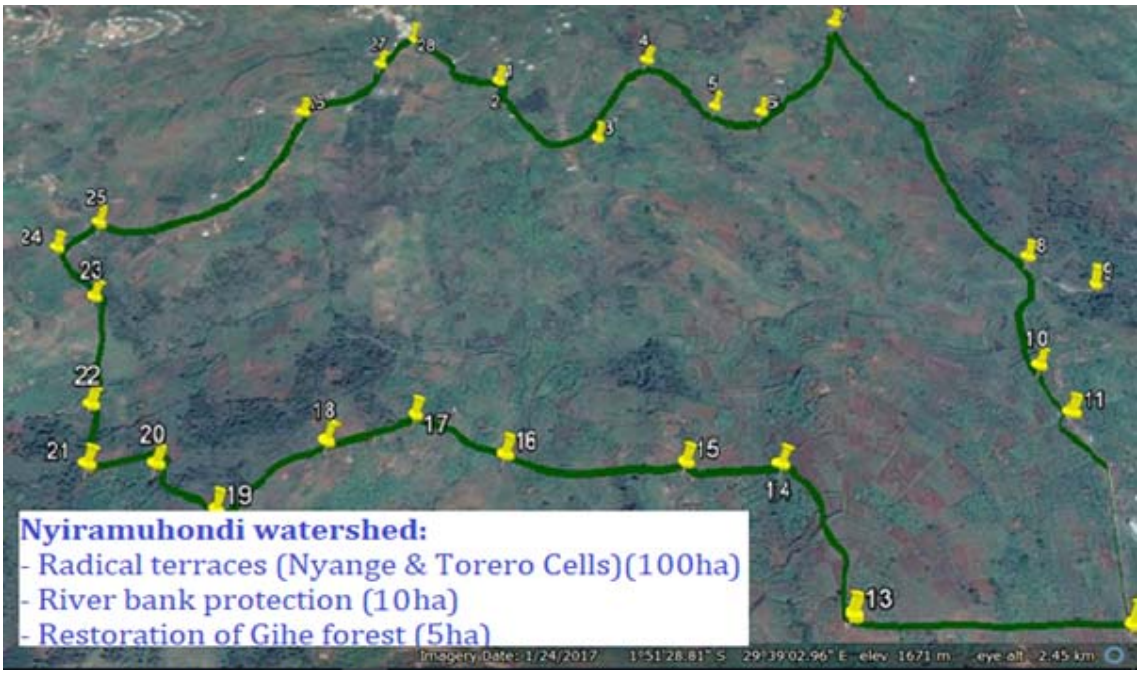

Figure 13. Satellite image of Nyiramuhondi watershed (January 2017)

Photo 13. Site for radical terracing, Nyiramuhondi watershed (June 2017)

Photo 14. Nyiramuhondi riverbank is not protected (June 2017)

Photo 15. Gihe forest to be rehabilitated by LDCF II project (June 2017)

(c) Soil erosion and major objectives of the sub-project at Nyaramuhondi watershed

One of the major challenges facing Nyiramuhondi watershed is the degradation of land due to soil erosion. The causes of soil erosion in the watershed are mainly the hilly topography with steep slopes coupled with unsustainable land use practices including artisanal mining, traditional farming systems (over-cultivation on steep slopes without appropriate soil conservation measures) and depletion of tree or forest cover. The relief and the unsustainable land use systems in a region with relatively high annual rainfall (1500 mm) exacerbate runoff and sheet erosion within the catchment leading to severe rill, gully and stream bank erosion and sedimentation.

In view of the land degradation in Nyiramuhondi watershed, Ngororero sector, Ngororero district, the overall objective of the sub-project is to restore the watershed using EbA approach to increase resilience of local communities living adjacent to Nyiramuhondi river to the observed and anticipated effects of climate change. This project will strongly reduce the amount of sediments and pollution carried by erosion and sustainably protect Nyiramuhondi river ecosystem. This will enhance critical ecosystem services such as trapping and filtering sediments, flood mitigation, water and carbon sequestration and replenish rivers and streams during dry seasons. The project interventions will therefore contribute to the regulation of the river flow in the hydrological system of Rwanda and increase the adaptability of the region on climate change by reducing erosion from surrounding catchments (LDCFII/REMA & Ngororero District, 2017).

The specific objectives include (LDCFII/REMA & Ngororero District, 2017):

(i) To mobilize and sensitize the local population on the use of EbA approach to rehabilitate Nyiramuhondi watershed and on Rwanda environmental policy and law in general;
(ii) Rehabilitation of Nyiramuhondi river banks on 10 ha and creation of radical terraces on 100 ha;
(iii) Protection of Nyiramuhondi riverbanks with bamboo plantation on 10 ha;
(iv) Rehabilitation of Gihe forest on 5 ha.

4.2.6. Gasabo and Kicukiro intervention site

(a) Baseline description

The LDCF II project will support NUWEP project in landscape restoration of Nyandungu wetland on an area of 130 ha (Figure 14). The wetland is located in three sectors of Gasabo and Kicukiro Districts (Kimironko, Ndera and Nyarugunga sectors) of Kigali City (Table 3). Nyandungu wetland is an urban protected wetland which is in the process of being landscaped to transform it into an ecotourism park with potential lucrative recreational activities. NUWEP has contracted a landscaping company to implement the works.

Figure 14. Satellite image of Nyandungu wetland (October 2017)

Currently, Nyandungu wetland vegetation is composed of indigenous species such as *Acacia spp.* (Photo 16) and a variety of exotic tree and bamboo species. In addition to landscaping, the project also intends to introduce many other species mainly indigenous species (native species) so that the park may serve multipurpose functions including scientific, touristic and cultural services. The swampy and stream areas are largely covered with *Cyperus papyrus* (Urufunzo); *Cyperus latifolius* (Urukangaga), *Phragmites mauritianus* (Imiseke), *Typha dominguesnsis* (Umuberanya). In a study by REMA in 2015, the land use within Nyandungu wetland was estimated as shown in Table 6.

Table 6: Land cover of Nyandungu wetland in 2015

Land cover type	**Area (ha)**	**Percentage (%)**
Swamp and streams	55.0	41.0%
Natural & fallow vegetation	56.5	42.2%
Human activities (crops and soil extraction)	19.2	14.3%
Access roads, paths	3.4	2.5%
Total	**134.1**	**100**

Photo 16. Part of the current vegetation of Nyandungu wetland (April 2019)

(b) Major objectives of the sub-project at Nyandungu wetland

The landscaping and restoration project of Nyandungu wetland will not only provide social and economic benefits to communities around the wetland and Kigali city but also support innovative approaches to restore and conserve wetland ecosystems on 130 Ha, promote the sustainable management of natural resources and support livelihood diversification to enhance incomes for local communities.

The project has four outputs (REMA, 2015):

(i) Biodiversity conservation through introduction of native tree species and terrestrial habitat restoration. The aim is to conserve an area of land planted with native tree species and to introduce measures to facilitate revenue generation.
(ii) Biodiversity conservation through aquatic habitat creation and restoration. The aim is to use habitat restoration and creation to demonstrate that wetlands can abate flooding and pollution; and introduce at the same time facilities required for revenue generation
(iii) Dissemination of project lessons learned by making sure that the valuable information gathered during the project gets a wider audience.
(iv) Employment as a result of the project by creating permanent green jobs in the eco-tourism park (in total about 70 green job will be created by the project).

5. INSTITUTIONAL AND POLICY FRAMEWORK

5.1. Institutional arrangements governing climate change in Rwanda

Rwanda has a comprehensive and progressive institutional framework and has established agencies to work cross-sectoral to support natural resource management, notably REMA and the Rwanda Water and Forests Authority (RWFA) within the Ministry of Environment (MOE). In addition, a National Fund for Environment and Climate Change (FONERWA) has been established to address cross- sector financing needs. Rwanda also recognizes the importance of engaging multiple stakeholders and has established mechanisms including regular cross-sectoral planning meetings and the Joint Action Development Forums (JADF), consultative platforms used for promoting cooperation between the private sector, civil society and the public sector. Table 7 shows the key institutions relevant to the climate change governance in Rwanda.

The National Climate Change Committee at national level was established to develop the Third National Communication (TNC) and various relevant institutions nominated their representatives to be members of the Committee and those already having representatives in TNC Working Groups were automatically Members of the National Committee on Climate Change (NCCC).

Table 1. List of institutions relevant to climate change governance

Institution	Description
MoE	Overall formulation and oversight of Policies and strategies on the environment and climate change; Coordination of forest management and agro-forestry development; land use planning
REMA	It has all activities related to climate change in its mandate
Meteo Rwanda	Provision of accurate and timely weather and climate information
MINAGRI	Development and management of suitable programmes of transformation and modernization of agriculture and livestock to ensure food security and to contribute to the national economy
MININFRA	Energy and urban planning management policy development
RTDA	Implement activities related to transport
RHA	Implementation of the national housing, urbanization, construction and Government assets management policies
MINEDUC	Overall formulation and oversight of Policies and strategies related to education, including environment education, in curriculum and research institutions
MoH	Development of environmental health policies and strategies
MINECOFIN	Financing of climate change programs and projects

RSB	Examining compliance with quality standards responding to sound environment and climate change requirements
REG	Implementation of projects providing environmental and climate friendly energy (renewable energy); energy supply that supports the development of green industry and services
WASAC	Management of water and sanitation services in Rwanda, through continuous innovation.
MINALOC	Facilitation of policy implementation at local level
MINEMA	Development of policies and strategies for adaptation to disasters due to climate change

5.2. Policy framework for climate change and natural resource management in Rwanda

The Green Growth and Climate Resilience Strategy (GGCRS) provides the country's roadmap for becoming a climate resilient, low carbon economy by 2050. The GGCRS developed in 2011 is central in directing the achievement of Rwanda's development targets through low carbon and climate resilient pathways and has high-level commitment from the Government of Rwanda (GoR). GGCRS' strategic objectives include the achievement of sustainable land use and water resource management and reduced vulnerability to climate change. The strategy contains 14 Programmes of Action towards its achievement, including Sustainable Land Use Management and Planning and Sustainable forestry, agroforestry and biomass energy. The GoR has successfully mainstreamed climate change into its national strategies and many of its sectoral strategies. Environment and climate change issues are also included in the Budget Call Circular (BCC). However, limited capacity to tackling climate change issues particularly in productive sectors such as agriculture reduces national capacity to adopt and implement the GGCRS.

Through the climate change project under REMA, Rwanda formulated its Initial National Communication in 2005, the second National Communication in 2012 and the third National Communication in 2018.

Rwanda's Intended Nationally Determined Contribution (INDC) includes mainstreaming agro ecology techniques (agroforestry, kitchen gardens, nutrient recycling, and water conservation); organic waste composting; mainstreaming sustainable pest management techniques; improving soil conservation and land husbandry (terraces and agroforestry); increasing irrigation and water management including rainwater harvesting; afforestation through enhanced germplasm and technical practices in planting and post-planting processes; Improved Forest Management for degraded forest resources; and sustainable use of biomass fuels through the increased uptake of improved cookstoves

and biogas. The major national strategies for development, climate change and environment include:

(1) The National Strategy for Transformation 2017 – 2024 (NST 1)

In the medium-term, the National Strategy for Transformation, NST-1/Seven Years Government Program (2017-2024) is the latest strategy which sets the priority for a Green Economy approach in its Economic Transformation Pillar that promote "Sustainable Management of Natural Resources and Environment to Transition Rwanda towards a Green Economy". Moreover, Environment and Climate Change were highlighted in NST1 as cross-cutting areas of policy concern which can be positively impacted by a range of development activities with priority given to agriculture, urbanization, industries and energy.

(2) Vision 2020 Development Programme (2000 & revised in 2012)

The VISION 2020 seeks to fundamentally transform Rwanda into a middle-income country by the year 2020. This will require achieving annual per capita income of US$ 900 (US$ 290 in 2000), a poverty rate of 30% (64% in 2000) and an average life expectance of 55 years. The six pillars of Vision 2020 are interwoven with three cross-cutting issues including protection of environment and sustainable natural resource management.

(3) National Adaptation Programme of Action (NAPA) (2006)

The NAPA articulates Rwanda's strategy to reduce vulnerability to climate change particularly from the main climatic hazards including intense rainfall, flash flooding, landslides, drought and low flows, extreme temperatures and heat waves. The six NAPA priorities include:

(i) Integrated Water Resource Management;
(ii) Setting up information systems to early warning of hydro-agro meteorological system and rapid intervention mechanisms;
(iii) Promotion of non-agricultural income generating activities;
(iv) Promotion of intensive agro-pastoral activities;
(v) Introduction of species resisting to environmental conditions; and
(vi) Development of firewood alternative sources of energy.

(4) National Strategy for Climate Change and Low-Carbon Development "Green Growth and Climate Resilience" (GGCRS) (2011)

The Strategy developed in 2011aims to guide the process of mainstreaming climate resilience and low carbon development into key sectors of the economy. It provides a strategic framework which includes

- A vision for 2050;
- Guiding principles (Economic growth and poverty reduction; Sustainability of the environment and Natural resources; welfare and wellness of all citizens in a growing population; good regional and global citizenship; gender equality and equity);
- Strategic objectives;
- 14 programmes of action (1. Sustainable intensification of small-scale farming; 2. Agricultural diversity of markets; 3. Sustainable land use management; 4. Integrated water resource management; 5. Low carbon energy grid; 6. Small scale energy access in rural areas; 7. Disaster management; 8. Green Industry and private sector development; 9. Climate compatible mining; 10. Resilient transport systems;11. Low carbon urban system; 12. Ecotourism, conservation and payment of ecosystem services; 13. Sustainable forestry, agroforestry and biomass; and 14. Climate data and predictions),
- Enabling pillars (1. Institutional arrangements; 2. Finance; 3. Capacity building and knowledge management, 4. Technology innovation and infrastructure; 5. Integrated planning and data management) and
- A roadmap for implementation.

5.3. Knowledge gaps and capacity needs in EbA approaches

The government and other institutions[1] at national, subnational and local levels have a central role for the promotion and mainstreaming of EbA in different sectors and territorial scales to respond to growing climate stresses and risks. Despite the considerable progress made towards building governance systems for climate change adaptation in Rwanda, EbA is a relatively new approach and limited evidence exist in the country. There are some knowledge needs and gaps that constrain the effective formulation and implementation of climate change and in particular, EbA-related policies and strategies. The needs and knowledge gaps can be grouped in four key knowledge aspects as presented in table 8 below.

[1] For the purposes of this report, it is considered that institutions are the formal entities designed to perform a set of functions related to decision making and implementation. They can be classified according to their status or function (e.g. private, public, nongovernmental, bilateral, multilateral, humanitarian, financial, etc.).

Table 8: Knowledge gaps and capacity needs in EbA approaches

Key Knowledge aspects	Knowledge gaps and capacity needs
Climate information and risk assessment	Climate data and information management for addressing climate risks and advancing adaptation. Timely, reliable and accurate climate and ecosystems data and uncoordinated information management fails to effectively inform policy planning. Hence, capacity needs for: (1) A comprehensive grasp of the local implications that climate change has on the human and natural systems (2) Knowledge and experience regarding the use of methodologies for conducting climate risks and vulnerability assessment
Coordination and partnering/networking:	Level of engagement with stakeholders and partners for adaptation initiatives.
Technical planning and implementation	Climate finance sectoral allocation and mobilization. Designing adaptation strategies with EbA approach; Assessing the costs and benefits of EbA measures to generate evidence for the effectiveness of the approach.
M&E of adaptation process and enhanced climate resilience:	Need to report performance on adaptation through M&E framework adequate for EbA. Monitoring and evaluation of EbA measures is a challenge and impedes learning and ascertaining best practices.

6. VALIDATION OF PROJECT TARGETS AND INDICATORS

LDCF II project indicators and targets for each outcome and output based on the adaptation results to be generated were reviewed and revised to keep only those that are SMART. Table 9 presents the original and recommended project indicators, baselines and targets and related explanation whether changed or kept or modified.

Table 9. Original and recommended project indicators, baselines, and targets

	Original	**Recommended formulation**	**Explanation**
	Project objective: "To increase capacity of Rwandan authorities and local communities to adapt to climate change by implementing Ecosystem-based Adaptation (EbA) interventions in forests, savannas and wetlands"		
Indicator	1. Degree to which capacity of targeted government institutions is strengthened at national and sub-national levels to identify, prioritize, implement, monitor and assess effectiveness of EbA interventions.	1. Degree to which capacity of targeted government institutions is strengthened at national and sub-national levels to identify, prioritize, implement, monitor and assess effectiveness of EbA interventions.	The original indicator was not changed

	Original	**Recommended formulation**	**Explanation**
Baseline	1. Current estimated level of capacity to identify, prioritize, implement, monitor and assess effectiveness of EbA interventions is 3. Institutions have increasing capacity to monitor and identify climate risks. They are also able to design, budget and implement restoration interventions but not EbA interventions. Ecosystem restoration is prioritised by national institutions but not EbA. Therefore, EbA interventions are not currently implemented. Baseline study to be conducted at the project inception stage. Quantitative assessment of the baseline for this indicator will be conducted at inception stage.	1. Current estimated level of capacity to identify, prioritize, implement, monitor and assess effectiveness of EbA interventions is 3. Institutions have increasing capacity to monitor and identify climate risks. They are also able to design, budget and implement restoration interventions but not EbA interventions. Ecosystem restoration is prioritised by national institutions but not EbA. Therefore, EbA interventions are not currently implemented. A "*Gap analysis study on EbA*" is currently being conducted by EbA consultant to determine the baseline value for each institution.	
Target	1. Increase of at least 4 points in the capacity score of each institution. (Max 10, Min 0)	1. Increase of at least 4 points in the capacity score of each institution (Max 10, Min 0)	
Indicator	2. Number of individuals benefitting directly from project interventions disaggregated by gender.	2. Number of individuals benefitting directly from project interventions disaggregated by gender.	The original indicator was not changed
Baseline	2. Zero	2. Zero	
Target	2. At least 2,800 (to be validated at inception) including 40% of women.	2. At least 2,800 including 40% of women.	

	Original	**Recommended formulation**	**Explanation**
	Component 1: National and local institutional capacity development for the use of an EbA approach		
	Outcome 1: National and local authorities have increased capacity to plan and implement EbA interventions		
Indicator	1.1. A National Steering Committee (NSC) mobilised as a platform to promote large-scale EbA programmes in Rwanda and capacitated to plan large-scale EbA interventions (disaggregated by gender).	1.1. A National Steering Committee (NSC) mobilized as a platform to promote large-scale EbA programmes in Rwanda and capacitated to plan large-scale EbA interventions (disaggregated by gender).	The original indicator was not changed but the target has been revised to 90% instead of 50% of NSC members.
Baseline	1.1. TOR for the National Steering Committee (NSC) has been developed but no meetings of NSC have been held.	1.1. TOR for the National Steering Committee (NSC) has been developed but no trainings of NSC have been held.	
Target	1.1. NSC is mobilized under REMA and has held at least 2 meetings. At least 50% of members (of which at least 40% women) have been trained on EbA.	1.1. At least 90% of the participants (to the NSC members (of which at least 40% women) have been trained on EbA.	
Indicator	1.2. Number of local government officials, environmental committee members and local community representatives with capacity to plan, budget and implement EbA interventions (disaggregated by gender).	1.2. Number of local government officials, environmental committee members and local community representatives trained to plan, budget and implement EbA interventions (disaggregated by gender).	The original indicator was slightly modified replacing the word “capacity” by “trained”.

	Original	Recommended formulation	Explanation
Baseline	1.2. Rwanda has recently implemented a number of national strategies, policies and plans for ecosystem restoration but no local government officials, environmental committee members or local community representatives have the capacity yet to plan, budget and implement EbA interventions. A more quantitative assessment of this indicator will be made at inception phase.	1.2. Rwanda has recently implemented a number of national strategies, policies and plans for ecosystem restoration but no local government officials, environmental committee members or local community representatives have the capacity yet to plan, budget and implement EbA interventions. A more quantitative assessment of this indicator will be made at inception phase.	
Target	1.2. By project end point, at least: i) 80 local government officials; ii) 110 environmental committee members including 15 members at the provincial level, 25 members at the district level, 30 members at the sectoral level and 40 members at the cell level; and iii) 80 local community representatives have capacity to plan, budget and implement EbA interventions (of which 50% of women).	1.2. By project end point, at least: i) 80 local government officials; ii) 110 environmental committee members including 15 members at the provincial level, 25 members at the district level, 30 members at the sectoral level and 40 members at the cell level; and iii) 80 local community representatives have been trained to plan, budget and implement EbA interventions (of which 50% of women).	
Indicator	1.3. Number of documents and technical EbA guidelines developed and disseminated to environmental committees and local authorities through the climate change adaptation portal.	1.3. Number of documents and technical EbA guidelines developed and disseminated to environmental committees and local authorities through the climate change adaptation portal.	The original indicator was not changed but the baseline was rephrased to reflect that LDCF I has a webpage on the Rwanda CC portal and the target now omits the mid-point target.
Baseline	1.3. CC portal has already been created. A webpage is currently being developed on the portal for the LDCF1 project. This project will extend the role of this website through compiling the information of the project as well as other adaptation projects on a national scale.	1.3. CC portal has already been created. A webpage has been developed on the portal for the LDCF1 project. This project will extend the role of this website through compiling the information of the project as well as other adaptation projects on a national scale.	

	Original	Recommended formulation	Explanation
Target	1.3. By project mid-point, at least 2 technical EbA guidelines developed; by project end-point, at least 3 technical EbA guidelines developed.	1.3. By project end-point, at least 3 technical EbA guidelines developed.	
Indicator	1.4. Number of educational resources on EbA developed by the project for communities living near project sites to increase awareness on EbA and integrate EbA in national curricula at primary, secondary and university level and submitted to to MINEDUC and other relevant educational institutions for validation.	1.4. Number of educational resources on EbA developed by the project for communities living near project sites to increase awareness on EbA and support new competence based curriculum at primary, secondary and university levels to address adaptation to climate change using EbA	The original indicator was reformulated to be more specific on purpose. The end point target was also revised to be more realistic.
Baseline	1.4. Zero	1.4. Zero	
Target	1.4. By end point at least 3 proposed revisions to school and university curricula to integrate EbA, 4 awareness campaigns on EbA targeting local communities, and 3 school-based EbA projects have been developed and submitted to MINEDUC and other relevant educational institutions for validation.	1.4. By end point at least one training manual to support new competence based curriculum at primary and secondary developed and one green campus guidelines to integrate EbA Developed, 4 awareness campaigns on EbA targeting local communities and National Curriculum development center staff.	
Indicator	1.5. Number of tools (research forum and data storage system) developed to disseminate scientific results and other knowledge on EbA and to promote long-term production of evidence base on EbA.	1.5. Number of master ‘s theses on EbA in Rwanda produced and validated at research forum and university level	The original indicator was reformulated and end project baseline and targets were adjusted.
Baseline	1.5. No research forum and data storage system currently exist.	1.5. No scientific studies on EbA in Rwanda published.	

	Original	Recommended formulation	Explanation
Target	1.5. By end-point, at least 1 research forum and 1 data storage system developed for the dissemination of scientific results and other knowledge on EbA.	1.5. At least 6 theses on EbA produced and validated at university level	
	Component 2: Policies, strategies and plans for adaptation to climate change		
	Outcome 2: Sectoral and local policies, strategies and plans strengthened to promote the restoration and management of degraded ecosystems for EbA.		
Indicator	2.1. Number of policy revisions proposed for cross-sectoral, sectoral and local policies, strategies and plans to incorporate EbA, and submitted to government for validation.	2.1. Number of policy revisions proposed for cross-sectoral, sectoral and local policies, strategies and plans to incorporate EbA, and validated by the government.	The original indicator was slightly reformulated and target adjusted to be more realistic.
Baseline	2.1. The majority of cross-sectoral, sectoral and local policies, strategies and plans promote ecosystem restoration. However, they do not promote EbA.	2.1. The majority of cross-sectoral, sectoral and local policies, strategies and plans promote ecosystem restoration. However, they do not promote EbA.	
Target	2.1. At least 9 policy revisions proposed for cross-sectoral, sectoral and local policies, strategies or plans to incorporate EbA.	2.1. At least 6 policy recommendations proposed and validated for cross-sectoral, sectoral and local policies, strategies or plans to incorporate EbA.	
Indicator	2.2. Number of upscaling strategies developed to promote EbA based on project interventions.	2.2. Number of upscaling strategies developed to promote EbA based on project interventions.	The original indicator was not changed.
Baseline	2.2. No upscaling strategy for best adaptation practices in Rwanda developed to date.	2.2. No up scaling strategy for best adaptation practices in Rwanda developed to date.	
Target	2.2. 1 national upscaling strategy developed.	2.2. National up scaling strategy developed.	

	Original	Recommended formulation	Explanation
	Component 3: EbA interventions that reduce vulnerability and restore natural capital		
	Outcome 3: EbA implemented by local communities to restore degraded ecosystems in forest, wetland and savannah ecosystems and establish climate resilient livelihoods.		
Indicator	3.1. Number of individuals implementing climate-resilient agriculture practices including agroforestry in the project intervention sites.	3.1. Number of households implementing climate-resilient agriculture practices including agroforestry in the project intervention sites.	The original indicator was slightly modified to replace the word "individuals" by "households" and the baseline and target were also modified to accommodate baseline survey results
Baseline	3.1. Zero	3.1. Households have on average between 14 and 22 trees on farm in project intervention sites.	
Target	3.1. At least 500 individuals implementing climate-resilient agriculture practices including agroforestry in the project intervention sites.	3.1. At least 500 households implementing climate-resilient agriculture practices including agroforestry in the project intervention sites. Beneficiary households have on average 30 trees on farm.	
Indicator	3.2. Number of hectares of wetlands restored with climate-resilient species in Bugesera, Gasabo and Ngororero.	3.2. Number of hectares of wetlands/Lakes restored with climate-resilient species in Bugesera, Gasabo, Kicukiro, Kayonza, Kirehe and Ngororero.	The original indicator was modified to change rangelands to wetland or lakes and to include two more districts (Kicukiro for Nyandungu wetland
Baseline	3.2. Zero	3.2. Zero	

	Original	Recommended formulation	Explanation
Target	3.2. At least 190 ha of rangelands restored with climate-resilient species.	3.2. At least 190 ha of wetlands or lakes restored with climate-resilient species	and Kirehe for Mpanga and Ibanda-Makera)
Indicator	3.3. Number of hectares of forest restored with climate-resilient species in Sanza	3.3. Number of hectares of forest restored with climate-resilient species	The original indicator was slightly modified to remove the word "Sanza"
Baseline	3.3. Zero	3.3. Zero	
Target	3.3. 20 hectares restored with climate-resilient species.	3.3. 20 hectares restored with climate-resilient species	
Indicator	3.4. Number of hectares of savanna restored with indigenous, climate-resilient species in Isangano.	3.4. Number of hectares of savannah restored with climate-resilient species.	The original indicator was slightly modified to remove the word "Isangano"
Baseline	3.4. Zero	3.4. Zero	
Target	3.4. 300 hectares restored using primarily indigenous, climate-resilient species.	3.4. 300 hectares restored using climate-resilient species	
Indicator	3.5. Number of individuals receiving training, equipment and technical support to adopt climate-resilient livelihoods in the project intervention sites.	3.5. Number of individuals receiving training, equipment and technical support to adopt climate-resilient livelihoods in the project intervention sites.	The original indicator was not changed but two more targets were added to it to reflect new

	Original	**Recommended formulation**	**Explanation**
Baseline	3.5. Zero	3.5.1. Zero 3.5.2. 66 Household benefited in climate change resilient houses under IDP model villages by LDCF I project. 3.5.3. Zero	interventions not included in the original project document including Gakoro green village and solar power irrigation facilities at Ndego and Mareba sectors.
Targets	3.5. At least 120 individuals, of which at least 40% women, have received training, equipment and technical support to adopt climate-resilient livelihoods in the project intervention sites.	3.5.1. At least 120 individuals, of which at least 40% women, have received training, equipment and technical support to adopt climate-resilient livelihoods in the project intervention sites 3.5.2. At least 46 additional Households benefited through climate change resilient houses with installation of renewable energy technologies such as biogas at Gakoro Green village. 3.5.3. Installation of Solar power irrigation pumps at Byimana cell (Ndego sector) and Rugarama cell (Murago wetland – Mareba sector)	

7. UPDATED RESULTS FRAMEWORK

After screening of original indicators, targets and baseline, the updated results framework for the LDCF II project is compiled in Table 10.

Table 10. LDCF II Updated results framework

Indicator	Baseline	Targets	Means of verification
Project objective: "To increase capacity of Rwandan authorities and local communities to adapt to climate change by implementing Ecosystem-based Adaptation (EbA) interventions in forests, savannahs and wetlands**"**			
1. Degree to which capacity of targeted government institutions is strengthened at national and sub-national levels to identify, prioritize, implement, monitor and assess effectiveness of EbA interventions.	1. Current estimated level of capacity to identify, prioritize, implement, monitor and assess effectiveness of EbA interventions is 3. Institutions have increasing capacity to monitor and identify climate risks. They are also able to design, budget and implement restoration interventions but not EbA interventions. Ecosystem restoration is prioritized by national institutions but not EbA. Therefore, EbA interventions are not currently implemented. A "*Gap analysis study on EbA*" is currently being conducted by EbA consultant to determine the baseline value for each institution.	1. Increase of at least 4 points in the capacity score of each institution. (Max 10, Min 0).	1.Verified through scoring methodologies developed by the TAMD and PPCR and adapted from the GEFSec - AMAT (2014)

Indicator	Baseline	Targets	Means of verification
2. Number of individuals benefitting directly from project interventions disaggregated by gender.	2. Zero	2. At least 2,800 including 40% of women.	2. Household surveys and reports
3. Number of people with reduced vulnerability to climate change and variability	3. Zero	3. At least 2,800 including 40% of women.	3. Household survey, Community-based vulnerability analysis
Component 1: National and local institutional capacity development for the use of an EbA approach			
Outcome 1: National and local authorities have increased capacity to plan and implement EbA interventions			
National and local authorities trained and capable to plan and implement EbA interventions	Most government officials, environmental committee members or local community representatives are not capable to plan, budget and implement EbA interventions.	Average score of 3 for trained officers.	A scoring scale methodology will be used to measure the capacity of trained officers. To measure people's capacity to identify, prioritize, implement, monitor and evaluate adaptation strategies and measures; the tracking tool recommends the following scoring scale: 1 = Very limited or no evidence of capacity 2 = Partially developed capacity 3 = Fully developed, demonstrated capacity.
1.1. A National Steering Committee (NSC) mobilised as a platform to promote large-scale EbA programmes in Rwanda and capacitated to	1.1. TOR for the National Steering Committee (NSC) has been developed but no trainings of NSC have been held.	1.1. At least 90% of the participants to the NSC members have been trained on EbA.	1.1. Meeting minutes, reports and list of participants in NSC meetings.

Indicator	Baseline	Targets	Means of verification
plan large-scale EbA interventions (disaggregated by gender).			
1.2. Number of local government officials, environmental committee members and local community representatives trained to plan, budget and implement EbA interventions (disaggregated by gender).	1.2. Rwanda has recently implemented a number of national strategies, policies and plans for ecosystem restoration but no local government officials, environmental committee members or local community representatives have the capacity yet to plan, budget and implement EbA interventions. A more quantitative assessment of this indicator will be made at inception phase.	1.2. By project end point, at least: i) 80 local government officials; ii) 110 environmental committee members including 15 members at the provincial level, 25 members at the district level, 30 members at the sectoral level and 40 members at the cell level; and iii) 80 local community representatives have been trained to plan, budget and implement EbA interventions (of which 40% of women).	1.2. Attendance registers from training sessions and training reports. A scoring scale methodology will be used to measure the capacity of trained officers. To measure people's capacity to identify, prioritize, implement, monitor and evaluate adaptation strategies and measures; the tracking tool recommends the following scoring scale: 1 = Very limited or no evidence of capacity 2 = Partially developed capacity 3 = Fully developed, demonstrated capacity Depending on the nature and scope of the training provided, the tracking tool may provide an average score based on an assessment of capacity along the following criteria: (a) understanding what is EbA and its role in adapting to climate change; (b) identifying EbA adaptation options and their use to restore ecosystems in Rwanda; (c) developing alternative livelihoods based on restored and resilient ecosystems; (d) identifying cost-effective adaptation interventions; (e)

Indicator	Baseline	Targets	Means of verification
			Planning, budgeting and implementing EbA measures.
1.3. Number of documents and technical EbA guidelines developed and disseminated to environmental committees and local authorities through the climate change adaptation portal.	1.3. CC portal has already been created. A webpage was developed on the portal for the LDCF1 project. This project will extend the role of this website through compiling the information of the project as well as other adaptation projects on a national scale.	1.3. By project end-point, at least 3 technical EbA guidelines developed.	1.3. The documents are produced and available on the climate change adaptation portal.
1.4. Number of educational resources on EbA developed by the project for communities living near project sites to increase awareness on EbA and support new competence based curriculum at primary, secondary and university levels to address adaptation to climate change using EbA.	1.4. Zero	1.4. By end point at least one training manual to support new competence based curriculum at primary secondary developed and one green campus guidelines to integrate EbA Developed, 4 awareness campaigns on EbA targeting local communities and National Curriculum development center staff.	1.4. Proposed revisions to primary, secondary and tertiary school curricula; report of the awareness-raising events and list of participants; surveys of proposed project intervention sites (i.e. bio-physical surveys)
1.5. Number of master 's theses on EbA in Rwanda produced and validated at research forum and university level.	1.5. No scientific studies on EbA in Rwanda published.	1.5. At least 6 theses on EbA produced and validated at university level	1.5. Master's theses; databases.

Indicator	Baseline	Targets	Means of verification
Component 2: Policies, strategies and plans for adaptation to climate change			
Outcome 2: Sectoral and local policies, strategies and plans strengthened to promote the restoration and management of degraded ecosystems for EbA.			
Sectoral and local policies, strategies and plans revised to integrate EbA approach	Most cross-sectoral, sectoral and local policies, strategies do not promote EbA.	Validation of 60% of proposed cross-sectoral, sectoral and local policies, strategies or plans revisions incorporating EbA	Proposed policy revisions; policy briefs; validated revisions and minutes of government meetings; workshop report.
2.1. Number of policy revisions proposed for cross-sectoral, sectoral and local policies, strategies and plans to incorporate EbA, and validated by the government.	2.1. The majority of cross-sectoral, sectoral and local policies, strategies and plans promote ecosystem restoration. However, they do not promote EbA.	2.1. At least 6 policy recommendations proposed and validated for cross-sectoral, sectoral and local policies, strategies or plans to incorporate EbA.	2.1. Proposed policy revisions; policy briefs; minutes of government meetings. Proposed policy revisions; policy briefs.
2.2. Number of upscaling strategies developed to promote EbA based on project interventions.	2.2. No up scaling strategy for best adaptation practices in Rwanda developed to date.	2.2. National up scaling strategy developed.	2.2. Finalized upscaling strategy document; workshop reports and consultant reports.
2.3. Number of policies and coordination mechanisms explicitly addressing climate change and resilience with EbA-related approach	2.3. No policy or coordination mechanism explicitly address climate change and resilience with EbA-related approach	2.3. At least three new policies or coordination mechanisms explicitly address climate change and resilience with EbA-related approach	2.3. Scorecard method using Microsoft Excel. Each scorecard lists 4 to 5 key questions that assess progress in implementing the PPCR activities using a score from 0 (no) to 10 (yes/completely). Qualitative self-assessments by the monitoring and

Indicator	Baseline	Targets	Means of verification
			evaluation team together with relevant stakeholders
Component 3: EbA interventions that reduce vulnerability and restore natural capital			
Outcome 3: EbA implemented by local communities to restore degraded ecosystems in forest, wetland and savannah ecosystems and establish climate resilient livelihoods.			
1. Target beneficiaries have adopted climate resilient livelihoods	10% of beneficiaries have some form of climate resilient technology	90% of project beneficiaries have adopted climate resilient livelihoods	Socio-economic surveys in project sites.
2. Degraded ecosystems restored through implementation of EbA	None	100% of targeted ecosystems are restored through EbA	Surveys of restored sites (i.e. bio-physical surveys)
3.1. Number of households implementing climate-resilient agriculture practices including agroforestry in the project intervention sites.	3.1. Households have on average between 14 and 22 trees on farm in project intervention sites.	3.1. At least 500 households implementing climate-resilient agriculture practices including agroforestry in the project intervention sites. Beneficiary households have on average 30 trees on farm.	3.1. Surveys of proposed project intervention sites (i.e. bio-physical surveys); Agroforestry inventory on sample farms of beneficiary households.
3.2. Number of hectares of wetlands/Lakes restored with climate-resilient species in Bugesera, Gasabo, Kicukiro,	3.2. Zero	3.2. At least 190 ha of wetlands/Lakes restored with climate-resilient species	3.2. Surveys of proposed project intervention sites (i.e. bio-physical surveys).

Indicator	Baseline	Targets	Means of verification
Kayonza, Kirehe and Ngororero.			
3.3. Number of hectares of forest restored with climate-resilient species	3.3. Zero	3.3. 20 hectares restored with climate-resilient species	3.3. Surveys of proposed project intervention sites (i.e. bio-physical surveys).
3.4. Number of hectares of savannah restored with climate-resilient species.	3.4. Zero	4. 300 hectares restored using climate-resilient species	3.4. Surveys of proposed project intervention sites (i.e. bio-physical surveys).
3.5. Number of individuals receiving training, equipment and technical support to adopt climate-resilient livelihoods in the project intervention sites.	3.5.1. Zero	3.5.1. At least 120 individuals, of which at least 40% women, have received training, equipment and technical support to adopt climate-resilient livelihoods in the project intervention sites	3.5.1 Surveys of proposed project intervention sites (i.e. questionnaires given to households); list of equipment purchased; reports on the training sessions and lists of participants.
	3.5.2. 66 Household benefited in climate change resilient houses under IDP model villages by LDCF I project.	3.5.2. At least 46 additional Households benefited through climate change resilient houses with installation of renewable energy technologies such as biogas at Gakoro Green village.	3.5.2. Surveys of settled households in the IDP model village
	3.5.3. Zero	3.5.3. Installation of Solar power irrigation pumps at	

Indicator	Baseline	Targets	Means of verification
		Byimana cell (Ndego sector) and Rugarama cell (Murago wetland – Mareba sector) .	3.5.3. Survey reports on households or farmers using the solar power pumps for irrigation in the two cells.
3.6. Number of households affected by drought	3.6. None	3.6. Declining trend in number of households affected by drought	3.6. Ministry/ies responsible for climate change and/or disaster risk reduction; Meteorological agency
3.7. Percentage of total livestock killed by drought	3.7. None	3.7. Declining trend of percentage of livestock killed by drought	3.7. Numerator = number of livestock killed by drought; Denominator = total number of livestock; Moving Average: Numerator = sum of annual measurements over the period; Denominator: number of years in the period
3.8. Number of people living in flood prone areas	3.8. None	3.8. At least 46 Households living in climate change resilient houses at Gakoro	3.8. Surveys in IDP model villages; National Institute of Statistics of Rwanda; Population census
3.9. Number of hectares of productive land lost to soil erosion	3.9. To be assessed in a specific study	3.9. At least 50% decline in soil erosion at Nyiramuhondi watershed	3.9. Soil erosion study results; Data from Ministry of Agriculture

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ANNEXES

Annex 1: Checklist of questions/issues for Key informants and Focus groups

Name: …… Position: ……..…..

Place: ……..... Phone: …….. Date: ……

(1) **Institutional framework for project implementation** - How will the project be managed?

……..

……..

……..

(2) **Challenges and gaps to be addressed by the project** –What are the challenges faced in the project intervention areas (prior to 2017)? What are the gaps (including risks) that may hinder successful implementation of the project?

Challenges: ……

……..

……..

Gaps: ……

……..

……..

(3) **Expected project benefits to beneficiaries** – What are anticipated project benefits to beneficiaries?

……..

……..

……..

……..

(4) **Project targets and performance indicators** – What are the project targets and performance indicators for each target?

Project targets	**Performance indicators**

…….*[2]	

(5) **Monitoring methods of project indicators and/or outcomes** – How will project indicators/outcomes be monitored?

……..

……..

……..

(6) **Bio-physical status in the project sites (**District and/or Sectors) **prior to project implementation** (**before July 2017**)

(a) Cropland (size […….ha], increasing/decreasing/constant?)

(b) Wetlands (size […….ha], increasing/decreasing/constant?)

(c) Forests (size […….ha], increasing/decreasing/constant?)

(d) Savannahs (size […….ha], increasing/decreasing/constant?)

(e) Other land uses (specify) (size […….ha], increasing/decreasing/constant?)

(7) Agricultural and land use practices in the project districts prior to project:

(a) **Types of soils** – Red, black, yellow, white, sandy, clayey, stony, granitic, etc.

– **Natural fertility level**: highly fertile? moderately fertile? Infertile?

(b) **Average farming size (ha) per household**?.....

(c) **Farming practices** (rain fed/Irrigation/monoculture/mixed cropping /land consolidation) and major crops (both food and cash crops) - Size […….ha] annually or seasonally in the Sector/District

……..

……..

……..

……..

[2] Whenever the answer provided exceeds availed answering space, the recto page of the form will be used

……

(d) **Fertilizers use** –

- Percentage of farmers using fertilizers? ……..
- What types and quantities and for which major crops?

……

……

……

(e) **Agroforestry practices** –

- Average number of trees on farms……
- Major agroforestry species and for what uses?

……

……

……

……

- What were the challenges in planting and maintaining trees on farm?

……

……

……

(f) **Wetland uses** - Protected? Farming (Cultivation)? Grazing? (Provide estimates if possible)

……

(g) **Soil erosion and control measures** - Is there erosion? if yes, which control measures?

……

……

……

(h) **Settlement** habits (villages, scattered on farms?) - Percentage

……

(8) **Status of livestock keeping in the project intervention areas before July 2017**-

(a) How many cattle per breed (local, crossed, exotic) – percentage?

- Local: ……
- Crossed: ……
- Exotic: ……..

(b) On average how many households own cattle (percentage)? ……

(c) Are there set aside grazing areas or only zero grazing? (If yes, Size […….ha])

(9) **Occurrence and frequency of harsh climate events**:

(b) Landslides? If yes, how often? What is the trend?

……..

(c) Flooding? If yes, how often? Are there damages or casualties? What is the trend?

……..

(d) Heavy storms and winds? If yes, how often? Are there damages or casualties? What is the trend?

……

(e) Drought? If yes, how often? Are there damages or casualties? What is the trend?

……

(10) **Livelihoods of local communities**:

(a) **Poverty levels** – How many households are extremely poor (Ubudehe 1)? What is the trend?.....

(b) **Major economic activities** – What are the predominant economic activities in the area?

……

……..

……..

(c) **Alternative sources of income –** what are other sources of income than agriculture?

……..

……..

Annex 2: Key informants and participants in the focus group discussions

(a) Key informants at National level

- LDCF II Project coordinator
- LDCF II Sector Specialist,
- LDCF II M&E Specialist
- 2-3 other representatives of NSC

(b) Key informants at District level

- Local authorities (e.g. Vice-Mayor in charge of Finance and Economic Development Affairs or Sector executive secretary)
- District Director of Agriculture and Natural Resources
- District Environment Officer
- District Forests and Natural Resources Officer
- Sector Land Officer
- Field Environmentalist of LDCF II project
- Representatives of major NGOs working in the project sites

(c) Focus group participants

- 10-15 Representatives of farmers ensuring as much as possible fair gender and livelihoods representation (i.e. women representatives, men representatives, youth representatives, representatives from different/major livelihoods in the area (e.g. fishermen/ herders/ farmers – coffee, tea, banana, etc.).

Annex 3: List of main documents consulted during the baseline assessment

(1) Building resilience of communities living in degraded wetlands, forests and savannahs of Rwanda through an ecosystem-based adaptation approach. Project document as of 20/08/2015. UNEP (2015).

(2) Updated results-based management framework for adaptation to climate change under the Least Developed Countries Fund and the Special Climate Change Fund. *GEF/LDCF.SCCF.17/05/Rev.01.* GEF (2014).

(3) Building Adaptive Capacity and Resilience to Climate Change in Afghanistan (LDCF). Baseline Assessment Report. UNEP Afghanistan, Kabul. UNEP (2014).

(4) Compendium of Field Visits Reports - LDCF II/REMA Project. Project staff (2017)

(5) Baseline information and indicators for the Rwanda AAP Project: "Supporting Integrated and Comprehensive Approaches to Climate Change Adaptation in Africa – Building a comprehensive national approach in Rwanda" and LDCF Project: "Reducing Vulnerability to Climate Change by Establishing Early Warning and Disaster Preparedness Systems and Support for Integrated Watershed Management in Flood Prone Areas". C4 EcoSolutions (2012).

(6) LDCF II_UNEP GEF PIR Fiscal Year 18 (1 July 2017 to 30 June 2018)

(7) Sub-project document for the restoration of Kibare lakeshores in Kayonza District (Kayonza District & LDCF II/REMA, 2017)

(8) Concept note for the construction of a selling point at Kibare lakeshore (Kayonza District & LDCF II/REMA, 2018)

(9) Sub-project document for the restoration of savannahs in Kayonza District by plantation of indigenous trees on 200ha at Rwinkwavu hill (Kayonza District & LDCF II/REMA, 2018).

(10) Sub-project document for the restoration of 250 ha with agroforestry, Ibandan-Makera savannah and natural forest (68 ha) with indigenous species and plantation of 20 ha of fruit trees to increase resilience of local communities to climate change in Kirehe District (Kirehe District & LDCF II/REMA, 2017)

(11) Sub-project document for the restoration of Nyiramuhondi watershed by protection of riverbanks on 10 ha, radical terraces on 100 ha and reforestation of Gihe forest on 5 ha (Ngororero District & LDCF II/REMA, 2017)

(12) Sub-project document for the restoration of Sanza natural forest restoration (Ngororero District & LDCF II/REMA, 2017)

(13) Sub-project document for the rehabilitation of lake Cyohoha North lake (115 ha) (Bugesera District & LDCF II/REMA, 2017)

(14) Sub-project document for the restoration of Murago wetland (Bugesera District & LDCF II/REMA, 2017)

(15) Memorandum of Understanding between Rwanda Environment Management Authority (REMA) and Bugesera District for the Restoration of Cyohoha North (2017).

(16) Memorandum of Understanding between Rwanda Environment Management Authority (REMA) and Bugesera District for the Restoration of Murago wetland (2017).

(17) Memorandum of Understanding between Rwanda Environment Management Authority (REMA) and Kayonza District for the Restoration of degraded savannah on Rwankwavu hill (2018).

(18) Memorandum of Understanding between Rwanda Environment Management Authority (REMA) and Kayonza District for the Restoration of Kibare lakeshores (2017).

(19) Memorandum of Understanding between Rwanda Environment Management Authority (REMA) and Kayonza District for the Construction of a selling point and storage hall at Kibare lakeshores, Isangano, Ndego Sector (2018).

(20) Memorandum of Understanding between Rwanda Environment Management Authority (REMA) and Kirehe District for the restoration of Ibanda-Makera natural forest and savannah (2017).

(21) Memorandum of Understanding between Rwanda Environment Management Authority (REMA) and Ngororero District for the restoration of Sanza natural forest (2017).

(22) Memorandum of Understanding between Rwanda Environment Management Authority (REMA) and Ngororero District for the rehabilitation of Nyiramuhondi watershed and rehabilitation of Gihe forest (2017).

(23) Memorandum of Understanding between Rwanda Environment Management Authority (REMA) and Musanze District for the construction of 11 houses of 4 in 1; and 1 house of 2 in 1 (2018).

(24) Contract Negotiation between Musanze District and MINADEF/RF on Validation of BOQ for Construction of houses for resettlement of 46 households, Biogaz (Canvas) with elevated bio-latrines, rainwater harvesting tanks, cowsheds and cow supply in Gakoro Green Village (2018).

Annex 4: Fieldwork, Key interviews and Focus group meetings

Date	District	Human Resources	Proposed project activities	Baseline survey activities
15/04/2019	Kirehe	Focus group & key informants (Annex 2)	- Kirehe District for restoration of Ibanda-Makera natural forest with indigenous species on 68 ha, plantation of agroforestry on 250 ha, and plantation of 20 ha of fruit trees. - Restoration with Agroforestry at Mushongi on 50 ha - Community Driven Development projects	- Key informant interviews - Focus group discussion - Point sampling in Agroforestry sites (5 random samples)
15/04/2019	Kayonza	Focus group & key informants (Annex 2)	- Restoration of Savannahs at Rwinkwavu hill (200 ha) - Restoration of Kibare lakeshores at Isangano Cell on 80 Ha - Community Driven Development projects	- Key informant interviews - Focus group discussion - Point sampling at Rwinkwavu hill (5 samples)
11/04/2019	Bugesera	Focus group & key informants (Annex 2)	- Restoration of Lake Cyohoha North by removal of water hyacinth and	- Key informant interviews - Focus group discussion

Date	District	Human Resources	Proposed project activities	Baseline survey activities
			other invasive aquatic species on 115 Ha, and - Restoration of Murago wetland on 52 Ha. - Small scale irrigation technology from the buffer zone of Murago wetland on 34 ha - Community Driven Development projects	- Point sampling (5 samples in agroforestry sites besides Murago wetland)
26/04/2019	Gasabo and Kicukiro	Key informants (Annex 2)	- Restoration 130 hectares of Nyandungu wetland.	- Key informant interviews
16/04/2019	Musanze	Focus group & key informants (Annex 2)	- Construction of green model village to resettle 46 households from Ruhondo islands (Gakoro Green village)	- Key informant interviews - Focus group discussion
17/04/2019	Ngororero	Focus group & key informants (Annex 2)	- Restoration of Nyiramuhondi watershed by construction of radical terraces on 100 Ha,	- Key informant interviews - Focus group discussion - Point sampling (5 samples at Gihe forest)

Date	District	Human Resources	Proposed project activities	Baseline survey activities
			- Agroforestry on terraces on 100 hectares - Protection of Nyiramuhondi riverbanks on 10 Ha, - Restoration of Gihe forest on 5 Ha, - Restoration of Sanza natural forest on 22 Ha. - Community Driven Development projects	
03/04/2019	All project districts represented at Rwamagana	Key informants (key project beneficiaries)	Interviews were conducted with participants in a training session organised by the project for representative beneficiaries from all the project sites	Checklist of questions and issues administered to each participant among the project beneficiaries.

Annex 5: Consolidated results from focus group discussion and key informant interviews

No	Issues	Kayonza – Rwinkwavu hill	Kayonza – Ndego Kibare lakeshore	Kirehe – Mpanga lakeshore and Ibanda Makera	Bugesera – Murago wetland & Cyohoha North	Musanze – Gakoro green Village & Ruhondo islands	Ngororero – Sanza natural forest	Ngororero – Nyiramuhondi watershed	Gasabo & Kicukiro - Nyandungu wetland
1	Types of soils – Project site	Rocky soil and black loam soil	Sandy soil	Black and loam	Laterite & Black soils	Brown clayey soils	Brown, clayey soils	Brown, clayey soils	Alluvial soils (grey clay soil at the center and silt-sand at the ridge of the wetland)
2	Natural fertility of soils - Project site	Loam soil very fertile	Infertile	Highly fertile	Black soils are highly fertile	Moderately fertile	Infertile	Infertile	Fertile
3	Average farm size per household (ha) – Project site	0.5	1 ha	1 ha	0.5	0.3	0.4	0.4	-
4	Farming practices: - Rain fed agriculture (%) - Irrigated land (%) - Consolidated farms (%)	 90% 10%	 95% 5%	100%	 20% 80% 40%	100%	100%	100%	80% of natural vegetation; other areas are used by community for agriculture &soil extraction (14.3%), roads and footpath network (2.5%)
5	Major crops (both food and cash crops)	Coffee, Maize, Beans, Banana, Rice, vegetables	Maize, Beans, Sorghum	Maize, Beans, Banana, Sorghum	Maize, rice, banana, beans, Ground nuts, Cassava, vegetables (onion, cabbage, tomatoes, etc.)	Maize, banana, coffee, sweet potatoes, sorghum	Maize, beans, Irish potato, vegetables (egg plants, cabbage, etc.),	Maize, Sweet potatoes, banana, coffee, soya, sugar cane, amateke	Prior to protection: Rice and vegetables; Currently: some small scale agriculture on the edges: maize and sweet potatoes

No	Issues	Kayonza – Rwinkwavu hill	Kayonza – Ndego Kibare lakeshore	Kirehe – Mpanga lakeshore and Ibanda Makera	Bugesera – Murago wetland & Cyohoha North	Musanze – Gakoro green Village & Ruhondo islands	Ngororero – Sanza natural forest	Ngororero – Nyiramuhondi watershed	Gasabo & Kicukiro - Nyandungu wetland
6	Percentage of farmers using chemical fertilizers	40%	20%	50%	60%	0%	80%	80%	-
7	Type of fertilizers used	Urea, DAP & NPK	Urea, DAP	Urea, DAP	Urea, DAP & NPK	-	Urea, DAP & NPK	Urea, DAP & NPK	-
8	Major crops fertilized with chemical fertilizers	Maize, coffee, rice and vegetables	Maize	Maize, Tomatoes	Maize and vegetables	-	Maize and vegetables	Maize, coffee, soya	-
9	Average number of trees on farms	20	14	15	18	20	22	16	-
10	Major agroforestry species	*Eucalyptus, Grevillea robusta, Markhamia lutea Mangifera indica Senna spp., Ricinus communis, Citrus spp., Persea americana, Albizia spp.*	*Combretum sp., Umumeya; Umumuna; Nyiragasave, Umusagara, Cassia spp., Mangifera indica*	*Grevillea; Calliandra, Persea americana, Mangifera indica, Markhamia lutea, Citrus spp., Guajava spp., Senna spp.*	*Grevillea, Eucalyptus, Senna spp., Markhamia lutea, Mangifera indica, Persea americana, Calliandra*	*Eucalyptus, Grevillea, Markhamia lutea, Ficus thonningii, Vernonia amygdalina, Mangifera indica, Euphorbia tirucallii*	*Eucalyptus, Grevillea, Polyscias fulva, Persea americana, Vernonia amygdalina, Pinus spp.*	*Eucalyptus, Persea Americana, ficus thonningii, Markhamia lutea, Calliandra, Vernonia amygdalina*	*Acacia spp., Senna spp., Croton megalocarpus, Spathodea campanulata, Erythrina abyssinica, Podocarpus falcatus; Casuarina equisetifolia, Bamboo spp.*
11	Major uses of agroforestry trees	Timber, fuelwood, fruits, bean stakes	Fuelwood, fodder, fruits, timber	Timber, fuelwood, fodder, fruits	Timber, fuelwood, fodder, fruits, erosion control	Timber, fuelwood, bean stakes, fruits, medicines	Timber, fuelwood, fruits, bean stakes, erosion control	Timber, fuelwood, bean stakes, fruits, medicines, erosion control	Wetland and ornamental species
12	Major challenges in planting and	Lack of sufficient desired	Drought, termites, lack	Drought, termites, lack of	Drought, termites, lack	Shortage of land; Lack of	No nursery, lack of desired	Shortage of land, lack of	Swampy conditions

No	Issues	Kayonza – Rwinkwavu hill	Kayonza – Ndego Kibare lakeshore	Kirehe – Mpanga lakeshore and Ibanda Makera	Bugesera – Murago wetland & Cyohoha North	Musanze – Gakoro green Village & Ruhondo islands	Ngororero – Sanza natural forest	Ngororero – Nyiramuhondi watershed	Gasabo & Kicukiro - Nyandungu wetland
	maintaining trees on farm	seedlings; long drought; termites	of adapted seedlings	desired seedlings, no nursery	of desired seedlings	tree seedlings and grafted fruit trees	seedlings, low knowledge of maintenance	desired seedlings	(recurrent water logging); little knowledge on adapted species
13	Wetland uses	Rice, Tomatoes, vegetables, Fruit trees, Amateke	Protected	Protected; Tomatoes; Watermelon, vegetables	Protected; rice and vegetables	-	-	Protected; vegetables	Protected; envisaged eco-tourism park
14	Soil erosion - level	Moderate	Low	Low	Moderate	Moderate	High	High	None
15	Soil erosion control measures	Erosion control ditches; trees and fodder grasses along ditches	Erosion control ditches and planting fodder grasses	Erosion control ditches and planting trees and fodder grasses	Erosion control ditches and planting trees and fodder grasses (urubingo)	Erosion control ditches and planting trees and fodder grasses	Erosion control ditches and planting trees and fodder grasses	Erosion control ditches and planting trees and fodder grasses	-
16	Settlement – Village (%); Scattered (%)	Village (100%)	Village (100%)	Village (100%)	Village (100%)	Village (85%) Scattered (15%)	Village (40%) Scattered (60%)	Village (90%) Scattered (10%)	No settlement
17	Households with cattle (%)	60%	60%	40%	70%	85%	80%	30%	-
18	Landslides occurrence and trend	None	None	None	None	Sometimes; no trend	Very often and increasing trend	Often and increasing trend	None
19	Flooding occurrence and trend	Often in April; increasing damages	Very often from Akagera river; increasing damages	Often from hills above (Nyarubuye); increasing damages	Rare	Sometimes but increasing trend	None	Not often	Often during heavy rainy periods
20	Heavy storms and winds occurrence and trend	Often in March and April damaging	Often and damaging	Often and damaging	Often and damaging	Often and damaging houses;	Often and damaging	Sometimes but increasing trend	Max wind speed is 21.2m/s, wind is calm at 32.7%;

No	Issues	Kayonza – Rwinkwavu hill	Kayonza – Ndego Kibare lakeshore	Kirehe – Mpanga lakeshore and Ibanda Makera	Bugesera – Murago wetland & Cyohoha North	Musanze – Gakoro green Village & Ruhondo islands	Ngororero – Sanza natural forest	Ngororero – Nyiramuhondi watershed	Gasabo & Kicukiro - Nyandungu wetland
		houses; increasing	houses; increasing	houses; increasing	houses; increasing	increasing trend	houses; increasing		mean temperature: 22°C
21	Drought occurrence and trend	Often and increasing length trend	Often and increasing length trend	Often and increasing length trend	Often and increasing length trend	Sometimes but increasing trend	Sometimes no clear trend	Sometimes no clear trend	-
22	Percentage of household below poverty line	12%	50%	20%	30%	20%	30%	20%	-
23	Major economic activities	Agriculture and livestock keeping	Agriculture and livestock keeping	Agriculture and livestock keeping	Agriculture and livestock keeping	Agriculture and livestock keeping	Agriculture and livestock keeping	Agriculture and livestock keeping	Urban jobs but also small scale agriculture
24	Major alternative source of income	Mining (20%)	Fishing (5%)	Business and casual labor	Business, fishing and casual labor	Business, fishing (7%) and casual labor	Business and casual labor	Business and casual labor	Clay extraction for pot making; sand extraction for construction

Annex 6: Consolidated results from focus group discussion and key informant interviews – Challenges and project benefits

No	Issues	Kayonza – Rwinkwavu hill	Kayonza – Kibare lakeshore	Kirehe – Mpanga lakeshore and Ibanda Makera	Bugesera – Murago wetland & Cyohoha North	Musanze – Gakoro green Village	Ngororero – Sanza natural forest	Ngororero – Nyiramuhondi watershed	Gasabo & Kicukiro - Nyandungu wetland
1	Major challenges and gaps to be addressed by the project	1. Long drought 2. Termites killing young plants (e.g. low survival of Eucalyptus plants) 3. Fuelwood and other wood products 4. Degraded forests and savannahs	1. Recurrent floods due to Akagera river 2. Long drought 3. Infertile soils 4. Lack of seedlings of grafted fruit trees. 5. No buffer around the lake	1. Long drought 2. Buffer zone of protected area (Makera natural forest) needed 3. Termites kill young plants 4. The forest and savannah behind it have been degraded by local communities	1. Few trees on farms; 2. Low knowledge in modern agriculture; 3. Adapted seeds and tree seedlings 4. Low quantity and quality of agricultural products	1. Water transport to the island (no boats with engine); 2. Frequent storms; 3. Increasing population density	1. Degradation of Sanza of the forest (illegal cutting); 2. Mining sites inside the forest to be restored; 3. Buffer zone need to be strengthened; 4. Many gaps inside the forest	1. High erosion and frequent landslides; 2. Degraded farms due to repeated cultivation and thus low land productivity; 3. Few cattle for milk and manure production	1. Cattle grazing; 2. Grass cutting (fodder; *Cyperus sp. & Typha sp*. for hand craft making and mulching) 3. Waste disposal and water pollution (sewage from neighboring households) 4. Agriculture encroachment 5. Invasive species (e.g. *Lantana camara*) 6. Flooding (during rainy season)
2	Expected project benefits to beneficiaries	1. Capacity building in environment conservation 2. Seedlings for tree planting (reforestation and agroforestry) 3. Employment opportunity	1. Seedlings of grafted fruit trees 2. Capacity building in environment conservation 3. Job opportunity	1. Job opportunity for people nearby 2. Reforestation of degraded forest and savannah 3. Agroforestry trees 4. Training in environment and natural resources management	1. Training in modern agriculture and environment conservation 2. More fish production after removals of invasive plant species; 3. Hill irrigation facility 4. Protection of the wetland	1. Good houses; 2. Cows for milk and manure; 3. Fodder grasses for the cows; 4. Biogas and solar energy.	1. Restoration of the forest with native species through enrichment planting 2. Strengthen the buffer zone by filling gaps 3. Job opportunity 4. Training in environmental conservation; 5. Provision of tree seedlings	1. Radical terracing; 2. Consolidated land; 3. Provision of seedlings for agroforestry; 4. Planting of fodder grasses and trees; 5. Improved cattle 6. Subsidies for chemical fertilizers on radical terraces and improved seeds	1. Restoration and landscaping for beautification 2. Wetland functions protection 3. Recreation and eco-tourism 4. Provision of employment (jobs)

Annex 7: Participants in different focus group discussions:

Focus Group Participants: Bugesera District – Murago wetland site
Date: 11/04/2019

Amazina (Names)	Akagari (Cell)	Phone	Signature
1. Ngendahimana Aloys	Rugarama	0782191786	
2. Twagirimana Venuste	Rugarama	0785363693	
3. Bihoyiki Victoire	Rugarama	0782938668	
4 Ntabanganyimana Bertho	Rugarama	0783182832	
5 BYUKUSENGE Mariceline	Rugarama	0789310701	
6. Twagirimana Aloiya	Bushenyi	0787751600	
7 UWIMANA M. Jeanne			
8 Nyirantawuziyamye Chatal	Rugarama	0782956389	
9. NTIYAMIRA Phocas	Rugarama	0780488813	
10. MUGENZI Jean Baptiste	Rugarama	0785629646	
11. Nyirahabagulima Mathilde	RUGARAMA	0782938666	
	Rugarama	0783669364	
12. NDAJAMBAJE Silas	BUSHENYI	0781409233	
13 SINGENGU Felicien	GIHEMBE	0780526059	
14 UWINEZA Jeanne	NGERUKA	0783387883	

Focus Group Participants: Kayonza District – Kibare Lakeshore and selling point

Date: 15/04/2019

Amazina (Names)	Akagari (Cell)	Umudugudu (Village)	Phone	Signature
1. RUTABOBA Bosco	ISANGANO	KIBARE	0784124808	[signature]
2. Ndatimana Valens	Isangano	Kanyinya	–	[signature]
3. Wataramaliye Marie	Isangano	Kanyinya	078098479	[signature]
4. Mubonyu mwizkuma Jonas	Isangano	Kagoma	0784534152	[signature]
5. GAHAMIRE Aloys	KARAMBI	MURAMBI	0782658032	[signature]
6. Mutundiyukuri Joyeuse	Isangano	Kibare	0782331702	[signature]
7. Niyonkuru EPIPhanie	Karambi	remera	0780053141	[signature]
8. Mutiime Gaspard	Isangano	Kamahoro	0784476350	[signature]
9. Nsengumukamyi Venoste	ISangano	Kibare Moso	078844139	[signature]
10. AYINKAMIYE abasiyata	ISangano	Kangoma	0780159199	[signature]
11. Bagemimana jean Paul	Mukoyojo	Mutembo	0785382843	[signature]
12. Mukeshimana IVONA	isangano	gashonga	0787176401	[signature]
13. Uwineza David	Gyome	MusogaraMoso	0780636401	[signature]
14. Nyabyenda Raymond	Isangano	umubinzi	0783421157	[signature]
15. Bazompabenda Lufonsino	Isangano	Kagoma / Kabeyunzu	0786918168	[signature]
16. Bangamwabo Alfred	Isangano	Kagoma	0788224341	[signature]
17. Sembagare Sanestini	Isangano	Kibare	0789553655	[signature]
18. inyanzi Nsabimana	isagano	Kagoma	0783124718	[signature]
19. Kanyeshyamba jerari	isagano	Cyibare	0785572057	[signature]
20. NKiriyeke J. Baptiste	Isongano	Gashonga	0787068528	[signature]

Focus Group Participants: Kayonza District – Rwinkwavu hill

Date: 15/04/2019

Amazina (Names)	Akagari (Cell)	Phone	Signature
1. BIZIYAREMYE CLAUDE	MBARARA	0786230810	
2. MUTABARUKA ERIC	MBARARA	0786640066	
3- HAKIZIMANA ALEX	MBARARA	0783009332	
4. NSHIMYUMUKIZA Jean claude	MBARARA	0727097278	
5. HABIMANA Eugene	MBARARA	0786188879	
6/ MANIRARORA GASPARI	MBRARA	0722302794	
7/ NIYEMBERE Alodis	MBARARA	0780091062	
8. MPUNGIYEHE Célestin	MBARARA	0783222606	
9 NTOHERI PIERRE	MBARARA	0780869626	
10 Uyaratekereza Deborah	Bunyetongo	0786140596	
11. MUKANABA Magel Julienne	BUNYETONGO	0780733660	
12, INGABIRE Jacqueline	NKONDO	0781331158	
13 DUSENGI Mona Jeanine	BUNYETONGO	0780639253	
14 MUKESHIMANA Josephine	NKONDO	0783700453	
15 KAMPETA Jeoviel	MBARARA	0781136044	
16 MUHOHENGERWA Claudine	MBARARA	0786332870	
17. UWIZEYIMANA Rehema	MBARARA	0780004706	

Focus Group Participants: Musanze District – Gakoro Green Village

Date: 16/04/2019

Amazina (Names)	Akagari (Cell)	Umudugudu (Village)	Phone	Signature
1. KARIMWABO Pholas	GAKORO	MUKORA	—	
2. Ntuganyenabonzi celestini	GAKORO	Mukora	0786672507	
3. NZABARANTUMYE J. Berchmas	GAKORO	MURORA.	0784667763	
4. Ndimugotubire J Baptiste	GAKORO	MURORA	0782915481	
5. Kanyabitaro Frederiko	GAKORO	MURORA	—	
6. SERUGENDO Jean	GAKORO	MURORA	—	
7 Munyemkaka Elizeus	Gakoro	Murora	07892281	
8 NYIRANDIKUBWIMANA Forence	GAKORO	MURORA	0784381525	
9 MUKANTWARI Jeanne Darc	GAKORO	MURORA	0785310752	
10 KABAZIGA Triphie	GAKORO	MURORA	0782950971	
11. MANIRIHO Albertine				
12 NYARANSABIMANAREWONIRA	Gakoro	Murora	0786595533	
13 Niramahame Biliane	GAKORO	MURORA	0787735724	
14. MUKASINE Amathalie	Gakoro	Murora	0782035911	
15. NYIRAROGENDO Yudithe	Gakoro	Murora	0789647073	
16 NYIRANSEKAMBABASE Nanesoizuye	Gakoro	Murora	—	
17= NTEGEYIMANA Justin	Gakoro	MURORO	0788379235	
18= No NSABIMANA Mediatrice	GAKORO	MURORA	0783670594	
19= MUKASINE Yomantine	GAKORO	MURORA	0787611295	
20= ZIGIRANYIRAZO Chrisostom	GAKORO	MURORA	0787042577	

Focus Group Participants: Ngororero District – Nyiramuhondi watershed

Date: 17/04/2019

Amazina (Names)	Akagari (Cell)	Umudugudu (Village)	Phone	Signature
1. Muvigashize Solange	Nyange	Karama	0725523791	
2. Nyirabageseera Mariya Roza	Nyange	Karama	- - - -	
3. Uwimana Fosasiso	Nyange	Karama	07264858	
4. MUKARUKUNDO Apolonie	Nyange	GIHE	072 6387094	
5 Habyarabatuma Didace	Nyange	Kabeza	0782933348	
6. Uwitegetse marie louize	Nyange	GIHE	0725033767	
7. Nikuze petronnila	Nyange	GIHE	0724722275	
8/ BAZIMAZIKI Jean claude	Nyange	KARAMA	0782337422	
9 HAKIZIMANA Albert	Nyange	Karama	0782497419	
10. MUNYENSANGA	NYANGE	KARAMA	0726403562	
11. GASHAKAMBA Théoneste	NYANGE	KABEZA	0782497419	
12 UWAYEZU odille	NYANGE	KARAMA	0784372851	
13. MUKANSINGA Stephanie	NYANGE	KARAMA	0725737454	
14. UKAMAHORO claudette	NYANGE	11	0723703173	
15. NIYONSABA Dorothe	11	11	0726173241	
16 ZIGIRANYIRAZO Maurice	11	11	0723066984	
17 Nyiramana Delitha	//	//	0723280909	
18. MUHAWENIMANA Angelique	11	11	0783745870	
19. Mizeyimana ezekiel	Nyange	Karama	0722959670	
20 Nkuriyehe medardi	Nyange	Karama	0728571008	
21. BIGORUKA Samuel	Nyange	Kabeza	0727443550	
22. Tuyishime Innocent	Nyange	Karama	0727029821	
23 MVUYEKURE Innocent	NYANGE	GIHE	0782017923	