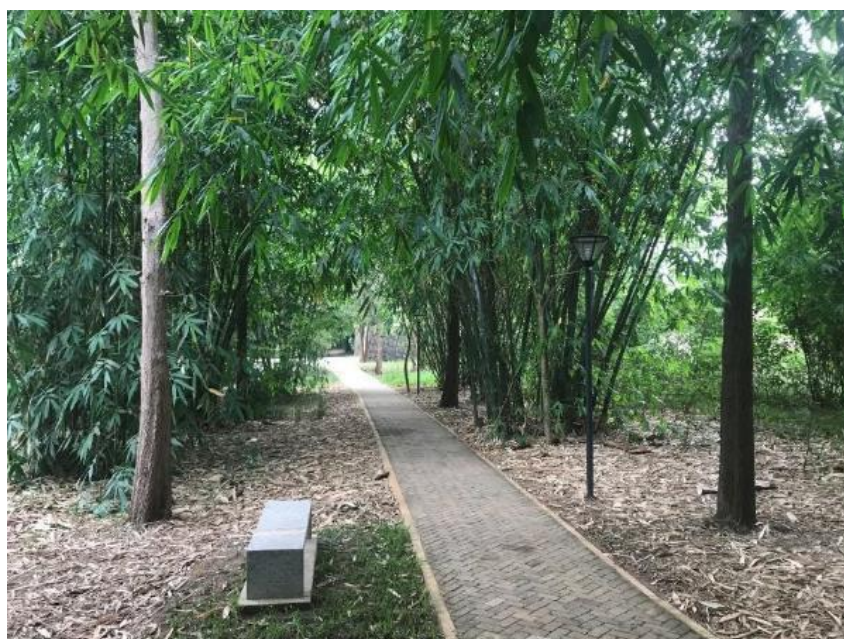


Rwanda Environment Management Authority



Updated Feasibility Study for Establishing Nyandungu Urban Wetland Eco-Tourism Park in Nyandungu Valley Kigali City, Rwanda



Contents

List of Figures	3
List of Tables	4
List of Photographs	5
Acronyms and Abbreviations	6
Executive Summary	7
I. Introduction	8
Background and Context	8
Rwanda Wetlands	8
Wetlands and Urban Parks	13
Nyandungu Urban Wetland Eco-tourism Park	14
Aim and objectives	14
NUWEP Vision	14
Study Design	15
II. Situation Analysis	17
Site location	17
Background of Nyandungu wetland	20
Physical characteristics	21
Topography	21
Geomorphology, Geology and Soils	22
Climate and Hydrology	23
Flora	25
Ecological Restoration	29
Socio Economic Activities in NUWEP	30
NUWEP Infrastructure	31
III. Legal, Policy and Institutional Framework	37
IV. NUWEP Development and Activities	45
A. Concept	45
B. NUWEP Uses	48
Recreation	49
Education	50
Potential Revenue Generating Options	55
Park Management Scenarios	61
V. Conclusion	63
References	64
ANNEXES	66
ANNEX I: Flora and Fauna Diversity in NUWEP	66
ANNEX II: Africa's Urban Park Case Studies	81
ANNEX III: Kigali Recreational Area Case Studies	91
ANNEX IV: Nyandungu Site Visit Pictures	95

List of Figures

Figure 1: Green Growth, Government of Rwanda Kigali 2050 Plan.	8
Figure 2: Decline in extent of wetlands relative to settlement and perennial agriculture.	9
Figure 3: Kigali city wetlands and waterways (Kigali Masterplan 2050).	10
Figure 4: Top map: 2018 Kigali land use status. Bottom map: 2050 vision.	12
Figure 5: Site visit by Conservation Capital team to NUWEP, 24 November 2021	16
Figure 6: Eight of Kigali's wetlands	17
Figure 7: Nyandungu wetland, north of the Kigali International Airport, Kicukiro and Gasabo Districts.....	18
Figure 8: Distances from prominent tourism locations in Kigali to Nyandungu during moderate traffic.	19
Figure 9: Five zones (Sectors) that comprise Nyandungu Wetland, Kigali, Rwanda.	20
Figure 10: Topography surrounding Nyandungu Wetland, high elevation in the surrounding areas.	21
Figure 11: Topography of Nyandungu Wetland.	21
Figure 12: Soil Map in Nyandungu Wetland.....	22
Figure 13: Average monthly temperature and precipitation in Rwanda between 1991-2020	23
Figure 14: Annual rainfall for the Ndera, Masoro, Kimironko and Remera from 1983 to 2016.....	23
Figure 15: Monthly rainfall of Masoro, Remera and Kimironko, for the years 2014, 2015 and 2016.....	24
Figure 16: Trends of temperature variation in the Nyandungu Catchment, 1983-2016 (Gasabo 2017).	24
Figure 17: Water catchment of NUWEP.	25
Figure 18: NUWEP vegetation cover (2021).	26
Figure 19: NUWEP vegetation cover percentage (2021).	27
Figure 20: Typical slope morphology of the sub-catchments discharging to the Nyandungu Wetland (left) and a 2005 Google Map showing those sub-catchments (right).....	30
Figure 21: NUWEP Track map (cyclist & pedestrian).....	34
Figure 22: NUWEP conceptual design completed by Afrilandscapes in 2017 for REMA.....	47
Figure 23: Approximate vegetation cover in Sector I.	47
Figure 24: Approximate vegetation cover in Sector II.	48
Figure 25: Vegetation cover in Sectors III & IV	48
Figure 26: Approximate vegetation cover in Sector V.....	48
Figure 27: Green roofs at Ellen DeGeneres Campus, in Kinigi, Musanze District, Rwanda.	48
Figure 28: Mitigation hierarchy framework (Forest Trends)	59
Figure 29: Policy trends biodiversity impact offset.	60
Figure 30: Average stored carbon in tons per hectare (World Climate Council IPCC).	61

List of Tables

Table 1: National Land Cover Comparison, 1990, 2000, 2010, and 2015 (hectares)	9
Table 2: Rwanda (2005) law on wetland protection and land use.	11
Table 3: Updated Sustainability Framework for City of Kigali.	11
Table 4: Goals and strategy for the Kigali Green City wetlands and waterbodies	12
Table 5: Breakdown of area of coverage (hectares) of different vegetation types / management zones.....	27
Table 6: Trails and paths developed in NUWEP (m) in Sectors III and IV.	34
Table 7: Rwanda NDC selected adaptation interventions by sector (Water).....	39
Table 8: Definition of play and leisure (2012 Feasibility Report).	49
Table 9: Potential suitable activities for NUWEP.....	52
Table 10: Activities judged unsuitable for NUWEP at this time.	53
Table 11: Potential time slots for NUWEP visitors.	54
Table 12: Potential revenue generating options for NUWEP.	56
Table 13: Hypothetical NUWEP pricing model and annual revenue extrapolation using conservation fees.....	57
Table 14: Examples of potential corporate partners for NUWEP.....	59
Table 15: Scenarios for NUWEP management (orange indicates less feasible and green indicates feasible).	62
Table 16: Plant species identified in Nyandungu wetland in 2017.....	68
Table 17: Plant species identified in Nyandungu wetland in 2020.....	76
Table 18: Species of plants in NUWEP grouped by families (2020).....	77
Table 19: Shrubs planted in the living fence	78
Table 20: List of Birds in Nyandungu.	80
Table 21: Daily visitor rates in urban parks in Africa	89
Table 22: Information on Parks throughout Africa.	90
Table 23: Price range of activities in Sunday Park.	91
Table 24: Price Range of Activities in Fazenda	93

List of Photographs

Photo 1: The clayey and sandy soils of Nyandungu Wetland (Photos: 2012 Feasibility Report).	23
Photo 2: The confluence of Mwanana and Kabagenda streams (Ndera Road) (Photo: 2012).....	25
Photo 3: Restored drainageways developed to facilitate waterflow from NUWEP.....	30
Photo 4: Main entrance gate on the Adventist Road.....	32
Photo 5: Parking lot off of the Kigali-Kayonza Road and near the information center located off the Kigali-Kayonza Road.	32
Photo 6: Information Center located just inside the gate off of the Kigali-Kayonza Road.....	33
Photo 7: Restrooms located in the parking lot at the entrance located off the road to the Adventist University and the drainage water plumbing plan.	33
Photo 8: Bike paths (left) and pedestrian paths (right), and solar lighting along the path.	34
Photo 9: The public road to the Adventist University that cuts through Sectors II and III of NUWEP.	35
Photo 10: Entrance view and inside view of the restaurant, located in Sector III.	35
Photo 11: One of the solar panel units in NUWEP used for lighting.	36
Photo 12: Signs erected inside the Park for directions and orientation.	36
Photo 13: Photo of the front of the maintenance building.....	37
Photo 14: Karura Forest. Left	81
Photo 15: Lusaka National Park.....	82
Photo 16: Nairobi National Park.....	83
Photo 17: Table Mountain National Park.....	84
Photo 18: Arusha National Park.	85
Photo 19: Banco National Park.....	86
Photo 20: Umusambi Village.	87
Photo 21: Uhuru Park. Left: The artificial lake at Uhuru Park. Right: National Monument at Uhuru Park.	88
Photo 22: Sunday Park, Kigali, Rwanda..	92
Photo 23: Fazenda Sengha.	94
Photo 24: Pedestrian walkway and bench in Sector III.	95
Photo 25: Pope's Garden in Sector III.....	95
Photo 26: NUWEP Vegetation.....	96
Photo 27: View from inside the restaurant in Sector III.	96
Photo 28: One of the restored ponds and signage.....	97
Photo 29: Waste coming from the industrial zone (Economic Zone) into NUWEP.....	97

Acronyms and Abbreviations

CBO	Community-Based Organization
CC	Conservation Capital
EIA	Environmental Impact Assessment
ES	Ecosystem Services
GoR	Government of Rwanda
IDP	Integrated Development Programme
IWRM	Integrated Water Resources Management
KCC	Kigali City Council
KIST	Kigali Institute of Science and Technology
MIDMAR	Ministry of Disaster Management and Refugee Affairs
MINIRENA	Ministry of Natural Resources
NDC	Nationally Determined Contributions
NG	Net Gain
NP	National Park
NNL	No Net Loss
NUWEP	Nyandungu Urban Wetland Eco-Tourism Park
NGOs	Non-Government Organization
OSC	One Stop Centre
PES	Payment for Ecosystem Services
PPP	Public Private Partnership
PRA	Participatory Rapid Appraisal
RDB	Rwanda Development Board
REMA	Rwanda Environment Management Authority
RWF	Rwandan Francs
SEA	Strategic Environmental Assessment
STP	Sewage Treatment Plants
tCO₂e	Tonnes of Carbon Dioxide Equivalent
ToRs	Terms of Reference
UK	United Kingdom
USD	US Dollar

Executive Summary

Rwanda's population is close to 13 million, with an annual growth rate of 2.86%. Its urbanization rate is increasing, and Kigali city is predicted to have the highest population density in the country. The Government of Rwanda (GoR) has committed to a country-level strategy of sustainable development and green growth. The Kigali Development Strategy for 2050 outlines clear green growth targets. As Rwanda urbanizes, the GoR is committed to creating more urban recreation areas and green space for its citizens ensuring healthy and environmentally friendly lifestyles. The country's wetland system is part of this green development strategy.

Approximately 7,521 hectares of Kigali city (73,800 hectares) is wetland, which can serve to mitigate flooding, secure biodiversity, and provide recreational opportunities. As Kigali continues to expand, the resulting increase in impervious surfaces and its subsequent increase in rainwater run-off, threatens to damage infrastructure and cause loss of human life. Protecting wetlands to mitigating flooding is a priority for the GoR.

Recognizing the ecological, economic, and social benefits of wetlands, the Government of Rwanda has committed to protecting and restoring the city's wetlands. The Nyandungu Urban Wetland Eco-Tourism Park (NUWEP) is a 121.89-hectare protected area located in Kicukiro and Gasabo Districts, just north of the Kigali International Airport. NUWEP was a degraded wetland system that is now managed by the Rwanda Environmental Management Authority (REMA). The Government of Rwanda is in the process of developing NUWEP to:

- preserve the ecological function of the wetland
- provide flood mitigation
- provide space for education, recreation, and contemplation
- apply state of the art practices for environmental, economic, and social sustainability
- support low impact amenities and activities

In 2012, a feasibility study for the development of NUWEP was completed and in 2017, a second report on the proposed design was developed: Developing an Improved Design Plan of the Park and Construction Supervision of Nyandungu Urban Wetland Eco-Tourism Park. Since then, significant development has taken place under the leadership of REMA, with donor support, and following the design guidance of the 2017 report.

This report builds on the prior assessments and provides an update on the status of NUWEP, and outlines potential activities, revenue generating activities and management options. This report will be followed by a holistic conservation area business plan.

I. Introduction

Background and Context

The Government of Rwanda's development strategy emphasizes the importance of environmental protection, natural resource management and climate change preparedness. The GoR has endorsed a Green Growth strategy for the country. The Government's vision for Kigali, outlined in the Kigali Master Plan, mirrors this country-level strategy of Green Growth (Figure 1). In addition to developing Kigali and Rwanda in a way that secures the country's natural assets, Rwanda is also committed to creating accessible green and open spaces for its citizens and visitors. For example, Rwanda's Vision 2050 outlines a target for 25% of Kigali City to be turned into recreational spaces, and to create a park in every neighbourhood with 2,000 to 50,000 inhabitants.



Figure 1: Green Growth, Government of Rwanda Kigali 2050 Plan.

Rwanda's population is close to 13 million, with an annual growth rate of 2.86%. Its urbanization rate is expected to increase from the current rate of 18.41% to 35% by 2024 (Gubic & Baloi 2020). Kigali City is predicted to have the highest population density in the country (National Land Use & Development Master Plan 2020-2050). As Rwanda urbanizes, the GoR is committed to creating more urban recreation and green space for its citizens to ensure healthy and environmentally friendly lifestyles for its citizens. In Kigali, this includes the protection and sustainable development of Kigali's wetland system, which will also help significantly with flood mitigation from rainwater run-off.

Between 2013-2018 green space and recreational areas in Kigali decreased and the Kigali Master Plan outlines various measures to reverse this. Pillar 6 is about Green Growth and the vision of Kigali's Green city outlined in the plan includes:

- Acknowledging the natural landscape of the city
- Protecting sensitive ecological areas from urban growth
- Restoring damaged natural elements like waterbodies
- Adopting natural resource management system, green building initiatives
- Forest protection strategies
- Steep slope protection strategies
- Green and blue plan, hierarchy of parks, connectors etc.
- Sustainable economic development

Rwanda Wetlands

Rwanda's cities, and Kigali in particular, support expansive wetlands systems, which play a key role in the Government's Green Growth agenda. Approximately 75.1 km² of Kigali city is wetland (Kigali 2050 Development Plan). Across Rwanda, wetlands have declined due to development, encroachment, and other key threats (Table 1 and Figure 2).

	Dense Forest	Moderate Forest	Sparse Forest	Woodland	Closed Grassland	Open Grassland	Closed Shrubland	Open Shrubland	Perennial Cropland	Annual Cropland	Wetland	Water Body	Settlement	Other land	Grand Total
National 1990	84,151	62,891	942,347	9,922	16,867	71,168	83,465	362,945	10,694	613,527	109,838	153,643	11,633	3,560	2,536,653
National 2000	63,081	148,949	535,085	7,967	15,826	233,408	1,901	154,484	11,036	1,115,204	80,956	153,716	13,843	1,197	2,536,653
National 2010	48,298	114,669	575,873	472	20,907	88,060	34,416	255,806	10,995	1,105,713	102,689	155,294	20,945	2,515	2,536,653
National 2015	115,762	47,237	269,210	-	31,446	117,687	49,937	282,607	34,058	1,310,704	88,773	152,300	36,344	587	2,536,653

Table 1: National Land Cover Comparison, 1990, 2000, 2010, and 2015 (hectares) (Rwanda Natural Capital Account Report 2018).

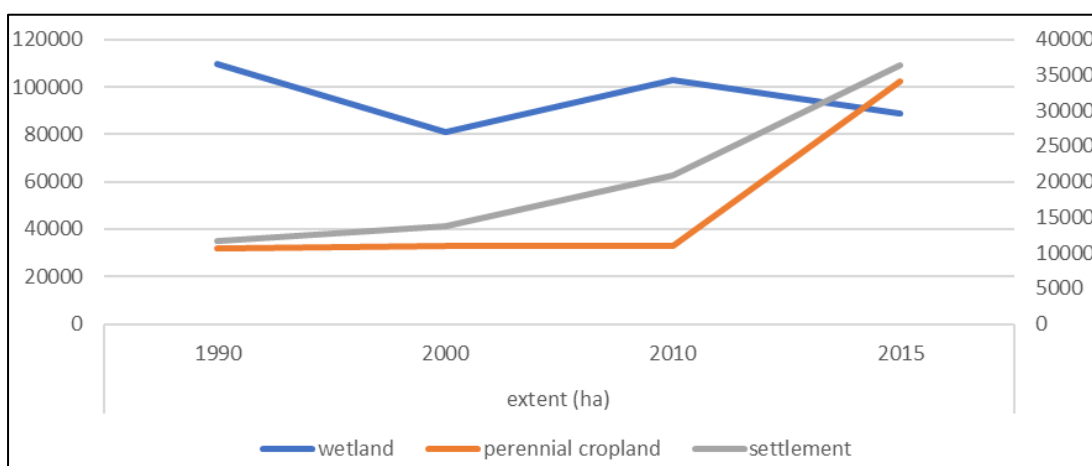


Figure 2: Decline in extent of wetlands relative to settlement and perennial agriculture. (Adapted from Rwanda Natural Capital Account Report 2018)

The GoR, through its wetland policies, development plans and commitment to various national and international conservation and development targets, aims to protect existing wetlands and restore degraded wetlands. As Rwanda develops and urbanizes in high rainfall and hilly terrain areas such as Kigali, the GoR recognizes the risk of increased runoff into the valleys and the need to protect wetlands to help mitigate flooding and support filtration. Once restored, the GoR aims to utilize the wetlands in Kigali for education about Rwanda's natural assets and to provide space for recreation and contemplation, and for some wetlands, managed agriculture.

Kigali is surrounded and traversed by several streams, rivers and lakes and is delineated into 25 watershed areas (Figure 3). Lake Muhazi lies along the border of the city northeast of Gasabo District. Nyabarongo River borders Nyarugenge and Kicukiro Districts along the southwestern edge of the city and is the river to which most of the city's other rivers and streams are tributaries. It flows to Lake Rweru and is part of the Nile River Basin via the Akagera River. The Yanze, Kibumba, Rwazangoro and Ruganwa Rivers all drain into Nyabugogo River, which flows into the Nyabarongo River to the west of Kigali (2050 Kigali Master Plan).

These waterbodies provide valuable water supplies, drain stormwater, and contribute to the physical beauty and character of Kigali. However, there are several challenges, including the turbidity of the Nyabarongo River due to high sediment load from soil erosion in the catchments and other polluting content inflowing from sewage and stormwater runoff. Agricultural areas are a source of sediment, pesticides, and chemical fertilizers, which further degrade the water quality of these waterbodies. Urban development and land cover change are increasing the impermeable surfaces in Kigali's catchments, leading to increased stormwater runoff and localized flooding. This compounds the already existent challenge of flash flooding and landslide risks associated with the hilly topography and steep slopes of the city causing significant damage, cost and loss of life. Flood risks are high in the

valley and wetland areas of Kigali to which the catchments drain, including along the Nyabugogo, Gikondo, and Nyabarongo Rivers. Preservation and restoration of the natural drainage channels across the catchments in Kigali is an important strategy for managing flooding, especially in the absence of developed stormwater drainage infrastructure in much of the city (2050 Kigali Master Plan).

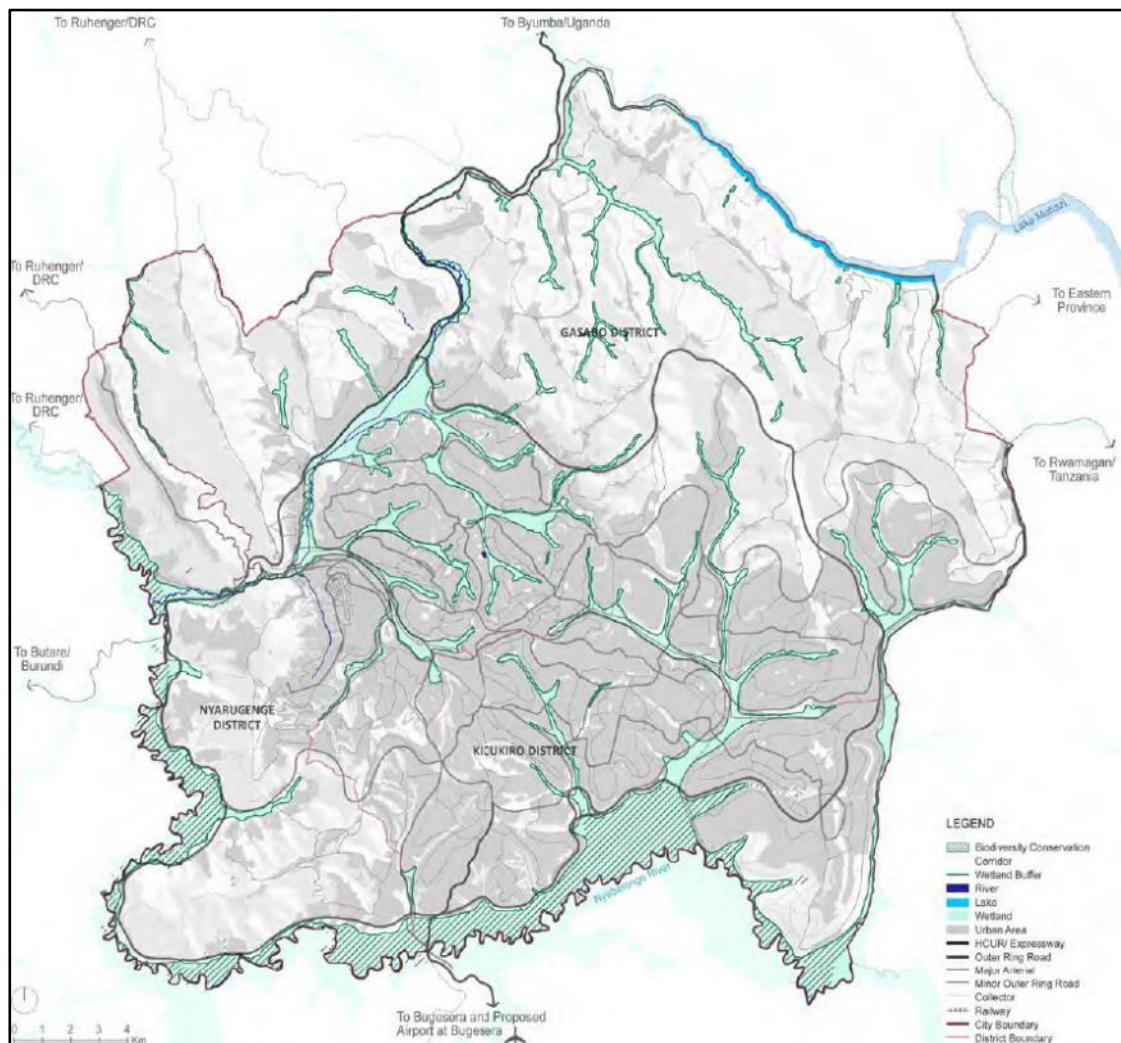


Figure 3: Kigali city wetlands and waterways (Kigali Masterplan 2050).

Wetlands are protected in Rwanda under various laws (Section III), including the Organic Law. REMA is responsible for enforcing wetland regulations; thus, any planned development activity encroaching on or impacting wetlands must be approved and coordinated with REMA. Through Prime Minister of Rwanda's Order No.006 of 13/02/2017 12, four wetlands in Kigali are to be designated as wetlands of international importance under the Ramsar Convention:

- Kitagurizwa Wetland (Gasabo and Kicukiro Districts)
- Rugende-Isumo Wetland (Gasabo and Kicukiro Districts)
- Nyabarongo-Aval Wetland (Nyarugenge and Kicukiro Districts)
- Nyabarongo-Amont Wetland (Nyarugenge District)

While Nyandungu wetland is not slated to be designated as a wetland of international importance under the Ramsar Convention, it is a priority conservation and development priority for the GoR and the city of Kigali.

To ensure the protection of wetlands, various land uses have been delineated in the wetland legal framework of Rwanda (Table 2). (2050 Kigali Plan).

The Kigali Development Plan outlines clear wetland protection (net zero loss) and restoration targets. Section 8.2 specifically mentions ecosystem rehabilitation focusing on urban wetlands (Nyandungu and Kimicanga). The sustainability framework (Tables 3 and 4) highlights wetland and highland conservation targets, and the plan includes specific spatial targets for wetland conservation (Figure 4).

WETLAND PROTECTION AND USE AS REGULATED BY THE ORGANIC LAW (2005)	
Total Protection wetlands:	Protection as its natural state no agriculture and other activities will be allowed. There are no natural wetlands left within the Kigali City limits except for a few patches of Nyabarongo wetland
Conditional use wetlands:	Allows continuation of existing agricultural activities and conditional use for projects (farming, clay extraction, recreational, etc.) with proper EIA assessment (wetlands mainly along the rural areas). Final authorization of such projects would be granted by REMA
Unconditional use wetlands:	Will not require environmental impact assessment but no development activities will be allowed. These wetlands could be used for recreation, parks, fishing ponds, horticulture etc. (wetlands mainly along the urban areas of Muhima, Kimihurura, Kicukiro etc.)

Table 2: Rwanda (2005) law on wetland protection and land use.

Component	Key Issues	Direction	Challenges	Recommendations
Environment Green & Efficient City	Nature areas: • Urban areas prone to landslides and flooding • Unplanned developments on steep slopes • Deforestation • Encroachment of wetlands	• Clearance of development in steep slopes and wetlands and acquire land for relocation • Restoration of steep slopes and wetlands • Afforestation	• Implementation mechanism and cost of land acquisition & relocation • Cost for programming and implementation restitution of nature areas	• Conserve all slopes above 30% • Conserve all wetlands • Prepare redevelopment schemes to relocate people from steep slopes and wetlands • Prepare strategies for rehabilitation and for management of slopes, forests, and wetlands • Explore possibilities for sustainable exploitation of nature areas for economic gain creation of green jobs

Table 3: Updated Sustainability Framework for City of Kigali prioritizing wetland conservation and restoration (bold added for emphasis) (Kigali Development Plan 2050).

KEY THEMES	PLANNING APPROACH & STRATEGIES	TARGETS & KPIS
WET LANDS AND WATERBODIES	- Development of Integrated Water Resource Management Plan (with Wetland, Water Bodies, Watershed and Stormwater Management Plans and Strategies). - Development of Wetlands and Waterbodies Management Manual - Awareness Campaign and Capacity Building Trainings - Protect wetlands allowing for recreational activities, agriculture and local material extraction in agreement with authorities - Participatory Programs and Action Plans - Promotion of Sustainable Wetlands and Waterbodies Use and Leverage protected natural resources for economic activities - Preservation and Restoration of wetlands and waterbodies encroached upon by human livelihood and urbanization activities - Relocation/resettlement of households inhabiting restricted and hazardous areas including protected wetlands. - Integration of Wetlands, Water Bodies and Natural Drainage Channel Restoration into design and development of green open spaces, urban parks and landscapes, and green city trails/corridors - Promotion of Long-term Phased Reduction of Wetland Cultivation and Increased Upland Agricultural Area (including household kitchen gardens and green roofs)	- Development of Integrated Water Resource Management Plan (with Wetland, Water Bodies, Watershed and Stormwater Management Plans and Strategies). - Development of Wetlands and Waterbodies Management Manual - A citywide Wetland Management Plan - Plan for management of agricultural practices in wetland areas - Zero net-loss of wetlands and waterbodies 20 m mandatory buffer for wetlands (Organic Law) 10m mandatory buffer for rivers and 50m buffer for lakes - Restoration of wetlands encroached for urban uses - Protect wetlands allowing for recreational activities, agriculture and local material extraction in agreement with authorities

Table 4: Goals and strategy for the Kigali Green City wetlands and waterbodies (Kigali Development Plan 2050).

The Kigali 2050 Development Plan depicts target areas for wetland conservation (Figure 4).

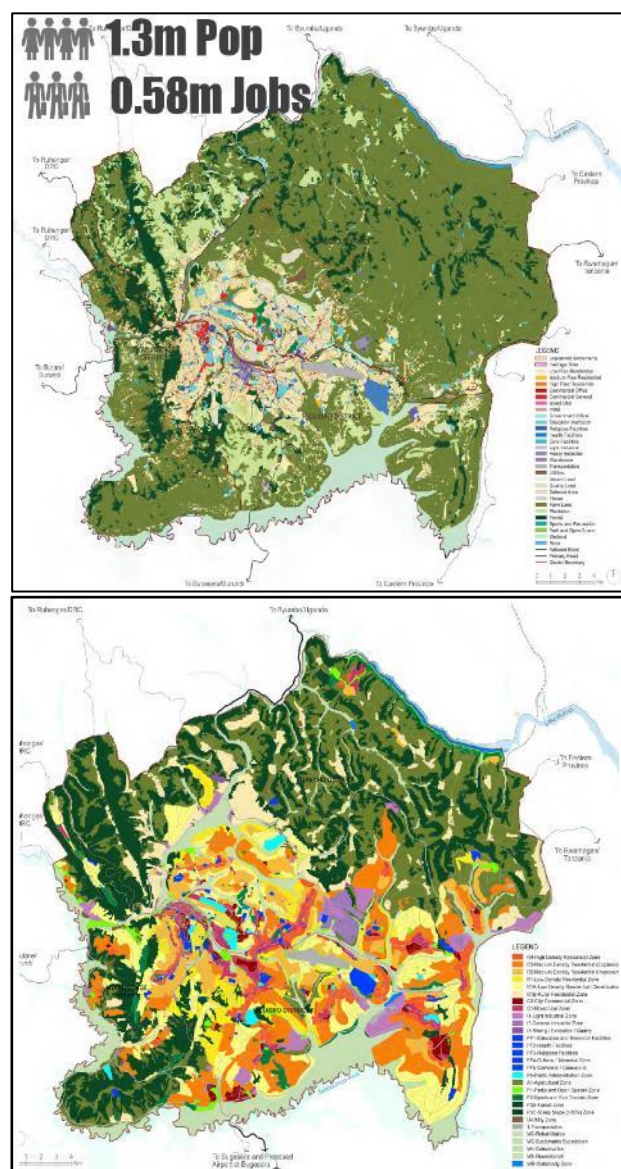


Figure 4: Top map: 2018 Kigali land use status. Bottom map: 2050 vision (wetlands depicted in light green). (Kigali Development Plan 2050).

Wetlands and Urban Parks

Rwanda's commitment to protecting and restoring its wetlands is clearly outlined in its national policies and strategies, and supported by the global recognition of the ecological, economic, and social value of wetlands.

Wetlands are rich in biodiversity and ecological goods and services and yet they are threatened globally. Due to development pressure in urban settings, there is increasing pressure on wetlands in cities and peri-urban areas for development space, agriculture, and overall use. In addition, flow of domestic sewage, pesticides, fertilizers and industrial effluents, encroachment of invasive species and eutrophication, threaten the quality of wetlands.

Urban wetlands are important globally in maintaining urban landscape by acting as the basic ecological infrastructure for the growing cities and studies have demonstrated that urban parks are immensely valuable for urban ecosystems and human well-being (Maller et al. 2005, Sherer 2006).

Urban Park Benefits

- Physical and psychological health
- Strengthening communities
- Make cities and neighborhoods more attractive places to live and work.
- Improve ecological conditions within cities.
- Protect local biological diversity
- Protect important ecosystem services such as water and air filtration, and pollination
- Garner conservation support
- Help people understand conservation

Urban parks contribute to the protection of biodiversity and play a major role in maintaining ecosystems. They help people understand the natural environment and provide citizens with the opportunity to engage in physical activity, cultural events, and quiet relaxation.

Studies have shown that urban parks positively influence quality of life for people of all ages (Maller et al. 2005). For example, spending time in or near nature lowers blood pressure and cholesterol levels, enhances survival after a heart attack, hastens recovery time after surgery, reduces anxiety and stress, and enhances one's ability to function effectively (Frumkin 2001). In addition, contact with nature has also been linked to reduction in crime and aggression (Kuo 2001). Contact with nature significantly improved the symptoms of children with attention disorders and teens with behavioural disorders (Frumkin 2001, Louv 2005).

Exposure to nature when engaging in physical activity is shown to enhance health (Bodin & Hartig 2003, Pretty et al. 2007). Physical activity is an indispensable part of staying healthy, reducing stress, fighting obesity, and preventing chronic conditions. City parks enable citizens to maintain overall well-being by providing space for recreation and contemplation. In addition, studies have shown that volunteering for outdoor stewardship activities increases social connections and greater community cohesion (Maller et al. 2005; Moore et al. 2006; Pretty et al. 2007; Stone 2006), something that is very apparent in Rwanda through the practice of *umuganda*. Urban parks also facilitate community cohesion by providing meeting places where community members can interact.

Urban parks contribute to the aesthetic quality of cities and neighbourhoods by providing green spaces. Nature plays an important role in creating vital neighbourhood spaces that not only bring neighbours together, but that also strengthen neighbourhood social ties (Sullivan et al. 2004).

Nyandungu Urban Wetland Eco-Tourism Park

Recognizing the value of wetland parks, the GoR through REMA is working to establish the Nyandungu Urban Wetland Eco-Tourism Park, which is envisioned to support ecological function, environmental education, and space for recreation and relaxation for the population of Kigali. In addition, REMA is interested in developing the wetland in a way that provides an attraction for international visitors in Kigali. REMA wants NUWEP to contribute to the need for recreational space as outlined in the City of Kigali Master Plan and demonstrate that wetland conservation can have economic, social, and environmental benefits to the inhabitants of Kigali, Rwanda and visiting tourists. NUWEP will provide much needed recreation space in the city, improve the health and well-being of the population, educate citizens on the importance of biodiversity conservation and environmental management, and provide an important natural asset to future generations of Rwandans.

Aim and Objectives

In 2012, a feasibility study for the development of the NUWEP was developed for REMA. In 2017, a second report on the design of the proposed Park was developed: Developing an Improved Design Plan of the Park and Construction Supervision of Nyandungu Urban Wetland Eco-Tourism Park.

Since the publication of these studies, significant work has been completed by REMA and partners in developing infrastructure in the Park and restoring the wetland. This report aims to provide relevant updates, as well as highlight the Park's status and potential opportunities for development and sustainability. This study will be followed by a business and operations plan, and a market analysis.

The specific objectives of this study are to:

1. Assess the status of NUWEP.
2. Provide relevant updates since the 2012 and 2017 reports.
3. Assess the existing institutional, policy and regulatory framework relevant to wetland management, eco-tourism, and parks.
4. Consider how to improve the protection, conservation and ecological enhancement of NUWEP.
5. Assess potential activities, financing, and management options.
6. Provide relevant updates on the existing conceptual plan for NUWEP.

NUWEP Vision

This study is guided by the vision for NUWEP outlined by REMA and the Ministry of Environment. NUWEP should:

- preserve the ecological function of the wetland
- improve the air quality and other environmental health for surrounding community and Kigali city
- represent the high-quality brand of Rwanda
- provide space for education, recreation, and contemplation
- cover its management costs (no need to generate revenue for other conservation areas)
- apply state of the art practices for environmental, economic, and social sustainability
- support low impact amenities and activities

The desired return on investment for NUWEP is:

- Ecological function of the wetland
- Enhanced waterflow and water quality
- Flood mitigation
- Access to nature for citizens
- Access to urban recreation areas for visitors

Study Design

This study was developed using the following methodologies:

1. Site visit to NUWEP
2. In person discussions, Zoom call engagement, and on-line surveys with key stakeholders
3. Desktop analysis, including review of prior reports, maps, literature, strategies, newspaper articles laws and policies
4. Assessment of case studies and global best practice

This report builds off the prior assessments that were completed for REMA and purposely does not duplicate the information; therefore, it should be considered an addition to the work that has been done by:

- Afrilandscapes. 2019-2021.
- JV Gasabo 3D and Astrik International. 2017.
- Gakuba. 2012.

The ecological restoration in Nyandungu wetland and the infrastructure development work in NUWEP was funded through grant finance from:

- The National Fund for Environment (FONERWA)
- United Nations Environment Program
- Italian Government
- Global Environmental Facility (GEF) through UNEP

Conservation Capital did a site visit on Wednesday, 24 November 2021, with members of the REMA team and Afrilandscapes. Figure 5 depicts where the team visited in NUWEP. In addition, the team walked and drove the outside boundaries.



Figure 5: Site visit by Conservation Capital team to NUWEP, 24 November 2021. Area walked indicated in yellow and the perimeters visited via road.

II. Situation Analysis

Site location

Kigali City has 37 wetlands covering ~7,700 hectares. Eight wetlands are highlighted in Figure 6.



Figure 6: Eight of Kigali's wetlands. Nyandungu wetlands located in the centre of the map. Other Kigali attractions particularly pertinent to international visitors are highlighted in red.

Nyandungu wetland is shared by the administrative sectors of Nyarugunga (Kicukiro District), Ndera and Kimironko (Gasabo District) in Kigali city. The wetland is approximately ~121.8 hectares and a total perimeter of approximately 6,730.8 meters (Figure 7). Nyandungu wetland is north of the Kigali International Airport. It is bordered to the south by the Kigali-Kayanza Road (RN3) and the road to the Adventist University to the west and the road to Ndera to the east. Kigali's industrial zone abuts Nyandungu to the north. Nyandungu wetland is drained by two streams: Mwanana and Kabagenda. Both flow into the Mulindi stream, a tributary of the Nyabarongo River.



Figure 7: Nyandungu wetland, north of the Kigali International Airport, Kicukiro and Gasabo Districts.

During moderate traffic, NUWEP is approximately 26-31 minutes from the Serena and Marriott hotels, 13-17 minutes from the Kigali Convention Centre and 23-27 minutes from the Genocide Memorial, all key areas in the city for tourists (Figure 8).

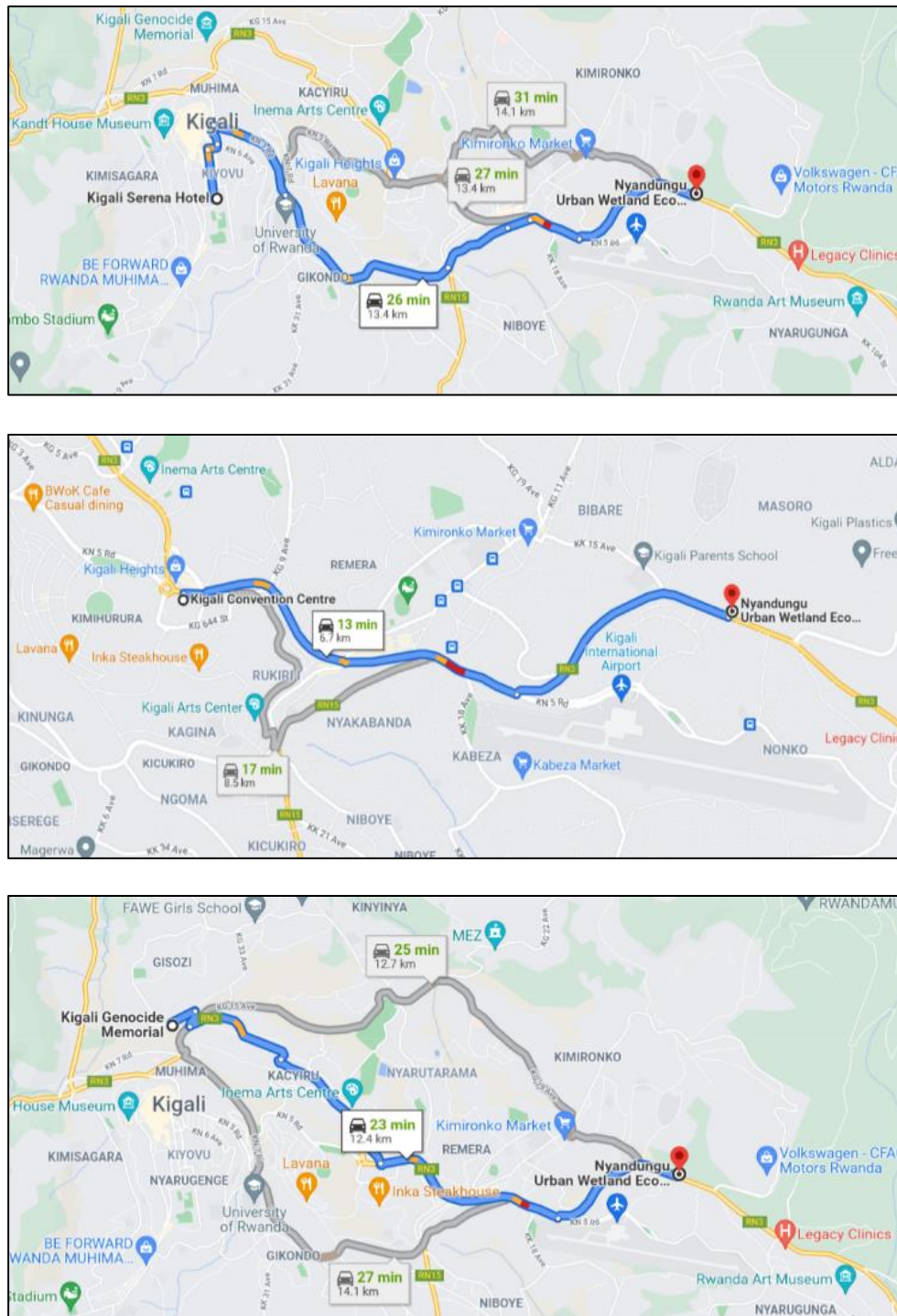


Figure 8: Distances from prominent tourism locations in Kigali to Nyandungu wetland during moderate traffic.

Background of Nyandungu Wetland

Nyandungu wetland was historically used for agricultural and pastoral activities. The wetland was polluted with sewage outflow from surrounding neighbours, as well as pollutants from road runoff, the industrial zone and urban development. The poor management of the wetland was leading to flooding of downstream areas. The site is flood-prone, which is due to three factors:

1. It is low land that receives water from the densely populated surrounding hills.
2. The soil is primarily clay, and the valley receives wastewater from various developments, such as the industrial zone, roads, and nearby households.
3. The Mwanana River is narrow and often flooded during heavy rainfall.

Historically, Nyandungu wetland was managed by the Ministry of Agriculture and Animal Resources. In the 1980s, it was comprised of sugar cane fields and crop nurseries. Thereafter, the wetland was transferred to the Ministry of Defence. Following the Genocide Against the Tutsi in 1994, the land was used for agricultural farming by private individuals, and for sand quarrying. A coffee washing station and other infrastructure were also developed during this period. The Ministry of Agriculture and Animal Resources wanted to develop fishponds and a Chinese company proposed to develop a bamboo nursery. In 2018, the wetland was transferred to REMA for management under the Minister of Environment. Subsequently, REMA has rehabilitated the wetland, which represents an incredible ecological restoration story, that mirrors Rwanda's country-level commitment to conservation and restoration.

For planning and management purposes, the wetland is divided into five sections (also referred to as Sectors), which are referred to throughout this report and depicted in Figure 9.



Figure 9: Five zones (Sectors) that comprise Nyandungu Wetland, Kigali, Rwanda.

Physical characteristics

Topography

Nyandungu Wetland is located at 1,360 meters and is surrounded by hills (Figure 10).

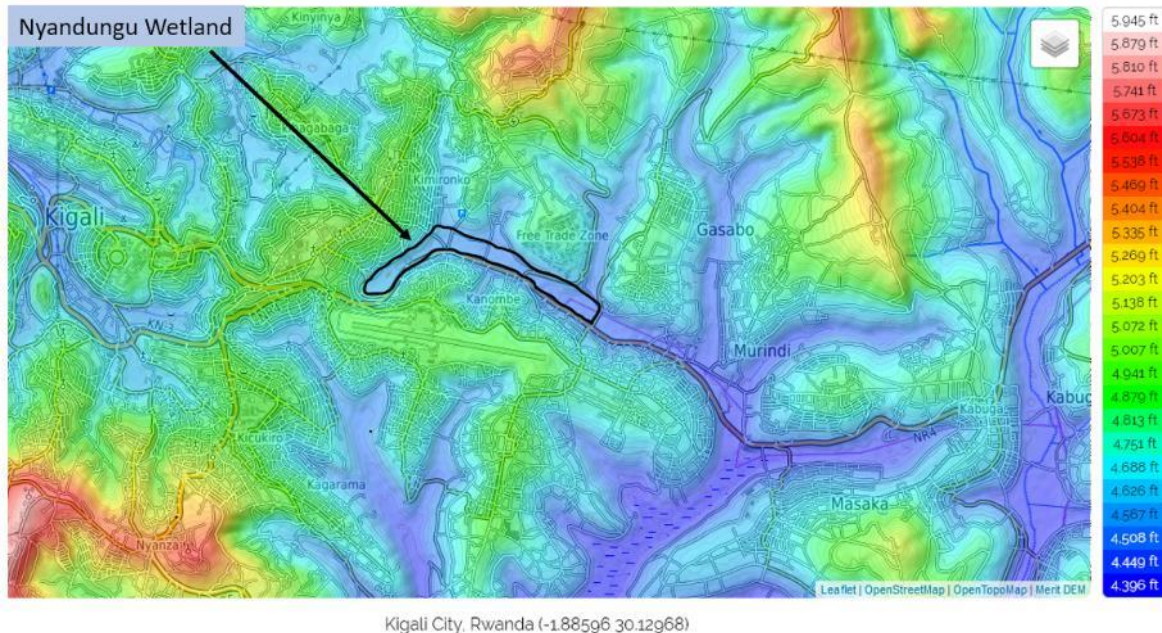


Figure 10: Topography surrounding Nyandungu Wetland, high elevation in the surrounding areas.

Nyandungu Wetland itself is relatively flat, with a linear ridge running along the north with hills at a maximum altitude of 1480 meters (Figure 11).

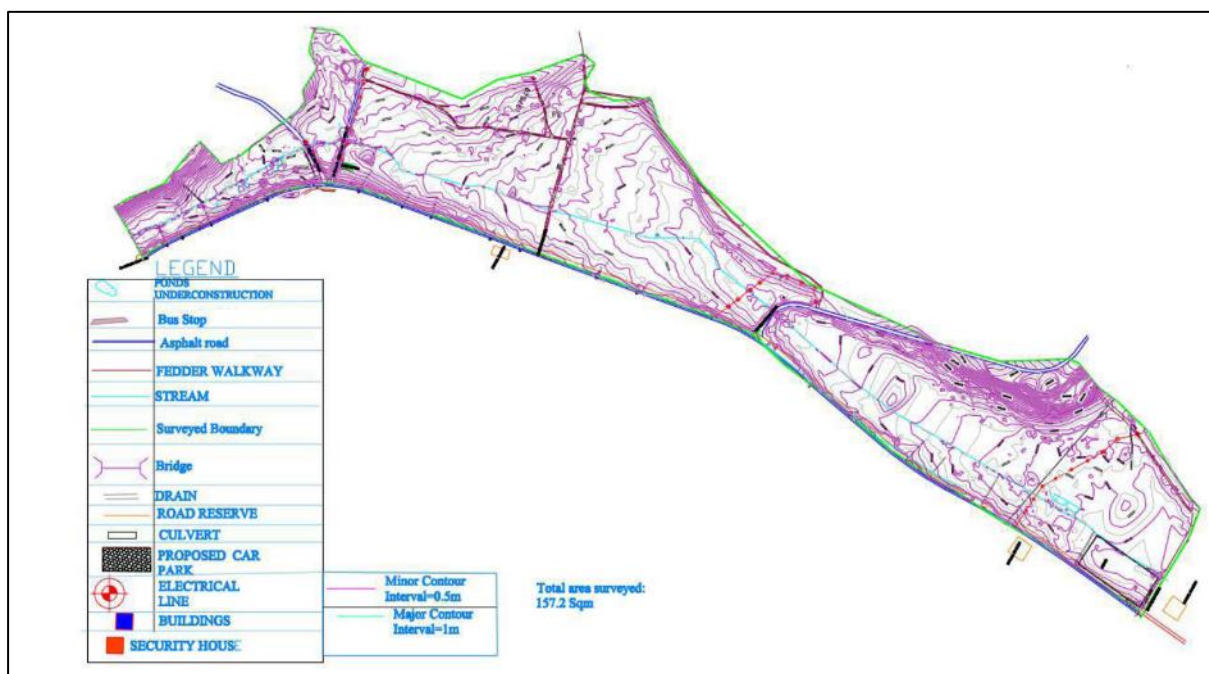


Figure 11: Topography of Nyandungu Wetland.

Geomorphology, Geology and Soils

The Nyandungu wetland is underlain by granitic rocks. The main parent materials from which the soils of the Nyandungu wetland area derived are quartzite, schist, granite, alluvia and colluvial (Figure 12).

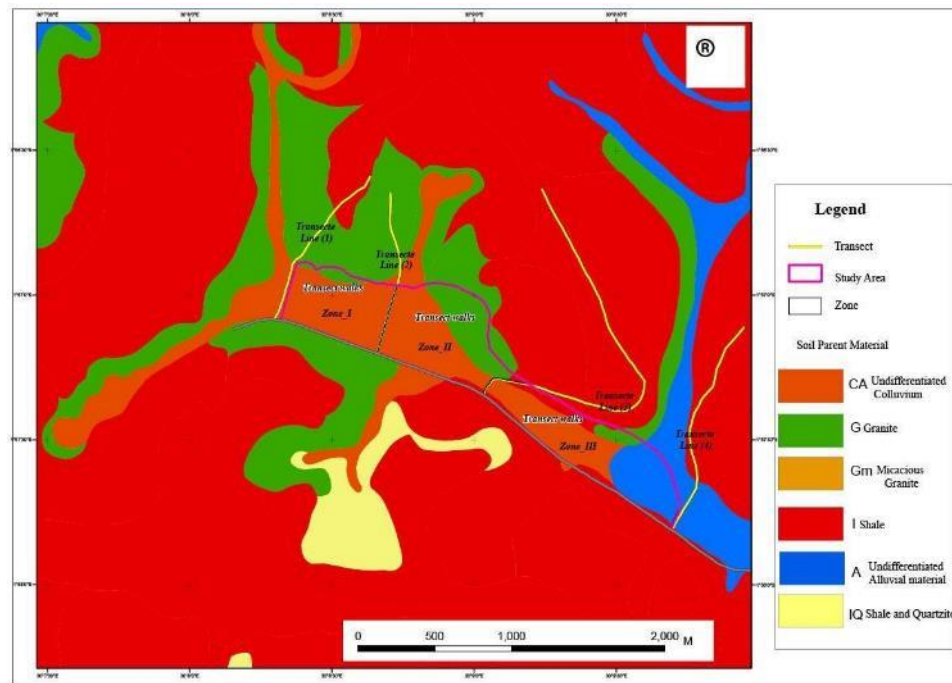


Figure 12: Soil Map in Nyandungu Wetland, depicting what was zone I, II, and III, now Sectors III, IV and V (Gakuba 2012).

The surface soils are dominated by alluvial soils typical for the marshlands, while the deep rock formation is dominated by granite with micas rocks. This type of rock formation is typical along the Nyabarongo River, which presents a fertile belt of alluvial soil suitable for agriculture and vegetation growth.

Two main soil series are Nyamatebe and Rwotsa. The Nyamatebe soil belongs to the taxonomic family of Fine, Mixed Iso-hyperthermic Cumulic Haplaquolls. These soils are developed from alluvial materials, their texture is clay, and they are yellow and present a Cambic development. They are poorly drained, deep, and not limited by a gravel pack. Their pedoclimate regime is aquic and/or iso-hyperthermic. The Rwotsa soil belongs to the family of Fine-silty, Mixed, Isothermic Aeris Umbric, Tropaquills. These soils are developed from colluvium and alluvium materials, they are silty-clay, yellow, imperfectly drained, deep (non-limited by a gravel pack) and show a cambic development. The Rwotsa soil is found in audic isothermic pedoclimate regime. The soils of Nyandungu valley are clay, silt, and sand (Figure 12). The sandy soils are predominant in the granitic area (north of the valley). Nyandungu wetland is characterized by clay soil at the centre and silt-sand at the ridge of the wetland (Gakuba 2012).

The soils in the buffer zone below the hills are predominantly fine silt mixed with Isothermic Aeris Umbric, Tropaquills soil. These soils are developed from colluvium and alluvium material, which are characterized by silt-clay, and are grey, imperfectly drained, and deep.



Photo 1: The clayey and sandy soils of Nyandungu Wetland (2012 Feasibility Report).

Climate and Hydrology

Kigali City (2°S), mean altitude equivalent to 1,500m, is located in the equatorial region. Its tropical climate is characterized by long wet seasons and relatively low temperatures as a consequence of its altitude (Tsinda, A, Ilunga, L.P. 2006). The monthly mean temperature is 21°C. The NUWEP area has relatively consistent temperatures throughout the year (16 – 17°C). Figure 13 depicts the average temperature and precipitation in Rwanda, and Figures 14 and 15 focus on Ndera, Masoro, Kimironko and Remera.

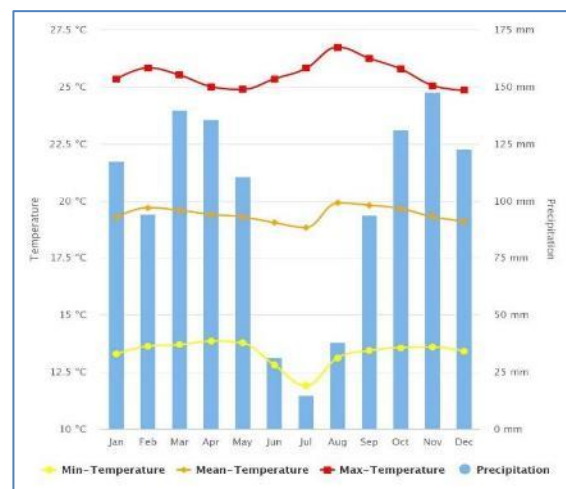


Figure 13: Average monthly temperature and precipitation in Rwanda between 1991-2020 (World Bank 2021).

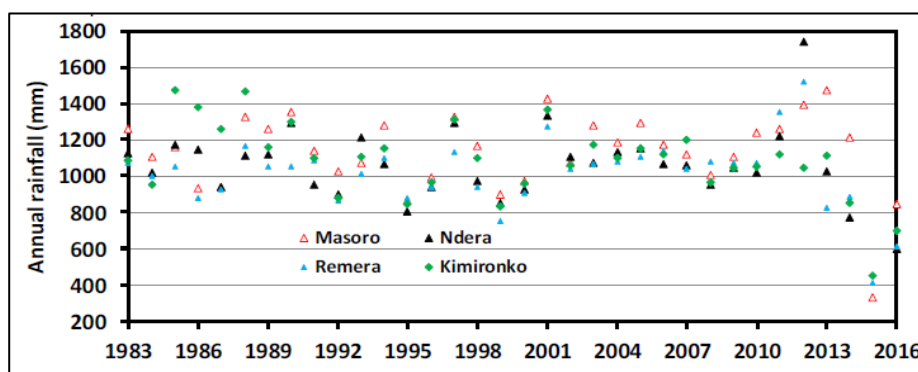


Figure 14: Annual rainfall for the Ndera, Masoro, Kimironko and Remera from 1983 to 2016 (Gasabo 2017).

The highest precipitation comes in March and April and October and November in Masoro, Remera and Kimironko (Figure 15).

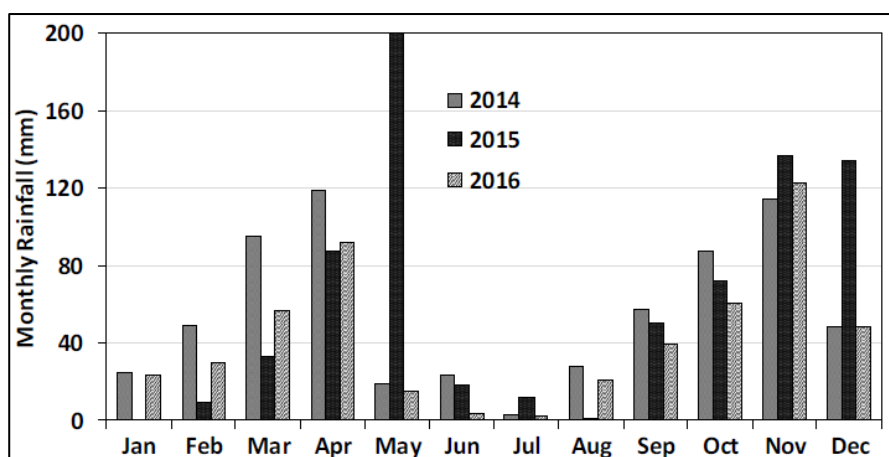


Figure 15: Monthly rainfall of Masoro, Remera and Kimironko, for the years 2014, 2015 and 2016 (Gasabo 2017).

While temperatures are relatively consistent, data between 1983-2016, show that temperatures are increasing (Figure 16).

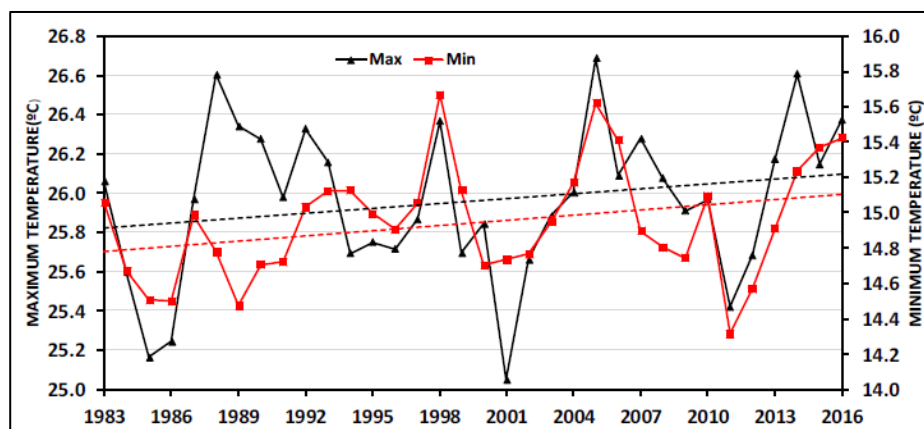


Figure 16: Trends of temperature variation in the Nyandungu Catchment, 1983-2016 (Average of Remera, Kimironko, Masoro and Ndera) (Gasabo 2017).

The Nyandungu valley is drained by two streams: Mwanana and Kabagenda (Photo 2). Both flow into the Mulindi Stream, a tributary of the Nyabarongo River. This catchment is an important contributor to the Nyabarongo wetland-river system that includes the Mugesera – Rweru wetland and the freshwater lake complex further downstream. It's somewhat low pluviometry annual module (996, 6 mm) and clayey sandy soils suggests relatively low runoff.

Photo 2: The confluence of Mwanana and Kabagenda streams (Ndera Road)
(Photo: 2012).



There are catchment areas around the wetland, which supports drainage (Figure 17).



Figure 17: Water catchment of NUWEP.

Flora

An initial flora surveys was conducted in 2017, using a grid map of 25 x 25 meters for stratified sampling. The survey identified 96 plant species belonging to 38 families. It found the herbaceous layer as the most dominant with 53 species, followed by shrubs with 21 species. Lianas were less represented in the wetland with only four species. The most represented family was *Asteraceae* (14 species) followed by *Poaceae* (12 species). An updated survey was conducted in 2020 and shows the growth in species. There are 372 identified species belonging to 76 families. The most dominant families are now the *Fabaceae*, *Poaceae* and *Asteraceae* with respectively 59, 52 and 45 species. The lists of the different plant species observed in Nyandungu between 2017 and 2019 are in Annex I, Table 16 and Table 17, as well as a summary of the species per family in Table 18.

Following the ecological restoration work in Nyandungu wetland, it is recommended that REMA partner with local universities to engage their students and train them on ecological assessments and monitoring to track changes in vegetation and other ecological aspects particularly following the later restoration and reforestation work conducted by Afrilandscapes.

NUWEP's vegetation (Figure 18) includes native and exotic species, and is further delineated as:

1. Exotic woodland
2. Acacia savannah
3. Mixed woodlands
4. Wetland vegetation (native and exotic species)

The following definitions were considered for this section:

- **Invasive plant:** An invasive plant is a plant that is both non-native and able to establish on many sites, grow quickly and spread to the point of disrupting plant communities or ecosystems.
- **Exotic plant:** An exotic plant is a plant that is non-native to the continent on which it is now found e.g., plants from Europe are exotic in Africa.
- **Native plant:** A native plant is the balance of nature that has developed over hundreds or thousands of years in a particular region or ecosystem.



Figure 18: NUWEP vegetation cover (2021).

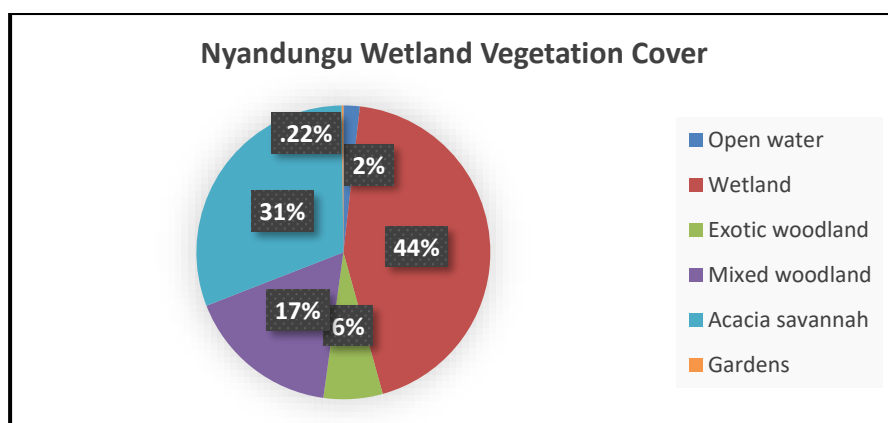


Figure 19: NUWEP vegetation cover percentage (2021).

The approximate vegetation cover is further broken down by Sector (Table 5). Sector V includes the largest area of wetland followed by Sector III.

	Open water	Wetland	Exotic woodland	Mixed woodland	Acacia savannah	Gardens	Total area (Hectares)	Total %
Sector 1	0.21	5.06	0	2.86	0.15	0	8.28	7%
Sector 2	0	2.33	0	0.82	0.77	0	3.92	3%
Sector 3	1.09	8.65	4.75	0.87	13.51	0.1	28.97	23%
Sector 4	0.44	6.46	3.31	3.1	16.83	0.12	30.26	24%
Sector 5	0.49	31.89	0	13.3	6.84	0	52.52	42%
Total Area (Ha)	2.23	54.39	8.06	20.95	38.1	0.22	123.95	
Total %	2%	44%	7%	17%	31%	0%	100%	

Table 5: Breakdown of area of coverage (hectares) of different vegetation types / management zones per Sector. Note there is a discrepancy between the total hectares because of the use of Google Earth and maps, but this provides a general estimate.

Historically, Nyandungu wetland was highly utilized and cleared. Under the management of REMA, the area has started to recover with active ecological restoration. The vegetation types identified above are the primary landscape types and management units.

The wetland zone is dominated by reeds in the genus *Typha* with pockets of *Papyrus* which are adjacent to areas of sedges composed of various *Cyperus* species. Contiguous to the wetland zone, in most Sectors, are areas of open acacia savannah with quickly maturing specimens of *Acacia polyacantha*. Beyond the savannah areas are two types of woodland. To the southern side of the wetland in Sectors III and IV is a lush woodland of primarily exotic tree species including *Casuarina*, *Grevillea*, *Jacaranda*, and others, which are listed in the Annex. The dominant feature of this woodland, that effectively shades the cycle and walking paths, is the stands of exotic *Bambusa* (bamboo). For the time being, removal of these species is not recommended. The other woodland type is described as mixed woodland and has been specifically planted in the landscaping project to follow the boundaries and paved paths elsewhere in NUWEP. This vegetation type is currently most developed on the northern side of Sector I & V where stands of *Podocarpus* and *Croton* are already providing significant shade and forming a nascent woodland.

As an urban site that has been significantly disturbed over the years, alien plant species are to be expected. Some alien plants are evident at least on the fringe of the wetland and in other areas of NUWEP and include most significantly invasive species such as *Lantana camara*, *Ricinus communis* and *Psidium guajava*.¹ *Lantana camara* is also the biggest threat to the savannah areas with some invasion of the areas north of the wetland in Sector V evident. Elsewhere on disturbed soils, *Datura* is relatively common. Of concern is the propagation of alien species in the medicinal garden, notably *Cassia (Senna) didymobotrya* (sometimes thought to be indigenous but is in fact introduced to Rwanda and is invasive²) and an *Opuntia* species³. Given the risk of some of these species being dispersed downstream by waterflow and impacting further ecosystems every effort must be made to remove them. There is also reference in a previous feasibility study to the planting of *Morus alba*, another invasive species that must be removed.⁴

Fauna

An inventory of mammalian fauna has not been completed and is recommended. A number of species, ranging from rodents to small carnivores, are very likely to occur based on their presence elsewhere in Kigali. Examples are marsh mongoose, blotched genet, and the striped weasel. There are reports of vervet monkeys occasionally visiting the site, as well. (Afrilandscapes *Per comm*).

More than 100 species of birds have been identified making NUWEP an interesting and exciting site for urban birdwatching by Rwandan citizens/residents as well as foreign visitors. It is expected that at least 130 species will be recorded as residents or regular / migratory visitors. The list provided in Annex I, Table 20 was generated over the course of a collective five visits by the Conservation Capital team and two well-known Kigali birders.

The restoration of Nyandungu wetland might result in the reintroduction of new species, such as birds, fish, and small mammals. Regular monitoring should be conducted to track the ecological recovery and restoration.

1 This plant, propagated by birds, produces a fruit loved by birds, monkeys and humans, making it easily dispersed. *Psidium guajava* or Guava can be highly invasive. While it may not yet have been noted to be invasive in Rwanda, there is abundant literature attesting to its invasiveness in other African countries, such as in Kakamega, Kenya. CABI (once again citing Witt & Luke, 2017) regard it as invasive in Rwanda: <https://www.cabi.org/isc/datasheet/45141>. See Kawawa et al 2016.

2 The literature is unclear on whether *Senna didymobotrya* is indigenous or introduced to Rwanda. No doubt it is naturalised. While *S didymobotrya* was collected in Akagera in 1959, there are dissenting views on this collection. See <https://www.cabi.org/isc/datasheet/20060234>; Witt A, Luke Q, 2017; [https://www.prota4u.org/database/protav8.asp?g=pe&p=Senna+didymobotrya+\(Fresen.\)+Irwin+&+Barneby](https://www.prota4u.org/database/protav8.asp?g=pe&p=Senna+didymobotrya+(Fresen.)+Irwin+&+Barneby); and <https://dp.la/item/11224048ed2066d66e9db8f6b34d5726>.

3 While this species can grow without being invasive (Ruhango and in Akagera National Park), it has been known to be invasive and should be uprooted. It is better to err on the side of caution and avoid planting plants in the *Opuntia* genus since the cladodes allow for such easy additional growth.

4 *Morus Alba* or Mulberry was introduced in 1981 to Rwanda. Since it had been difficult to find mulberry in Rwanda until in 2000's when a project of growing silkworms was initiated in Karongi region. Mulberry was planted in Sector 4 approximately 5 years ago with the intention to feed silkworms producing silk. Mulberries are easily propagated by birds, saplings might soon be found growing in the wetland, in areas where they are hard to remove. This should be carefully assessed by botanists in coordination with the wetland ecologists.

Ecological Restoration

NUWEP was historically severely degraded. However, over the past few years, under the management of REMA and with support from donors, the wetland has been actively restored. The central feature of the Park and the design is the wetland and the water system.

The Nyandungu wetland and its hydrological system and restoration are described in detail in the 2017 report by Gasabo (Chapter 4). The main restoration features included:

1. Restoring water flow
 - a. Stream widening
 - b. Removal of debris
2. Reviving wetland function
 - a. Erosion control
3. Construction of ponds for flood control
4. Soil stabilization
5. Removal of 'unwanted vegetation', invasive species and replanting / and / or natural recovery of native vegetation

Provision of adequate flow of water (stream flow) (1 above) is a key driving force in the functioning of the wetland. The presence of excess water within a wetland can adversely affect its biodiversity and ecosystem. In terms of hydrologic design, Gasabo 3D considered:

1. the number of streams discharging to the wetland
2. slope of contributing sub-catchments
3. the soil moisture regime
4. the hill slope geomorphology

Other important design parameters considered include slope shape (uniform, convex, concave), slope gradient and length, streamflow characteristics (e.g., braided, dendritic), soil depth to bedrock, bedrock characteristics (e.g., fractured, hardness, bedding), soil texture and permeability. The slope morphology of the hills of the sub-catchments, which discharge to the Nyandungu Wetland are convex (e.g., wide ridges). These slopes tend to disperse water as it moves downhill and contribute to the build-up of a hydrostatic pressure (for example, the Masoro, Bibare, Kanombe and Ndera Hills). The other sub-catchments are characterized by concave slopes which exhibit swales and draw the valleys of Nyarugunga, Mwanana and Kabagenda Streams. The slope shapes presented in Figure 20 provide information on accumulation or dispersion of surface and subsurface waters toward Nyandungu Valley.

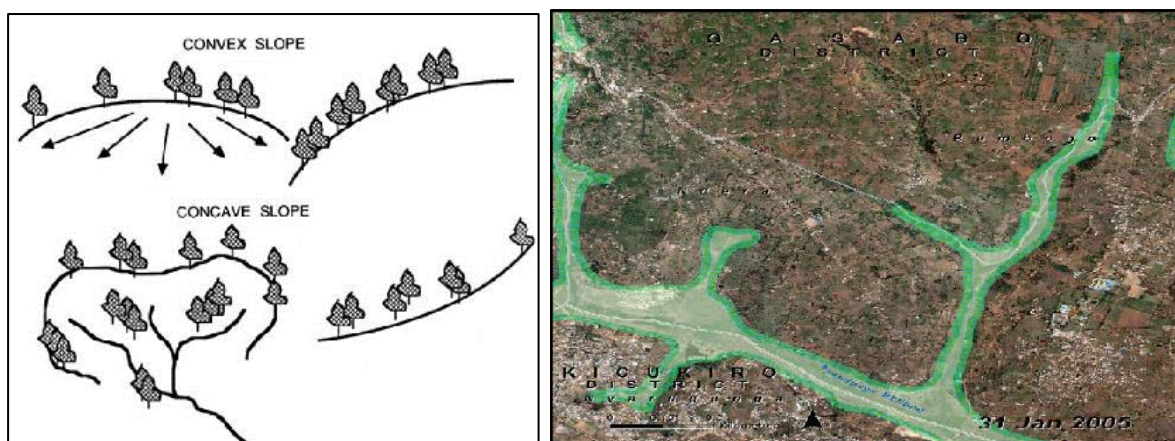


Figure 20: Typical slope morphology of the sub-catchments discharging to the Nyandungu Wetland (left) and a 2005 Google Map showing those sub-catchments (right).

The wetland restoration work was largely complete in 2020. The management team has experienced high rains during this period and therefore they are relatively comfortable that all the infrastructure, such as paths and buildings, can withstand the rains. Furthermore, they are confident that the water flow mechanisms developed to facilitate outflow (Photo 3) will mitigate flooding.



Photo 3: Restored drainageways developed to facilitate waterflow from NUWEP.

Socio Economic Activities in NUWEP

Although Nyandungu is legally protected and managed by REMA, residents have historically used the wetland. In the past, aside from agriculture, the area was used for cattle grazing, drinking water, collection of medicinal plants, materials for construction and collection of grass. Over the past few years, there has been a decline in use of the wetland by the neighbours. This is because a 'living fence' (a fence comprised of vegetation) has been planted, the area is no longer 'vacant' because of the workers in NUWEP, and there is greater awareness about REMA's management oversight. Nonetheless, use by neighbouring people continues.

REMA is trying to manage utilization of NUWEP by the surrounding population. Their main use is the collection of grasses. Registered farmers living around the area are permitted to utilize the area for vegetation collection (grass cutting). They are given orange vests to indicate that permission has been granted. While there is still illegal encroachment, it has decreased since the active restoration commenced.

To ensure that the adjacent neighbours support NUWEP, their continued ability to access certain resources in a managed way is important. In addition, there is land outside of NUWEP that might be used to develop a grass bank or tree plantation that could be managed and used by the local neighbours. For example, on the northeast section of Sector V there is an area that was slated for a parking area. In addition, on the plot where Afrilandscapes has their office, space might be maximized to include other use. This would alleviate pressure on NUWEP and create positive relations with the neighbours. Moreover, the carefully managed removal of 'excess' grass and reeds could potentially mimic the role of large herbivores and play a management / maintenance function within NUWEP.

NUWEP Infrastructure

Between 2019-2021, significant infrastructure has been developed in NUWEP following the 2017 designs. This section outlines the current infrastructure.

Throughout the Park, specific material was used to enhance the ecological restoration of the wetland and to develop and ensure the durability of the Park (Afrilandscapes).

- Foundation: the foundations of all buildings are made with RC footings, sub columns, ring beam and stone masonry infill.
- Walls: the walling is cement blocks cladded with volcanic cut stones and paintings interior.
- Finishing: made of stone cladding, paint, timber ceiling and floor tiles.
- Roofing: roof shingles are on all the buildings.

The selection of the material was based on the type, cost, the carbon footprint, life cycle and their ability to be recycled. Hence, the selection of volcanic stones cladding for walls, the construction the gates, the restaurant, some benches, and walkways as it is a recyclable and local material. These rocks are also known to facilitate natural ventilation and have strong resistance to different climate making it durable.

1. Two Entrance Gates

There are two entrance gates (Photo 4), one off the Kigali-Kayanza Road (RN3) and one off the road to the Adventist University. Each entrance has a:

- Green wall made of volcanic stones with hidden joint cement mortar
- A gate with a green metallic facial board
- Signage made of stainless and metallic cut with a silhouette of an acacia tree, the logo of the Park
- A gate house, a masonry wall cladded with well-cut volcanic stones.
- An automatic boom gate
- A still 'U' shape gutter for rainwater collection



Photo 4: Main entrance gate on the Adventist Road.

2. Two Parking Lots

There is a parking lot at the main entrance off the Kigali-Kayonza Road (RN3), which has capacity for 60 cars, and a parking lot off the entrance on the road to the Adventist University, which has capacity for 50 cars. There was a plan to develop a third parking lot north of Section V, which was not pursued because of budget limitations.

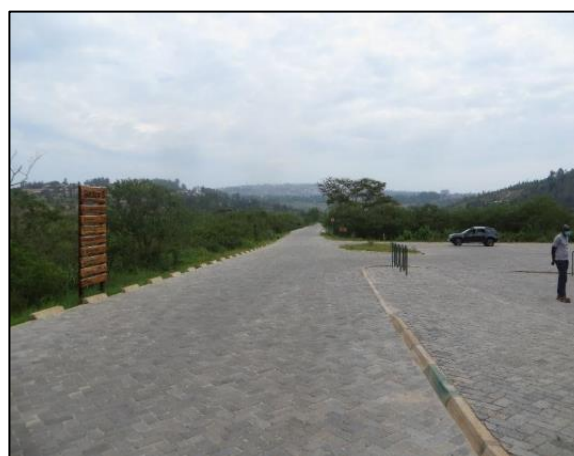


Photo 5: Parking lot off of the Kigali-Kayonza Road and near the information center located off of the Kigali-Kayonza Road.

3. Information Centre

An information centre (Photo 6) is located just inside the entrance gate off of the Kigali-Kayonza Road. It is a three-room facility which includes an office space, a general entry way / atrium that is envisioned to have maps and other educational information, and a room for a shop. There are restrooms also at the information centre. The information centre is also equipped with fire alarms, a first aid nursing station and a CCTV room. The building has several ventilation louvers made of steel alternating with glass for lighting purposes.



Photo 6: Information Centre located just inside the gate off of the Kigali-Kayanza Road.

4. Restrooms

There are three restroom facilities at NUWEP: at the information centre; near the entrance off the road to the Adventist University; and at the restaurant. Mechanical and sanitation plans, and drawings were developed for REMA by Gasabo Design 3D Ltd. in 2017.

A septic design was completed by Gasabo 3D to drain all the water used in the different restrooms into one of the two Sewage Treatment Plants (STP) present in Sector 3 & 4. These seem to be well designed and function well and will need to be monitored when the Park opens and there is more use.

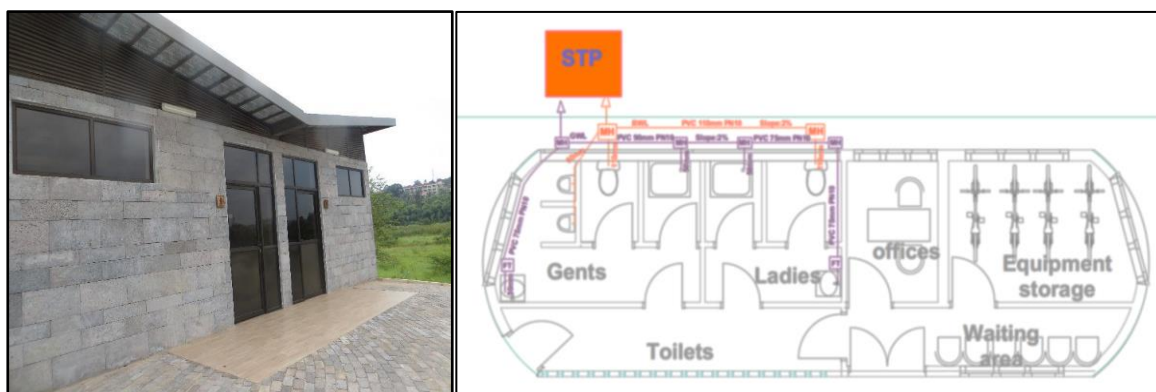


Photo 7: Restrooms located in the parking lot at the entrance located off the road to the Adventist University and the drainage water plumbing plan.

5. Bike paths and Footpaths

Paved and unpaved paths were developed in Sections III, IV and V (Figure 21 and Table 6). The paved pathways are wheelchair accessible. The bike and pedestrian pathways are parallel and separated by vegetation or stones, with clear signage, which prevents conflict between the different recreation users.



Figure 21: NUWEP Track map (cyclist & pedestrian).



Photo 8: Bike paths (left) and pedestrian paths (right), and solar lighting along the path.

In Sectors II and III, there are more than 13 km of walking path.

Trails and paths developed in NUWEP (excluding the paved roads)					
Sectors 3 & 4	Existing (m)				
Cyclist (paved)	3,601	686	168	0	0
Pedestrian (paved)	3,144	691	161	0	0
Pedestrian (unpaved)	88	298	136	131	102

Table 6: Trails and paths developed in NUWEP (m) in Sectors III and IV.

6. Roads

The public road to the Adventist University cuts through Sectors II and III of NUWEP, and KK 15 Avenue cuts through Sectors I and II. There is a high quality, paved maintenance road that runs between the two entrances (Photo 9). This can be used for recreation. It also allows easy access to the Park. The roads that cut through the Park however bring noise, pollution, traffic and could spread exotic species. Buffering the Park from the road with native trees is one way to mitigate these impacts as well as monitoring for exotic species. The other challenge for consideration is safety. If someone is passing from one Sector to another across the road, they need to be cautious when crossing. REMA may

consider working with the city of Kigali to install cross ways so that vehicles and pedestrians are cautious and away of the crossing.



Photo 9: The public road to the Adventist University that cuts through Sectors II and III of NUWEP.

7. Restaurant

A restaurant was developed in Section III, close to the entrance off the road to the Adventist University. It has an indoor and outdoor dining area, a counter for serving, restrooms, and a relatively well supplied kitchen. This was developed using donor funding. The coffee shop company, Bourbon, is currently using the restaurant under a short-term arrangement. The restaurant's indoor and outdoor space has a capacity of 30-50 people. A picnic area with benches and tables is located nearby. The walls are made of volcanic stones and the wooden parts (floor, stairs and ramps) are made of Muvula wood. There is green metallic signage with the NUWEP logo and some louvers for natural ventilation and lighting. The restaurant is equipped with a solar panel for energy, a plastic tank to collect rainwater and large folding aluminium doors that can be opened, pending on the climate.



Photo 10: Entrance view and inside view of the restaurant, located in Sector III.

8. Solar

The pathways are lit with solar lamps. One of the goals is to power NUWEP completely by solar power to reinforce Rwanda's firm commitment to green growth and sustainability, and to create an eco-friendly park. There are also solar panels in the restaurant and the STPs.

Photo 11: One of the solar panel units in NUWEP used for lighting.



9. Living Fence

Trees and vegetation have been planted along the boundaries to create a living fence. In areas where the vegetation is thick and uninviting, the living fence works and deters incursion. A full list of the plants used for the living fence is included in Annex I, Table 19. However, in areas where it is thin, young, and dry, it does not work and thus access cannot be restricted. The inability to manage access creates a serious risk for REMA and the future manager of NUWEP. Given the potential high use of Sectors 3 & 4, it is recommended that a proper metal fence be built to secure these Sectors and provide a safe and managed environment for users. It is recommended that the living fence continue to exist, to create a natural buffer for the fence, which is aesthetically pleasing. A fence is expensive, and management of the fence is required. These considerations will be included in the business plan.

10. Signage

Attractive, numerous and high-quality signage has been erected throughout the Park, clearly delineating the paths, roads, location of key features, and directions. These will need to be maintained over time and as the Park opens, one of the questions users should be asked is whether they felt the signage was adequate. Information and interpretive signs have not been developed and this is described later and will be recommended in the business plan.



Photo 12: Signs erected inside the Park for directions and orientation.

11. Security

Cameras will be installed in the different pathways and at strategic locations such as the restaurant. Unrestricted access due to the lack of an effective perimeter barrier is currently the most significant security concern.

Additional photographs of NUWEP and the infrastructure are included in Annex IV.

12. Maintenance building

The site also has a maintenance building that is currently used for equipment storage. It includes an office, storage room and a washroom. Like the other buildings, it is made of well-cut volcanic stones and has a set of fixed windows to light the hall of storage and wire mesh for natural ventilation.



Photo 13: Photo of the front of the maintenance building.

III. Legal, Policy and Institutional Framework

This section outlines relevant legislation that guides the development and management of NUWEP.

1. International Conventions

Rwanda is a signatory to various international and regional multilateral environment conventions, which are directly or indirectly relevant to NUWEP. These should be considered when further development and activities take place in NUWEP.

Ramsar Convention on Wetlands

The *Ramsar Convention on Wetlands* is an intergovernmental agreement that offers the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources (REMA, 2011). This convention requires Governments to avoid pollution in wetlands. Through its restoration, Nyandungu wetland now fulfils four out of nine Ramsar criteria. An assessment should be done to determine compliance with the other Ramsar criteria. For example, in 2005, the Rugezi wetland in Rwanda was restored and became a Ramsar site in 2006. Ramsar status brings recognition to wetlands, enhances Rwanda's profile as a proponent for wetland conservation and may help the GoR catalyse additional resources for wetland conservation in the country.

Convention on the Conservation of Migratory Species (CMS)

The CMS was adopted to conserve terrestrial and marine migratory species. The convention's agreement on the conservation of African-Eurasian migratory water birds is specific on the need to protect the feeding, breeding, and wintering habitats, the main ones being wetlands and open water bodies (REMA, 2011). The convention is relevant due to the presence of migratory bird species and other relevant species in NUWEP. Increasing the number of species will support the Government of Rwanda's goal in fulfilling its commitment to the CMS.

United Nations Framework Convention on Climate Change (UNFCCC)

The UNFCCC provides the basis for global action "to protect the climate system for present and future generations." The Convention on Climate Change sets an overall framework for intergovernmental efforts to tackle the challenge posed by climate change. It recognizes that the climate system is a shared resource whose stability is affected by industrial and other emissions of carbon dioxide and other greenhouse gases.

The ultimate objective of UNFCCC and related legal instruments that the Conference of the Parties may adopt is to achieve, in accordance with the relevant provisions of the Convention, stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. Under the Convention, governments:

- Share information on greenhouse gas emissions, national policies and best practices.
- Launch national strategies for addressing greenhouse gas emissions and adapting to expected impacts, including the provision of financial and technological support to developing countries; and
- Cooperate in preparing for adaptation to the impacts of climate change.

Under the Paris Agreement on Climate Change, part of UNFCCC, Rwanda committed to developing Nationally Determined Contributions (NDC). The Government of Rwanda has outlined clear climate change objectives and NUWEP will help the Government fulfil its obligations around climate mitigation and adaptation. Through its renovation, NUWEP helps sequester carbon, helps to filter air pollution, and mitigate the impacts of climate change. By measuring NUWEP's carbon sequestration the Government of Rwanda can use this towards its climate targets and fulfilling its NDC. The target for the reduction of the GHG emission by 2030 were set following two models⁵:

- Unconditional contribution: A reduction of 16% in the year 2030; equivalent to an estimated mitigation level of 1.9 million tonnes of carbon dioxide equivalent (tCO₂e) in that year. This is an unconditional target, based on domestically supported and implemented mitigation measures and policies.
- Conditional contribution: An additional reduction of 22% in the year 2030; equivalent to an estimated mitigation level of 2.7 million tCO₂e in that year. This represents an additional targeted contribution, based on the provision of international support and funding.

The restoration of the Nyandungu wetland can contribute to both targets given the wetland sequesters carbon, and its engagement of domestic and international support. The wetland restoration also supports the objectives of Rwanda's NDC pertaining to water as show, in Table 7.

5

https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Rwanda%20First/Rwanda_Updated_NDC_May_2020.pdf

Water	1	To develop a national water security through water conservation practices, wetlands restoration, water storage and efficient water use.
	2	To develop water resource models, water quality testing and hydro-related information.
	3	Develop and implement a management plan for all level I catchment.

Table 7: Rwanda NDC selected adaptation interventions by sector (Water)

East African Community (EAC) Protocol on Environment

The protocol was contracted by the EAC partner states on 29 November 2003. Article 5: Paragraph 4 states that countries should promote sustainable utilization of water resources and article 6, paragraph 1 puts emphasis on improving water quality and controlling pollution. Rwanda can utilize the successful restoration of NUWEP when reporting as a member of EAC on its commitment and success in water conservation and utilization, and pollution management.

Sustainable Development Goals (SDGs)

Rwanda has adopted a roadmap for domestication and implementation of SDGs, which highlight economic development, environmental sustainability, and social inclusion. As part of this, Rwanda has developed an analysis of gaps in policy and indicators for measuring progress due to different measures and policies against baselines (MINECOFIN, 2016). Rwanda is committed to actions to increase resilience or adapt to and reduce emissions in the face of climate change. To this end, Rwanda has established a national environment fund, FONERWA (described below), and is accessing adaptation, mitigation, and resilience funding from all possible international sources, including the Green Climate Fund (GCF), multilateral development banks, and specialized climate funds, such as the Forest Investment Program, and the Pilot Program for Climate Resilience.

Rwanda is also developing a Result Based Monitoring and Evaluation (RBM&E) System as a tool for efficiently monitoring and assessing performance of environment quality and natural resources against development targets, and to help identify trade-offs between economics, environment, and natural resources plus constraints to development. Natural Capital Accounts (see WAVES below) are a relevant and important resource for developing indicators and tracking the progress on socio-economic, environment and natural resources targets against baselines under many of these initiatives.

NUWEP helps the GoR achieve:



Gaborone Declaration on Sustainability

In 2012, Rwanda signed the Gaborone Declaration on Sustainability in Africa (GDSA) and determined to use NCA as a tool to inform national sustainable development. GDSA encourages countries to collect and monitor information across ecosystems, agriculture, fisheries, and human well-being to provide information at multiple scales so that actors can make decisions with a better understanding of both the environmental and socio-economic consequences. Rwanda's NCA effort can support the GDSA approach and objectives.

Global Partnership on Wealth Accounting and Valuation of Ecosystem Services (WAVES)

In 2013, Rwanda joined WAVES and accessed World Bank technical assistance to support its NCA efforts. Based on early scoping efforts in 2014 and 2015, the Government determined to focus NCA

development on land, water, and mineral accounts. Water was identified as a key resource for domestic household uses and for agricultural production and an important input to most sectors of the economy. This report describes the first iteration of the water accounts developed with support from the World Bank and the WAVES Global Partnership. NCA will help determine NUWEP's ecological and economic value, and as REMA considers different payment for ecosystem service models in the future to support the management and conservation of NUWEP, the NCA will provide the relevant information to generate revenue from the ecosystem services.

2. Rwanda Legal Framework

Rwanda has a suite of legislation that aims to support the long-term conservation and sustainability of its natural resources. These need to be considered in the development and management of NUWEP.

The Rwandan Constitution

The Constitution of the Republic of Rwanda was introduced in 2003 following approval by a referendum held on 24 May 2003. The Constitution incorporates articles pertaining to protection of the environment. For example, article 4 states that each citizen has the right to a healthy and satisfying environment (Official Gazette of the Republic of Rwanda, 2003). The successful restoration and development of NUWEP is entirely consistent with the Constitution's article on environmental protection and, as per article 4, will provide citizens with a healthy environment at the Park itself and contribute towards creating a healthy environment through water and air filtration.

Law on Environmental Protection and Management

The Organic Law on Environmental Protection, Conservation, and Management is highly relevant to NUWEP. The legislation sets out the general legal framework for environmental protection and management and on avoiding and reducing negative impact on the environment (Official Gazette of the Republic of Rwanda, 2005). Article 65 further specifies that every project shall be subjected to environmental impact assessment prior to its commencement. Article 80 stipulates that buildings, various establishments, and motor vehicles and other movable properties that are publicly or privately owned, shall be constructed, exploited, and used in conformity with existing technical standards approved or indicated by implementation of this organic law.

According to Article 29, swamp land belongs to the state and no person can use the reason that he or she has spent a long time with it to justify the definitive takeover of the land (Tsinda and Abbott 2012).

The Use and Management of Land in Rwanda

Land use and management law determines how land should be used in Rwanda. It also establishes the principles that are respected on land rights as well as all other appendages natural or artificial. Chapter II of the law categorizes land according to its uses.

Article 12 of the law gives the state ownership over land as follows: land that makes up the public domain including lakes and rivers as listed by an order of the Minister having water in his or her attributions; shores of lakes and rivers up to the length determined; land occupied by springs and wells determined in accordance with an order of the Minister having water in his or her attributions; land reserved for environmental conservation composed of natural forests, national parks, reserved swamps, public gardens and tourist sites among others.

Article 29 gives the state control over swamps. The laws state that in order for the swamp land to be efficiently managed and exploited, a Minister having Environment in his or her attributions must give an order that shall determine a list of swamps and their boundaries. The law further requires that such a list shall clearly indicate the structure of the swamps, their use, how they can be organized so that they can be beneficial to Rwandan nationals on a sustainable basis. The ministerial order must

also certify the modalities of how swamp land shall be managed, organized and exploited. The management and further development of NUWEP will need to take this land use framework into consideration.

Environmental Impact Assessment (EIA) Regulations

Ministerial Order N°004/2008 of 15/08/2008 establishes the list of works, activities and projects that must undertake an environmental impact assessment and includes projects such as: construction and repair of international and national roads, plants, large bridges, industries, factories, hydro-dams and electrical lines, public dams for water conservation, large hotels and public building which accommodate more than one hundred daily, extraction of mines and public landfills among others (Official Gazette of the Republic of Rwanda, 2008). The manager of NUWEP will need to consider when and if any EIA is required for any further development in the Park.

The National Fund for Environment and climate change in Rwanda

FONERWA is a fund designed to support implementation of the “Green Growth and Climate Resilient Strategy” that was approved by Rwanda Cabinet in December 2011. FONERWA supports national priorities through the public and private sector, with a focus on key national objectives of poverty reduction and economic growth. FONERWA financed the development of NUWEP and has been a key partner.

FONERWA is a financing vehicle through which environment and climate change finance is channelled, programmed, disbursed, and monitored. As a national Basket Fund, FONERWA is an instrument to facilitate direct access to international environment and climate finance, as well as to streamline and rationalize external aid and domestic finance.

REMA’s Operationalization of FONERWA Final Report⁶ established that FONERWA will have a national identity and implement diverse funds intended to support different priorities of REMA and the Ministry of Environment.

3. Policy Framework

Below are some of the relevant policies that need to be considered in the development and management of NUWEP.

Environmental Policy

The overall objective of the Environmental Policy is the improvement of man’s well-being, the judicious utilization of natural resources and the protection and rational management of ecosystems for a sustainable and fair development (REMA 2010). The policy seeks to achieve this through:

- Rational management and utilization of resources and environment, integrating environmental aspects into all the development policies, planning and in all activities carried out at the national, provincial, and local level; and
- Improved health and quality of life for every citizen and promotion of sustainable socio-economic development.

This policy seeks to conserve, preserve, and restore ecosystems and maintain ecological and systems functions, particularly the conservation of national biological diversity; optimize utilization of resources to attain a sustainable level of resource consumption; and create awareness among the public to understand and appreciate the relationship between environment and development, ensuring participation of individuals and the community in the activities for the improvement of

⁶ Access report here:

https://rema.gov.rw/rema_doc/pei/FUND%20FOR%20ENVIRONMENT%20_FONERWA_FINAL_REPORT.pdf

environment. The successful restoration of the NUWEP wetland and the conservation of the natural resources in NUWEP are entirely consistent with the Environmental Policy and any management activity will need to follow this policy.

Tourism Policy

The overall objective of the Tourism Policy is to increase tourism revenues in a sustainable manner and generate profits for reinvestment and jobs. This will be done by developing new and distinctive, market-led products that are clearly positioned and promoted in the marketplace, and social-economic balance with the distribution of tourism benefits. For Rwanda, sustainable development incorporates environmental, social, and economic elements.

NUWEP provides tourists with a new and exciting urban activity. Business tourists who have a weekend in Kigali may utilise NUWEP. This enhances Kigali's brand and the overall tourism product in Rwanda, by providing a diversified experience to offer visitors.

Land Policy

The policy calls for rational use and sound management of national land resources and is based on master plans (Ministry of Lands, 2004). The policy provides for the development of land use plans based on suitability of the areas/lands, thus distinguishing the different categories of land and their purpose. To achieve the land policy objectives, the policy calls for the maintenance of marshlands in the state's private land and establishment of clear regulations for their sustainable use to avoid farming with negative environmental consequences, undertaking an inventory of marshlands and clarification of their location and purpose, and promoting specialization of marshland farmers and introduction of measures to avoid the division of land in smaller units. The reference to master plans is relevant for the development and conservation of NUWEP.

National Water Resources Management Policy

The National Water Resources Management Policy aims at fair and sustainable access to water, and the improvement of the management of water resources through reforestation on hillsides and water catchments areas (REMA, 2011). Given REMA's focus on the restoration of the NUWEP's water sources, the water resources management policy is very relevant to the site.

Disaster Management Policy

The goal is to increase the resilience of vulnerable groups to disasters. This policy presents the institutional structures, roles, responsibilities, authorities, and key processes required. The restoration of NUWEP helps the GoR as it considers flooding disasters. The design and restoration of the wetland, and consideration of the highland areas around NUWEP is part of Rwanda's disaster mitigation measures.

National Wetlands Conservation Program

This program engages various government ministries in wetland conservation and ensures a holistic approach to wetland management (REMA, 2011). Involved authorities will have proper coordination of activities concerning wetland management. The National Commission for Development and Reform, jointly with the Ministries of Finance Education Scientific Research and Technology Environment Lands Water and Natural Resources and Agriculture launched this program, which was supposed to run from 2002 to 2030.⁷ The main goal is to make sure all decisions regarding the exploitation and management of wetlands are approved by REMA. This program is relevant given REMA's role in its development and management.

⁷ <https://documents1.worldbank.org/curated/en/450511468009612926/pdf/E27810V30AFR0E00Box358357B00PUBLIC0.pdf>

National Biodiversity Strategy and Action Plan

This strategy defines the objectives and priorities for the conservation and sustainable management of biodiversity. The plan includes hillsides and wetlands, and protected areas amongst others. The strategy focuses on five major areas including: improved conservation of protected areas and wetlands; sustainable use of biodiversity in natural ecosystems and agroecosystems; rational use of biotechnology; development and strengthening of policy, institutional, legal, and human resources frameworks; and equitable sharing of benefits derived from the use of biological resources. The successful conservation of the wetland and NUWEP helps the Government of Rwanda achieve various aspects of the strategy, such as protection of wetlands, improved conservation of PAs and sustainable use of natural resources.

National Land Use & Development Master Plan 2020-2050

NLUDMP is Rwanda's national land use and development plan that outlines a vision and road map for 2050. The plan recognizes that Kigali City is predicted to have the highest population density in the country and indicates that more urban recreational spaces will be needed for the larger population. Section 12.4 (Human settlement and urbanization) outlines that the increase of people living in cities must result in sustainable growth. Section 16.3 on water and wetlands suggests, "Opening up and leaving 183 Km² of the wetlands to be used conditionally for other uses, recreation, research, tourism" (page 109), which directly correlates to the conservation of the Nyandungu wetland. Additionally, Section 16.6 on green urban development proposes, "that every city/urban development provide 20-25% of green spaces" (page 111), which NUWEP helps achieve

Kigali Master Plan 2050

Rwanda's vision for Kigali outlines a green growth strategy (principle 5) for a highly liveable, productive, healthy, and sustainable city. The plan outlines a strategy to reduce car dependency, manage open sprawl, and accommodate open spaces (section 3.5), such as NUWEP. It calls for more open spaces, the establishment of networks of parks and natural areas across the city, and the formation of neighbourhood nature parks (11.4.5 Table 11.2 - Kigali Master Plan 2013 aims for:

- One neighbourhood park per 15,000-20,000 people (1 hectare)
- One sub-city park per planning area (6 hectare)
- One sports field per planning area (1.5 hectare)

NUWEP is the first public wetland park in Kigali and will help achieve the Master Plan targets as well as create a guide for further development of other parks in the city. Section 11.8, outlines the open space plan, which includes developing wetland parks as public open spaces for the following benefits:

- Utilizing natural city asset for benefit of residents
- Restoration of wetland
- Recreation/tourism venue
- Vegetation can be used sustainably
- Habitat for migratory birds
- Replotting for open spaces will have the following benefits:
- Encourage social equity through public participation
- Improved accessibility
- Improved quality housing
- Improved public health and quality of life

National Strategy for Transformation

Rwanda's National Strategy for Transformation, (NST1/ Seven Years Government Program (2017-2024) sets priorities for a Green Economy approach in its Economic Transformation Pillar that

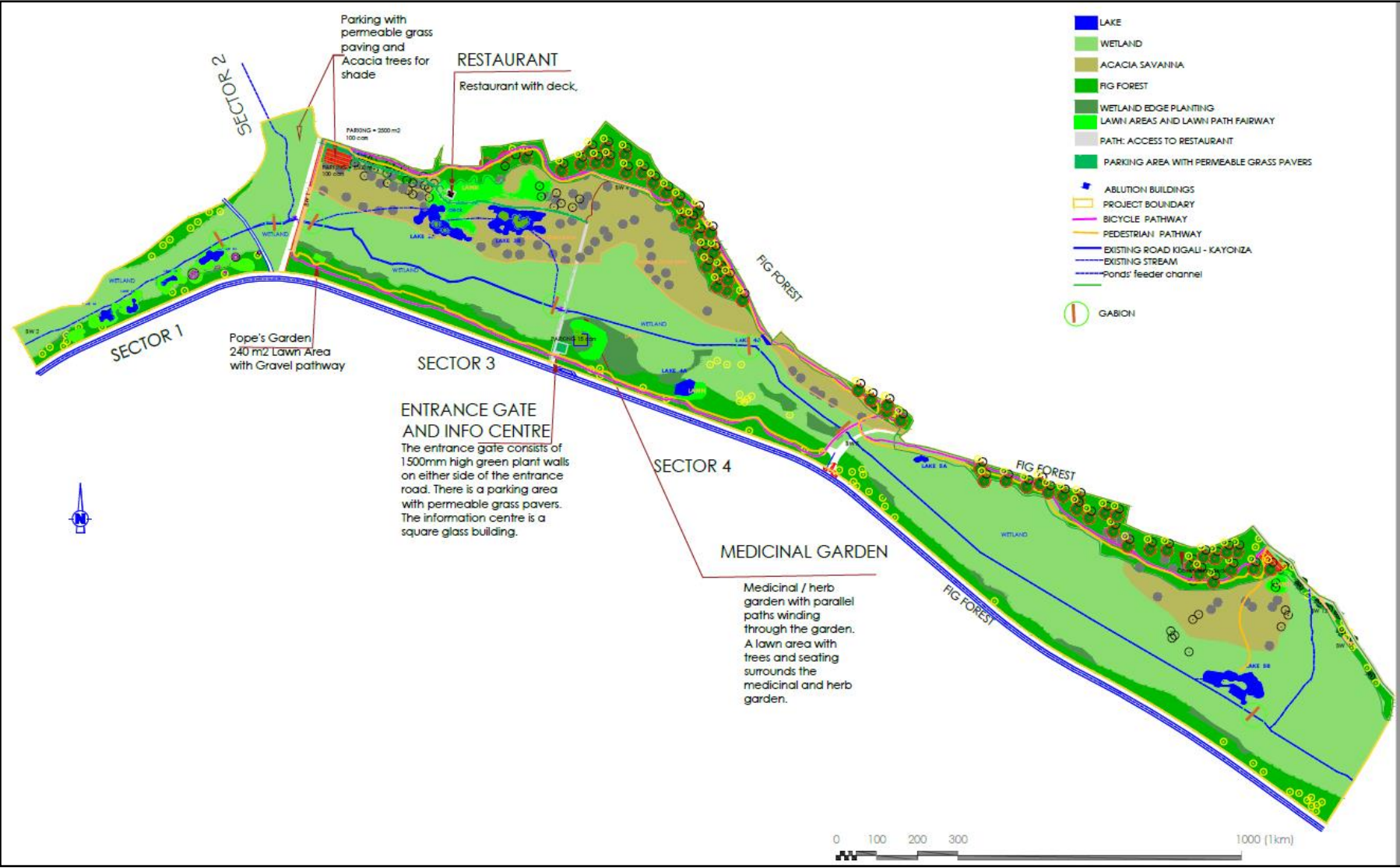
promotes “Sustainable Management of Natural Resources and Environment to Transition Rwanda towards a Green Economy.” In addition, Rwanda’s vision 2050 focuses on becoming a high-income economy, with high quality of life and standards of living for its citizens (NST1 2018). The pathway to achieving the vision will substantially depend on how the environment, natural resources and climate change are managed. NST1 targets five specific subsectors: Forestry, Land, Water, Environment and Climate Change. These will enable achievement of the SDGs as well as Rwanda’s NDCs. A key innovation is the adoption of NCA practices to track the value of natural capital to the Rwandan economy to enhance evidence-based decision making. The development of NUWEP has been guided by green growth principles and in the future, the roles of NCA should be incorporated into its plans, so that there is awareness of the natural capital value, and this information can be used to catalyse revenue generation to sustain the Park.

IV. NUWEP Development and Activities

A. Concept

A conceptual design was completed for NUWEP in 2017 and much of the development has followed this plan. The design is centred around the restoration and maintenance of the wetland; provision of pathways for recreation; certain features that serve to attract key groups of citizens, such as the Pope's Garden and Medicinal Garden (Sector 3); and facilities, such as the restaurant and an information centre (Figure 22).

Figure 22: NUWEP conceptual design completed by Afrilandscapes in 2017 for REMA.



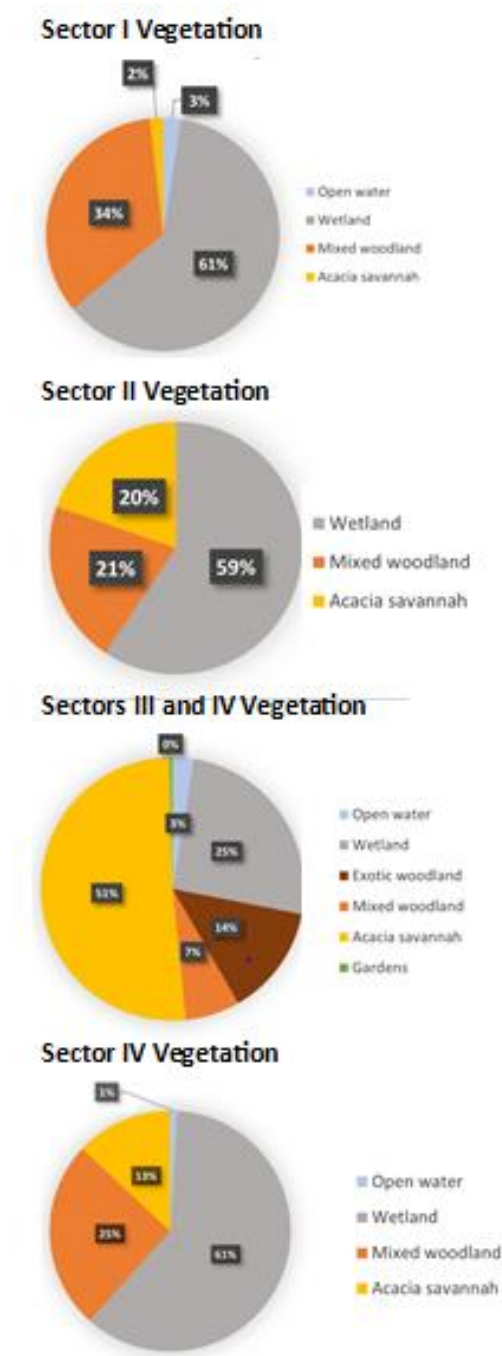
Each Sector in NUWEP was zoned for certain attributes and activities and the vegetation cover was estimated using Google Maps.

Sector I. The primary function of Sector I is its ecological function. In addition, there is an unpaved path, that runs parallel to the Kigali-Kayonza Road (RN3), which is used for walking, birding and as a catchment pond.

Sector II. The primary function of Sector II is ecological. There are currently no paths in this Sector due to the thick vegetation, wetland, and water.

Sectors III & IV. These two Sectors are most suitable for ‘high use.’ This includes recreation, picnicking, and access to the restaurant, both parking areas, the maintenance road, Pope’s Garden, the information centre, and the medicinal garden. Approximately 25% of these Sectors include wetland and its ecological function should be maintained. Therefore, activities need to be designed in a way that do not negatively impact the wetland. Activities are outlined in Table 9 and will be expanded upon in the business plan.

Sector V. This is the largest single Sector and is zoned for recreation and conservation. The main bike and pedestrian paths run along the northern boundary. The eastern section includes a pond that is accessed by an unpaved path.



Figures 23, 24, 25, 26 (top to bottom): Approximate vegetation cover in each Sector.

Some other features might be considered and incorporated into NUWEP as outlined below.

Parks and Art and Culture

Arts can be a source of inspiration for the design of an urban park and can be used to attract people to public spaces. Rwanda has a very rich art history and culture, which can be reflected in NUWEP's design. For example, Kigali's conference centre auditorium is designed to reflect the inside of the King's Palace. Rwanda's art, such as sculptures, could be displayed in NUWEP, such as a sculpture garden, the information centre, and/or the restaurant. Rwanda is proud of its art and culture, and ways to showcase this should be incorporated in the design and management of NUWEP.

Green infrastructure

In keeping with Rwanda's firm commitment to conservation and sustainability, any infrastructure in NUWEP should be designed to maximize sustainable design. For example, rooftop gardens at the Ellen DeGeneres conservation Campus, reduce urban heat island effect, improve air quality, provide habitat for birds and insects, and promote urban biodiversity. The existing infrastructure in NUWEP took green principles into consideration, such as the use of volcanic rocks. In the future this should be replicated, and new green designs considered for any further infrastructure development. Given the location of NUWEP in Kigali and its high accessibility, NUWEP presents the GoR with a great opportunity to showcase some innovation around green infrastructure.



Figure 23: Green roofs at Ellen DeGeneres Campus, in Kinigi, Musanze District, Rwanda.

Where feasible, nature should be used in NUWEPs design. For example, if a barrier is needed to shield a building, rather than erecting a wall, a row of trees may provide the screen.

B. NUWEP Uses

Based on discussions with REMA and other stakeholders, while there are numerous activities that could be developed, the following can be considered most feasible and appropriate given the vision for NUWEP. All of these will be thoroughly vetted and included in the business plan. Case studies of other urban parks in Africa and Rwanda are included in Annex II.

Urban Biodiversity Protection

The primary use and objective of NUWEP is to restore and maintain the ecological health of the wetlands and protect biodiversity within its urban setting. The Park design has taken advantage of the wetland and water flow. However, it must be recognized that NUWEP is an urban park and that it has and will continue to be influenced by human factors inside and outside its boundaries and as a result is unlikely ever to be a ‘pristine’ ecosystem. However, urban biodiversity plays a key role in conservation. NUWEP, for example, protects key ecosystem services (ES) such as regulating temperature, capturing carbon from the atmosphere, reducing stormwater runoff, and flooding risks, preventing soil erosion, and protecting water quality (Daily 1997). While this has not been properly quantified to date, there is an opportunity to do so in the future, through Rwanda’s NCA program and other means, and to track ES conservation.

Recreation

Urban parks provide space for a diversity of recreational activities that range from low to high impact, and passive to active. Recreational activities range from strolling, sitting, picnicking, running, biking, or observing nature, all of which are envisioned in NUWEP. The trick in developing recreational activities in a small, urban park is to ensure that one activity does not compromise another. This requires proper zonation and management. The Park has been zoned as noted prior into five Sectors. The pathways developed in each Sector will guide certain activities such as bike riding and walking. Each Sector, and their use are described in the beginning of Section IV.

Outdoor Play and Leisure

The definitions of play and leisure are included in Table 8. While they differ, both provide people with the freedom to simply have unstructured time outside and away from their daily obligations. In modern society there is very little unstructured time. Providing space for people of all ages to simply play outdoors is critical for human health. This is core to the GoR’s vision of creating green space for citizens in Kigali, especially as the city expands and becomes more densely populated.

Concept	Definition
Leisure as time	Leisure is time free from obligations, work (paid and unpaid), and tasks required for existing (sleeping, eating).
Leisure as activity	Leisure is a set of activities that people engage in during their free time—activities that are not work oriented or that do not involve life maintenance tasks such as housecleaning or sleeping.
Leisure as state of mind	Leisure depends on a participant’s perception. Perceived freedom, intrinsic motivation, perceived competence, and positive affect are critical to the determination of an experience as leisure or not leisure.
Play	Play is imaginative, intrinsically motivated, nonserious, freely chosen, and actively engaging. Play is typified by spontaneity, joyfulness, and inhibition and is done not as a means to an end but for its inherent pleasure.
Recreation	Recreation is an activity that people engage in during their free time, that people enjoy, and that people recognize as having socially redeeming values. The activity performed is less important than the reason for performing the activity, which is the outcome.

Table 8: Definition of play and leisure (2012 Feasibility Report).

Recreation and Health

Recreation, defined in Table 8, is essential for the health of individuals—physical and emotional. Recreation helps with prevention of health problems and in rehabilitation. Urban parks can create space for formal and informal recreation. For example, they may range from sports grounds where teams can play football to paths for walking. Rwanda’s car free day is extremely popular in the city and illustrates the strong interest in outdoor recreation. NUWEP is envisioned to support informal recreation such as walking, jogging, and biking.

Social Interaction

Urban parks provide a place for social interaction of people. Parks create a space that ultimately results in the potential for people of different ages, cultures and with different interests to meet. Scheduled and spontaneous events may bring people together.

Education

There is an array of educational activities that occur in urban parks. If designed well, parks are a place where children and adults can learn about nature and the environment. This can be formal learning through programs and educational features, and informal learning through observation and immersion. NUWEP provides an exceptional opportunity for citizens to experience nature, learn about the natural world, and ideally become an ambassador for Rwanda's natural heritage.

Conservation Capital assessed different activities that could take place in NUWEP and outlined what additional resources are needed to support the activity. These are depicted in Tables 8 and 9. All of these will be further assessed in the conservation area business plan to determine feasibility, cost, and return on investment.

Category	Activity	Infrastructure		Comment	Specific Revenue Generator?
		Already present?	Additional Needed?		
Sport and health improvement	Walking	Yes - Paved paths (5.4km)	Yes. For safety purposes cross walks across roads linking Sectors.		Free - Covered by conservation fee
	Running	Yes - Paved paths (5.4km)	Yes. For safety purposes cross walks across roads linking Sectors.		Free - Covered by conservation fee
	Cycling	Yes - Paved paths (5.4km)	Yes. For safety purposes cross walks across roads linking Sectors.		Free - Covered by conservation fee
	Fitness	No	Yes - Kinetic fitness stations		Free - Covered by conservation fee
	Social sport / Exercise (e.g., frisbee)	Yes - Lawns	No	Zonation required	Free - Covered by conservation fee
Nature & Contemplation	Bird watching	Yes - Paved & unpaved paths	Yes - Additional unpaved paths, hide; wetland boardwalk		Free - Covered by conservation fee
	Reading	Yes - Benches; lawns	No		Free - Covered by conservation fee
	Meditation	No	No		Free - Covered by conservation fee
	Yoga / Tai Chi	No	No - Although an open-sided pagoda might be used for yoga sessions as well as a corporate meeting space		Free - Covered by conservation fee
	Prayer	Yes - Pope's garden	No - Although worth engaging with catholic church to see		Free - Covered by conservation fee
Social Recreation	Socializing	Yes - Picnic space; restaurant	No		Free - Covered by conservation fee
	Picnic	Yes - Benches	Yes - Tables	Zonation required	Free - Covered by conservation fee
	Instagram selfies	No	Yes - 'Photo frame' celebrating wetlands, hashtags, etc.		Free - Covered by conservation fee
	Restaurant	Yes– Bourbon (temporarily)	Need to consider satellite kiosks for snacks; or picnic baskets/ takeaways		Yes

	Cocktail bar/Lounge	No	Yes - Attached to restaurant for sundowners / cocktails		Yes
	Kids playing	No	Yes - Nature-themed playground	Zonation required	Depends on development
Events	Fun runs / Park runs	Yes - Paved paths	No		Free - Covered by conservation fee
	Corporate meetings / Team building	No	Yes - Open sided pagoda as mentioned above		Yes - Venue hire
	Art installation	No	Yes - Open sided pagoda as mentioned above		Free - Covered by conservation fee
Learning	Wetland	No	YES - Wetland boardwalk; information in the information centre & educational signage	Critical if one of the primary REMA objectives is to be met	Free - Covered by conservation fee
	Ethnobotany	Yes - Medicinal garden	No		Free - Covered by conservation fee
	Rwanda's National Parks	No	Yes - Interpretive centre with VR experience and expo display	Requires capital investor; potentially RDB does this as part of The Tembera campaign	Depends on development
	Research site	No	No		Free
	Lectures / Enviro functions	No	Yes - Open sided pagoda as mentioned above		Depends on needs
Other	Nature-themed office space	No	Yes	Requires market research and a capital investor	Yes
	Bike hire	No	Yes	Needs private sector concessionaire	Yes
	Guided walks (Birding/Botany)	No	No	Needs trained community guides	Yes

Table 9: Potential suitable activities for NUWEP.

Given NUWEP's size and the vision and objectives set forth by the GoR, the following activities were vetted and considered not suitable at this time.

Activity	Explanation
ATV Riding	Loud, ecologically degrading (especially in wet landscape), polluting, dangerous, and will compromise the experience of others NUWEP visitors.
Kayak / Canoe	The water bodies are too small in NUWEP.
Weddings	Park is too small for large weddings. Will compromise the experience of others. Small weddings might be considered in the future if well managed or users separated spatially. Guidelines will be required and suitable zoning if this is to be considered.
Events	Park is too small for large events. Will compromise the experience of others. Small events might be considered in the future if well managed or users separated spatially. Guidelines will be required and suitable zoning if this is to be considered.
Fishing	Not recommended since would appear contradictory to the mandate of NUWEP.
Horseback riding	Maintaining horses in NUWEP is expensive, there is not adequate space for stables or trails for riding.
Zoo	Not consistent with the vision of NUWEP.
Large species reintroduction	Requires veterinary team, fencing, and management, which is expensive.
Organized sport	Organized sports include soccer, volleyball etc.... Given space limitations, at this stage, putting in a football pitch or a volleyball net is not recommended; this does not preclude visitors from playing football, frisbee etc.... although zonation will be required to ensure no impact on other users.
Hotel/lodge development	Not recommended: too close to industrial zone, has the noise of the airport, and will undoubtedly be uncompetitive with any such development at Gikondo or the other wetlands due for rehabilitation in the more central tourism part of Kigali.

Table 10: Activities judged as unsuitable for NUWEP at this time.

Carrying Capacity and Operating Hours

Tourism carrying capacity can be a subjective measure and depends on how thresholds of potential concern are viewed and also what the objectives of the area being visited are. At the outset of a carrying capacity assessment in NUWEP it should be stated that the environment historically suffered significant impact and cannot now, even after years of rehabilitation and restoration, be regarded as a pristine wetland. It should also be understood that carrying capacity can be variable depending on degrees of management. With this in consideration, we attempted to calculate a carrying capacity for NUWEP that takes its particular socio-environmental context into consideration as well, of course, as aspects such as its size, infrastructure, likely user profiles and its soil and ecosystem/vegetation composition.

Given the concentration of facilities in Sectors 3, 4 and 5, and the intention to leave Sectors 1 and 2 'undeveloped,' only Sectors 3, 4 and 5 are considered in the carrying capacity calculation. Calculating carrying capacity based on area size alone is inadequate. Instead, we calculated carrying capacity based on maximum optimal usage of the pathway infrastructure already in place together with additional pathways suggested. Thus, carrying capacity is calculated per metre of available pathway rather than square metres or hectares. Upper thresholds for people per metre of such infrastructure were based on the average speed of movement and purpose of the user in using that infrastructure. Thus, the lower limit of metres per person of paved cycleway (80m / person) is greater than half of that for paved walkways (30m / person), and this figure varies for unpaved pathways (50m / person) used for exposure to nature rather than for exercise, and the higher density usage of the suggested boardwalk crossing the wetland (20m / person).

The calculated carrying capacity as a result of this equation is ~300 people for Sectors 3, 4 and 5 combined, at any one time, not as the limit of visitors per day (which could be far greater). It should also be understood as needing to be applied partially to Sectors 3 & 4 and partially to Sector 5. Thus, at any one time, the maximum number of people permitted in Sectors 3 and 4 combined is suggested as 232 people (just under 4 people per hectare), while the maximum number permitted in Sector 5 at any one time is suggested as 76 people (or 1.5 people per hectare).

NUWEP will invariably attract a diversity of users across both weekdays and weekends/holidays, ranging from early morning birders and pre-work joggers to midday walkers to evening rendezvous. The current plan is to open the Park at 5.30 AM and close in the evening, because of safety factors our recommendation is to close the Park at 7 PM. This gives adequate time for people to walk after work get a drink at the restaurant and leave as it is getting dark. Ticketing can be done on-line with a platform such as TiCQet.

Security for visitors, especially female visitors, is very important. Many of the activities proposed require proper fencing, presence of 'rangers'/security personnel and good lighting. NUWEP visitors will generally fall into the categories below and these time slots may be used for planning and capacity management, which will be elaborated on in the conservation area business plan. These slots are not proposed for ticketing but used for management.

Time Slot	Theoretical User Type	Primary Activities	Comments
05h30 – 08h00	Exercisers: cyclists, runners, walkers Nature enthusiasts: birders	Exercise on paved paths Exercise at fitness stations Birding on paved and unpaved paths, the wetland boardwalk and bird hide	We envisage this occurring both during the week and on weekends
08h00 – 11h30	School groups Families Friends Couples	Usage of paved paths Concentrations around the restaurant and picnic areas, as well as on the wetland boardwalk and bird hide.	Aside from school groups during the week, we envisage this time slot being utilised primarily on weekends
11h30 – 14h30	School groups Families Friends Couples	Usage of paved paths Concentrations around the restaurant and picnic areas, as well as on the wetland boardwalk and bird hide.	Aside from school groups during the week, we envisage this time slot being utilised primarily on weekends
14h30 – 17h00	Families Friends Couples	Usage of paved paths Concentrations around the restaurant and picnic areas, as well as on the wetland boardwalk and bird hide.	We envisage this time slot being used primarily on weekends.
17h00 – closing (19h00)	Friends Couples Exercisers: cyclists, runners, walkers	Usage of paved paths Concentrations around the restaurant and picnic areas, as well as on the wetland boardwalk and bird hide.	We envisage this time slot being utilised more heavily on weekends, but also during the week at lower intensity

Table 11: Potential time slots for NUWEP visitors.

Strategic marketing is key for attracting and maintaining visitors to the Park. Successful urban ecotourism relies on creative and effective marketing that understands the desire of potential clients, increases awareness of the product, and attracts people with infrastructure, activities, or events. Marketing products for NUWEP might include websites / social media, maps, signs, roadside billboards in other parts of the city and guidebooks. Engaging local media (print, digital and tv) will be essential in reaching the widest audience possible.

Potential Revenue Generating Options

REMA and other GoR relevant authorities made it clear they do not necessarily perceive NUWEP to be a generator of profit for use elsewhere, but that it is essential that sufficient revenue is generated through the use of NUWEP to pay for its operation, ongoing maintenance, and reinvestment. Nature-themed businesses are also an important tool to promote nature and engage people in its conservation and restoration. Table 12 outlines several potential revenue sources that might developed. All of these will be expanded upon in the conservation area business plan.

	Scenarios	Advantages	Disadvantages
I	Conservation Levy A conservation levy suggests that users are paying for conservation, an entrance fee means they are paying to enter a public space	- Revenue generated can be used for management and conservation activities - Pricing can limit numbers of users, which will help to maintain the ecological carrying capacity - A perception of nature's value can be inspired in the public	- Pricing will impact peoples' choice and frequency of visiting this site. - A high conservation levy will raise concerns about equitable access.
II	Filming and photography fees	- Revenue generated can be used for management and conservation activities - Helps to promote NUWEP and Rwanda	If not managed well can disrupt users' visits
III	Restaurants, coffee bar/lounge	- Concession fee generates revenue for management and conservation activities - Could provide local jobs - Will result in a concentration of many users in one central space thereby allowing for an effective zonation and separation of different kinds of users and a management plan that is geared to this	- Requires good waste management - Must be compliant with Rwanda's commitment to no plastic - If expensive, will create animosity - Attracts people to a certain part of the Park which could create a negative impact if not well managed
IV	Activity Concessions (Bike Rental for example)	- Concession fee generates revenue for management and conservation activities - Could provide local jobs	- Requires good waste management - Must be complaint with Rwanda's commitment to no plastic - If expensive, will create animosity - Attracts people to a certain part of the Park which could create a negative impact
V	Corporate Sponsorship (CSR)	- Revenue generated can be used for management and conservation activities - Might results in volunteer days, trash clean up exotic species removal	Requires clarity around potential expectations of use
VI	Biodiversity Offset	Revenue generated can be used for management and conservation activities	- Expensive to set up to determine offset - Requires very clear monitoring and evaluation

VII	Payment for Ecosystem Services (PES)	Revenue generated can be used for management and conservation activities	- Need to calculate the ecosystem value, such as waterflow, and structure the payment - Requires very clear monitoring and evaluation
VIII	Carbon Offset	Revenue generated can be used for management and conservation activities	- Expensive to calculate the carbon sequestration - Requires very clear monitoring and evaluation
IX	Additional activities such as temporary or permanent exhibitions or events	- Revenue generated can be used for management and conservation activities - Diversified activities can attract a diversified visitor spectrum - Exhibitions and events can be tailored to amplify the educational and other purposes of NUWEP	- May require additional capital investment - Large events could result in unnecessary disruption to the environment or other users

Table 12: Potential revenue generating options for NUWEP.

I. Conservation Levy

REMA has been clear that ideally access to the site is paid for by the public, this pricing being affordable and in no way a barrier to access, but rather a mechanism to change public perspectives on the value of nature and how it should be treated and thus positioned as a ‘conservation levy’ rather than an ‘entrance fee.’

While protected areas play a central role in conservation, education, and recreation, they are often underfunded. Despite a documented willingness to pay for nature-based experiences on the part of tourists, an urban park predominantly used by citizens requires a different model.

As a public asset, charging user fees to citizens can be controversial, raising issues of equity, accessibility and ability to-pay (Boo 1990). Fees and pricing will affect peoples’ choice and frequency of visiting sites (Schwartz& Lin 2006). With a lower price, NUWEP is more attractive to the public, and can still attract visitors while instilling an awareness about its value and the need to maintain the asset. Studies have shown that when visitors know where their money is going, for example to maintain and protect NUWEP, they are willing to pay. Table 13 depicts a hypothetical pricing model for NUWEP.

	Occupancy	Total visitors	Citizen	Resident	Tourist	Total (per day)	Total revenue 2022
Weekdays			80%	18%	2%		
	14%	210	168	37.8	4.2	210	
		#					
		RWF	168,000	189,000	42,000	399,000	103,740,000
		USD	168	189	42	399	103,740
Saturday	57%		80%	18%	2%		
		855	684	153.9	17	855	
		RWF	684,000	769,500	171,000	1,624,500	86,098,500
		USD	684	770	171	1,625	86,099
Sunday	57%		80%	18%	2%		
		855	684	153.9	17		
		RWF	684,000	769,500	171,000	1,624,500	84,474,000
		USD	684	770	171	1,625	84,474
Total RWF 2022							274,312,500
Total USD 2022							274,313
Citizen Cons Fee	RWF 1,000						
Expat Residents Cons Fee	RWF 5,000						
Tourist Cons Fee	RWF 10,000						
		Total Tickets	Weekday occupancy	Weekend occupancy	Weekday tickets	Weekend tickets	
Early AM	05h30 - 08h00	300	20%	35%	60	105	
AM	08h00 - 11h30	300	10%	50%	30	150	
Midday	11h30 - 14h30	300	10%	80%	30	240	
Afternoon	14h30 – 17h00	300	10%	60%	30	180	
Evening	17h00 – 19h00	300	20%	60%	60	180	
100% Capacity		1,500	14%	57%	210	855	

Table 13: Hypothetical NUWEP pricing model and annual revenue extrapolation using conservation fees (cons fee in the Table).

II. Filming and Photography Fees

Special permits could be sold for filming and photography. RDB has guidelines for filming and photography, and this should be reviewed and made consistent with other Rwanda parks.

III. Restaurant

A restaurant was constructed in NUWEP using donor funding, which will help attract guests to the Park and in turn generate entry fees for the Park. The restaurant should be professionally managed by a private sector partner. Additional revenue will be generated by the operating lease that is granted to an operator. Given the CAPEX costs have already been financed through grant funding, a 5-year management lease could be issued to an operator with a track record and experience. The business plan will describe how to attract and contract an operator of the restaurant.

Generally, concessions like restaurants are paid through a fixed fee (lease) and a variable fee (percentage of revenue). In general, variable fees should always be based on top-line revenue (gross) net of sales taxes. When CAPEX is required by the operator, the average fee is approximately 10%. Given CAPEX has been covered in the case of NUWEP, this fee would be reviewed. This should be based on quarterly management accounts submitted by the operator to the landowner, audited by a pre-agreed audit firm, which is approved by NUWEP's manager. The costs of such audit to be borne by the operator.

IV. Activity Concession

To attract visitors to NUWEP certain activities might be developed, such as bike rentals, guided walks, or birding visits. In some cases, revenue is generated by attracting people to the Park and collecting conservation fees. However, in some cases a lease fee or concession fee might be charged to provide additional revenue for NUWEP management. Like the concession model described in III, a percentage of gross revenue may be considered as a fee. Training local communities as guides is a good way to provide employment and provide a quality experience for visitors.

V. Corporate Social Responsibility

The industrial zone is directly adjacent to NUWEP. Many of these companies operating in the industrial zone have corporate social responsibility programs and may be interested in supporting NUWEP (Table 14). A sponsorship program could be developed to engage corporate partners and certain benefits may be provided such as their logo on a sponsorship sign or map; a reduced price for employee access; or space provided for corporate events. Different sponsorship packages could be designed (gold, silver, bronze), with different pricing and benefits provided. The first step for a sponsorship program is to develop a comprehensive list of potential corporate partners, perhaps engage the Chamber of Commerce in Rwanda, identify potential interest in and benefit from NUWEP, determine capacity of sponsorship and design a strategy for engagement.

Business name	Business purpose
Strawtech	Produce affordable and environmentally sustainable building materials
Ameki Color	Rwanda's largest paint producer (they also produce furniture)
Aquasan	Production of water pipes and tanks
Bhaves	Non-ferrous metal recycling
Plascon	Paint manufacturer
Papyrus	Manufacture commercial furniture
Volkswagen	Car assembly
Alpha Media	Outdoor advertising, hoardings ⁸ , digital printing
Serena	Promoting brand and place for guests to visit
Radisson Hotel	Promoting brand and place for guests to visit
Sheraton Hotel	Promoting brand and place for guests to visit
Bank of Kigali	Brand recognition and corporate engagement
Equity Bank Rwanda	Brand recognition and corporate engagement
Alpha Media	Outdoor advertising, hoardings, digital printing

Table 14: Examples of potential corporate partners for NUWEP, some based in the Industrial zone located directly adjacent to NUWEP

VI. Biodiversity Offset

Biodiversity offsets are measurable conservation outcomes designed to compensate for adverse and unavoidable impacts of projects, in addition to prevention and mitigation measures already implemented. Biodiversity offsets are only appropriate for projects which have rigorously applied the mitigation hierarchy (Figure 28) framework, a widely accepted approach for biodiversity conservation.

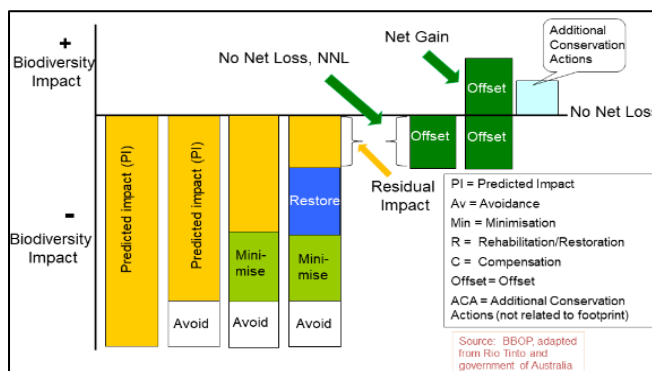


Figure 24: Mitigation hierarchy framework (Forest Trends)

The aim of offsets is to achieve No Net Loss (NNL) and preferably a Net Gain (NG) of biodiversity when projects take place. Measures that are not designed to result in NNL and preferably NG are not biodiversity offsets. The achievement of NNL/NG is dependent on measurable, appropriately implemented, monitored, evaluated, and enforced offset schemes. Biodiversity offsets must be a measure of last resort; and in certain cases, offsets are not appropriate and should not be used. Public and private sector investments in projects such as infrastructure development, mining and oil exploration are among the current drivers of economic growth. However, biodiversity is not well accounted for under our present economic system and such projects can have important impacts on species and ecosystems more generally.

⁸ Hoarding is as a temporary boarded fence in a public place, usually erected around a building site. These are used to protect the public from site works whilst also being used to display advertisements.

There is growing interest by governments and the private sector to look for ways of compensating for biodiversity impacts to achieve a NNL and preferably a NG of biodiversity when projects take place.⁹

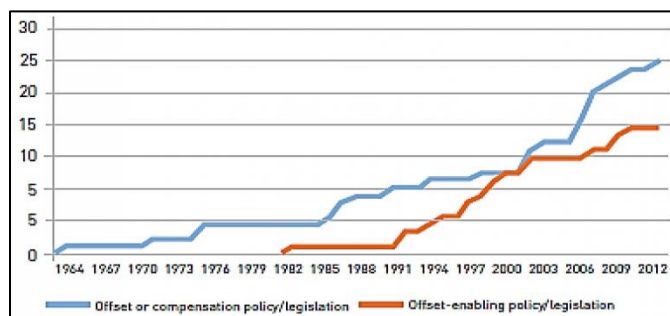


Figure 25: Policy trends biodiversity impact offset.

Measures to compensate for negative impacts, for example by protecting threatened forests or restoring wetlands, collectively known as biodiversity offsets, are increasingly being used by governments and the private sector. Biodiversity offsets are conservation actions intended to compensate for the residual, unavoidable impact on biodiversity caused by projects, to ensure at least a No Net Loss of biodiversity and, where possible, a Net Gain.

Section III highlights the businesses operating directly adjacent to NUWEP in the industrial zone. Some of these corporate partners may need to offset their operations, in terms of footprint, carbon emissions, water use or wastewater flow into the wetland. This could be done by supporting NUWEP.

VII. Payment for Ecosystem Services

Rwanda has committed to a climate-resilient, low-carbon economy by 2050. It is in this line that the Payment for Ecosystem Services (PES) constitutes one of the pillars of Rwanda vision 2050, which sets the vision for the country's economic transformation and development agenda. Rwanda and Costa Rica signed a Memorandum of Understanding (MoU) on environment cooperation that will specifically focus on exchanging experiences on payments for ecosystem services.

PES is an approach that promotes good management of environmental resources to provide ecological services. In March 2019, the GoR in partnership with the Netherlands launched a PES pilot program in Upper Nyabarongo catchment, which is one of the water towers of Rwanda. The piloting is intended to assess pathways towards the implementation of a proposed PES scheme that is expected to be implemented countrywide.¹⁰ Given the water source of NUWEP, a PES centred on water might be considered. This would also dovetail into Rwanda's NCA aims.

While carbon offsets are a type of PES, this is described separately.

⁹ <https://www.iucn.org/resources/issues-briefs/biodiversity-offsets>

¹⁰ <https://drive.google.com/file/d/1DHMghAlDEOziYcfXW XF7t4IOHgrx1pZQ/view>

VIII. Carbon Offset

Healthy wetlands play a significant role in climate change mitigation by storing carbon that would otherwise contribute to global warming, leading to the reduction of water and food resources as well as more extreme weather phenomena. NUWEP is approximately 130-hectares, and the wetland is 54 hectares. Determining the annual carbon sequestration of the wetland presents an interesting revenue opportunity for the Park. The industrial zone of Kigali is directly adjacent to NUWEP. An agreement could be entered into between NUWEP and the companies in the industrial zone providing them an opportunity to offset their carbon footprint.

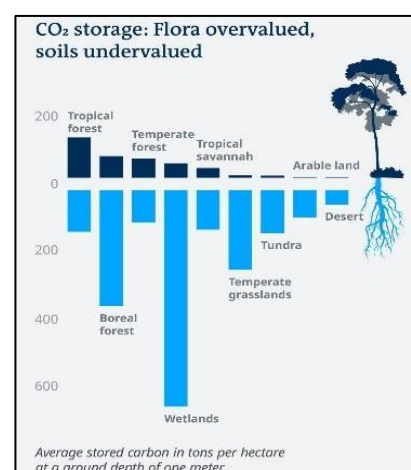


Figure 26: Average stored carbon in tons per hectare (World Climate Council IPCC).

Park Management Scenarios

NUWEP requires professional management. As one of the first public parks in Kigali, there is no precedent. While REMA currently oversees the management of NUWEP, their role long-term is not in managing NUWEP. Operation of NUWEP is envisaged by GoR to be conducted by an independent operator in a kind of Public Private Partnership (PPP) model. The GoR has successful PPPs in parks. For example, Akagera National Park is managed through a PPP between RDB and African Parks. Table 15 highlights the potential management scenarios that might be considered. All of these will be further described in the business plan.

Potential Park Manager	Potential Role	Advantages	Disadvantages
The City of Kigali / District	The city/municipality oversees the day-to-day management of NUWEP	NUWEP is within the city of Kigali's jurisdiction / and the local municipality	The city / district does not have the experience, staffing or budget in place to manage NUWEP
REMA	REMA provides advisory for the efficient management of NUWEP	REMA is the authority that oversees environmental projects including wetlands	REMA's mandate does not include the direct management of parks.
RDB	RDB oversees the management of Rwanda's national parks, and tourism activities and development	RDB is the authority that oversees national parks in Rwanda	RDB manages national parks and in some cases engages partners in a PPP, which is their recommendation given the nature of the Park.
Local Community Management (sector, cell, village)	A local CBO manages the Park in a community-based management model	Local engagement and ownership	- They lack the skills and experience to manage NUWEP - They do not have adequate resources - They do not have connections to donors - They lack the business acumen to manage an urban park

Private Sector Partner (PPP)	Advertise for a private sector partner to take on management of NUWEP	• The right partner may be able to effectively manage the Park and generate adequate revenue to support the Park and make a profit. • The right partner may be able to attract other businesses (bike hire, restaurant, events, exhibitions) • The right partner may have access to capital for further development / improvement of NUWEP	To make a profit the private sector partner may engage in activities that are not compatible with the Park.
NGO (PPP)	Advertise for an NGO to take on management of NUWEP	• The right NGO partner may be able to effectively manage the Park and generate adequate revenue to support the Park and make a profit. • The right NGO partner can attract donor funding • The right NGO partner may be able to attract other businesses (bike hire, zip line, restaurant, events, exhibitions)	• While there are PPPs for park management in Rwanda, there are no PPPs for urban park management, this would be the first • Most NGOs lack the business acumen to manage an urban park

Table 15: Scenarios for NUWEP management (orange indicates less feasible and green indicates feasible).

V. Conclusion

Nyandungu wetland has been restored from a degraded wetland to a functioning ecological system and has enabled the development of NUWEP, a park that can support recreation and education. This remarkable recovery mirrors the ecological recovery story across Rwanda and presents an exceptional opportunity to profile this to citizens and visitors and provide outdoor green space for citizens and visitors. Restoration is very relevant in the global conservation context and Rwanda has another opportunity to make its mark as a leader in this field.

Over the past few years, with donor support, REMA has overseen the development of high-quality infrastructure in NUWEP and the design of an urban wetland park that can provide space for citizens and tourists to recreate and enjoy nature.

There are a number of revenue-generating opportunities that can be developed in NUWEP to support the management and conservation of the Park while maintaining its ecological function and Rwanda's high-quality brand. All of these will be outlined in the forthcoming conservation area business plan. As Kigali considers the conservation and development of its other wetlands, NUWEP serves as a very important pilot.

References

- Bodin, M., & Terry, H. (2003). Does the outdoor environment matter for psychological restoration gained through running? *Psychology of Sport and Exercise*, 4(2), 141-153.
- Carr, S., Francis, M., Rivlin, L. G., & Stone, A. M. (1992). Public space. Cambridge: Cambridge University Press.
- Frumkin, H. (2001). Beyond toxicity: The greening of environmental health. *American Journal of Preventative Medicine*, 20, 234-240.
- Gabuka, A. (2012). NUWEP Feasibility Study - Final Report. Kigali.
- Gasabo 3D (2017). NUWEP Feasibility Study. Final Report Volume 1: Developing an Improved Design Plan of the Park and Construction Supervision of Nyandungu Urban Wetland Eco-Tourism Park. Kigali: Gasabo 3D.
- Gasabo 3D (2017). NUWEP Feasibility Study. Volume 2: LANDSCAPINGS & ECOLOGICAL ENHANCEMENT AND ARCHTECTURAL.pdf.
- Gasabo 3D (2017). NUWEP Feasibility Study. Volume 3: MECHANICAL AND SANITARY DRAWINGS. Kigali: Gasabo 3D.
- Gibson, A., Dodds, R., Joppe, M. & Jamieson, B. (2003). Ecotourism in the city? Toronto's Green Tourism Association. *International Journal of Contemporary Hospitality Management*, 15(6).324-327.
- Gibson, R.B. Hassan, S., Holtz, S., Tansey, J., Whitelaw, G. (2005). *Sustainability Assessment: Criteria and Processes*. London: Earthscan.
- Government of Rwanda (2020). National Land Use & Development Masterplan 2020-2050. Kigali.
- Gubic, I. and Baloi, O. (2020) "Public open space initiatives for healthier cities in Rwanda", *The Journal of Public Space*, 5(2), pp. 129-146. doi: <https://doi.org/10.32891/jps.v5i2.1287>.
- Harrill, R. & Potts, T.D. (2003). Tourism planning in historic districts: Attitudes toward tourism development. *Journal of the American Planning Association*, 69(3):233-244.
- Higham, J. & Luck, M. (2002). Urban ecotourism: A contradiction in terms? *Journal of Ecotourism*, 1(1).36-51.
- International Year of Ecotourism 2002. (2002). *Final report on Sustainable Development of Ecotourism Web Conference (April 1-26, 2002)*. UN: IYE.
- Kawawa, R., Obiri, J., Muyekho, F., Omayio, D., Agevi, H., & Mwaura, A. et al. (2016). *Allelopathic potential of invasive Psidium guajava L., against selected native tree species in Kakamega Tropical Forest, Western Kenya*. IOSR Journal of Pharmacy and Biological Sciences, 11(05), 80-86. doi: 10.9790/3008-1105028086.
- Knopf, R.C. (1990). Marketing Public Lands: Is it the Right Thing to Do? Parks and Recreation, (March) Kuo, F., E.
- Krishnasamy, S., Chhetri, L., Mchugh, A. & Thosani, D. (2019). Kigali Master Plan 2050 – edition 2020. 1st ed. Kigali: City of Kigali.
- Maller, C., Townsend, M., Pryor, A., Brown, P., & St, L., L. (2005). Healthy nature healthy people: "contact with nature" as an upstream health promotion intervention for populations. *Health Promot Int*, 21, 45-54.
- Ministry of Lands (2004). National Land Policy for Rwanda. Kigali: Republic of Rwanda.
- Ministry of Trade and Industry (2009). Rwanda Tourism Policy Kigali: Republic of Rwanda.
- Moore, M., Townsend, M., & Oldroyd, J. (2006). Linking human and ecosystem health: The benefits of community involvement in conservation groups. *Eco Health*, 3, 255-261.
- Mvukiyumwami, J. (2019). Inventory of plants in Nyandungu Urban Wetland Eco-tourism Park in January 2019. Afrilandscapes, unpublished internal report.
- National Institute of Statistics of Rwanda (2018). Rwanda Natural Capital Account. NCA – Land. Kigali: NISR, WAVES, World Bank, Ministry of Environment.
- National Institute of Statistics of Rwanda (2019). Rwanda Natural Capital Accounts. NCA - Water. Kigali: NISR, WAVES, World Bank, Ministry of Environment.
- Official Gazette of the Republic of Rwanda (2008). Ministerial Order N°004/2008 of 15/08/2008 establishing the list of works, activities and projects that have to undertake an Environmental Impact Assessment. Kigali: Republic of Rwanda.
- Official Gazette of the Republic of Rwanda (2005). The Organic Law No 04/2005 of 08/04/2005 on Environment Protection and Management. Kigali: Republic of Rwanda.
- Pletsch, C. (2011). The promise of Partnerships Local Governance and the Practice of Partnership. PhD thesis. The University of Guelph, Canada.
- Rugege, D. (2004). Environmental Impact Assessment of the proposed establishment of free zones in the Nyandungu valley and adjacent areas in the City of Kigali, Rwanda.

- Rwanda Environment Management Authority (2011). Environmental and Social Management Framework for Rwanda under LVEMP II (Final report). Kigali: Republic of Rwanda.
- Rwanda Environment Management Authority (2010). Operationalization of National Fund for Environment (FONERWA) in Rwanda: Final Report. Supported by Poverty Environment Initiative (PEI). Kigali: Republic of Rwanda.
- Rwanda Environment Management Authority (2010). Rwanda State of Environment and Outlook. Kigali: Republic of Rwanda.
- Rwanyiziri, G., Kayitesi, C., Mugabowindekwe, M., Byizigiro, R., Muyombano, E., Kagabika, M. & Bimenyimana, T. (2020). Spatio-temporal Analysis of Urban Growth and Its Effects on Wetlands in Rwanda: The Case of Rwampara Wetland in the City of Kigali. *Journal of Applied Sciences and Environmental Management*, 24(9), pp.1495-1501.
- Sullivan, W., C. (2001). Environment and crime in the inner city. *Environment and Behavior*, 33(3), 343-367.
- Turner, M. A. (2004). Urban parks as partners in youth development. The Urban Institute; Washington, DC
- Tsinda A. & Abbott, P. (2012). A Review and Analysis of the Situation pertaining to the Provision of Sanitation to Low-Income Settlements in Kigali City (Rwanda): Diagnostic Report Kigali: Institute of Policy Analysis and Research (Rwanda).
- Tsinda, A. & Ilunga, L (2006). Facteurs physiques du ruissellement à Kigali (Rwanda): *Geo-Eco-Trop*, 2004, 28, 1 2: pp.53-60.
- Tsinda, A & Gakuba, A. (2010). Sustainable Hazards Mitigation in Kigali city (Rwanda), 46th ISOCARP Congress, 2010. Retrieved on 2012/12/10, http://www.isocarp.net/Data/case_studies/1829.pdf
- UNFCCC Updated Rwanda NDC (2020):
https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Rwanda%20First/Rwanda_Updated_NDC_May_2020.pdf.
- US Department of State. (2003). Overview of sustainable ecotourism in the United States of America. World Ecotourism Summit: UNEP.
- Wall, G. (1997). Is Ecotourism Sustainable? *Environmental Management*, 21(4), 483-491.
- Wells, M.P. (1997). Economic Perspectives on Nature Tourism, Conservation and Development. *Environmental Economics*.
- Witt A, Luke Q. (2017). Guide to the naturalized and invasive plants of Eastern Africa. [ed. by Witt A, Luke Q]. Wallingford, UK: CABI. vi + 601 pp. <http://www.cabi.org/cabebooks/ebook/20173158959> DOI:10.1079/9781786392145.0000.

ANNEXES

ANNEX I: Flora and Fauna Diversity in NUWEP

Two Assessment of the plant species in NUWEP have been completed since the project began. The initial list of plants was provided by Gasabo 3D in the Final Report Volume 1: Developing an Improved Design Plan of the Park and Construction Supervision of Nyandungu Urban Wetland Eco-Tourism Park in 2017 (Table 16). Another inventory was conducted in 2019 by the Botanist of NUWEP Joseph Mvukiyumwami, who provided a list of all the plants found in the Park and the ones used for the living fence (Table 19). A list of birds is provided in Table 20.

No	Scientific name	Kinyarwanda Name	Family	Life Form	Indigenous/Exotic
1	<i>Abutilon mauritianum</i>	Umuhatura, Umukungeri	Malvaceae	Herb	Indigenous
2	<i>Acacia hockii</i>	Umugenge	Fabaceae	Shrub	Indigenous
3	<i>Acacia polyacantha</i> subsp. <i>Campylacantha</i>	Umugu, Umuharaba	Fabaceae	Tree	Indigenous
4	<i>Acacia sieberiana</i>	Umunyarugera, Umunyinya	Fabaceae	Tree	Indigenous
5	<i>Acanthus pubescens</i>	Igitovu	Acanthaceae	Herb	Indigenous
6	<i>Achyranthes aspera</i>	Umuhurura	Amaranthaceae	Herb	Indigenous
7	<i>Agave sisalana</i>	Umugwegwe	Asparagaceae	Herb	Exotic
8	<i>Ageratum conyzoides</i>	Akaziraruguma	Asteraceae	Herb	Indigenous
9	<i>Amaranthus hybridus</i>	Imbwija	Amaranthaceae	Herb	Exotic
10	<i>Araucaria angustifolia</i>	N/A	Araucariaceae	Tree	Exotic
11	<i>Asparagus falcatus</i>	Umushabishabi	Asparagaceae	Herb	Indigenous
12	<i>Aspilia pluriseta</i>	Icyumya	Asteraceae	Herb	Indigenous
13	<i>Blumea brevipes</i>	Igitabicyimpisi	Asteraceae	Shrub	Indigenous
14	<i>Brachiaria brizantha</i>	Ivubwe	Poaceae	Herb	Indigenous
15	<i>Canna indica</i>	Kana	Cannaceae	Herb	Exotic
16	<i>Carissa spinarum</i>	Umunyonza	Apocynaceae	Shrub	Indigenous
17	<i>Casuarina equisetifolia</i>	Filaho	Casuarinaceae	Tree	Exotic
18	<i>Centella asiatica</i>	Gutwikumwe	Apiaceae	Herb	Indigenous
19	<i>Clerodendrum rotundifolia</i>	Ikiziranyenzi	Verbenaceae	Herb	Indigenous
20	<i>Commelina benghalensis</i>	Uruteja	Commelinaceae	Herb	Exotic
21	<i>Conyza sumatrensis</i>	Urububa	Asteraceae	Herb	Indigenous
22	<i>Crassocephalum vitellinum</i>	Isununu	Asteraceae	Herb	Indigenous
23	<i>Croton megalocarpus</i>	Umurangara, Umunege	Euphorbiaceae	Tree	Indigenous
24	<i>Cynodon dactylon</i>	Umucaca	Poaceae	Herb	Indigenous
25	<i>Cyperus latifolius</i>	Urukangaga	Cyperaceae	Herb	Indigenous
26	<i>Cyperus papyrus</i>	Urufunzo	Cyperaceae	Herb	Indigenous
27	<i>Datura stramonium</i>	Rwiziringa	Solanaceae	Herb	Exotic /Invasive
28	<i>Desmodium uncinatum</i>	Desimodiyumu	Fabaceae	Herb	Exotic
29	<i>Digitaria abyssinica</i>	Urwiri	Poaceae	Herb	Indigenous
30	<i>Dioscorea quinqueloba</i>	N/A	Dioscoreaceae	Liana	Indigenous
31	<i>Dodonaea viscosa</i>	Umusasa	Sapindaceae	Shrub	Indigenous
32	<i>Duranta erecta</i>	N/A	Verbenaceae	Shrub	Exotic

33	<i>Entada abyssinica</i>	Umusange	Fabaceae	Tree	Indigenous
34	<i>Eragrostis sp</i>	Umutsina	Poaceae	Herb	Indigenous
35	<i>Erythrina abyssinica</i>	Umuko, Umurinzi	Fabaceae	Tree	Indigenous
36	<i>Euphobia tirucalli</i>	Umuyenzi	Euphorbiaceae	Tree	Indigenous
37	<i>Euphorbia grantii</i>	Madwedwe	Euphorbiaceae	Shrub	Indigenous
38	<i>Ficus benamina</i>	N/A	Moraceae	Tree	Exotic
39	<i>Galinsoga parviflora</i>	Kimali	Asteraceae	Herb	Indigenous
40	<i>Grevillea robusta</i>	Gereveriya	Proteaceae	Tree	Exotic
41	<i>Guizotia scabra</i>	Igishikashike	Asteraceae	Herb	Indigenous
42	<i>Helichrysum sp</i>	Manayeze	Asteraceae	Herb	Indigenous
43	<i>Hygrophila auriculata</i>	Bugangabukari	Acanthaceae	Herb	Indigenous
44	<i>Hyparrhenia firipendula</i>	Umukenke	Poaceae	Herb	Indigenous
45	<i>Indigofera arrecta</i>	Umusororo	Fabaceae	Shrub	Indigenous
46	<i>Ipomoea cairica</i>	Umuzenga	Convolvulaceae	Liana	Indigenous
47	<i>Jacaranda mimosifolia</i>	Jakaranda	Bignoniaceae	Tree	Exotic
48	<i>Kalanchoe integra</i>	Ikinetenete	Crassulaceae	Herb	Indigenous
49	<i>Kyllinga erecta</i>	Uruvuya	Cyperaceae	Herb	Indigenous
50	<i>Lactuca sp</i>	Rurira	Asteraceae	Herb	Indigenous
51	<i>Lantana camara</i>	Lantana	Verbenaceae	Herb	Exotic
52	<i>Leonotis nepaetifolia</i>	Igicumucumu	Lamiaceae	Herb	Indigenous
53	<i>Leucaena leucocephala</i>	Resena	Fabaceae	Shrub	Exotic
54	<i>Ludwigia abyssinica</i>	Umuzingangore	Onagraceae	Herb	Indigenous
55	<i>Macadamia tetraphylla</i>	Makadamiya	Proteaceae	Shrub	Exotic
56	<i>Mangifera indica</i>	Umwembe	Anacardiaceae	Tree	Exotic
57	<i>Markhamia lutea</i>	Umusave	Bignoniaceae	Tree	Indigenous
58	<i>Maytenus senegalensis</i>	Umushubi	Celastraceae	Shrub	Indigenous
59	<i>Melinis repens</i>	Urwarikafundi	Poaceae	Herb	Indigenous
60	<i>Microglossa pyrifolia</i>	Umunyuragisaka	Asteraceae	Herb	Indigenous
61	<i>Mimosa pigra</i>	Umugeyo	Fabaceae	Shrub	Exotic
62	<i>Momordica foetida</i>	Umwishywa	Fabaceae	Liana	Indigenous
63	<i>Morus nigra</i>	Iboberi	Moraceae	Shrub	Exotic
64	<i>Nymphaea nouchali</i>	Amarebe	Nymphaeaceae	Herb	Indigenous
65	<i>Ocimum gratissimum</i>	Umwanya	Lamiaceae	Herb	Indigenous
66	<i>Oxyntenanthera abyssinica</i>	Umugano	Poaceae	Herb	Exotic
67	<i>Panicum maximum</i>	Igikerakenja,	Poaceae	Herb	Indigenous
		Igikaranka			
68	<i>Paspalum notatum</i>	Pasiparumu	Poaceae	Herb	Exotic
69	<i>Pennisetum purpureum</i>	Urubingo	Poaceae	Herb	Indigenous
70	<i>Persea Americana</i>	Avoka	Lauraceae	Tree	Exotic
71	<i>Phragmites mauritanus</i>	Imiseke	Poaceae	Herb	Indigenous
72	<i>Physalis peruviana</i>	Umuhuhu, Gaperi	Solanaceae	Herb	Exotic
73	<i>Polygonum pulchrum</i>	Igorogonzo	Polygonaceae	Herb	Indigenous
74	<i>Polyscias fulva</i>	Umwungo	Araliaceae	Tree	Indigenous
75	<i>Potamogeton thunbergii</i>	N/A	Potamogetonaceae	Herb	Indigenous
76	<i>Psidium guajava</i>		Guava	tree	Exotic
77	<i>Psydrax parviflora</i>	Umugaju	Rubiaceae	Shrub	Indigenous
78	<i>Rhus natalensis</i>	Umusagara	Anacardiaceae	Shrub	Indigenous

79	<i>Ricinus communis</i>	Ikibonobono	Euphorbiaceae	Herb	Exotic ¹¹
80	<i>Senna occidentalis</i>	Umuyoka	Fabaceae	Shrub	Exotic
81	<i>Senna spectabilis</i>	Kasiya	Fabaceae	Tree	Exotic
82	<i>Sesamum angolense</i>	Igonde	Pedaliaceae	Herb	Indigenous
83	<i>Sesbania sesban</i>	Umunyegenyege	Fabaceae	Shrub	Indigenous
84	<i>Setaria sp</i>	Urukoko	Poaceae	Herb	Indigenous
85	<i>Sida cordifolia</i>	Umucundura	Malvaceae	Herb	Indigenous
86	<i>Solanum aculeastrum</i>	Umutoobotobo	Solanaceae	Shrub	Indigenous
87	<i>Solanum mauritianum</i>	N/A	Solanaceae	Shrub	Exotic
88	<i>Spathodea campanulata</i>	Umunyara	Bignoniaceae	Tree	Indigenous
89	<i>Tagetes minuta</i>	Nyiramunukanabi	Asteraceae	Herb	Exotic
90	<i>Terminalia superba</i>	Teriminariya	Combretaceae	Tree	Exotic
91	<i>Thevetia peruviana</i>	N/A	Apocynaceae	Shrub	Exotic
92	<i>Thunbergia alata</i>	Nkurimwonga	Acanthaceae	Liana	Indigenous
93	<i>Tithonia diversifolia</i>	Icyicamahirwe	Asteraceae	Shrub	Exotic
94	<i>Typha domingensis</i>	Umuberanya	Typhaceae	Herb	Indigenous
95	<i>Urena lobata</i>	N/A	Malvaceae	Herb	Exotic
96	<i>Vernonia amygdalina</i>	Umubirizi	Asteraceae	Shrub	Indigenous
97	<i>Vernonia lasiopus</i>	Ivumavumo	Asteraceae	Herb	Indigenous

Table 16: Plant species identified in Nyandungu wetland in 2017 (Gasabo 3D 2017).

¹¹ This plant is considered indigenous in East Africa but is labelled as invasive in Kenya. The taxonomy is still debated. <https://www.cabi.org/isc/datasheet/47618#tosummaryOfInvasiveness>.

No	Species	Family	Vernacular Name
1	<i>Abutilon mauritianum</i>	Malvaceae	Umuhato
2	<i>Abutilon angulatum</i>	Malvaceae	Umuhato
3	<i>Acacia abyssinica</i>	Fabaceae	aumunyinya
4	<i>Acacia gerrardii</i>	Fabaceae	Umunyinya
5	<i>Acacia hockii</i>	Fabaceae	Umugeyo
6	<i>Acacia polyacantha subsp. Campylacantha</i>	Fabaceae	Ruganambuga, Umuharata
7	<i>Acacia sieberana var. kagerensis</i>	Fabaceae	Umunyinya
8	<i>Acacia sieberiana var. vermoseni</i>	Fabaceae	Umunyinya
9	<i>Acanthus pubescens</i>	Acanthaceae	Igitovu
10	<i>Achyranthes aspera</i>	Amaranthaceae	Umuhurura
11	<i>Adenostema perrottetii</i>	Asteraceae	
12	<i>Agapanthus africanus</i>	Liliaceae	
13	<i>Agave sisalana</i>	Agavaceae	Umugwegwe
14	<i>Ageratum conyzoides</i>	Asteraceae	Akairaruguma; Inkurubwa
15	<i>Albizia versicolor</i>	Fabaceae	Umububa
16	<i>Albizia adianthifolia</i>	Fabaceae	Umusebeya
17	<i>Alectra sessiliflora</i>	Orobanchaceae	Inturumbutsi
18	<i>Alsicarpus rugosus</i>	Fabaceae	
19	<i>Amaranthus hybridus</i>	Amaranthaceae	Imbwija
20	<i>Anneilema aequinotiale</i>	Commelinaceae	Uruteja
21	<i>Araucaria bidwilli</i>	Araucariaceae	
22	<i>Aristida adoensis</i>	Poaceae	
23	<i>Asparagus africanus</i>	iliaceae	
24	<i>Asparagus racemose</i>	Liliaceae	
25	<i>Aspilia Africana</i>	Asteraceae	
26	<i>Asplenium sp.</i>	Aspleniaceae	igishihe
27	<i>Astripomoea grantii</i>	Convolvulaceae	
28	<i>Asystasia gangetica</i>	Acanthaceae	
29	<i>Bambusa textillis</i>	Poaceae	Umugano
30	<i>Bambusa vulgaris</i>	Poaceae	Umugano
31	<i>Barleria ventricose</i>	Acanthaceae	
32	<i>Barleria brandicalyx</i>	Acanthaceae	
33	<i>Bidens Formosa</i>	Asteraceae	
34	<i>Bidens Pilosa</i>	Asteraceae	Inyabarasanya
35	<i>Biophytum helenae</i>	Oxalidaceae	Nyiramabumba
36	<i>Blumea alata</i>	Asteraceae	Igitabicyimpyisi
37	<i>Blumea brevipes</i>	Asteraceae	Igitabicyimpyisi
38	<i>Botriocline longipes</i>	Asteraceae	igihehe
39	<i>Brachiaria brizantha</i>	Poaceae	Urnyamavuta
40	<i>Brachiaria dictioneura</i>	Poaceae	Urnyamavuta
41	<i>Brachiaria platynotan</i>	Poaceae	Urnyamavuta
42	<i>Brillantaisia cicatricose</i>	Acanthaceae	Ikirogora
43	<i>Brugmansia suaveolens</i>	Solanaceae	Ikibutibuti
44	<i>Caesalpinia decapetala</i>	Fabaceae	Umufatangwe
45	<i>Callistemon citrinus var splendens</i>	Rutaceae	
46	<i>Cana indica</i>	Canaceae	igishapule

48	<i>Capparis erythrocarpos</i>	Caparidaceae	Umukorokombe
48	<i>Capparis tomentosa</i>	Caparidaceae	Umukorokombe
49	<i>Cardamine obliqua</i>	Brassicaceae	
50	<i>Carex sp</i>	Cyperaceae	
51	<i>Carica papaya</i>	Caricaceae	Ipapayi
52	<i>Casuarina equisetifolia</i>	Casuarinaceae	umubunda; filao
53	<i>Caylusia abyssica</i>	Amaranthaceae	
54	<i>Celosia sp.</i> (ornamental)	Amaranthaceae	
55	<i>Celosia trigyna</i>	Amaranthaceae	
56	<i>Celtis gonphophylla</i>	Canabaceae	
57	<i>Cenchrus ciliaris</i>	Poaceae	
58	<i>Centella asiatica</i>	Apiaceae	
59	<i>Chamaecrypta mimosoides</i>	Fabaceae	
60	<i>Chloris pynhotrix</i>	Poaceae	
61	<i>Chloris gayana</i>	Poaceae	
62	<i>Chrosichloa hubbardiana</i>	Poaceae	
63	<i>Chrysanthemum frutescens</i>	Asteraceae	
64	<i>Cisampelos mucronate</i>	Menispermaceae	Umuhandu
65	<i>Cissus oliveri</i>	Vitaceae	Runya
66	<i>Cissus quadrangularis</i>	Vitaceae	Runya
67	<i>Cleome hirta</i>	cleomaceae	
68	<i>Cleome monophylla</i>	Cleomaceae	
69	<i>Clerodendron myricoides</i>	Verbenaceae	Umukuzanyana
70	<i>Clerodendron rotundifolia</i>	Verbenaceae	Ikiziranyenzi
71	<i>Clutia abyssinica var pedicellaris</i>	Euphorbiaceae	Umutarishonga
72	<i>Coelachne Africana</i>	Poaceae	
73	<i>Colocasia esculenta</i>	Araceae	Iteke
74	<i>Combretum mole</i>	Combretaceae	Umurama
75	<i>Commelina Africana</i>	Commelinaceae	Inteja
76	<i>Commelina benghalensis</i>	Commelinaceae	Inteja
77	<i>Commelina diffusa</i>	Commelinaceae	Inteja
78	<i>Commelina reptans</i>	Commelinaceae	Inteja
79	<i>Conyza aegyptiaca</i>	Asteraceae	
80	<i>Conyza sumatrensis</i>	Asteraceae	
81	<i>Crassocephallum montuosum</i>	Asteraceae	Igifuraninda
82	<i>Crassocephallum paludum</i>	Asteraceae	
83	<i>Crassocephallum sp.</i>	Asteraceae	
84	<i>Crassocephallum vitellinum</i>	Asteraceae	Isununu
85	<i>Crassocephalum sarcobasis</i>	Asteraceae	
86	<i>Crinum zeylanicum</i>	Amaryllidaceae	
87	<i>Crotalaria agatiflora subsp. Imperialis</i>	Fabaceae	Ikiyogera
88	<i>Crotalaria longirostrata</i>	Fabaceae	Akayogera
89	<i>Crotalaria ochro leuca</i>	Fabaceae	Akayogera
90	<i>Crotalaria ononoides</i>	Fabaceae	Akayogera
91	<i>Crotalaria brevidens</i>	Fabaceae	Akayogera
92	<i>Crotalaria juncea</i>	Fabaceae	Akayogera
93	<i>Crotalaria spinosa</i>	Fabaceae	Akayogera

94	<i>Croton megalocarpus</i>	Euphorbiaceae	Umunege
95	<i>Cuscuta kilmanjari</i>	Cuscutaceae	
96	<i>Cyclosorus sp</i>	Thelypteridaceae	Igishuhe
97	<i>Cymbopogon nardus</i>	Poaceae	Itete
98	<i>Cynium hersfeldianum</i>	Orobanchaceae	Inzirurimi
99	<i>Cynium adoense</i>	Orobanchaceae	Muzimyamuro
100	<i>Cynodon aethiopicus</i>	Poaceae	Umucaca
101	<i>Cynodon dactylon</i>	Poaceae	Umucaca
102	<i>Cynodon nlemfuensis</i>	Poaceae	Umucaca
103	<i>Cyperus latifolius</i>	Cyperaceae	Urukangaga
104	<i>Cyperus angolensis</i>	Cyperaceae	
105	<i>Cyperus atroviridis</i>	Cyperaceae	
106	<i>Cyperus dichrostachys</i>	Cyperaceae	
107	<i>Cyperus distans</i>	Cyperaceae	
108	<i>Cyperus dives</i>	Cyperaceae	
109	<i>Cyperus esculentus</i>	Cyperaceae	
110	<i>Cyperus ottonnifolia</i>	Cyperaceae	
111	<i>Cyperus papyrus</i>	Cyperaceae	Urufunzo
112	<i>Cyphostema midibraedii</i>	Vitaceae	ikibondi
113	<i>Dactyloctenium aegypticum</i>	Poaceae	
114	<i>Datura stramonium</i>	Solanaceae	Rwizilinga
115	<i>Dendrocalamus brandis</i>	Poaceae	UMugano munini
116	<i>Desmodium barbatus var procumbens</i>	Fabaceae	desimodiyumu
117	<i>Desmodium intortum</i>	Fabaceae	desimodiyumu
118	<i>Desmodium tortuosum</i>	Fabaceae	
119	<i>Desmodium salicifolium</i>	Fabaceae	
120	<i>Desmodium setigerum</i>	Fabaceae	
121	<i>Desmodium repandum</i>	Fabaceae	
122	<i>Desmodium uncinatum</i>	Fabaceae	
123	<i>Dichrocephala integrifolia</i>	Asteraceae	Akamatila
124	<i>Digitalia abyssinica</i>	Poaceae	Urwili
125	<i>Digitalia diagonalis</i>	Poaceae	Urwili
126	<i>Digitalia longiflora</i>	Poaceae	Urwili
127	<i>Diplocyclos palmatus</i>	Cucurbitaceae	
128	<i>Diplophium africanum</i>	Apiaceae	
129	<i>Discoristes radicans</i>	Acanthaceae	
130	<i>Dissotis sp</i>	Melastomataceae	
131	<i>Dodonea viscosa</i>	Sapindaceae	
132	<i>Dryopteris sp</i>	Dryopteridaceae	
133	<i>Duranta bicolor</i>	Verbenaceae	
134	<i>Echinochloa stagnina</i>	Poaceae	
135	<i>Echinochloa pyramidalis</i>	Poaceae	
136	<i>Elephantopus scaber</i>	Asteraceae	
137	<i>Eleusine Indica</i>	Poaceae	
138	<i>Eleusine indica subsp Africana</i>	Poaceae	
140	<i>Emilia caespitosa</i>	Asteraceae	
141	<i>Emilia coccinea</i>	Asteraceae	

142	<i>Entada abyssinica</i>	Fabaceae	
143	<i>Epilobium sp.</i>	Onagraceae	
144	<i>Eragrostis exasperata</i>	Poaceae	
145	<i>Eragrostis paniciformis</i>	Poaceae	Ishinge
146	<i>Eragrostis racemose</i>	Poaceae	Ishinge
147	<i>Eragrostis macilenta</i>	Poaceae	Ishinge
148	<i>Eriobotria japonica</i>	Rosaceae	Umunofiliya
149	<i>Erucastrum arabicum</i>	Brassicaceae	
150	<i>Erythrina abyssinica</i>	Fabaceae	
151	<i>Ethulia sp.</i>	Asteraceae	
152	<i>Eulophia streptopetala</i>	Orchidaceae	
153	<i>Eulophia welwithii</i>	Orchidaceae	
154	<i>Euphorbia grantii.</i>	Euphorbiaceae	
155	<i>Euphorbia hirta</i>	Euphorbiaceae	
156	<i>Euphorbia prostrata</i>	Euphorbiaceae	
157	<i>Euphorbia schimperana</i>	Euphorbiaceae	
158	<i>Euphorbia tirucalli</i>	Euphorbiaceae	
159	<i>Eustachys paspaloides</i>	Poaceae	
160	<i>Felicia grantii</i>	Asteraceae	
161	<i>Ficus benjamiana</i>	Moraceae	
162	<i>Ficus sur</i>	Moraceae	
163	<i>Ficus thonningii</i>	Moraceae	
164	<i>Ficus vallis-choudae</i>	Moraceae	
165	<i>Fimbristilis dichotomus</i>	Cyperaceae	
166	<i>Fimbristilis madagascariensis</i>	Cyperaceae	
167	<i>Floscopa glomerata</i>	Commelinaceae	
168	<i>Flueggea virosa = Securinea virosa.</i>	Phyllanthaceae	
169	<i>Galinsoga parviflora</i>	Asteraceae	
170	<i>Gladiolus atropurpureus</i>	Iridaceae	Karungu
171	<i>Gloriosa superb</i>	Liliaceae	
172	<i>Glycine wightii subsp. wightii var logicanda</i>	Fabaceae	
173	<i>Gomphocarpus fruticosus</i>	Asclepiadaceae	
174	<i>Gomphrena celosiodes</i>	Amaranthaceae	
175	<i>Grevillea robusta</i>	Proteaceae	gereveriya
176	<i>Grewia similis</i>	Malvaceae	umukoma
177	<i>Guizotia scabra</i>	Asteraceae	Igishokashike
178	<i>Gynandropsis gynandra (Cleome gynandra)</i>	Cleomaceae	Isogi
179	<i>Harpachne schimperii</i>	Poaceae	
180	<i>Helichrysum odoratissimum</i>	Asteraceae	
181	<i>Hemerocallis lilio asphodelus</i>	Liliaceae	
182	<i>Heteranthera callifolia</i>	Pontederiaceae	
183	<i>Hibiscus acetocela</i>	Malvaceae	
184	<i>Hibiscus fuscus</i>	Malvaceae	
185	<i>Hibiscus subdarifa</i>	Malvaceae	
186	<i>Hoslundia opposite</i>	Lamiaceae	
187	<i>Hydrocotyle mannii</i>	Apiaceae	
188	<i>Hydrocotyle subtorpioides</i>	Apiaceae	

189	<i>Hygrophilla auriculata</i>	Acanthaceae	Bugangabukali
190	<i>Hymenocallis sp.</i>	Liliaceae	
191	<i>Hyparrhenia bracteata</i>	Poaceae	
192	<i>Hyparrhenia filipendula</i>	Poaceae	
193	<i>Hyparrhenia Formosa</i>	Poaceae	
194	<i>Hypoxis angustifolia</i>	Hypoxidaceae	
195	<i>Hypoxis obtuse</i>	Hypoxidaceae	
196	<i>Hyptis pectinate</i>	Lamiaceae	
197	<i>Imperata cylindrica</i>	Poaceae	
198	<i>Indigofera spicata</i>	Fabaceae	
199	<i>Indigofera circinella</i>	Fabaceae	
200	<i>Indigofera erecta</i>	Fabaceae	
201	<i>Ipomoea cairica</i>	Convolvulaceae	
202	<i>Ipomoea obsura (Feuille haste)</i>	Convolvulaceae	
203	<i>Ipomoea tenuirostris</i>	Convolvulaceae	
204	<i>Ipomoea purpurea</i>	Convolvulaceae	
205	<i>Jacaranda mimosifolia</i>	Bignoniaceae	
206	<i>Juncus effusus</i>	Juncaceae	
207	<i>Kalenchoe integra</i>	Crassulaceae	
208	<i>Kalenchoe rolsfii</i>	Crassulaceae	
209	<i>Kyllinga appendiculata</i>	Cyperaceae	Indagarago
210	<i>Kyllinga bulbosa</i>	Cyperaceae	Indagarago
211	<i>Kyllinga chrysantha</i>	Cyperaceae	Indagarago
212	<i>Kyllinga elatior</i>	Cyperaceae	Indagarago
213	<i>Kyllinga intricate</i>	Cyperaceae	Indagarago
214	<i>Kyllinga sphacelate</i>	Cyperaceae	Indagarago
215	<i>Lactuca attenuate</i>	Asteraceae	Rurira
216	<i>Lactuca capensis</i>	Asteraceae	Rurira
217	<i>Lactuca glandulifera</i>	Asteraceae	Rurira
218	<i>Lactuca inermis</i>	Asteraceae	Rurira
219	<i>Ladgenaria abyssinica</i>	Cucurbitaceae	Umutanga
220	<i>Lantana camara</i>	Verbenaceae	Umuhengeri; Maviyakuku
221	<i>Lantania trifolia</i>	Verbenaceae	Umuhengeri
222	<i>Leersia hexandra</i>	Poaceae	
223	<i>Leonotis nepetaefolia</i>	Lamiaceae	Igicumucumu
224	<i>Leucaena leucocephala</i>	Fabaceae	Losena
225	<i>Leucas martinicensis</i>	Lamiaceae	Akanyamapfundo
226	<i>Lippia sp</i>	Verbenaceae	
227	<i>Ludwigia abyssinica</i>	Onagraceae	Umuzigangore
228	<i>Macadamia tetraphylla</i>	Proteaceae	macadamia
229	<i>Macrotyloma axillaire</i>	Fabaceae	
230	<i>Maerua triphylla ver. Johannis</i>	Caparidaceae	
231	<i>Maesopsis eminii</i>	Rhamnaceae	Umuhumuro
232	<i>Mangifera indica</i>	Anacardiaceae	Umwembe
233	<i>Mariscus sumatrensis</i>	Cyperaceae	
234	<i>Mariscus tomaiophyllus</i>	Cyperaceae	
235	<i>Markhamia lutea</i>	Bignoniaceae	Umusave

236	<i>Maytenus acuminata</i>	Celastraceae	Umushubi
237	<i>Maytenus senegalensis</i>	Celastraceae	Umushubi
238	<i>Melanthera scandens</i>	Asteraceae	Cyumya
239	<i>Melastomastrum sp</i>	Melastomataceae	
240	<i>Melia azedarach</i>	Meliaceae	
241	<i>Melinis repens</i>	Poaceae	
242	<i>Microglosa pyrifolia</i>	Asteraceae	Umuhe
243	<i>Mimosa pigra</i>	Fabaceae	
244	<i>Mimosa pudica</i>	Fabaceae	
245	<i>Mirabilis jalapa</i>	Solanaceae	Kalifuma
246	<i>Momordica foetida</i>	Cucurbitaceae	Umwishwa
247	<i>Monechma subsessilis</i>	Acanthaceae	
248	<i>Morus alba</i>	Moraceae	Bobeli
249	<i>Mucuna stans</i>	Fabaceae	Mukuna
250	<i>Murdania simplex</i>	Commelinaceae	
251	<i>Myrica salicifolia</i>	Myricaceae	
252	<i>Neonotonia wightii</i>	Fabaceae	
253	<i>Nicandra physaloides</i>	Solanaceae	
254	<i>Nicotiana glauca</i>	Solanaceae	
255	<i>Nymphaea lotus</i>	Nymphaeaceae	Amarebe
256	<i>Nymphaea maculate</i>	Nymphaeaceae	Amarebe
257	<i>Nymphaea nouchallii</i>	Nymphaeaceae	Amarebbe
258	<i>Ocimum gratissima</i>	Lamiaceae	Umwunya
259	<i>Ophresia radicata var radicata</i>	Fabaceae	
260	<i>Ottelia ulvifolia</i>	Hydrocharitaceae	
261	<i>Oxalis corniculata</i>	Oxalidaceae	Byunyubwanyamanza
262	<i>Oxalis latifolius</i>	Oxalidaceae	Byunyubwanyamanza
263	<i>Oxalis obliquicola</i>	Oxalidaceae	Byunyubwanyamanza
264	<i>Oxygonum sp.</i>	Polygonaceae	
265	<i>Oxygonum sinuatum</i>	Polygonaceae	Ubuhandanzovu
266	<i>Panicum maximum</i>	Poaceae	
267	<i>Panicum paludum</i>	Poaceae	
268	<i>Paspalum notatum</i>	Poaceae	
269	<i>Paveta ternifolia</i>	Rubiaceae	
270	<i>Pavonia urens var. urens</i>	Malvaceae	Icyuyuyu
271	<i>Pennisetum purpureum</i>	Poaceae	Urubingo
272	<i>Persea americana</i>	Lauraceae	Ivoka
273	<i>Phragmites mauritanus</i>	Poaceae	Imiseke
274	<i>Phyllanthus nimmurifolius</i>	Phyllanthaceae	Uruheza
275	<i>Phyllanthus pseudoniruri</i>	Phyllanthaceae	Uruheza
276	<i>Physalis peruviana</i>	Solanaceae	Impuhu; Gapeli.
277	<i>Plantago major</i>	Plantaginaceae	Imbatatabata
278	<i>Podocarpus falcatus</i>	Podocarpaceae	Umufu
279	<i>Podocarpus latifolius</i>	Podocarpaceae	Umuhulilizi
280	<i>Polygonum pulchrum</i>	Polygonaceae	Igorogonza
281	<i>Polygonum salicifolium</i>	Polygonaceae	Igorogonza
282	<i>Polyscias fulva</i>	Araliaceae	Umwungo

283	<i>Portulacca oleracea</i>	Portulacaceae	Manikakaguru
284	<i>Potamogeton thumbergii</i>	Potamogetonaceae	
285	<i>Pseudarthria hookeri</i>	Fabaceae	
286	<i>Psidium guajava</i>	Rutaceae	Ipera
287	<i>Pycnus macrostachyus</i>	Cyperaceae	
288	<i>Ranunculus multifidus</i>	Renonculaceae	Kazingashya
289	<i>Rhus longipes</i>	Anacardiaceae	Umusagara
290	<i>Rhus vulgaris</i>	Anacardiaceae	Umusagara
291	<i>Rhyncheltrum repens</i> = <i>R. roseum</i>	Poaceae	Urwalikafundi
292	<i>Ricinus communis</i>	Euphorbiaceae	Ikibonobono
293	<i>Rhoicissus tridentata</i>	Vitaceae	Umumara
294	<i>Rumex abyssinicus</i>	Polygonaceae	Umufumba
295	<i>Rumex bequaertii</i>	Polygonaceae	Nyiramuko
296	<i>Rumex usambarensis</i>	Polygonaceae	Umufumbageshi
297	<i>Scadoxus multiflorus</i>	Amaryllidaceae	
298	<i>Senna didymobotrya</i>	Fabaceae	umucyuro; umubagabaga
299	<i>Senna floribunda</i>	Fabaceae	Umuyoka, Umwicanzoka
300	<i>Senna hirsute</i>	Fabaceae	umuyoka
301	<i>Senna spectabilis</i>	Fabaceae	Umwicanzoka
302	<i>Setaria pumila</i>	Poaceae	Akalizo
303	<i>Sesamum angolense</i>	Pedaliaceae	Igonde
304	<i>Sesbania micrantha</i>	Fabaceae	Umunyegenyege
305	<i>Sesbania seban</i>	Fabaceae	Umunyegenyege
306	<i>Setaria barbata</i>	Poaceae	Urukoko
307	<i>Setaria pallide-fusca</i>	Poaceae	Akalizo
308	<i>Setaria sphacelate</i>	Poaceae	Setaria
309	<i>Setaria verticillata</i>	Poaceae	
310	<i>Sida cordifolia</i>	Malvaceae	Umucundura
311	<i>Siegesbeckia abyssinica</i>	Asteraceae	
312	<i>Solanum angwivii</i>	Solanaceae	
313	<i>Solanum capsoides</i>	Solanaceae	
314	<i>Solanum incanum</i>	Solanaceae	
315	<i>Solanum mauritianum</i>	Solanaceae	
316	<i>Solanum nigrum</i>	Solanaceae	Isogo
317	<i>Solanum torvum</i>	Solanaceae	Intobokaremba
318	<i>Solanum aculeastrum</i>	Solanaceae	Untobotobo
319	<i>Sonchus asper</i>	Asteraceae	Rurira
320	<i>Sonchus oleracea</i>	Asteraceae	Rurira
321	<i>Sorghum arundinacea</i>	Poaceae	
322	<i>Spathodea campanulate</i>	Bignoniaceae	Umunyara
323	<i>Spermacoce prince</i>	Rubiaceae	Ngingwijana
324	<i>Sphaelanthus suaveolens</i>	Asteraceae	
325	<i>Sphagneticola trilobata</i> or <i>wedelia</i>	Asteraceae	Singapore daisy
326	<i>Spilanthes mauritianum</i>	Asteraceae	Akamenampishyi
327	<i>Sporobolus africanus</i>	Poaceae	Umutsinna
328	<i>Sporobolus festinus</i>	Poaceae	Umutsina
329	<i>Sporobolus pyramidalis</i>	Poaceae	Umutsina

330	<i>Stephania abyssinica</i>	Menispermaceae	
331	<i>Sterculia quiquiloba</i>	Sterculiaceae	
332	<i>Stylosanthes fruticose</i>	Fabaceae	
333	<i>Stylosanthes muconata</i>	Fabaceae	
334	<i>Syzygium guineense</i>	Myrtaceae	Umugote
335	<i>Syzygium parvifolium</i>	Myrtaceae	Umugote
336	<i>Tagetes minuta</i>	Asteraceae	Nyiramunukanabi; Munukanabi
337	<i>Tephrosia pumila</i>	Fabaceae	Umuruku
338	<i>Tephrosia vogellii</i>	Fabaceae	Umuruku
339	<i>Teramnus labialis</i>	Fabaceae	
340	<i>Teramnus repens</i>	Fabaceae	
341	<i>Terminalia mantaly</i>	Combretaceae	
342	<i>Themeda triandra</i>	Poaceae	
343	<i>Thevetia peruviana</i>	Apocynaceae	
344	<i>Thumbergia alata</i>	Acanthaceae	Nkurimwonga
345	<i>Tithonia diversifolia</i>	Asteraceae	Cyambazi; Igitereza; Icyicamahirwe
346	<i>Tragia brevipes</i>	Euphorbiaceae	Isusa
347	<i>Trema orientalis</i>	Rhamnaceae	Umudobori
348	<i>Trichodesma zeylanicum</i>	Boraginaceae	
349	<i>Tridax procumbens</i>	Asteraceae	
350	<i>Trifolium perseglovei</i>	Fabaceae	
351	<i>Trifolium repens</i>	Fabaceae	
352	<i>Triumfetta cordifolia</i>	Malvaceae	
353	<i>Triumfetta rhomboidei</i>	Malvaceae	
354	<i>Typha capensis</i>	Thyphaceae	Umuberanya
355	<i>Typha dominguensis</i>	Thyphaceae	Umuberanya
356	<i>Typha latifolia</i>	Thyphaceae	Umuberanya
357	<i>Urera hypselodendron</i>	Urticaceae	Umuse
358	<i>Vallisneria aethiopica</i>	Hydrocharitaceae	
359	<i>Verbena x Verbena</i>	Acanthaceae	
360	<i>Vernonia auriculifera</i>	Asteraceae	
361	<i>Vernonia amygdalina</i>	Asteraceae	Umubilizi
362	<i>Vernonia lasiopus</i>	Asteraceae	Ivumavumo
363	<i>Vernonia pogosperma</i>	Asteraceae	
364	<i>Vernonia scaetae</i>	Asteraceae	
365	<i>Vigna parkerii</i>	Fabaceae	
366	<i>Vigna luteola</i>	Fabaceae	
367	<i>Vigna maccrorhyncha</i>	Fabaceae	
368	<i>Vigna parkeri subsp. maraguensis</i>	Fabaceae	
369	<i>Vigna reticulata</i>	Fabaceae	
370	<i>Vigna vexilata</i>	Fabaceae	
371	<i>Zanthedeschia aetiopicum</i>	Araceae	Amaroma
372	<i>Zehneria scabra</i>	Cucurbitaceae	Umushishiro
373	<i>Oreoscice africana</i>	Cucurbitaceae	

Table 17: Plant species identified in Nyandungu wetland in 2019 (Mvukiyumwami 2019)

No	Family Name	Number of Species	No	Family Name	Number of Species
1	Acanthaceae	10	41	Lauraceae	1
2	Agavaceae	1	42	Liliaceae	5
3	Amaranthaceae	6	43	Malvaceae	10
4	Amaryllidaceae	2	44	Melastomataceae	2
5	Anacardiaceae	3	45	Meliaceae	1
6	Apiaceae	4	46	Menispermaceae	2
7	Apocynaceae	1	47	Moraceae	5
8	Araceae	2	48	Myricaceae	1
9	Araliaceae	1	49	Myrtaceae	2
10	Araucariaceae	1	50	Nymphaeaceae	3
11	Ascepiadaceae	1	51	Onagraceae	2
12	Aspleniaceae	1	52	Orchidaceae	2
13	Asteraceae	45	53	Orobanchaceae	3
14	Bignoniaceae	3	54	Oxalidaceae	4
15	Boraginaceae	1	55	Pedaliaceae	1
16	Brassicaceae	2	56	Phyllanthaceae	3
17	Canabaceae	1	57	Plantaginaceae	1
18	Canaceae	1	58	Poaceae	52
19	Caparidaceae	3	59	Podocarpaceae	2
20	Caricaceae	1	60	Polygonaceae	7
21	Casuarinaceae	1	61	Pontederiaceae	1
22	Celastraceae	2	62	Portulacaceae	1
23	Celastraceae	2	63	Potamogetonaceae	1
24	Cleomaceae	3	64	Proteaceae	2
25	Combretaceae	2	65	Renonculaceae	1
26	Commelinaceae	7	66	Rhamnaceae	2
27	Convolvulaceae	5	67	Rosaceae	1
28	Crassulaceae	2	68	Rubiaceae	2
29	Cucurbitaceae	5	69	Rutaceae	2
30	Cyperaceae	20	70	Sapindaceae	1
31	Cyperaceae	20	71	Solanaceae	13
32	Euphorbiaceae	9	72	Sterculiaceae	1
33	Fabaceae	59	73	Thyphaceae	3
34	Fern	2	74	Urticaceae	1
35	Hydrocharitaceae	1	75	Verbenaceae	6
36	Hypoxidaceae	2	76	Vitaceae	4
37	Iliaceae	1			
38	Iridaceae	1			
39	Juncaceae	1			
40	Lamiaceae	5			
Total Species					371

Table 18: Species of plants in NUWEP grouped by families (Mvukiyumwami 2019).

No	Shrub Species	Number
1	<i>Phragmites mauritianum</i>	80,516
2	<i>Dracaena afromontana</i>	5,736
3	<i>Euphorbia tirucalii</i>	7,622
4	<i>Solanum aculeastrum</i>	16,595
5	<i>Acanthus pubescens</i>	11,028
6	<i>Vernonia amygdalina</i>	11,185
7	<i>Acacia montigena</i>	1
8	<i>Toddalia asiatica</i>	19
9	<i>Dodonea viscosa</i>	789
10	<i>Bougainvillea spectabilis</i>	1,528
11	<i>Acalypha bipartite</i>	10
12	<i>Hibiscus rosa sinensis</i>	20
13	<i>Hibiscus diversifolius</i>	574
14	<i>Dovyalis caffra</i>	30
15	<i>Ronce</i>	43
16	<i>Acacia montigena</i>	1
17	<i>Maytenus. sp.</i>	11,375
18	<i>Carissa edulis</i>	2519
19	<i>Tetradenia riparia</i>	483
20	<i>Dwarf bamboo</i>	425
21	<i>Cyperus papyrus</i>	4,750
22	<i>Afromomum sanguineum</i>	24
23	<i>Ficus pumilla</i>	156
	Total	144,244

Table 19: Shrubs planted in the living fence (Mvukiyumwami 2019).

No	Common Name	No	Common Name
1	White-faced Whistling Duck	51	African Black-headed Oriole
2	Spur-winged Goose	52	Fork-tailed Drongo
3	Yellow-billed Duck	53	African Paradise-flycatcher
4	Little Grebe	54	Pied Crow
5	Yellow-billed Stork	55	Common Bulbul
6	African Openbill	56	Plain Martin
7	Sacred Ibis	57	Angola Swallow
8	Hadedda Ibis	58	Wire-tailed Swallow
9	Little Bittern	59	Lesser-striped Swallow
10	Cattle Egret	60	Red-rumped Swallow
11	Grey Heron	61	Winding Cisticola
12	Black-headed Heron	62	Tawny-flanked Prinia
13	Great Egret	63	Grey-capped Warbler
14	Little Egret	64	Yellow White-eye
15	Hamerkop	65	Black-lored Babbler
16	Pink-backed Pelican	66	Arrow-marked Babbler
17	Long-tailed Cormorant	67	African Thrush
18	Palm-nut Vulture	68	White-browed Robin-Chat
19	Long-crested Eagle	69	Swamp Flycatcher
20	Black Kite	70	Common Stonechat
21	Yellow-billed Kite	71	Collared Sunbird
22	African Fish Eagle	72	Scarlet-chested Sunbird
23	Gabar Goshawk	73	Bronzy Sunbird
24	Grey-crowned Crane	74	Marico Sunbird
25	Black Crane	75	Red-chested Sunbird
26	African Wattled Lapwing	76	Copper Sunbird
27	African Jacana	77	Variable Sunbird
28	Common Sandpiper	78	Thick-billed Weaver
29	Red-eyed Dove	79	Baglafaecht Weaver
30	Blue-spotted Wood Dove	80	Spectacled Weaver
31	Emerald-spotted Wood Dove	81	Holub's Golden Weaver
32	Bare-faced Go-away-bird	82	Village Weaver
33	White-browed Coucal	83	Black-headed Weaver
34	Common Cuckoo	84	Red-billed Quelea
35	African Palm Swift	85	Fan-tailed Widowbird
36	Speckled Mousebird	86	Pin-tailed Whydah
37	African Pygmy Kingfisher	87	Cuckoo Finch (Parasitic Weaver)
38	Malachite Kingfisher	88	Bronze Mannikin
39	Giant Kingfisher	89	Black-and-White Mannikin
40	Pied Kingfisher	90	Red-cheeked Cordon-bleu
41	Woodland Kingfisher	91	Green-winged Pytilia
42	Little Bee-eater	92	Red-billed Firefinch
43	Cinnamon-chested Bee-eater	93	White-collared Oliveback
44	European Bee-eater	94	Common Waxbill

45	Spot-flanked Barbet	95	Northern Grey-headed Sparrow
46	Lesser Honeyguide	96	African Pied Wagtail
47	Sulphur-breasted Bush-shrike	97	Yellow-throated Longclaw
48	Tropical Boubou	98	African Pipit
49	Black-headed Gonolek	99	Western Citril
50	Grey-backed Fiscal	100	Golden-breasted Bunting

Table 20: List of Birds in Nyandungu (authors 2021; Will Wilson, Pers comm; Claudien Nsabagasani, Pers comm).

ANNEX II: Africa's Urban Park Case Studies

KARURA FOREST

Name:	Karura Forest
Location:	Nairobi, Kenya
Size:	1,041 hectares
Managed by:	Kenya Forest Service
Annual Visitors:	200,000
Concessions Inside:	Yes
Donor Support:	Yes
Partner NGO:	Friends of Karura Forest

FRIENDS OF KARURA FOREST
✓ Registered October 2009
✓ 947 members
✓ 510 annual passes issued
✓ 34 large events held
✓ More than 5,000 bikes rented
KARURA FOREST RESERVE
✓ 200,000 annual visitors
✓ 70% of visitors Kenya citizens
✓ TripAdvisor Certificate of Excellence 2014, 2015
✓ No. 4 of 100 places to visit in Kenya (according to TripAdvisor)
✓ A rapidly recovering ecosystem (according to 21 mammal species)

Karura Forest, located in Nairobi, Kenya, is a great example of how an urban park can become a hub of recreational and educational activities for local populations and foreigners. Karura is in the heart of Nairobi and prior to its development, was a forest area feared by locals and visitors. It was known as sheltering bandits and thieves; therefore, was not used for recreation.

Friends of Karura Forest, a local NGO, provides support to KFS, helps raise funding from donations and corporate sponsorship and helps with volunteer days. Karura has successfully engaged local citizens in forest conservation and development. There are 16,000 visitors per month. Karura Forest offers:

- Hiking, biking, jogging, dog-walking
- Eco-tours
- Restaurant (available for booking for private events)
- Picnic area

There are several success factors:

- Well-maintained infrastructure
- Clear trails and signage
- Reasonable entry fee
- Security
- Accessible parking areas next to the restaurant and walking trails
- Modern and appealing restaurant with great view
- Nice picnic area¹²



Photo 14: Karura Forest. Left: The River Cafe, a restaurant located in Karura Forest. Right: Parking for the restaurant and hiking/biking trails

¹²http://www.kenyaforestservice.org/index.php?option=com_content&view=article&id=77:karuraforest&catid=80:ecotourism&Itemid=523

LUSAKA NATIONAL PARK

Name:	Lusaka National Park
Location:	Lusaka, Zambia
Size:	6,715 ha
Managed by:	Zambia Wildlife Authority
Annual Visitors:	16,800 (2015)
Concessions Inside:	No
Donor Support:	Yes
Partner NGO:	ARC Zambia

Lusaka National Park¹³ is located ~30 kilometers from Lusaka, the capital of Zambia, and is the newest park in the country, the 20th in the country. Lusaka NP opened to the public in 2015 and is the second national park in a city environment in the country. Before becoming a national park, it was the Lusaka South Forest Reserve. The area is an important water catchment area for the city of Lusaka, and ARC Zambia is working with the park to conserve the catchment systems as well as reintroduce large mammal species.

The Park supports more than 1,000 species that exist in the park including rhinos, zebras, giraffes, and more. The park is ~6,715 hectares and is governed by Zambia Wildlife Authority (ZAWA). The park offers activities such as camping, walking safaris, bicycle trails, game viewing, boating, photographic safaris, bird watching and picnics. There is an observation deck where guests can view animals from above, and the park features a rare white rhino, which attracts guests. The park does not have any concessions or an information centre. ZAWA is currently considering a PPP for management.



Photo 15: Lusaka National Park. Left: Entrance to the park and the heightened platform in the back. Right: The southern white rhino that is located within the park and attracts visitors.

13 <https://www.zambiatourism.com/destinations/national-parks/lusaka-national-park/>

NAIROBI NATIONAL PARK

Name:	Nairobi National Park
Location:	Nairobi, Kenya
Size:	11,700 ha
Managed by:	Kenya Wildlife Service
Annual Visitors:	600,600 (2015)
Concessions Inside:	Yes
Donor Support:	No
Partner NGO:	Sheldrick Wildlife Trust

Nairobi National Park¹⁴ is ~117 km² and located in the heart of Nairobi. The Park supports over 100 mammal species and 400 migratory and endemic bird species. Nairobi NP also features three campsites, a private tented camp, an orphanage, hiking trails and picnic areas. The park is only a short drive out of Nairobi's central business district and supports the endangered Black Rhinoceros. In 2015, 600,600 people visited the Park, the Safari Walk, and the orphanage.

The Park contains a Wildlife Conservation Education Centre which offers lectures and videos about the wildlife in the Park. They also offer guided tours of the park as well as the animal orphanage. Near the entrance of the park is a KWS managed orphanage, and a second animal orphanage run by the Sheldrick Wildlife Trust which helps elephants and rhinoceros calves mature and eventually releases them back into sanctuaries. Nairobi National Park contains a safari walk, which offers an up-close view of plants and animals native to Kenya.



Photo 16: Nairobi National Park. Left: A black rhinoceros in the NP with the Nairobi skyline in the background. Right: Nairobi National Park's landscape with the city in the back.

¹⁴ <http://www.kws.go.ke/parks/nairobi-national-park>

TABLE MOUNTAIN NATIONAL PARK

Name:	Table Mountain National Park
Location:	Cape Town, South Africa
Size:	22,100 ha
Managed by:	South African National Parks
Annual Visitors:	4.2 million
Concessions Inside:	Yes
Donor Support:	Yes
Partner NGO:	Worldwide Fund (WWF)

Table Mountain NP, which used to be known as Cape Peninsula NP, is in Cape Town, South Africa. The park is managed by South African National Parks and is a part of the UNESCO Cape Floral Region World Heritage Site. The Park contains the landmarks Table Mountain and the Cape of Good Hope (southwestern tip of Africa) and includes the Boulders Penguin Colony in Simons Town, Signal Hill, Lion's Head peak, and a variety of beaches. There are lots of hiking trails, free guided walks, scuba, surfing, rock climbing, and horse-riding opportunities.

Table Mountain National Park is not a contiguous area and is separated into three areas: Table Mountain section, Silvermine-Tokai section, and Cape Point section.

The Park features the Table Mountain Cableway, which takes visitors to the top of Table Mountain easily. Another large draw for the Park is the Cape of Good Hope, which is one of the most southern tips of Africa. There are multiple shops in the park including a souvenir shop at the Boulders Visitor Centre and the Curio Shop at the Cape of Good Hope. Basic camping and lodging are provided in the Cape of Good Hope.¹⁵



Photo 17: Table Mountain National Park. Left: Table Mountain. Right: Boulders Beach Penguin colony.

¹⁵ <https://tablemountainnationalpark.org>

ARUSHA NATIONAL PARK

Name:	Arusha National Park
Location:	Arusha, Tanzania
Size:	13,700 ha
Managed by:	Tanzania National Parks Authority
Annual Visitors:	66,808 (2012)
Concessions Inside:	No
Donor Support:	No
Partner NGO:	No

Arusha NP is the most accessible park in Tanzania, as it is located very close to the towns of Arusha and Moshi. The Park is ~52 km² and supports a great diversity of wildlife. The Park contains Mount Meru, a volcano that reaches 4,566 meters in elevation, the Jekukumia River, the Momella Lakes, and the Ngurdoto Crater. Although the Park is not massive in size, it has many varying landscapes for visitors to enjoy.

Arusha NP is home to a very diverse number of bird species, making it a great destination for bird lovers. The Momella Lakes are known for having populations of wading birds, including pink flamingos, pelicans, African fish eagles, and more, as well as zebras and giraffes along the banks. Each of the lakes are a different shade of green or blue making them beautiful; this is because they are alkaline lakes with significant algal growth.

Many people come here for driving, walking, canoe safaris, picnicking, and hiking Mount Meru. Tourists like to use the Mount Meru hike as training for Kilimanjaro, as it is the second highest peak in Tanzania. The park also has the Ngurdoto Museum, which contains insects and bugs from the park amongst other artifacts from over the years.



Photo 18: Arusha National Park. Left: Lesser Flamingos along one the banks of one of the Momella Lakes. Right: Giraffes in the Park.

BANCO NATIONAL PARK

Name:	Banco National Park
Location:	Abidjan, Cote d'Ivoire
Size:	3,438 ha
Managed by:	OIPR West Africa
Annual Visitors:	18,000 (2012)
Concessions Inside:	No
Donor Support:	No
Partner NGO:	PAMs Foundation, Leadership Conservation Africa

Banco NP, ~300 km², is located north of Abidjan in Cote d'Ivoire. Banco hosts a large number of hiking trails and features many rare species of trees (including mahogany) as well as chimpanzees and many other species of unique birds and monkeys. Banco also has approximately 88 rare or endangered plant species, of which seven are only known in Cote d'Ivoire.

Banco has 600 ha of primary forests, which have trails throughout for visitors to walk or run in the park. There is an arboretum housing over 800 species of plants native to Asia, Latin America, and tropical Africa, with local species as well. Visitors can see chimpanzees, if they are lucky, and wildlife in the forests. Guided tours can be arranged. Additionally, the park has a nature centre including exhibits with information on animals, workshops, and educational films.



Photo 19: Banco National Park. Top: Nature centre, which was restored by Wild Chimpanzee Foundation in 2005. Bottom: One entrance to the Park.

UMUSAMBI VILLAGE

Name:	Umusambi Village
Location:	Kigali, Rwanda
Size:	16 hectares
Managed by:	Rwanda Wildlife Conservation Association
Annual Visitors:	5,000 – 8,000 (2018)
Concessions Inside:	No
Donor Support:	YES
Partner NGO:	Wildlife Conservation Network

Umusambi Village¹⁶ is a restored marshland approximately 45 minutes outside of Kigali city, on the road towards Kabuga (RN3). Umusambi Village was created to prevent the Grey Crowned Crane from going extinct. Grey Crowned Crane were very common in Rwanda until they became subject to illegal trade. Their numbers in the wild were reduced to roughly 400 cranes. Umusambi has become a sanctuary for these birds where they are rescued and rehabilitated, and visitors are able to see the birds and spread awareness of their plight.

The wetland area of Umusambi Village is home to more than 50 Grey Crowned Cranes, and they can be observed by visitors as they walk along the various trails throughout the park. These trails include informational signs on both the wetland environment and the Grey Crowned Cranes. The park has a medicinal plant garden for people who would like to learn more about natural healing, and it has a butterfly garden for children and adults to experience and learn more about butterflies. Tours can be scheduled in the park, with guides explaining the significance of what visitors see in the wetland; special dawn or dusk tours can also be scheduled ahead of time. There is a café and bikes are available for rent with access to approximately 20 km of trails. Umusambi is popular with locals and tourists and its busiest day is on Sunday (with approximately 150 people) followed by Saturday. There are group visits from schools as well as birding clubs.



Photo 20: Umusambi Village. Left: Concept plan for upcoming renovations to Umusambi Village. The park will have more trails in the upcoming years. Right: Picture of one of the trails in Umusambi.

¹⁶ <https://umusambivillage.org/>

UHURU PARK KENYA

Name:	Uhuru Park
Location:	Nairobi, Kenya
Size:	12.9 hectares
Managed by:	Nairobi Metropolitan Services (NMS) and City Hall
Capacity:	60,000
Concessions Inside:	No

Uhuru Park is a recreational park adjacent to the central business district of Nairobi, Kenya. It is open to the general public and contains an artificial lake that attracts many residents for relaxation. In addition to Nairobi National Park, the park is a great source of pride for the Government of Kenya. Nairobi is referred to as a green city because of Uhuru Park. It is unfenced and there is no fee for entry. The park is known as a place for rallies and protest, ranging from religious, political, and general. It became famous when Wangari Maathai and many of her followers held a protest at the park to stop the construction of the 60-storey Kenya Times Media Trust business complex. The following activities take place in the park:

- Walking
- Skateboarding
- Monument visits
- Political and religious gathering
- Jogging
- Picnicking

There are several success factors:

- Central location (just off Uhuru Highway)
- Free access
- Historic background
- Access to water activities in the city due to the artificial lake
- Nice picnic area
- Can be used by seasonal vendors depending on events



Photo 21: Uhuru Park. Left: The artificial lake at Uhuru Park. Right: National Monument at Uhuru Park.

The table below outlines the prices for each protected area.

Price, USD	Umusambi Village	Banco NP	Arusha NP	Table Mountain	Nairobi NP	Lusaka NP	Karura Forest
Locals							
Adult (locals/ CEDEAO/EA)	\$4	\$1.8	\$4.4	Boulders: \$2.72 Cape of Good Hope: \$5.83 Newlands, Oudekraal, Siilvermine, Tokai Picnic: \$2.33	\$3.58	\$10	\$0.9
Child	\$4	\$0,9	\$0,9	Boulders: \$1.36 Cape of Good Hope: \$2.91 Newlands, Oudekraal, Siilvermine, Tokai Picnic: \$1.17	\$1.79		\$0.5
Bike rent		\$0.5					
Annual pass		\$20 – individual \$30 – family*		Local residents can purchase a Green Card or Activity Permit Green Card: \$11.34 (12 free entries)	Pass is personalized and charged different fees depending on visitor category.		\$45 – individual \$90 – family
Foreign							
Entrance fee	\$17	\$9	\$45 adult \$15 child Free under 5 years old	Boulders: \$11.02 Cape of Good Hope: \$23.33 Newlands, Oudekraal, Siilvermine, Tokai Picnic: \$9.33 (Half price for children)	\$35 adult \$20 child	\$10	\$5.5 – adult \$2.7 – child
Bike rent		\$5.5					\$5.5 – 2h
Guided tour		\$18	\$15-20	Starting at <u>\$44</u> (third-party)	Starting at <u>\$52</u> (third-party)		
Annual pass		\$45 – individual \$90 – family*		N/A	See local annual pass above		45 – individual \$90 – family
Other							
Parking		\$0.5*					\$0.9
Parking Annual pass		\$10*					\$45
Camping			\$2.17 adult \$1.09 child				
Visitors							
Annual	5000 – 8000 (2018)	18,000 (2012)	66,808 (2012)	4,200,000	600,600 (2015)	16,800 (2015)	200,000

Table 21: Daily visitor rates in urban parks in Africa (*To be introduced).

Table 22 provides more information about each of the protected areas profiled.

	Umusambi Village	Banco NP	Arusha NP	Table Mountain	Nairobi NP	Lusaka NP	Karura Forest
Location	Kigali, Rwanda	Abidjan, Cote d'Ivoire	Arusha, Tanzania	Cape Town, South Africa	Nairobi, Kenya	Lusaka, Zambia	Nairobi, Kenya
Size (Hectares)	16	3,438	13,700	22,100	11,700	6,715	1,041
Entrance Fees	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Different Prices for Citizens, Residents, Tourists	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Managed By	Rwanda Wildlife Conservation Association	PARCC West Africa	Tanzania National Parks Authority	South African National Park	Kenya Wildlife Services	Zambia Wildlife Authority	Kenya Forest Service
Annual Visitors	5,000-8,000	18,000	66,808	4,200,000	600,600	16,800	200,000
Concessions	No	No	No	Yes	Yes	No	Yes
Donor Support	Yes	Yes	No	Yes	Yes	Yes	Yes
Partner NGO		PAMS, LCA		WWF	Sheldrick Wildlife Trust	ARC Zambia	Friends of Karura Forest

Table 22: Information on urban parks throughout Africa.

ANNEX III: Kigali Recreational Area Case Studies

SUNDAY PARK

Name:	Sunday Park
Location:	Nyarutarama, Kigali, Rwanda
Size:	2.8 hectare
Managed by:	Local entrepreneur
Affordability:	Entry Fee – RWF 10,000

Sunday Park¹⁷ is one of the most popular, if not the most popular, wedding garden in Kigali. It's safe and elite location, as well as the different landscapes featured in the park, encourages a variety of activities and events to take place on its grounds.

The Park is mostly used on weekends and hosts weddings that last the entire day. It also offers beautiful natural scenery for professional photoshoots and features Rwandan culture (pottery, sculpture, painting). In addition to wedding and photoshoots, the venue is also used to host picnics, birthday parties and a series of smaller events.

The price range of the services provided indicates the targeted market segment: middle to high end. Sunday Park does not have a restaurant and does not offer additional services except the space rental. Sunday Park can host between 1,000 and 1,500 people and is usually packed on popular days. With the COVID regulations, adjustments have been made to not have such a large number all at once.

Activity	Price (RWF)	Comments
Entrance Fee	10,000	For adults and free for kids below 5 years old
Wedding Space (ceremony no reception)	1,300,000	No tent, chairs, tables, catering, audio system, etc. provided. Just the space. One wedding in a day.
Wedding Space (ceremony with reception)	1,800,000	No tent, chairs, tables, catering, audio system, etc. provided. Just the space for an entire day. One wedding in a day.
Birthdays and Small parties	500,000	For around 20-30 people. Several birthday parties can take place on the venue at the same time
Photoshoot	300,000	For one hour and a half. 5 photoshoots can happen at the same time.
Professional Camera (not a photoshoot)	100,000	Predominately nature photographs
Picnic	10,000	Per person price
Mini Golf	-	-
Others	-	Quotes for specific types of events available on the website

Table 23: Price range of activities in Sunday Park.

There are several success factors that attract people to the park:

- Very well-maintained infrastructure
- Safe neighbourhood, strategic location with great view and walking distance to the golf court
- Nice picnic and photo area
- Ponds, fishing, birding
- Boardwalk

¹⁷ <https://sunday-park.business.site/>



Photo 22: Sunday Park, Kigali, Rwanda. Top Left: A part of the wedding space in Sunday Park. Top Right: One of the spots with Rwandan pottery and sculpture. Bottom: One of the water scene and boardwalk.

FAZENDA SENGHA

Name:	Fazenda Sengha
Location:	Nyamirambo, Kigali, Rwanda
Size:	4 ha
Managed by:	Foreign ownership
Affordability:	Entry fee – RWF 3000

Fazenda Sengha¹⁸ is an outdoor recreational centre located on top of Mount Kigali. Its premium location gives its visitors a breath-taking view of the city of Kigali. It is mostly known for its zipline and horseback riding, but Fazenda also provides a wide range of activities listed below:

Activity	Price Weekdays (RWF)	Price Weekend + Holidays (RWF)	Comments
Horse Ride in the Arena (1H)	20,000	22,000	Fazenda owns 9 horses and 10 donkeys. The donkeys are solely for children.
Horse Ride in the Arena (30Min)	15,000	17,000	
Trail Ride	25,000	30,000	
Zipline	8,000	10,000	There are three zip lines, and the fee allows two turns at each line.
Archery	8,000	10,000	
Bungee Jumping	5,000	6,000	Children below 15
Quad Bikes (30min)	25,000		
Quad Bikes (15min)	15,000		
Badminton	Free		
Trampolines	Free		
Hiking	Free		
Petanque	Free		
Corn Hole	Free		
Bicycle ride	TBD		
Access to Site	3,000	4,000	If not taking part in any activity (except the free one)

Table 24: Price Range of Activities in Fazenda Sengha.

In addition to these activities, Fazenda has a restaurant and a juice/cocktail bar to encourage its visitors to stay longer. The facility is currently working on adding an indoor bar to the service provided. Fazenda also has a paintball facility opposite its main premises.

The popularity of Fazenda is based on the following:

- Premium location offering a good view of the city
- A variety of free activities for those who can't afford the main activities
- Restaurant, picnic, and barbeque area
- The well-maintained infrastructures and ever-growing range of activities
- A family inclusive service with safe, child-friendly activities

¹⁸ <http://sengha.com/>

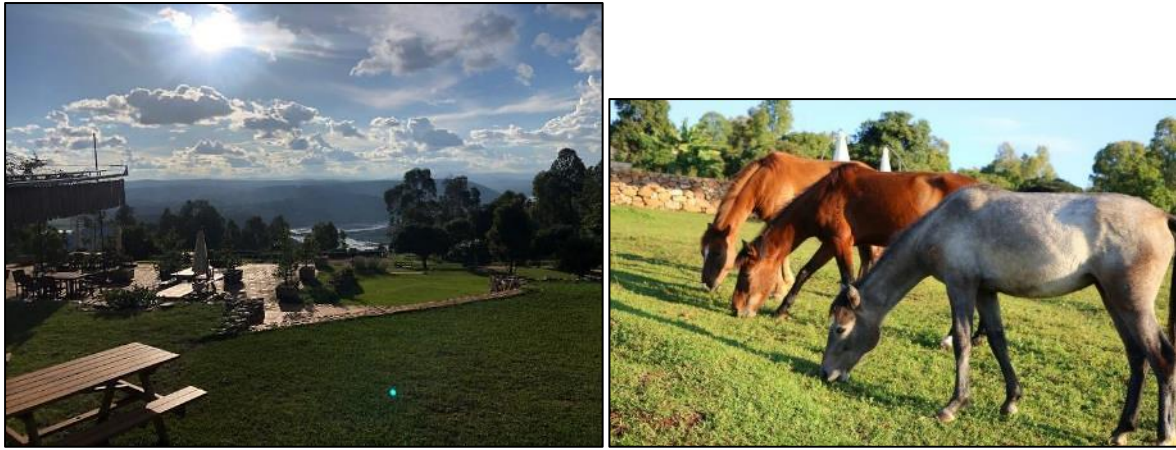


Photo 23: Fazenda Sengha. Left: The restaurant and picnic area in Fazenda Sengha. Right: Fazenda Sengha horses.

ANNEX IV: Nyandungu Site Visit Pictures

Pictures taken by Conservation Capital site visit in November 2021.



Photo 24: Pedestrian walkway and bench in Sector III.



Photo 25: Pope's Garden in Sector III.



Photo 26: NUWEP Vegetation.



Photo 27: View from inside the restaurant in Sector III.



Photo 28: One of the restored ponds and signage.



Photo 29: Waste coming from the industrial zone (Economic Zone) into NUWEP.