

Policy Brief on Protected areas, Biodiversity and Ecosystem-based Adaptation

Summary

Global climate models project a warming of 1-1.5 and 4-5°C for tropical region during the present century under the best, and worst-case climate change scenarios, respectively, compared to the period 1986-2005. For Rwanda, temperature is projected to increase by 2.5 °C by 2050 and by 4 °C by 2080 from the intermediate A1B scenario of CMIP3. Ecosystems and biodiversity are exposed directly to natural conditions, and have less adaptive capacity, which compromise their ability to deliver important goods and services to people, and thus harming livelihoods. This in turn, push people to resort to unsustainable use of natural resources, leading to ecosystems degradation. Although, conserving biodiversity in protected areas (PAs) is at the heart of the national development in Rwanda, climate change and non-climate related anthropogenic stressors put PAs and other natural ecosystems at risk, resulting in habitat loss and threatening biodiversity. There is therefore need for increasing both people and ecosystems resilience to the changing climates and better balancing human needs with those of the environment. Strategies and appropriately designated approaches for enhancing ecosystems and people resilience to climate change are proposed in this policy brief; Ecosystem-based adaptation (AbA) approaches. For PAs, these include the enforcement of management and conservation of PAs, expanding their size wherever possible, and identifying pathways of invasive alien species, and their spatial distribution and put in place mitigation measures including environmentally friendly removal methods. For degraded/fragmented natural ecosystems, restoration of ecosystems functioning approaches are suggested; through regular ecosystem vulnerability assessment, fencing and afforesting those natural patches to restore the habitat and reestablish the ecological integrity using native trees. Further, human capacity development through providing and supporting alternative income generating activities to local communities around restored ecosystems are the options to explore. This can be done through trainings and funding on agroforestry, small projects such beekeeping, etc, which therefore create a great sense of community engagement and ownership due to the direct benefits.

I Introduction

Ecosystem health and functioning are sensitive to both climate change and anthropogenic activities. Climate change and non-climate change related human activities adverse impacts on ecosystems and biodiversity are observed worldwide. Global climate models project a warming of 1-1.5 and 4-5°C for tropical region during the present century under the best, and worst-case climate change scenarios, respectively, compared to the period 1986-2005. For Rwanda, temperature is projected to increase by 2.5 °C by 2050 and by 4 °C by 2080 from the intermediate A1B scenario of CMIP3. Moreover, water deficit period in which potential evapotranspiration exceeds precipitation is projected to extend from the current 4 months to 10 months in some parts in the country.

Protection of wildlife and biodiversity areas are among the top priorities for Rwanda and Protected Areas (PAs) are at the heart of the national development. In Rwanda PAs cover an area of 232,000 ha, representing 9.11 % of the country. This area is projected to 37.7 % of the country's surface by 2050, to meet the global set targets of 27 % as stipulated by the SDGs. Among these PAs, three are UNESCO Biosphere reserves; the Volcans Biosphere Reserve, in the northwest, designated in 1983. This is a part of Albertine Rift, and important ecological structure in the region of east-central Africa. It covers 16,000 ha and it is a home of 30% of the global population of mountain gorillas (*Gorilla beringei beringei*), which generate important tourism revenue and are found in only two other countries, Uganda and Democratic Republic of Congo. The Volcans hosts many other animal species including big mammals, 245 plant species, 17 of which are threatened as per IUCN Red List, and 13 orchid species protected by CITES.

The Gishwati-Mukura Landscape Biosphere Reserve was designated in 2020 and covers a total area of 3, 558 ha. It is in the Albertine Rift in the western part of Rwanda. This youngest park in the country hosts a variety of endemic and critically endangered species; Chimpanzee (*Pan troglodytes schweinfurthi*) and endangered species; Golden monkey (*Cercopithecus (mitis) kandti*). Very recently, Nyungwe National Park was nominated as a UNESCO World Heritage site. It covers an area of 101,005 ha in south-west Rwanda and host a great number of endemic and threatened animal and plant species.

As result of the country's effort in natural ecosystems protection, mountain Gorilla population has increased and is stable, in addition, grey crown cranes have been rescued from captivity in households and hotels and brought back to their natural environment. Umusambi village sanctuary was created for them and 242 cranes have been removed from captivity. Further, programmes to promote biodiversity using in-situ and ex-situ conservation of both plants and

animals are put in places. Moreover, guidelines for access and Benefit-sharing have been formulated.

In Rwanda, the challenge remains on how to sustainably manage natural ecosystems, for both present and future generations, given the on-going change in climate and high population density. There is therefore need for increasing ecosystems resilience to the changing climates and better balancing human needs with those of the environment. Meeting this challenge will require fundamentally new strategies and approaches for enhancing ecosystems and people resilience to climate change.

2 Specific problem

Ecosystems and biodiversity are exposed directly to natural conditions, and have less adaptive capacity, which make them to be the most vulnerable to climate change. The adverse effects of climate change, including increased risk of floods due to erratic rainfall, droughts, landslides, and soil erosion degrade ecosystems and compromise their ability to deliver important goods and services to people, and thus harming livelihoods. This in turn, push people to resort to unsustainable use of natural resources, leading to ecosystems degradation, impeding their capacity to deliver services. Human activities, such as agricultural expansion, human settlement, and over-exploitation of natural resources (both animals and plants), and the introduction of alien invasive species among others threaten natural ecosystems functioning, resulting in loss of species and associated services, therefore, exacerbating the effect of climate change on these ecosystems. Interactions between natural ecosystems, climate change and people are illustrated in Figure 1.

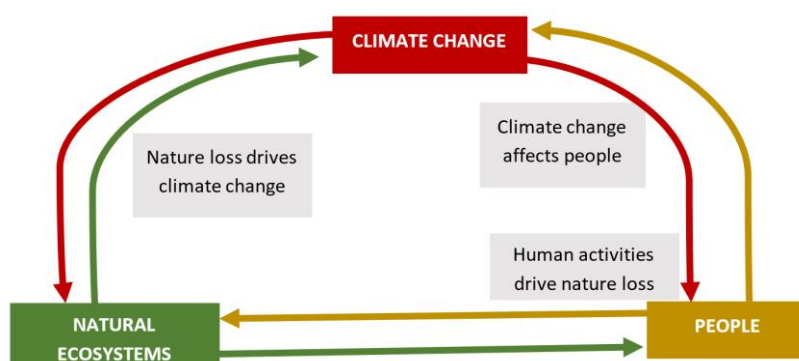


Figure 1. Interactions between climate change, people, and natural ecosystems

Although, conserving biodiversity is at the heart of the national development, population growth in Rwanda put pressures on natural ecosystems to meet mainly agricultural, energy and timber needs to name a few. For example, energy use in Rwanda is dominated by biomass, accounting for 86 % of total energy source. Therefore, increasing population growth

exacerbates the dependence on traditional biomass energy, reflecting direct effects on natural forests ecosystems. Research projected population growth to be strongly correlated with the energy demand and use as, shown in Figure 2.

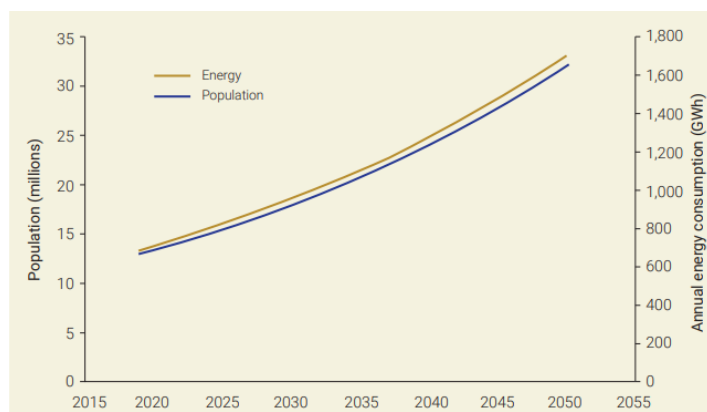


Figure 2. Annual energy consumption projection against population growth in Rwanda for the period of 2019-2050 (Imasiku & Ntagwirumugara, 2019).

Ecosystems degradation and habitat loss is a major concern, and some plants, birds, and mammal species are threatened due to both change in climate and anthropogenic activities. Overtime change in size for different natural forest ecosystems is shown in Table I.

Table I. Overtime changes in size for natural ecosystems including national parks and remnant forests

Ecosystem	Original size (ha) In 1984	Current size (ha) In 2015	% size loss
National Parks			
Akagera	267,740	112,185	58
Volcanoes	16,128	16,003	
Nyungwe	112,230	101,005	10
Gishwati-Mukura	25,583	3,558	86
Remnant Natural Forests			
Busaga Forest	191.22	158.86	17
Dutake Forest	31.33	10.76	60
Ibanda-Makera Forest	1424.88	168.88	88
Karama Forest	3235.45	1064.85	67
Karehe Gatuntu Forest	48.27	19.14	60
Kibirizi-Muyira Forest	453.9	352	22
Mashoza Forest	36.25	17.78	51
Mashyuza Forest	84.83	6.20	93

Muvumba Forest	1285.72	687.57	46.5
Ndoha Forest	38.70	28.64	26
Nyagasenyi Forest	44.65	18.66	58
Sanza Forest	48.73	23.9	51

Furthermore, based on the IUCN classification, the status of all four national parks of Rwanda falls well within Endangered or Critically Endangered threat categories as follow: Nyungwe and Akagera national parks are classified as Endangered while Volcanoes and Gishwati-Mukura national parks are classified among Critically Endangered ecosystems. Similar threat status is attributed to most of natural remnant forest ecosystems. Anthropogenic activities threatening ecosystems exacerbate the adverse effect of climate change. The main reason for this, is the high population density and very small land size per household. The population density in Rwanda is about 340 persons km⁻² on average with some rural districts recording densities of up to 1000 people km⁻². This has resulted in the occupation and development of land which is unsuitable for agriculture such as wetlands and steep slopes leading to degradation of natural resources evidenced by deforestation, reduction of biodiversity, soil erosion among others. This calls for urgent action to conserve, maintain and restore these forests ecosystems.

Biodiversity loss in Rwanda is highlighted in the sixth National Biodiversity Report showing a significant decline in population of large mammals (elephants, giraffes, buffaloes) due to poaching pressure and habitat loss. The black rhino has been extinct in Rwanda, fortunately, these have been recently reintroduced. Given the number of endemic and endangered plant and animal species hosted in PAs, conservation efforts addressing particularly the effects of climate change and non-climate related factors on Rwanda's biodiversity is urgently needed.

Sustainable conservation of biodiversity must consider the adverse impacts of both changing climates and non-climate related anthropogenic stresses. This policy brief provides the framework for effective strategies for action to save biodiversity and promote sustainable use. While PAs will continue to serve as core and center pieces of the conservation efforts, they will be complemented by other categories of conservation areas and conservation-based production systems. This policy brief proposes strategies and approaches for enhancing ecosystems and people resilience to climate change.

3 Rationale

Healthy, functioning ecosystems are essential for protecting our climate and adapting to climate change and thus improve human well-being and development. Worldwide, people depend on a wide range of goods and services they provide. Rwandans rely on natural ecosystems services including clean water, soil and land stabilization, agricultural production through pollination, timber, fuel wood, clean air, extreme events buffering and climate regulation.

Ecosystem-based Adaptation (EbA) is an approach based on the restoration and conservation of biodiversity and ecosystem functioning to enhance resilience of ecosystems to climate change impacts on biodiversity and on the well-being of communities at local, regional, and global levels. EbA solutions promote ecological, economic, and social benefits and are built on health ecosystems, and thus require managing the ecosystems for their long-term benefits. Therefore, appropriately designed EbA approaches help to secure ecosystem services while enhancing people's resilience to climate change (see Figure 3).

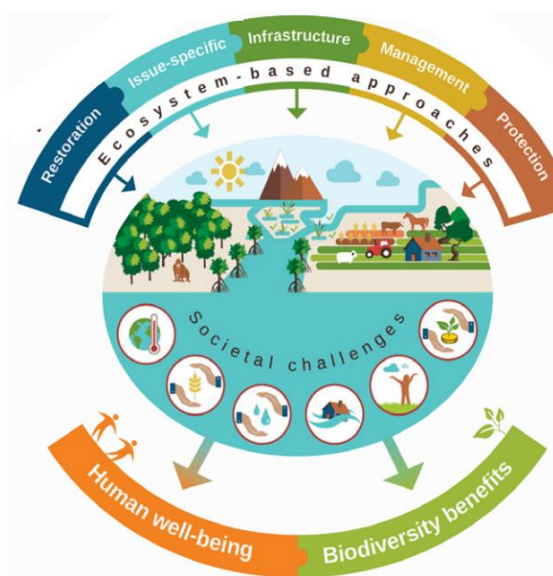


Figure 3. Conceptual framework for ecosystem-based approaches (Adapted from IUCN, in: Cohen-Sacham et al., 2016)

4 Key recommendations

In Rwanda, PAs and biodiversity are mostly threatened by climate change, high population density with few alternative income generating activities, low skills of local people to diversify their source of livelihoods, invasive alien species and inadequate capacity for ecosystem management at both national and local levels. Sustainable biodiversity conservation under uncertain future climatic conditions requires therefore an integrated institutional and mechanism that builds on the existing capacities and mechanisms.

Existing PAs

In, already existing PAs, ecosystem protection approaches are appropriate, including area-based conservation and protected area management. Therefore, requiring:

- Enforcing management and conservation of protected areas and building long-term institutional capacities.
- Increase the size of PAs where possible, to increase the habitat for biodiversity, enhance essential services to human livelihoods.
- Identify pathways of invasive alien species, and their spatial distribution and put in place mitigation measures including environmentally friendly removal methods. This is also applied for non-protected areas.

Degraded/fragmented natural ecosystems:

For degraded natural ecosystems, designing appropriate restoration of ecosystem functioning approaches is needed:

- Initiate regular ecosystem vulnerability assessment. Make a survey of relevant ecosystem services, ecosystem health and function and perceived changes. In addition, conduct a survey of vulnerability of livelihoods linked to the status and availability of ecosystems services.
- Fence and afforest degraded / fragmented natural patches to restore the habitat and reestablish the ecological integrity using native trees. Restoring and conserving degraded ecosystems enhance habitat for wildlife, and support biodiversity, which in turn increase potential to store carbon and mitigate climate change.
- Create a local forest management association around each restored ecosystem, that has a task of managing and monitoring the restored areas.
- Although, the government took an important step in providing incentives for biodiversity conservation through formulation of guidelines for access and revenue-sharing with communities around PAs, there is lack of motivation of local communities around other conserved ecosystems, where people are restricted to access to forests for collection of firewood, medicinal plants, beekeeping, etc. Therefore, providing and supporting alternative income generating activities to local people would be options to explore to reduce pressure on natural ecosystems. This can be done through trainings and funding, beekeeping. Diversifying practices generating income would create a great sense of community engagement and ownership due to the direct benefits. This would increase resilience of local communities to climate variability and

change, while safeguarding ecosystems functioning and biodiversity in these restored ecosystems.

Ecosystem management planning and implementation, and human capacity development

- Integration of values of biodiversity and ecosystem services into planning processes, poverty reduction strategy and national economy and strengthening the environmental governance at local level.
- Increase the involvement of representative from private entities and strengthen the ability of stakeholders and institutions to coordinate adaptation processes and make use of climate information and act.
- Provide trainings to local authorities and representative of partners on integrating ecosystems services into development planning and strengthen their capacity to flexibly plan the management of natural resources and make decision on conservation and restoration of biodiversity.

Further Reading

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