

# Policy Brief on Land Use and Climate Changes in Rwanda

## 1. Introduction

Land use and climate are highly interrelated; changes in one impose changes in the other at various temporal and spatial scales. Land-use change is always inflicting land cover change and has been pre-dominated by deforestation as consequence of increasing demand for food and energy, and by urbanization. In Rwanda, land use varies from area to area; in rural areas (countryside), it mainly includes farming and forestry while the urban areas (towns and cities) are dominated by housing and industry.

In Rwanda and worldwide, land use and local livelihoods are significantly suffering from climate changes, and this is dramatically lowering the national economy. For instance, higher temperatures, variations in seasonal rainfall patterns, and increased frequency of extreme storms have led to more frequent flooding, droughts, and landslides. These extreme events have resulted into property damage and destruction (including agriculture, private property and infrastructure), costly emergency actions, and increases in weather related morbidity and mortality. Such consequences of climate changes are forcing the government of Rwanda to adjust and adapt how it plans, prepares, and implements day to day operations and larger visions for the future.

The negative impacts of climate changes on land use in Rwanda are amplified by a fast growing population under an increasing density distribution (**World Bank, 2011**). Challenges associated to this highly increasing population density are leading to unsustainable and unhealthy land use practices, including: settlements on steep slopes and in floodplains, deforestation and removal of the natural vegetation cover, over-exploitation of vegetation for domestic use, overcrowding in urban areas, and poor waste management, to name a few (**Republic of Rwanda, 2011; Bizimana, 2018**). With projections in the near future pointing toward continuously increasing population, higher temperatures and more variable rainfall patterns, Rwanda is risking to face more dramatic impacts of climate changes.

Within the last two decades, and even more so in recent years, Rwanda has done much to include climate change adaptation elements into land use policies, regulations, programs, and strategies. However there are still challenges within implementation linked to lack of enough integration, involvement and motivation of local communities throughout the whole process. This leads to a reduced level of the communities' ownership in the policies implementation and to unsustainability of the programs. Therefore, to incorporate sustainable adaptation measures of climate changes into policies of land use to reduce vulnerability of the country to climate changes, Rwanda necessitates an approach which focuses on ecosystem services and active participation of the local communities with an overall goal of their socio-economic development.

This policy brief is examining key impacts of climate changes on land use in Rwanda. It assesses the performance and implementation of climate changes adaptation measures in land use policy frameworks presently in use. Finally, it suggests key recommendations that could strengthen Rwanda's land use policies to better integrate climate changes adaptation measures.

## **2. Data of recent disasters associated to climate changes in Rwanda and scientific projections**

- Since 1970, Rwanda has faced an increasing mean annual temperature (0.35°C per decade, slightly higher than the global average of 0.27°C per decade). If nothing is done, these temperatures are projected to continue increasing by 2.5°C by 2050 and 4°C by 2080 (**Republic of Rwanda, 2011**). Additionally, extreme warming events are frequently occurring in Rwanda and even in the whole eastern parts of Africa (**IPCC, 2019; IPCC, 2014**).
- Rwanda is experiencing high irregularities in rainfall patterns. Although enough data are missing, there are predictions that rainfall will continue to increase throughout the beginning and middle of the 21<sup>st</sup> century in many eastern and

central parts of Africa, resulting in a wetter and more intense wet season (IPCC, 2019; IPCC, 2014). There are also multiple predictions of more frequent and intense drought in some other parts of the central and eastern Africa (IPCC, 2019; IPCC, 2014).

- Over the last few decades, Rwanda has experienced various natural disasters including floods and landslides resulting from heavy rain. The most recent extreme flood events took place in 2019 in the Northern and Western Provinces whereby vulnerability was increased by topography and soil type. In these provinces, large areas of steep slopes concentrate rainfall runoff into narrow valleys and floodplains. In addition, rocky terrain with shallow topsoil and reduced forest/plant cover due to spreading agriculture and charcoal production has led to limited soil absorption of precipitation, resulting in increased runoff and erosion.
- Although less frequent, Rwanda has been experiencing droughts mostly in the Eastern Province. This occurred mainly in 2000, 2006, 2011 and 2013 (Warnest et al, 2012).

### **3. Impact of climate changes on Rwanda economy**

Weather related injury, fatality and property loss are some of the most concerns derived from climate changes in Rwanda. Flooding and landslides resulted into loss of people lives, people displacement, loss of property, and loss of agricultural production. For instance in 2011, floods killed at least 10 people, displaced hundreds of households in northwestern Western Province, and damaged over 350 homes and 3,000 hectares of farmland. On May 7<sup>th</sup>, 2011, landslides killed 14 people in Nyabihu District (**Ministry of Disaster and Refugee Affairs, 2012**). Because of these extreme cases, the Government of Rwanda has procured land and resources to relocate people living in high-risk areas.

In Rwanda, variations in regional precipitations have highly impacted large portions of the rural population and the national economy at large. This is because most of the

country rural areas are reliant on rain-fed agriculture, and variations in regional precipitations have had large effects on large portions of the rural population, such as food deficits, crop failures and decreases in livestock production, decreasing therefore the national economy.

Overall, in terms of costs and economic loss, variations in precipitation patterns and warmer temperatures caused extensive costly damages and economic loss. For instance, loss inflicted by flood of 2007 in Nyabihu and Rubavu Districts alone was estimated between \$4 and \$22 million (SEI, 2009). By 2030, it was estimated that climate changes impacts will cost Rwanda up to 1% of its GDP per year (SEI, 2009).

#### **4. Rwanda climate changes adaptation integrated in land use policy**

So far, a lot has been done by the Government of Rwanda to integrate climate changes in land use management activities. These include various policies, laws, and programs to preserve land quality. In this matter, the following programs are already in use:

- Programs designed to control erosion, including slop control such as terracing and tree planting, reforestation, and steep slope use restrictions. With this, a number of landslides and soil loss were reduced (Widomski, 2011).
- Organic Law on the Environment (2018) requiring Environmental Impact Assessments (EIA) for all new projects that have an effect on the environment. This law is an effective tool to ensure that all projects have adequately considered and minimized project impacts on the environment.
- Land use planning (both at national, urban, and district levels) appearing to be the strongest land use policy integrating climate risk mitigation measures, even though it was not designed for that specific purpose. However, district authorities are currently still under the process of drafting and/or approving their respective district land use plans.

## **5. Key recommendations to strengthen Rwanda's land use policies and programs to better integrate climate changes adaptation measures**

Rwanda is facing drastically increasing effects of climate changes year to year and these impacts are going to intensify in both the near and distant future. Therefore, Rwanda policy makers should make plans, policies and programs well equipped with the necessary provisions to increase Rwanda's adaptive capacity to protect against climate changes. Here listed below are the recommendations to strengthen current land use policy and processes, emphasizing on their enforcement. The recommendations emphasize on Ecosystem Based Adaptation (EBA). They also include best practices from other countries that share similar attribute with Rwanda and are facing similar climate threats and pressures. We are therefore recommending the following:

- Fully involving local communities in the implementation of all the government policies and programs that preserve land quality. This will increase level of the communities' ownership in the policies implementation and to sustainability of the programs.
- Always ensuring enforcement and implementation of land use controls and regulations in use. Until now, people are still getting approval to settle in steep slopes, and wetlands are still heavily farmed or used for different other purposes. To deal with this, stricter enforcement needs to be put in place, insuring even penalties and requirements to offset site disturbance and unapproved land. Teams of inspectors have to be employed to rigorously control implementations of regulations of land use polices & programs and of master plans.
- Regular assessment to identify priority environmental and climate change interventions.
- Offering incentives to private designs and activities that incorporate or promote climate change adaptation, with priority to highly vulnerable areas.
- Promoting green building designs as they have been proven to be successful.

- Planting enough trees in towns and cities, and creating green zones/spaces such as parks, woods and gardens. In addition to their environmental benefits like improving air quality and reducing temperature, these provide beauty to the landscapes and are used for different recreation activities.
- Planting enough trees in schools' gardens, especially fruit trees, and motivate learners/students themselves to take care of the planted trees.
- Motivating people in Rwanda especially in towns and cities to plant fruit trees in their compounds. These trees are multi-purpose because besides their environmental benefits, they also add the beauty to the home and provide food for consumption.
- Promoting farming systems such as agroforestry, perennial pasture phases and use of perennial grains, to substantially reduce erosion and nutrient leaching while building soil carbon.
- Promoting contour and strip farming where slope is too steep or when there are no other alternative methods to prevent soil erosion. In addition to its benefit in fighting against soil erosion, contour strip farming improves crop yields by encouraging water infiltration and thereby increasing soil moisture.

## References

1. Bizimana, I. (2018). Final Country Report of the LDN Target Setting Programme in Rwanda. Kigali: Ministry of Lands and Forestry. Retrieved May 6, 2021, from [https://knowledge.unccd.int/sites/default/files/ldn\\_targets/2019-01/Rwanda%20LDN%20TSP%20Country%20Report.pdf](https://knowledge.unccd.int/sites/default/files/ldn_targets/2019-01/Rwanda%20LDN%20TSP%20Country%20Report.pdf)
2. IPCC (2014). *AR5*. Chapter 22: Africa.
3. IPCC (2019). *Climate Change and Land: an IPCC special report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems*
4. Ministry of Disaster and Refugee Affairs (2012). *Impacts of Floods and Landslides on Socio-Economic Development Profile*. Department of Research and Public Awareness, Kigali.
5. Republic of Rwanda (2011). *Green Growth and Climate Resilience: National Strategy for Climate Change and Low Carbon Development*. In collaboration with the Smith School of Business and the Climate Development Knowledge Network.
6. SEI (2009). *The Economics of Climate Change in Rwanda*.
7. United Nations Interagency Framework Team for Preventive Action (2014). *Toolkit and Guidance for Preventing and Managing Land and Natural Resource Conflict: Land and Conflict*.
8. Warnest, Mathew, Sagashya, Didier, Nkurunziza, Emmanuel (2012). *Emerging in a Changing Climate – Sustainable Land Use Management in Rwanda*. FIG Working Group Week, Rome.
9. Widomski, Marcin (2011). *Terracing as a Measure of Soil Erosion Control and Its Effect on Improvement of Infiltration in Eroded Environment, Soil Erosion Issues in Agriculture*. Ed: Dr. Danilo Godone.

Website: <http://www.intechopen.com/books/soil-erosion-issues-inagriculture/terracing-as-a-measure-of-soil-erosion-control-and-its-effect-on-improvement-of-infiltration-in-erod>

10. World Bank, Global Poverty Working Group (2011). Website: <http://data.worldbank.org/country/rwanda>