CONCEPT NOTE PROPOSAL FOR SINGLE COUNTRY

Title of Project:	Strengthening resilience to extreme weather events - drought and flooding - for smallholder farmers in the rural regions of Burundi
Country:	Burundi
Thematic Focal Area[1]:	Agriculture, Food security, Forests, Nature-based solutions, and Ecosystem-based adaptation
Type of Implementing Entity:	Regional Implementing Entity
Implementing Entity:	Sahara and Sahel Observatory (OSS)
Executing Entities:	Office Burundais pour la Protection de l'Environnement (OBPE); Africa Apiculture Consortium (AAC)
Amount of Financing Requested:	10,000,000 in U.S Dollars Equivalent
Letter of Endorsement (LOE) signed:	Yes ☒ No ☐

Stage of Submission:

NOTE: LOEs should be signed by the Designated Authority (DA). The signatory DA must be on file with the Adaptation Fund. To find the DA currently on file check this page: https://www.adaptation-fund.org/apply-funding/designated-authorities

Stage of Submission:

☐ This proposal has been submitted before including at a different stage (pre-concept, concept, fully-developed proposal)

☒This is the first submission ever of the proposal at any stage

In case of a resubmission, please indicate the last submission date:

[1] Thematic areas are: Agriculture, Coastal Zone Management, Disaster risk reduction, Food security, Forests, Human health, Innovative climate finance , Marine and Fisheries, Nature-based solutions and ecosystem based adaptation, Protection and enhancement of cultural heritage, Social innovation, Rural development, Urban adaptation, Water management, Wildfire Management.

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Acronyms

AAC	Africa Apiculture Consortium
ACRE Africa	Agriculture and Climate Risk Enterprise
AF	Adaptation Fund
AfDB	African Development Bank
AFOLU	Agriculture, Forestry and Other Land Uses
AHDI	Action Humanitaire pour le Développement Intégré
Alliance Bioversity-CIAT	Alliance of Bioversity International and the International Center for Tropical Agriculture (CIAT)
ApiVent	Apiculture Ventures
APRN	Association Protection des Ressources Naturelles pour le Bien-Etre de la Population au Burundi
AYII	Area Yield Index Insurance
B2B	Business-to-Business
CA	Climate Action
CbA	Community-based Adaptation
CBO	Community Based Organization
CBT	Commodity Based Trade
CC	Climate Change
CGIAR	Alliance of Biodiversity
CIAT	International Center for Tropical Agriculture
CN	Concept Note
CSA	Climate Smart Agriculture
CSO	Civil Society Organization
DA	Designated Authority
EbA	Ecosystem-based Adaptation
EIA	Environmental Impact Assessment
ESP	Environmental and Social Management Plan
FAO	Food and Agriculture Organization of the United Nations
FEWSNET	Famine Early Warning Systems Network
FGDs	Focus Group Discussions
FIs	Finance Institutions
FP	Full Proposal
GAPs	Good Agricultural Practices
GDP	Gross Domestic Product
GESI	Gender Equity and Social Inclusion
GHG	Greenhouse gases
GIS	Geographic Information Systems
GoB	Government of Burundi
GP	Gender Policy
HDI	Human Development Index
IA	Intersectional Approach
IFAD	International Fund for Agricultural Development
IPCC	Intergovernmental Panel on Climate Change
ISABU	Institute of Agronomic Sciences of Burundi
KPI	Key Performance Indicators
MoAE	Ministry of Agriculture and Environment Burundi
NAPA	National Adaptation Programme of Action
ND-GAIN	Notre Dame Global Adaptation Initiative
NDA	National Designated Authority
NDC	Nationally Determined Contributions
NRM	Natural Disaster Risk Management
OBPE	Office Burundais pour la Protection de l'Environnement
OSS	Sahara and Sahel Observatory
PPP	Public-Private Partnership
RCPs	Representative Concentration Pathways
SDGs	Sustainable Development Goals
SES	Social and Environmental Safeguards
SLMPs	Sustainable Land Management Practice
SMEs	Small and Medium-sized Enterprises
SPS	Sanitary and Phytosanitary
SSC	SME-Support Centre
STFC	Science and Technology Facilities Council
T-Labs	Transformation Labs
TAP	Technology Action Plan
TNA	Technology Needs Assessment
TNCCC	Third national communication on climate change
TOT	Trainer of Trainers
TSP	The Source Plus
UB	Université du Burundi
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
USD	United States Dollar
VA	Vulnerability Assessment
WHO	World Health Organization
WIBI	Weather Index-Based Insurance
ZEP-RE	PTA Reinsurance Company

PART I: PROJECT INFORMATION

1. Project Background and Context

1.1. Geographic Context

Burundi, a landlocked country in East Africa, lies between meridians 29°00'–30°25' East and parallels 2°20'–4°25' South. It shares borders with Tanzania, Rwanda, and the Democratic Republic of Congo. With an estimated population of 11.6 million in 2020 and an annual growth rate of 3.34%[2], Burundi covers an area of approximately 27,834 square kilometers, making it one of Africa's smallest countries[3]. Characterized by five geomorphological zones, it has a typical relief of countries in the East African Great Rift Region. The Nile and Congo Basins provide ample forest resources, but these are vulnerable due to climatic conditions and unequal rainfall distribution. Environmental challenges include soil degradation, deforestation, and sanitation, exacerbated by high population density and extreme events[4].

Burundi's geography, topography, and climate significantly impact its economy, society, and environment. Agriculture, the backbone of the economy, faces challenges from natural disasters like flooding and droughts. Diverse ecosystems, including forests, wetlands, and savannas, support flora and fauna, but natural resources are threatened by deforestation, soil erosion, and pollution. Climate change exacerbates these issues. Burundi's social context is diverse, with three main ethnic groups: Hutu, Tutsi, and Twa. The largest ethnic group, Hutu, accounts for about 85% of the population. Kirundi, French, and Swahili are the official languages, and literacy rates are around 73%, with higher rates among men[5]. Poverty is a major challenge, with about 75% of the population living below the poverty line. Political instability and conflict have hindered development, but recent efforts have focused on stability, economic growth, and development.

1.2. Economic Context

Burundi is one of the poorest countries in the world, with a gross domestic product (GDP) per capita of only $216 in 2020 (World Bank, 2023[6]). Agriculture is the mainstay of the Burundian economy, employing over 90% of the population and accounting for over 32% of GDP (Agriculture in Burundi, n.d[7], FAO, 2021[8]). However, smallholder farmers, who constitute the majority of the agricultural sector, face numerous challenges such as inadequate access to finance, limited access to markets, and insufficient infrastructure (IFAD, 2019[9]), which hinder their ability to increase productivity and improve their livelihoods (USAID, 2021[10]).

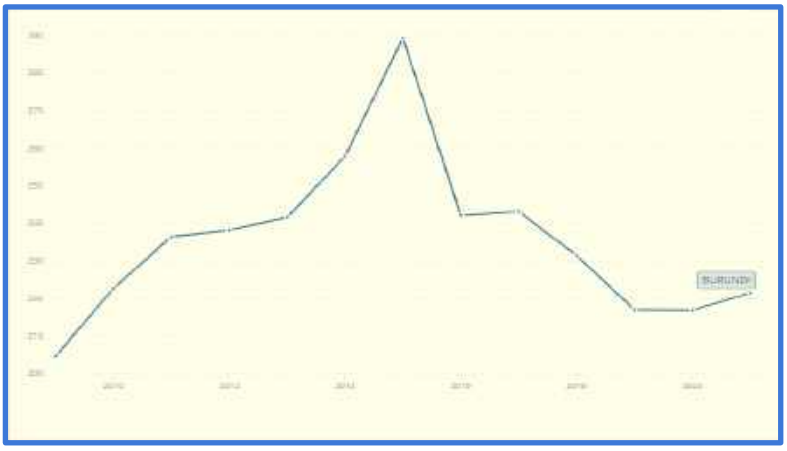

Figure 1: Burundi's GDP per capita trend from 2010 to 2020 (World Bank, 2021).

This makes the integration of traceability, insurance, and finance using blockchain technology even more important, as it can help address these challenges and provide smallholders with greater economic stability and access to resources. Burundi's financial sector is small and not well developed, and access to finance is a major obstacle for companies in the formal and informal sectors. Credit is concentrated in the trade and equipment sectors, which attract more than 61.1% of the total. Credit is generally short-term (53.5% of the total). The banking market is dominated by three banks, which share 63.7% of sector assets, 60.7% of the credit portfolio, and 66.2% of deposits. Vulnerability in the banking sector has been aggravated by the rise in domestic debt resulting in the steady decline of credit to the private sector. Furthermore, given the country's past

[2] World Bank. (2021). Burundi: https://data.worldbank.org/country/burundi
[3] CIA World Factbook. (2022). Burundi: https://www.cia.gov/the-world-factbook/countries/burundi/
[4] Burundi, Third National Communication for climate Change, 2019.
[5] UNESCO. (2022). Burundi: http://uis.unesco.org/en/country/bi
[6] "Burundi." The World Bank,2023. https://data.worldbank.org/country/burundi
[7] Agriculture in Burundi. (n.d.). The Embassy of the Republic of Burundi in Japan: http://burundiembassy-jp.com/agriculture-in-burundi/
[8] FAO. (2021). Burundi: http://www.fao.org/burundi/en/
[9] IFAD. (2019). Investing in rural people in Burundi: https://www.ifad.org/en/web/operations/project/id/1600002044
[10] USAID. (2021). Burundi: https://www.usaid.gov/burundi

fragility such as the 2015 post-election chaos, investors consider Burundi a risky place for investments. The banking sector in Burundi remains unaware of the climate-related opportunities and access to climate funds. In 2008, a study carried out by World Bank, indicated that Burundi's business environment continued to be constrained by 1) limited access to and high cost of financing which is a result of the country's underdeveloped financial system 2) high level of concentration of economic assets in public enterprises which according to the report experience difficult financial conditions and are burdened by governance challenges such as overstaffing and poor management 3) cumbersome regulatory framework for SMEs and lack of effective dialogue mechanisms between the government and private enterprises . This was further confirmed in 2018 in World Bank's Implementation Completion and Results Report of Burundi - Financial & Private Sector Development (Fig.1) which highlighted that the 3 aspects still hamper Burundi's business environment.

1.3. Social Context

Burundi is one of the most densely populated country in Africa with approximately 11.89 million habitants and a density of 470 inhabitants/km^2 (Fig.2) with average household size of 4.8 (World Bank estimate[11]). The Burundi population has been growing at the alarming rate of over 3.3% per year over the past 20 years[12]. This situation leads to a growing pressure on natural resources. Burundi is characterized by a slow urbanization rate of around 10.4%, with over 90% of the population living in rural areas[13]. Agriculture is the mainstay of the economy with 90% of the 9.85 million inhabitants depending on it for their livelihood and employing 85% of the population but represented only 28.1% of the GDP in 2017[14]. In 2015, the Human Development Index of Burundi listed the country as 187th out of 191 countries. Burundi is a Least Developed Country (LDC).

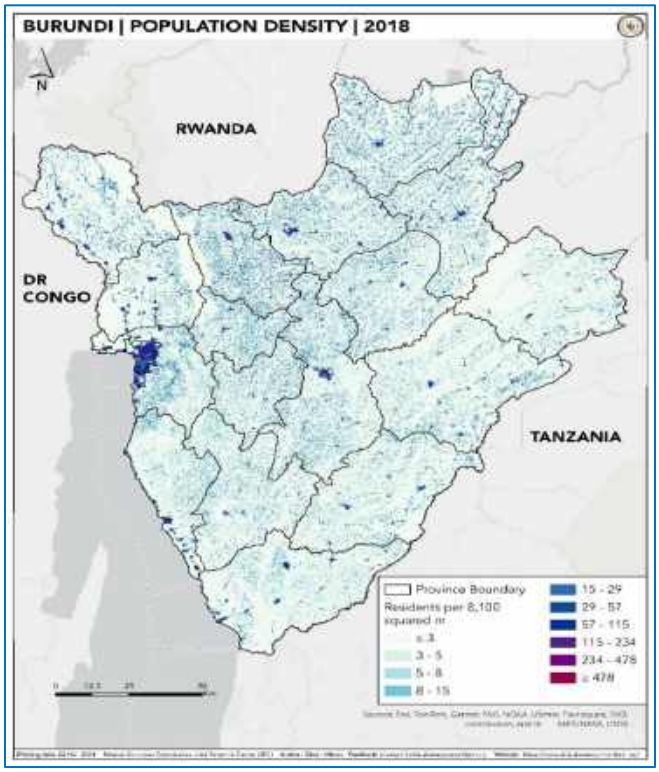

Figure 2: Population density of Burundi.

Smallholder farmers in Burundi are typically poor and vulnerable, with limited access to education, health care, and other social services (IFAD, 2019[15]). Women and youth are particularly vulnerable, as they often face barriers to accessing resources and decision-making processes in the agricultural sector (FAO, 2021[16]). By providing education and training on sustainable farming practices and facilitating access to finance, the project can help empower women and youth farmers and contribute to more equitable and inclusive development.

1.4. Development Context

Burundi is classified as a low-income country by the World Bank, its GDP per capita in 2020 stood at $216.8 USD, 89% of the population lived in rural areas, and female agricultural labor force participation rate was 92.3% (World Bank, 2020). With a human development index (HDI) of 0.417, indicating low levels of development (UNDP, 2020[17]). The country faces numerous development challenges, including poverty, food insecurity, fragile health system and high rates of malnutrition (IFAD, 2019[18]). The country is also highly vulnerable to climate change, with extreme weather events

[11] http://data.un.org/en/iso/bi.html
[12] Report of SDG contextualization in Burundi, Mars 2017
[13] Report of SDG contextualisation in Burundi, Mars 2017
[14] Study on the cost of inaction in Burundi
[15] IFAD. (2019). Burundi country profile: https://www.ifad.org/en/web/operations/country/id/burundi
[16] FAO. (2021). Burundi: http://www.fao.org/burundi/en/
[17] UNDP. (2020). Human Development Report 2020: http://hdr.undp.org/en/content/2020-human-development-index-ranking
[18] IFAD. (2019). Burundi Country Report: https://www.ifad.org/en/web/ioe/ppe?mode=search&keywords=Burundi

such as floods and droughts becoming more frequent and intense (UNDP, 2020[19]). In addition, Burundi is vulnerable to the impacts of climate change, with increasing temperatures, erratic rainfall, and more frequent and severe droughts and floods (World Bank, 2019[20]).

1.5. Climate and Environmental Context

Burundi is characterized by a diverse range of ecosystems, including tropical rainforests, wetlands, and savannahs (UNEP-WCMC, 2021)[21]. It is a biodiversity hotspot, with rich ecosystems that provide important services such as water regulation, soil fertility, and pollination (WWF, 2021)[22]. However, Climate change is exacerbating these environmental challenges, with increasing temperatures and changing rainfall patterns affecting agricultural productivity and livelihoods (World Bank, 2019)[23]. Burundi, like many other countries in the East African region, is particularly vulnerable to the impacts of climate change. According to the World Bank, the country is experiencing an increase in temperature, with projections indicating a rise of up to 1.5°C by 2050. This increase is likely to lead to changes in precipitation patterns, which could result in both droughts and floods, both of which can have significant impacts on agriculture, which is the mainstay of the economy and the livelihood of many Burundians (World Bank, 2018)[24]. In recent years, the country has experienced a number of climate-related disasters, including floods, landslides, and droughts, which have had severe impacts on food security and livelihoods. The 2015-2016 El Niño-induced drought, for example, affected over 1.6 million people in Burundi, with more than 25,000 hectares of crops destroyed (FAO, 2016)[25]. To address these challenges, the government of Burundi has developed a National Adaptation Programme of Action (NAPA)[26] that seeks to address the country's priority adaptation needs and enhancing the resilience of vulnerable communities to the climate change impacts.

i). Land Degradation

According to MESA (2014), 38% of Burundi land are highly degraded or extremely degraded[27]. The most degraded lands are in the South, Centre, Centre East, and along the western border of the country. Six of the poorest regions of the country (Muyinga, Bururi, Gitega, Kayanza, Karusi and Rutana), are also amongst the most degraded ones. According to the United Nations Environment Programme (UNEP), over 75% of agricultural lands are degraded and resulting production loss are evaluated at UDS $400 million/ year[28]. Land degradation in Burundi is characterized by soil erosion in agricultural land, with a loss of soil evaluated at 37,921,100 tons every year[29]. Further to affecting agricultural land fertility, large scale erosion disturbs the water cycle and proper function of forests and waterways, through downstream sedimentation (and the siltation of swampy areas and rural lands). Anti-erosion measures implemented at national scale are limited, with difficulties in developing land management approaches: (i) at the level of national, provincial and local authorities in charge of urban and municipal planning; and (ii) at the lawmaker level, whose role is to prescribe the regulations relating to land tenure and land use[30]. In the country, three out of four plots are not equipped with land degradation solution information/knowledge. Many stakeholders are committed to degradation fighting at national level (National Anti-Erosion Fight Programme managed by the Ministry of Environment, National Programme for Territory Restoration of the Government, World Bank, IFAD and FAO programmes dedicated to erosion fighting, etc.). where good practices for land degradation have been funded under as presented in table 4 in the country and in the sub-region[31], however, the main challenge remains the adoption of practices and their replication at a local scale.

[19] UNDP. (2020). Human Development Report 2020. The Next Frontier: Human Development and the Anthropocene: http://hdr.undp.org/sites/default/files/hdr2020.pdf
[20] World Bank. (2019). Climate Change Knowledge Portal: Burundi: https://climateknowledgeportal.worldbank.org/country/burundi
[21] United Nations Environment Programme World Conservation Monitoring Centre (UNEP-WCMC). (2021). Burundi: https://www.protectedplanet.net/country/BDI
[22] World Wildlife Fund (WWF). (2021). Burundi: https://www.worldwildlife.org/places/burundi
[23] World Bank. (2019). Burundi: https://www.worldbank.org/en/country/burundi/overview
[24] World Bank. (2018). Climate Change Knowledge Portal: Burundi. https://climateknowledgeportal.worldbank.org/country/burundi
[25] FAO. (2016). El Niño 2015-2016 in East Africa: Impacts and Outlook. Food and Agriculture Organization of the United Nations. http://www.fao.org/emergencies/resources/documents/resources-detail/en/c/409754/
[26] Government of Burundi. (2010). National Adaptation Programme of Action (NAPA) to Climate Change. http://unfccc.int/resource/docs/napa/bur01.pdf
[27] Data and results from the spatial analysis available to the public on the map portal: Risk management in Burundi
[28] http://documents1.worldbank.org/curated/en/244311510936931800/pdf/121464-CEA-P156727-PUBLIC-BurundiCEAFrenchWebFinal.pdf
[29] World Bank, Country Environmental Analysis, 2017
[30] MEEATU 2011.
[31] Inventory of the SLM practices in the Kagera watershed, FAO 2017

Indeed, populations recruited for the implementation of these practices are attracted first and foremost by the daily pay offered by the projects, and in the areas where there is lack of awareness and works are conducted without financial compensation (for example when organized in community works frameworks).

This is a common problem with addressing land degradation and the solution is often complex, requiring a detailed understanding of the localized incentive structure surrounding land management activities and crafting a suitable enabling environment to promote their uptake: the key challenge is to identify mechanisms enabling the perpetuation of the approach, in order to truly enable the development of progressive solutions, and the registration of these techniques into local planning (at the hill level through the Community Development Comities , and at the community level through the Consultative community Development comities. Land degradation in Burundi is a comprehensive process that can be attributed to a number of factors. The often-steep topography combined with the high population means that cultivation often takes place in areas with steeper slopes than would normally be recommended. In natural conditions the land would be largely covered in forest. In many places this has now been cleared, either for agriculture or for fuel and timber. With a lack of low-priced alternative fuels, charcoal burning is big business in Burundi, both for domestic use and for sale to the cities, contributing significantly to deforestation. Small farm sizes mean that there is no possibility of soil being left uncultivated to recover between cropping cycles. Over time poor land management practices mean that soil nutrients are effectively mined. Poor farmers may not be able to afford the fertilizers to replace the nutrients removed by successive cropping. The soil structure breaks down with this chemical depletion as well as a reduction in the vegetable matter that would be there under the natural forest cover. This makes the soil less resilient to erosion. Under agriculture, soil may also be left bare after harvest and exposed to the more intense rainfall that is one feature of climate change. The proposed activities take into account the linked issues of deforestation, over-grazing, degradation of soil structure and nutrients and the exposed soil surfaces under agriculture that lead to land degradation and, siltation of rivers and flooding. The impacts of climate change, together with these unsustainable land management techniques together pose a significant challenge to agricultural production itself in Burundi. Agriculture is not just a contributory cause of the land degradation problems but also the part of the economy that suffers the most from them.

ii). Vulnerability to climate change and impacts

Globally Burundi has the lowest per capita GHG emissions, ranking 188 out of 188 countries and contributing only 0.01% to global emissions. On climate vulnerability, Burundi ranks 173 out of 191 countries in the Notre Dame Global Adaptation Initiative (ND-GAIN) index for climate vulnerability. It is the 18th most vulnerable country and the 19th least ready country, meaning it is extremely vulnerable to, yet very unready to combat climate change effects[32]. Climate change is projected to create a large number of risks associated with the following phenomena: (i) season creep; (ii) flooding of swamps and lowlands; (iii) land degradation and loss of soil fertility; (iv) shortage of groundwater resources; (v) extreme weather events (hail, violent showers, heavy winds, etc.); (vi) changes to the growing seasons of crops and forests; and (vii) unpredictable movements of pests. There is a great need for investment and innovations to reduce vulnerabilities and improve readiness and a great urgency for action. Burundi is the 18th most vulnerable country and the 19th least ready country based on this index[33]. A study on the integrated vulnerability analysis in Burundi conducted by GIZ[34], focuses on land degradation as one of the three vulnerability factors most impacted by climate change, and locates vulnerability hotspots in the North-Western and Northern area of the country. Over the past 60 years, Burundi has been affected by a decennial alternance of flooding[35] and drought cycles (under the effect of El-Nino[36]/La Nina), as well as an increase in average temperatures and an extension of the dry season[37]. Estimation of annual losses resulting from extreme weather events due to climate change range from 5 to 17% of the GDP[38]. Between 1995 and 2005, yields/hectare have decreased for almost all food- crops, and wheat production has experienced a large decline.

[32] ND-GAIN Country Index 2018 - Burundi
[33] ND-GAIN, 2018.
[34] https://www.preventionweb.net/publications/view/44118
[35] Floods represent 60.6% of natural risks in Burundi are not only more frequent, but also more deadly. Alone, extreme drought and flooding events reduce the long-term growth of GDP in the region by 2.4% every year. Severe floods, with similar effects (2006-2007).
[36] Burundi has been particularly affected by the 2015-2016 El-Nino cycle with torrential rains provoking landslides and flooding, followed by droughts.
[37] World Bank, 2017
[38] Country Environmental Analysis, World Bank, 2017

Nationwide, Burundi has alternatively experienced severe droughts, resulting in crop failure and a 35% livestock mortality (1998-2005).

Small-scale farmers in Burundi face a host of agricultural challenges, and climate change exacerbates these issues. Climate change directly affects agriculture by causing shorter vegetative growth periods, shifting crop seasons, and reducing biomass growth. This leads to degraded arable land, increased water stress, and a decline in surface water volume. These changes, coupled with production deficits, pose a threat to food security for populations relying on local farming. The mismatch between weather calendars and crop seasons further complicates agricultural production. Additionally, there is an increased risk of famine, extending the hunger gap and forcing seasonal displacement of farmers in search of more favorable areas. The impact is evident in crop losses due to climate-induced calamities such as floods, droughts, and bushfires. Drought alone affects 85.4% of the population annually, rising to 7.9% with population growth. Rising temperatures and altered rainfall patterns also contribute to pest and disease infestations, with banana, a vital crop, experiencing up to 60% yield losses due to diseases such as cassava brown streak disease[39]. Climate change is manifesting in Burundi through reduced rainfall, shorter rainy seasons, increased temperatures, and various ecological challenges. In the Kuruzi and Kirundo Commune, threats include decreased precipitation, heatwaves, and soil degradation, impacting agriculture significantly. The Bururi Commune faces similar risks but with a smaller decline in rainfall. The Vyanda Commune experiences lower precipitation, land degradation, and reduced soil fertility, affecting agricultural productivity to a lesser extent than the north. The Musigati, and Rugazi Communes encounters shifting wet seasons, reduced river flow, and erosion.

Burundi's food security is at risk, with the United Nations Development Programme reporting that 57% of the population is food-insecure, directly linked to the impact of climate change. Agriculture accounts for 90% of employment in Burundi, primarily involving small-scale farmers. Climate change projections by the Intergovernmental Panel on Climate Change (IPCC) predict a future with more frequent and prolonged droughts and increased rainfall variability in East Africa, including Burundi. Addressing these issues necessitates the adoption of climate-resilient farming practices, investment in irrigation infrastructure, and improved post-harvest handling. International support and local policy changes are also critical to help Burundi's small-scale farmers adapt to a changing climate and secure their livelihoods[40]. Climate projections indicate a precipitation increase of up to 10%, that will be particularly important in the Congo-Nile mountains, the Plateau Central and Western Trough. These changes result in a modification of rainfall patterns, with more torrential rains that caused massive flooding throughout the 20th century for Burundi, especially in the 1960's when the level of Lake Tanganyika increased by 4 meters causing districts in Bujumbura and Gatumba to flood[41]. And in 2002, floods caused by heavy rain forced many people from their homes (under the effect of El-Nino[42]/La Nina). and a reduction of rains during critical periods (increase droughts periods), impacting yields and presenting particular risks for the exploitation of marginal areas (steep slopes, deforested ridges, etc.) already very exposed to degradation of land.

iii). Droughts

Droughts repeatedly strike Burundi accounting for 67.8% of the distribution of natural hazards that occur in the country. They have devastating impacts on key economic sectors and can affect a large proportion of the population like the one that struck in 2004 and affected over 2 million Burundians. Storms have affected thousands of people in the first decade of the 21st century with 25,500 people being affected in 2004 alone. While the rainy season seems to be decreasing in the northeastern regions of Burundi, they have experienced torrential rains, lightning, and thunder during the rainy season, increasing their vulnerability to loss of livestock, food insufficiency, decreased agricultural output, bush fires, and loss of human life. Changes in the duration of wet and dry seasons have recently been observed. Total precipitation has declined, the long-wet season ends sooner (often in April) while the short-wet season starts later (in October). This means that the 'long dry season' is further prolonged and can now be considered to last from May to September as seen in figure 3. Moreover, an increase in average temperature of 0.8°C has been observed between 1930 and 2000. This

[39] https://dicf.unepgrid.ch/burundi/climate-change

[40] https://www.wfp.org/stories/africa-day-how-wfp-helps-families-struck-climate-change-burundi

[41] Floods represent 60.6% of natural risks in Burundi are not only more frequent, but also more deadly. Alone, extreme drought and flooding events reduce the long-term growth of GDP in the region by 2.4% every year. Severe floods, with similar effects (2006-2007).

[42] Burundi has been particularly affected by the 2015-2016 El-Nino cycle with torrential rains provoking landslides and flooding, followed by droughts.

intensification of dry and wet seasons results in more severe droughts and floods. Projections for future changes in temperature due to climate change estimate an increase of 0.4°C per decade and a 1.9°C increase by 2050. Mean annual rainfall is projected to increase over Burundi by mid and late 21st century

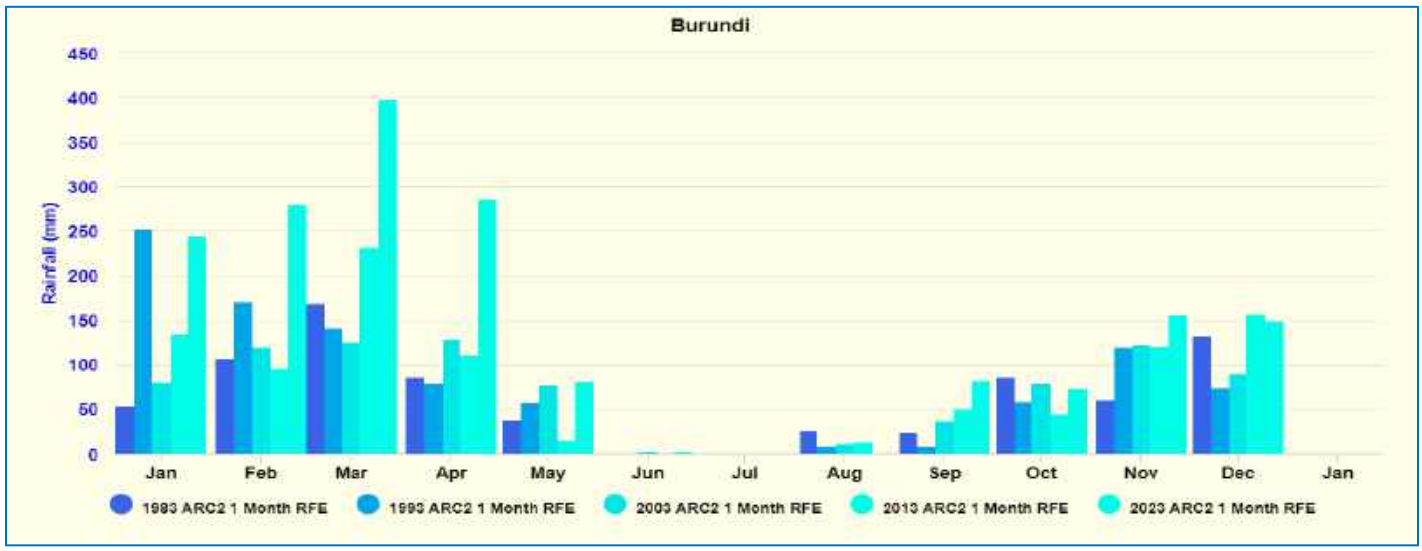

Figure 3: Changes in Rainfall Pattern in Burundi

iv). Protection and Restoration of Forests and Watersheds

The interconnected ecosystems of forests and watersheds play a crucial role in sustaining the well-being of Burundian communities. The ecological integrity of these systems is paramount for community livelihoods, and any compromise in their health poses a significant threat. Recognizing the vital role of forests and associated water bodies in enhancing Burundi's climate resilience, it becomes imperative to address the threats posed by both natural and human-induced factors to these ecosystems. Burundi faces challenges such as large-scale deforestation, ecosystem loss from fires, pests, diseases, and inadequate management practices. Burundi's environment faces critical challenges, with an annual deforestation rate of approximately 5.5% from 2010 to 2015 (FAO, 2015). This alarming trend jeopardizes the country's approximately 50 distinct watersheds (World Resources Institute), which play a pivotal role in water provision and climate regulation. Notably, Lake Tanganyika, shared by Burundi with other nations, is a significant source of freshwater but is under threat due to increasing sedimentation and pollution. The consequences of these challenges extend beyond environmental concerns to impacting the economy and communities in profound ways. The country's ability to adapt to a changing climate is intricately linked to the preservation of key ecosystems. Therefore, implementing concrete adaptive measures to restore lost ecosystems and safeguard those under threat is crucial for effectively addressing the impacts of climate change.

Forests and water bodies within watersheds collaborate to protect and supply essential water resources to the nation. Burundi boasts over 20 watersheds, with many originating within the Congo Basin, including a few transboundary ones like Rusizi. Given the vital role of water in sustaining life and communities, protecting it from the adverse effects of climate change is of utmost importance. The changing climate poses threats to water availability through alterations in precipitation patterns and the hydrological cycle. More frequent droughts reduce the quantity and quality of water accessible to communities, including those relying on underground aquifers. Economic impacts are profound, as approximately 90% of Burundi’s workforce is employed by agriculture, a sector heavily reliant on ecosystem services from forests and watersheds (World Bank, 2020). With agriculture contributing around 40% of the Gross Domestic Product (GDP), the degradation of these ecosystems could have a severe economic impact (World Bank, 2020). Climate change also brings about increased storms and rainfall, contributing to the flooding of water bodies. This, in turn, diminishes the availability of clean water as sediments saturate water sources. The ecological integrity of watersheds is further jeopardized by deforestation and degradation, leading to a reduction in their functionality. This, in turn, diminishes the supporting and provisioning services provided by forested systems and watersheds. Deforestation poses an additional threat to biodiversity by altering the natural environment and habitat of key species. Anthropogenic activities such as agriculture and improper waste disposal further exacerbate the challenges, introducing health hazards and deform water quality.

v). Future Extremes

Based on the Representative Concentration Pathways (RCPs) 4.5 scenario, Burundi's average annual temperature is likely to increase by 0.75°C for 2021-2050 compared to 1991-2020 period (Fig. 4). Rainfall will become increasingly variable with more extremes and increase by about 10% in the southern part of the country (Fig. 5). Temperature variability in 2021-2050 compared to 1991-2020 period: +23.8%. Precipitation variability in 2021-2050 compared to 1991-2020 period: +22.7%. Climate projections also indicate that rainfall tends to decrease in March / April and August / September by 10 to 25% prolonging the dry periods and increasing drought risk significantly. As a consequence, high intensity rainfall during the short-wet season will increase. These climate changes will engender a number of increased risks associated with: (i) season creep and changes to the growing seasons of crops and forests; (ii) episodic flooding of swamps and lowlands; (iii) land degradation from deforestation and loss of soil fertility from more frequent and intense runoff events and (iv) more frequent extreme weather events (hail, violent showers, heavy winds, etc.). The changes in precipitation, in particular, will put at risk several Government's investments that were made to improve the livelihood

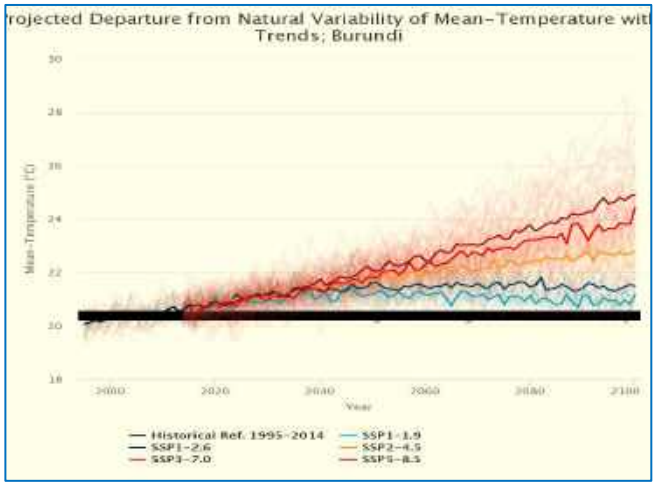

Figure 4: Mean temperature changes in Burundi

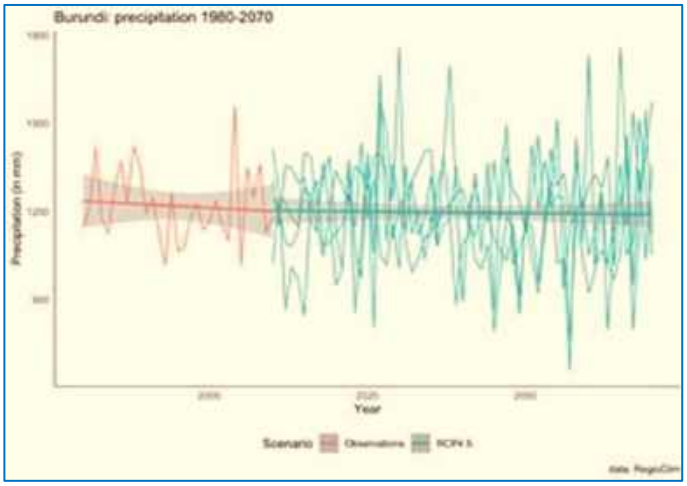

Figure 5:Precipitation changes in Burundi

of its citizens, rehabilitate irrigation schemes and increase food security.

As depicted in Fig. 4 and Fig. 5, increasing temperatures and changing rainfall patterns are contributing to ecosystem degradation, poor animal condition, disease outbreaks, and market exclusion – creating a vicious cycle of degradation, increased agricultural emissions, reduced habitat sequestration potential, and reduced livelihoods for the most vulnerable populations in Burundi living in last-mile communities. The climate-induced degradation of ecosystems also drives increased wildlife poaching, encroachment into conservation areas through agriculture and by cattle which affects natural wildlife movements, and increased trapping, poisoning, and hunting of predators that negatively affect biodiversity and extend threats to ecotourism activities in the country. This cycle must be broken through a paradigm shift to collective management of natural rural land resources, implemented in a context-driven, gender responsive way that reflects the needs and capacities of all stakeholders. This paradigm shift is critical for people and nature in Burundi and throughout Africa.

1.6. Project Area

The project will work in 12 communes located in 6 provinces across the country (fig 6): 2 communes in Bubanza province: Gihanga, and Bubanza communes; 3 communes in Bururi province: Bururi, Vyanda and Rutovu communes; 2 communes in Karuzi province: Bugenyuzi and Buhiga commune; 2 communes in Ruyigi province: Butezi and Ruyigi commune; 2 communes in Rutana province: Musongati and Giharo commune; and 1 commune in Kirundo province: Kirundo commune. These communes are amongst the most vulnerable to climate change and poorest ones in the country. The above twelve communes in the six provinces (Bubanza, Bururi, Karuzi, Ruyigi, Rutana and Kirundo) were primarily selected based on the social and climate vulnerability assessment carried out by the design team and on the following criteria:

(i) the presence of unsustainable and under functioning agriculture activities *(Vulnerability of agricultural production systems),*

(ii) environmental degradation and climate vulnerability *(Vulnerability of natural resources),*

(iii) the prevalence and severity of poverty *(Vulnerability of humans),* and
(iv) the potential for leveraging resources and achieving operational synergies with the project.

Collectively, the areas cover 3,922km^2 of the country and have an average population density of 328 inhabitants/km^2. In the communal lands of the six provinces, poverty levels exceed 70%, with socio-economic conditions largely attributed to the effects of drought on traditional agriculture, limited alternative economic opportunities in rural areas, and lack of access to formal markets.

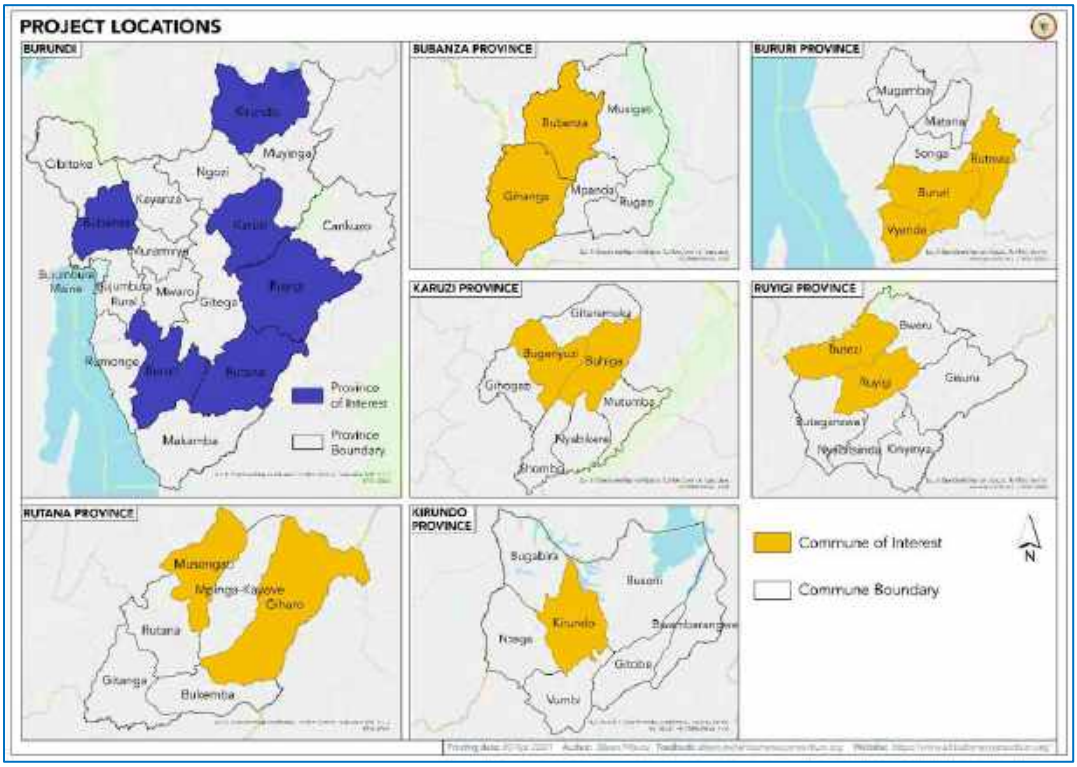

Figure 6: Project Locations

1.7. Project Impacts

The project's impacts are multifaceted and will lead to more robust and empowered rural communities in Burundi. These communities will be better prepared to address the challenges presented by climate change and land degradation, ultimately improving their quality of life and prospects for the future. By focusing on building adaptive capacity and resilience, the project will help communities better withstand and respond to the negative impacts of climate change and land degradation. Some of the potential impacts include: -

(a) **Enhanced Agricultural Productivity and Ecosystem Health:** Through the integration of beekeeping with agroforestry practices, the project is set to significantly increase agricultural productivity. This holistic approach will not only improve the yield and quality of agricultural produce but also contribute to the health of ecosystems by promoting biodiversity and enhancing soil stability through conservation and restoration of critical ecosystems such as forests and watersheds. This integration is fundamental to creating a sustainable agricultural system that is resilient to the changing climate.

(b) **Economic Diversification and Improved Livelihoods:** By focusing on value-added and improving market access for crop and livestock value chains, the project aims to enhance economic diversification for smallholder farmers. This is crucial for building resilience against economic shocks and stresses, including those induced by climate change. Improving livelihoods through these means can lead to reduced poverty levels and better food security for the rural population.

(c) **Improved Resilience to Climate Variability and Extreme Weather Events:** The introduction of blockchain traceability and parametric insurance systems is a novel approach to manage risks associated with market risk and climate variability respectively. Blockchain technology, will enable market access ensuring products meet the SPS standards and offers Price Risk-Protected Warehouse Receipt System. Parametric insurance, in particular, offers a financial safety net against extreme weather events, thus improving the resilience of the farming community. These

technologies will enable farmers to have better access to climate information, thereby making informed decisions.

(d) **Strengthening Climate-Responsive Policy Advocacy and Governance:** By developing and adopting enabling policies, strategies, and legal frameworks, the project will ensure its sustainability and the replication of its successes across other regions. Strengthened governance frameworks will facilitate community adaptation to climate change, ensuring that the benefits of the project are durable and far-reaching. Strengthened governance frameworks and multi-stakeholder platforms will facilitate community adaptation efforts, ensuring long-term project sustainability and scalability.

Table 1: Project Area in km square

Areas in km²				
Commune of Interest	**Project Area**	**Cropland**	**Forested Land**	**Rangeland**
Bubanza Commune	224.80	17.67	48.36	143.28
Gihanga Commune	287.30	89.53	45.21	106.22
Rutovu Commune	286.30	24.85	24.47	224.26
Bururi Commune	391.60	21.95	99.58	247.68
Vyanda Commune	226.50	5.65	73.81	138.17
Bugenyuzi Commune	234.60	29.47	19.66	167.28
Buhiga Commune	275.40	46.11	21.95	186.26
Butezi Commune	334.10	12.67	61.40	233.22
Ruyigi Commune	289.10	26.28	16.11	216.67
Musongati Commune	274.20	10.43	12.73	218.58
Giharo Commune	585.90	36.37	63.70	439.49
Kirundo Commune	207.30	93.72	14.56	64.70
TOTAL	**3,617.10**	**414.69**	**501.55**	**2,385.82**

Over the 5 years implementation period, the Project is expected to directly increase the climate change resilience of 24,000 small scale farmers (65.69% of the Project area population), directly impacting 143,040 (average household size in Burundi is 5.96[43]) and indirectly 572,160 people in the 6 provinces and improve the management of 3,617.10 km² of land and natural ecosystems (Table 1). The Project has the long-term potential to indirectly increase the climate change resilience of the entire national population of Burundi (~12.71M people) and improve the condition of 6,235 km² of natural ecosystems and associated mitigation impacts.

2. Project Objectives

The project will roll out the primary innovation designed to significantly increase the adaptive capacity of the farmers in rural areas of Burundi, predominantly women, to respond to the negative impacts of climate change stated above. The overall goal of the project *is to enhance the adaptive capacity and resilience of rural communities in Burundi, particularly small-scale farmers in "last-mile communities," in response to the negative impacts of climate change and land degradation.* The overarching aim is to build the capacity of rural communities to withstand and thrive in the face of environmental and climate challenges, thereby enhancing their overall well-being and reducing vulnerability to climate-related impacts. The project aims to achieve its goals through the following five objectives:

1. **Strengthen Community Resilience**: Enhance the resilience of rural communities in Burundi to the adverse effects of climate change by integrating climate-smart practices that improve ecosystem health and agricultural productivity.
2. **Promote Economic Diversification**: Boost economic diversification and market access for smallholder farmers to improve livelihoods and ensure food security in the context of climate variability.
3. **Build Resilience to Climate Risks**: Increase resilience to climate variability and extreme weather events for small-scale farmers and communities by leveraging innovative solutions such as blockchain traceability,

[43] Global Data Lab: https://globaldatalab.org/areadata/table/hhsize/BDI/

parametric insurance technologies, and enhanced access to climate information.

4. **Foster Enabling Policies**: Support the development and implementation of policies, strategies, and governance frameworks that promote climate-resilient agriculture and community adaptation, ensuring long-term sustainability and environmental conservation.
5. **Enhance Stakeholder Capacities**: Strengthen the capacities of stakeholders in climate risk management and mobilization of climate finance to support adaptation and resilience-building initiatives.

The project approach is centered on enhancing adaptation, with a primary focus on capacity building at various levels to improve climate resilience. This approach emphasizes cohesive and intensive interventions that foster connections between individuals, communities, and institutions. It aims to create an informed network that shares experiences, tools, and a common language, ultimately enhancing the collective ability to respond effectively to climate-related challenges.

2.1. Current Paradigm

The current paradigm in Burundi is characterized by a series of challenges that pertain to climate change adaptation activities. The contemporary agricultural practices employed by rural communities in Burundi, is characterized by unsustainable methods such as slash-and-burn cropping, indiscriminate use of chemicals, and cultivation near water sources or on slopes, are leading to heightened soil erosion and degradation of both forested and adjacent farmland landscapes. It's reported that agricultural practices near water sources have escalated sedimentation in water bodies by approximately 15%, impairing aquatic ecosystems (Ministry of Environment, Burundi, 2020[44]). This scenario is compounded by the cultivation on slopes without proper terracing or conservation measures, which exacerbates land degradation and loss of arable land, estimated at around 10% over the past two decades (UNEP, 2022[45]). These practices, marked by low productivity, leading to detrimental impacts on soil fertility, causing soil erosion rates to increase as high as 30 tonnes per hectare per year in some regions (FAO, 2021[46]). The indiscriminate use of agrochemicals has further contributed to soil and water contamination, reducing the availability of clean water resources by up to 20% (WHO, 2018[47]), thus posing significant challenges to the sustenance of rural livelihoods. Compounding these issues are the escalating impacts of climate change, it has intensified these issues, causing disruptions in farming cycles due to unpredictable rainfall patterns with some regions experiencing variations in the start of the rainy season by more than a month (WMO, 2022[48]). Increased storm intensity has led to a rise in flood events by about 25% and subsequent destruction of cropland and infrastructure (Burundi Meteorological Service, 2023[49]). Moreover, climate change is linked to a 20% increase in pest and disease outbreaks, further threatening crop yields and food security (IPPC, 2021[50]). The combination of unpredictable rainfall and rising temperatures contributes to more severe droughts and an upsurge in pest and disease occurrences. As communities find it increasingly challenging to maintain their livelihoods, they resort to exploiting forest resources for essentials like wood for cooking, leading to the unsustainable harvesting of non-forest products and conversion of forested land for agriculture. This unsustainable resource use significantly impacts the ecosystem services provided by forests, threatening the community's resilience to climate change impacts.

Several barriers hinder communities in maintaining their agricultural-based livelihoods amid climate change. These include a lack of technical capacity in sustainable agriculture, a scarcity of alternative livelihood opportunities, and limited awareness of how these issues connect to community sustainability and climate change resilience. To address these challenges, community capacity building is essential. According to the FAO (2020[51]), expansion of training in sustainable agriculture techniques can increase productivity by up to 79% while reducing environmental impacts. Furthermore, sustainable landscape-based enterprises have the potential to increase household incomes by up to 50%, offering an alternative to traditional agricultural practices (World Bank, 2019[52]). This involves building awareness of how landscape management choices affect ecosystem services and sustainability, providing training in building regenerative

[44] Ministry of Environment, Burundi. (2020). National Report on the State of the Environment.
[45] United Nations Environment Programme (UNEP). (2022). Global Environment Outlook.
[46] Food and Agriculture Organization of the United Nations (FAO). (2021). Soil Erosion: The Greatest Challenge to Sustainable Soil Management.
[47] World Health Organization (WHO). (2018). Emerging Issues of Environmental Concern
[48] World Meteorological Organization. (2022). State of the Global Climate Report.
[49] Burundi Meteorological Service. (2023). Annual Climate Variability and Trends.
[50] International Plant Protection Convention. (2021). Pest and Disease Climate Adaptation Framework.
[51] Food and Agriculture Organization of the United Nations (FAO). (2020). Increasing Productivity and Advancing Sustainable Food Systems.
[52] World Bank. (2019). Climate-Smart Agriculture: An Opportunity for Sustainable Development.

agricultural systems that enhance soil health and biodiversity, and offering coaching in establishing sustainable landscape-based agricultural systems. These strategies not only promote landscape regeneration but also enhance livelihoods, thereby bolstering community economic resilience.

The Food and Agriculture Organization of the United Nations (FAO) defines "sustainable diets" as those with low environmental impacts that contribute to food and nutrition security, respecting biodiversity and ecosystems, culturally acceptable, economically fair, and affordable. Transforming current food production systems using regenerative ecological principles, optimizing production diversity, eliminating harmful inputs, and leveraging beneficial biotic relationships can result in safer, nutrient-rich foods that contribute to the health of present and future generations. The transition to regenerative ecological principles can enhance food safety and nutrition, potentially reducing diet-related health issues by up to 20% (Lancet, 2022[53]). The pursuit of economic resilience translates into economic stability for participants. Many economic losses incurred by participants stem from natural disasters like droughts, floods, and diseases. It is estimated that a 10% investment in preventive climate adaptation measures could reduce potential future losses by as much as 40% (Global Commission on Adaptation, 2021[54]). Strengthening capacity in developing and implementing livelihood strategies resilient to climate change not only improves the economic well-being of participants but also contributes to the restoration of soils and essential ecosystem services, leading to a 10-20% improvement in water quality and air purification (Nature Conservancy, 2022[55]).

i). Food Insecurity and Climate Risk

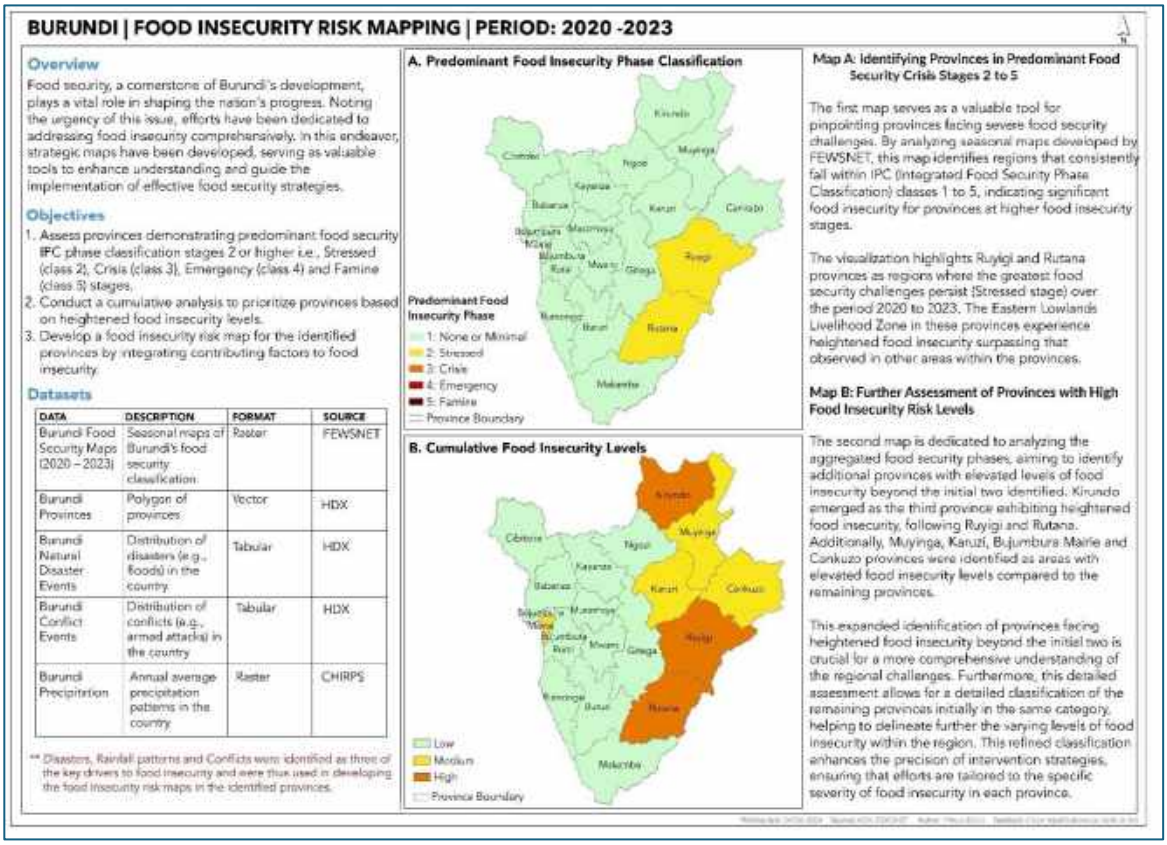

Figure 7:Burundi Food Insecurity Mapping

Agriculture remains the linchpin of Burundi's economy, engaging about 80% of the population in farming activities that serve as their primary source of food and income (WFP, 2020). This widespread dependence on agriculture underscores the sector's critical role in underpinning food security and economic resilience. Despite the central role of agriculture, several systemic challenges severely undermine the sector's productivity and sustainability. These include entrenched

[53] Lancet. (2022). Food in the Anthropocene: the EAT–Lancet Commission on healthy diets from sustainable food systems.
[54] Global Commission on Adaptation. (2021). Report on Adaptation to Climate Change and Agriculture.
[55] Nature Conservancy. (2022). The Benefits of Regenerative Agriculture: Restoring Health to Land, Water, and Air.

poverty, accelerated population growth rates, heightened susceptibility to climate-induced shocks, constrained access to clean water resources, and diminishing access to essential social services like healthcare and education (UNDP, 2020)[56]. Economic constraints are starkly evident as households are compelled to allocate up to two-thirds of their income to food, an unsustainable situation exacerbated by volatile food prices (WFP, 2020). This disproportionate expenditure on food leaves little room for other critical needs, such as healthcare and education, further entrenching the cycle of poverty and food insecurity. Furthermore, the aggregate food production in Burundi falls significantly short of meeting the populace's demands (Fig. 7). The World Food Programme highlights that the total food output in the country suffices for only about 55 days of consumption annually per capita, a stark indicator of the inadequacy of food production to sustain the population (WFP, 2020)[57].

The challenges facing Burundi's agricultural sector and food security landscape are further compounded by the adverse effects of climate change. Increasing temperatures and erratic rainfall patterns disrupt traditional farming cycles, leading to reduced crop yields and heightened food insecurity. The vulnerability of the agricultural sector to climate-related shocks is a pressing concern that necessitates urgent and comprehensive interventions (FAO, 2019)[58]. Addressing these challenges requires an integrated approach that not only focuses on increasing agricultural productivity but also on building resilience against climate change and enhancing social services. Strategies such as promoting sustainable farming practices, investing in irrigation and water management infrastructure, and implementing social protection programs can play a pivotal role in mitigating food insecurity. Moreover, policy interventions aimed at stabilizing food prices, supporting smallholder farmers, and investing in agricultural research and development are crucial for fostering a resilient agricultural sector (The World Bank, 2021)[59].

ii). Adoption of Climate-Resilient Agricultural Practices and Technologies

Despite various programs and training initiatives aimed at enhancing the knowledge and utilization of climate-resilient agricultural methods and technologies across Burundi, stakeholders have indicated a pervasive lack of deep understanding in many regions of the country. Particularly, rural women face significant challenges in accessing climate-resilient agricultural technologies, information, training, and inputs, largely due to the lack of gender-sensitive interventions. Regional disparities exist within Burundi, with higher levels of women's participation in agriculture observed in the Southwestern and Southern eastern regions compared to the Northern districts (World Bank, 2023)[60]. Cultural and religious factors also influence agricultural practices in Burundi. For instance, some farmers refrain from using pesticides for religious or spiritual reasons. In a recent case of armyworm infestation affecting maize crops in certain districts of Burundi, farmers opted not to utilize available pesticides (UNEP, 2022)[61]. While such beliefs may pose barriers to conventional agriculture, they could potentially foster the adoption of organic production practices if accompanied by sustained support and effective inputs. However, the development and dissemination of improved organic fertilizers and biopesticides in Burundi have been inadequate thus far (FAO, 2022)[62].

iii). Rural Finance for Climate-Resilient Livelihoods

Access to rural finance in Burundi is generally inadequate to meet the needs of smallholder farmers, with women facing particularly acute challenges. Despite efforts by financial institutions to provide equal and non-preferential treatment, as well as government initiatives to promote financial inclusion through priority sector lending, rural women continue to experience limited access to finance. This constraint can be attributed to various factors, including the lack of sufficient collateral, limited decision-making power, complex loan procedures, and loans that do not align with their

[56] United Nations Development Programme (UNDP). (2020). Human Development Report: Burundi.
[57] World Food Programme (WFP). (2020). The State of Food Security in Burundi.
[58] Food and Agriculture Organization of the United Nations (FAO). (2019). FAO in Burundi: Strengthening Resilience for Food Security and Nutrition
[59] The World Bank. (2021). Burundi Economic Update.
[60] https://blogs.worldbank.org/en/africacan/burundi-scaling-climate-resilience-land-3000-hills
[61] https://www.unep.org/news-and-stories/story/farmers-adapt-climate-crisis-burundis-precarious-hillsides
[62] Reducing climate vulnerabilities of the agriculture sector: baselines and informed priority actions, FAO, 2022: https://www.fao.org/3/cc3359en/cc3359en.pdf

needs (WFP, 2022)[63]. Although there are numerous savings and credit schemes available, they primarily cater to commercial ventures and entrepreneurship, providing insufficient support to subsistence farmers looking to transition into more commercial activities. Moreover, there is a lack of rural women-targeted schemes specifically designed to enhance the adaptability and resilience of smallholder farmers to climate change in Burundi (IMF, 2022[64]). While indemnity insurance for crops exists in Burundi, it is primarily accessible to larger commercial farmers and relies on time-consuming and resource-intensive inspections of damages for each insured household. This limits its effectiveness in providing financial protection to smallholder farmers, particularly rural women (UNEP, 2021). These challenges have significant implications for the well-being of rural communities, the sustainability of land ecosystems, and the overall economic resilience of the region (WFP, 2021)[65], World Bank, 2022)[66].

2.2. Desired paradigm

The project's desired paradigm focuses on collective management of natural and rural land resources to enhance the adaptive capacity of rural landscapes and vulnerable households. This paradigm aims to provide diversification and alternative income sources, as well as agriculture contributions to food security. It represents a significant shift in addressing the complex challenges posed by climate change and land degradation in Burundi.

The project's primary goals are twofold: empowering vulnerable households with increased adaptive capacity and optimizing land and agriculture practices for climate resilience and food insecurity reduction. This paradigm goes beyond mere conceptualization and requires a comprehensive restructuring of governance, farming methods, and community engagement. It adopts an approach that prioritizes climate-resilient agricultural practices, informed decision-making, and sustainable land management. This shift sets the stage for greater economic security and ecosystem conservation.

To achieve these goals, the project will implement several key initiatives: a) Improving Governance and Information Availability: This aligns with the grant's priority on adaptation. The project aims to enhance governance structures and information availability to facilitate climate-responsive agriculture planning[67]. This includes measures to improve ecosystem productivity and foster informed decision-making in rural communities; b) Institutionalizing Communal Adaptive Management: The project seeks to institutionalize adaptive management in communal agricultural production systems. This involves aspects such as crop rotation, farm/crop health, crop composition, record-keeping, and off-take, all of which are crucial for climate-resilient agriculture[68]; and c) Rewarding Collective Action and Market Access: The project aims to reward collective action that leads to improved ecosystem health. It achieves this by unlocking market access and enterprise development opportunities. It also aims to raise awareness within the industry and among consumers for regenerative agriculture products, which contributes to adaptation while ensuring income security for vulnerable farming households and maintaining low-emission production systems.

In transitioning Burundi towards a climate-resilient, low-emission sustainable development paradigm, the project envisions the following outcomes: a) Aligned Programs and Policies: The desired paradigm envisions a Burundi where the government's commitments to the Sustainable Development Goals (SDGs) and the United Nations Framework Convention on Climate Change (UNFCCC) translate into aligned programs and policies. These policies will empower community-level governance structures to develop and enforce climate-resilient communal farming and land management strategies, with a focus on adaptation; b) Training and Employment of Marginalized Rural People: The project will empower marginalized rural populations by providing training and employment opportunities as professional restoration workers. These individuals will draw on indigenous knowledge systems and utilize new technologies to restore and maintain rural land ecosystems and farm health. This approach also improves farm management for record-keeping and offtake; c) Reduced Losses and Improved Farm Management: By implementing parametric insurance innovation and farm management practices, the project aims to help farmers, and their communities experience fewer losses of their economic assets due to climate stresses. These practices enhance the

[63] Africa Day: How WFP helps families struck by climate change in Burundi, 2022: https://www.wfp.org/stories/africa-day-how-wfp-helps-families-struck-climate-change-burundi

[64] Economic Growth, Fragility, and non-price competitiveness, 2022: https://www.elibrary.imf.org/view/journals/002/2022/258/article-A001-en.xml

[65] Burundi: Critical Corporate Initiative: Climate Response Analysis for Adaptation (December 2021)

[66] Diagnosing Drivers of Climate and Environmental Fragility in Burundi's Colline Landscapes: Towards a Multi-Sector Investment Plan to Scale up Climate Resilience: https://documents1.worldbank.org/curated/en/099930006302237433/pdf/P17682007885e00780b1cc093a09277df1a.pdf

[67] https://www.fao.org/3/i3325e/i3325e.pdf

[68] https://www.fao.org/3/i7931e/i7931e.pdf

resilience of agricultural systems and rural livelihoods. They will benefit from new land and farm management practices designed for adaptation; and c) Market Access and Climate-Resilience Protocols: The desired paradigm involves the creation of new market access channels and climate-resilience protocols. These initiatives will build value-chain partnerships and promote local-level enterprise development, which may encompass activities such as natural honey development, micro-finance institutions, restoration enterprises, veterinary enterprises, organic fertilizer production,, and syntropic forestry operations. Additionally, the project seeks to establish fund & insurance mechanisms that support the sustainability of healthy rural lands under climate change. Through these diverse approaches, the project seeks to transition Burundi towards a climate-resilient and sustainable development paradigm that emphasizes adaptation, benefits rural communities, and promotes the conservation of natural resources and ecosystems. The theory of change diagram in annex 3 illustrates how the Project will overcome key obstacles to attain its objectives .

3. Project Components and Financing

Project Components	Expected Outcomes	Expected Outputs	Amount (US$)
1. Establishment and strengthening of tools for the sustainable management of extreme weather events.	1.1: Improved resilience to climate variability and extreme weather events through access to climate information and insurance products.	1.1.1: Blockchain-Based Traceability System for Livestock developed implemented	350,000
		1.1.2: National Warehouse Receipt System for Crop Value Chain	450,000
		1.1.3: National Parametric Insurance Scheme for Climate Resilience in Agriculture developed.	200,000
		1.1.4: Farmers trained on using climate information and understanding insurance products.	200,000
	1.2: Enhanced capacity of farmers and government to manage climate-related risks in agriculture.	1.2.1: Mobile applications and web platforms for real-time climate information developed.	200,000
		1.2.2: Community-based workshops on risk management and financial planning conducted	200,000
		1.2.3: An adaptation-oriented partnership with financial institutions to facilitate access to credit and insurance established.	600,000
Sub-total Comp 1			**2,200,000**
2. Enhance the resilience of ecosystems and the most vulnerable populations to the impacts of climate change through concrete adaptation measures	2.1: Increased agricultural productivity and ecosystem health through integrated beekeeping and Syntropic agroforestry practices.	2.1.1: Guidelines on Syntropic agroforestry and apiculture practices developed and enhanced.	250,000.00 USD
		2.1.2: Demonstration sites showcasing effective integration of apiculture with syntropic agroforestry techniques developed.	700,000.00 USD
	2.2: Improved soil stability and water catchment health in agricultural lands.	2.2.1: Soil and water conservation techniques and farmers capacity enhanced through syntropic agroforestry practices.	3,000,000.00 USD
Sub-total Comp 2			**3,950,000**
3. Develop and promote value-added products to expand income opportunities and improve market access for economic resilience and stability.	3.1: Enhanced income diversification for smallholder farmers through value-added livestock and crop food value chains products.	3.1.1: Farmers trained on processing and value addition of bee and forestry food products.	400,000
		3.1.2: Community crop nurseries are established for producing genetically diverse and climate resilient crop planting material.	400,000
		3.1.3: Certification, SPS framework and quality assurance for bee and forestry food products established.	200,000
		3.1.4: Market linkages for bee and agroforestry food products established locally, regionally and internationally.	100,000
	3.2: Increased market access and fair-trade opportunities for crop and livestock value chains.	3.2.1: Farmer cooperatives or associations established for better market negotiation	250,000
		3.2.2: Enhanced visibility and market presence of bee products through participation in trade fairs and engagement with online market platforms	200,000

		3.2.3: Comprehensive workshops delivered on marketing strategies and brand development specifically tailored for bee and agroforestry products	100,000
Sub-total Comp 3			**1,650,000**
4. Enhancing knowledge Management, awareness creation and information sharing.	4.1: Enabling policies, strategies, and legal frameworks developed and adopted, enhancing project sustainability.	4.1.1: Policy advocacy campaigns and stakeholder engagement meetings conducted.	125,000
		4.1.2: Policy briefs and recommendations based on project findings developed.	125,000
		4.1.3: Workshops and forums with policymakers, community leaders, and stakeholders on sustainable practices and climate adaptation conducted.	100,000
	4.2: Strengthened governance frameworks aid community adaptation to climate change.	4.2.1: Multi-stakeholder platforms for knowledge exchange and coordination established based on strengthened extension services/Lead farmers program (ToT Model)	350,000
Sub-total Comp 4			**700,000**
Total for Sub-total Component (1,2,3,4)			**8,500,000**
Total Project Cost (A)			**9,231,000**
Project Cycle Management Fee charged by the Implementing Entity (B)			**769,000**
Amount of Financing Requested (A+B)			**10,000,000**

4. Projected Calendar

Milestones	Expected Dates
Start of Project Implementation	2026.01.01
Mid-term Review (if planned)	2028.01.01
Project Closing	2029.12.01
Terminal Evaluation	2030.03.01

PART II: PROJECT JUSTIFICATION

A. Description of the project components

The project is organized into four distinct components, each with a specific focus and set of activities aimed at enhancing climate resilience in Burundi. These components collaborate to address the challenges posed by climate change and promote sustainable agricultural practices. Component 1 focuses on establishing and strengthening tools for managing extreme weather events. Component 2 aims to enhance the resilience of ecosystems and vulnerable populations to the impacts of climate change through concrete adaptation measures. Component 3 involves developing and promoting value-added products to expand income opportunities and improve market access for economic resilience and stability while strengthening the capacities of the various stakeholders. Component 4 focuses on enhancing knowledge management, awareness creation, and information sharing. These four components work together to create a holistic approach to building climate resilience in Burundi, encompassing governance, agriculture, economic development, and disaster preparedness. Through this integrated strategy, the project seeks to empower local communities, protect ecosystems, and ensure a sustainable, low-emissions future in the face of climate change. The key actors and key adaptation activities of the program are illustrated in the graphic below (Fig 8):

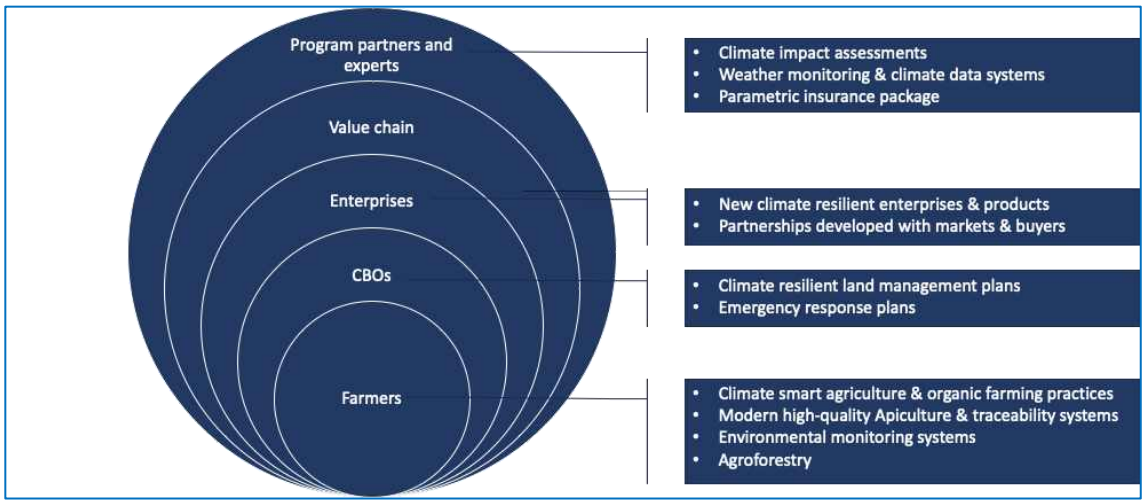

Figure 8: Project stakeholder ecosystem.

Component 1: Establishment and strengthening of tools for the sustainable management of extreme weather events.

Objective: *Enhance agricultural resilience to climate variability and promote risk-informed decision-making through advanced technologies*

This component focuses on using innovative solutions, such as blockchain-based smart contracts and parametric insurance models, to improve communities' preparedness for climate-related disasters. Upgraded climate data infrastructure and advanced parametric insurance schemes will create a system that triggers automatic financial disbursements when predefined conditions are met, providing timely support. Training will familiarize communities with insurance mechanisms, including triggers, compensation processes, and climate data usage. Disaster risk reduction will also be integrated into local planning, strengthening both financial and community resilience. A community-led warehouse receipt system and blockchain traceability mechanisms will establish platforms for knowledge exchange and collective responses to climate risks. This comprehensive approach aims to enhance climate resilience and reduce vulnerability.

Drawing on ACRE Africa's expertise, the project will implement index-based microinsurance, compensating farmers for climate-induced losses through weather index-based insurance (WIBI) and Area Yield Index Insurance (AYII). WIBI uses weather anomalies as triggers, while AYII bases payouts on regional crop yields, ensuring transparent, cost-effective compensation mechanisms. The Africa Apiculture Consortium's blockchain traceability and price-protected warehouse systems will stabilize market prices for farmers, reducing risks and improving access to credit. A pre-feasibility study conducted in six project locations in Burundi highlights opportunities and barriers, including financial service access, agricultural risk insurance demand, and regulatory frameworks. The study emphasizes integrating blockchain traceability and insurance systems to improve credit access and adoption of climate adaptation strategies. Findings reveal gaps in financial inclusion and agricultural insurance but strong farmer interest in microinsurance and traceability products. Capacity building for financial institutions, insurance providers, and regulators remains critical. Two insurance models—WIBI and AYII—offer transparency and reduced costs but cater to different needs: WIBI addresses weather-related risks, while AYII covers broader risks, including pests and diseases, though with higher administrative demands.

The project will tailor multi-peril WIBI and AYII products to Burundi's diverse agricultural zones, focusing on climate-resilient crops and livestock such as bananas, cassava, coffee, and avocados. These crops were prioritized based on productivity, vulnerability to climate risks, and adaptability. Preliminary evaluations favoured bananas, cassava, and sweet potatoes in the east; avocados, palm oil, and coffee in the west; and organic farming nationwide. This initiative, under Outputs 1.1.1 to 1.2.3, will align insurance schemes with local environmental conditions, strengthening agricultural value chains and enhancing community resilience. Further crop and vulnerability assessments during the FP phase will refine insurance products and address data quality gaps, ensuring the initiative's sustainability and scalability.

Outcome 1.1: Improved resilience to climate variability and extreme weather events through access to climate information and insurance products.

Output 1.1.1: Blockchain-Based Traceability System for Livestock developed implemented

The launch of a blockchain traceability system in the agricultural sector, particularly for livestock, is a monumental technological advancement. This system, meticulously designed, will introduce a new level of transparency and trust in the supply chain. It will meticulously document every product's journey from the farm to the end consumer. The development of a specialized digital platform for these products will guarantee their authenticity, significantly enhancing market access for farmers. By certifying products as sustainably produced, it encourages the adoption of environmentally beneficial practices, such as reduced chemical usage, habitat preservation, and biodiversity maintenance. These practices are crucial for enhancing the ecosystem's resilience to climate change, contributing to broader adaptation efforts. The specific activities under this output are:

- Activity 1.1.1.1: Undertake a capacity needs assessment and stakeholder engagement to understand the specific requirements of livestock farmers, traders, and consumers
- Activity 1.1.1.2: Design and develop the blockchain-based traceability system in collaboration with technology providers and stakeholders.
- Activity 1.1.1.3: Train livestock producers, processors, and stakeholders on using the blockchain system, including data entry, monitoring, and maintaining traceability records to ensure effective adoption and utilization.
- Activity 1.1.1.4: Acquire, distribute and implement livestock identification tools, such as RFID tags, QR codes, or biometric identifiers for digital tagging and data collection.

Output 1.1.2: National Warehouse Receipt System for Crop Value Chain

The warehouse receipt system for the crop value chain establishes a standardized method for storing and managing crops, integrating a price risk-protected feature to safeguard farmers from market price fluctuations. This system not only provides secure receipts for stored crops but also ensures financial protection by locking in prices or offering compensation in the event of price drops. By enhancing both efficiency and financial security, the system improves market access and supports better financial planning for farmers, ultimately strengthening the overall crop value chain and enabling more stable and profitable agricultural practices. The specific activities under this output are:

- Activity 1.1.2.1: Undertake assessment and upgrade/establish warehouses to meet standards for secure crop storage, including proper ventilation, pest control, and temperature regulation.
- Activity 1.1.2.2: Design and develop the warehouse receipt system in collaboration with stakeholders to create a standardized system for storing and managing crop products, including receipt issuance and verification.
- Activity 1.1.2.3: Develop a Warehouse Receipt System (WRS) framework with a digital platform and pilot the receipt system with selected crop producers
- Activity 1.1.2.4: Provide training to warehouse operators, farmers, and other stakeholders on the use of the warehouse receipt system, including how to handle receipts, storage procedures, and quality assurance.
- Activity 1.1.2.5: Develop and implement price risk management tools, such as forward contracts or crop insurance, linked to the WRS to protect farmers from price volatility.

Output 1.1.3: National Parametric Insurance Scheme for Climate Resilience in Agriculture developed.

The project aims to develop and implement a parametric insurance product to enhance the agricultural sector's resilience to climate-related risks. This strategic shift focuses on enhancing the agricultural sector's adaptive capacity to climate variability and extreme weather events. Through detailed feasibility studies, the project identifies prevalent climate threats like droughts, excessive rainfall, and temperature fluctuations. Based on these assessments, parametric insurance products are designed to provide timely payouts triggered by predefined weather conditions, rather than relying on traditional loss assessments. This innovative approach offers farmers a reliable financial safety net, mitigating their vulnerability to climate shocks and supporting continuous agricultural production. The initiative involves collaboration with insurance companies to ensure the products are affordable and tailored to specific regional climatic challenges.

- Activity 1.1.3.1: Conduct risk assessments and actuarial studies to design parametric insurance products tailored to the climate and environmental risks faced by livestock and crop producers.
- Activity 1.1.3.2: Develop a national insurance scheme in collaboration with government agencies, insurance companies, and financial institutions to ensure comprehensive, affordable and accessible parametric insurance

coverage across the country.

- Activity 1.1.3.3: Organize training and awareness programs for farmers and livestock producers on the benefits, purchase process, and claims procedure for parametric insurance products.
- Activity 1.1.3.4: Establish/update policy and regulatory frameworks for parametric insurance schemes.

Output 1.1.4: Farmers trained on using climate information and understanding insurance products.

To address the pressing need for climate risk management education among farmers, the project will develop and disseminate educational materials to empower farmers with the knowledge and tools required to effectively utilize climate information and comprehend the intricacies of insurance products designed to mitigate climate risks. This initiative aims to equip farmers with the skills to effectively utilize climate information and grasp parametric insurance products as means of mitigating climate risks. The project will create and distribute educational materials that cover various climate risks, insurance mechanisms, and the process of integrating climate data into agricultural planning. Community workshops will serve as interactive platforms where farmers can engage with experts in climate science and risk management, facilitating knowledge exchange. Furthermore, a mobile app or SMS service will provide real-time climate information and insurance updates, enabling farmers to make timely decisions to reduce their vulnerability to adverse weather events. Training sessions will ensure that farmers are proficient in utilizing these digital tools, establishing a comprehensive support system for navigating climate variability.

- Activity 1.1.4.1: Develop training modules on climate information, covering key topics such as interpreting weather forecasts, climate trends… tailored for smallholder farmers.
- Activity 1.1.4.2: Organize workshops and training sessions in collaboration with local extension services to educate farmers on how to apply climate data.
- Activity 1.1.4.3: Provide hands-on training for farmers on understanding parametric insurance products, including how to assess coverage, make claims, and integrate these products into their risk management strategies.
- Activity 1.1.4.4: Develop Information, Education and Communication (IEC) materials Create easy-to-understand informational materials (e.g., brochures, mobile apps, radio programs) to raise awareness and improve farmers' knowledge about climate information services and insurance products, especially targeting rural and underserved communities.

Outcome 1.2: Enhanced capacity of farmers and government to manage climate-related risks in agriculture.

Output 1.2.1: Mobile applications and web platforms for real-time climate information developed.

The initiative to develop mobile apps and web platforms empowers farmers with real-time climate data, forecasts, and agricultural advice. By bridging the information gap, it enables informed decisions based on weather conditions. The mobile app provides tailored advice to small-scale farmers, while the web platform offers in-depth analysis, educational resources, and knowledge exchange. Integrating these platforms with the blockchain traceability system strengthens market access and encourages climate-resilient farming practices, enhancing farmers' resilience to climate variability and change.

- Activity 1.2.1.1: Develop and test mobile applications and web platforms in collaboration with climate experts, agricultural scientists, and software developers to ensure accurate, real-time delivery of climate data, forecasts, and tailored agricultural advice for diverse agro-ecological zones.
- Activity 1.2.1.2: Conduct user training and outreach programs to familiarize farmers with the mobile app and web platform, providing hands-on demonstrations on how to access climate data, interpret forecasts, and apply this information to improve their farming practices.
- Activity 1.2.1.3: Integrate the mobile and web platforms with existing agricultural systems, including the blockchain traceability system (from Output 1.1.1), to create a seamless flow of information that connects real-time climate data with market access, traceability, and sustainable farming practices.

Output 1.2.2: Community-based workshops on risk management and financial planning conducted.

The project's strategy to enhance climate resilience in agriculture involves community-based workshops that integrate climate risk into planning and financial management. These workshops educate farmers on the importance of climate-risk-informed farming and financial processes. Peer learning sessions facilitate knowledge exchange and case studies of successful risk management. The project will focus on small-scale farmers to foster proactive risk management. Collaboration with local agricultural extension services and NGOs will ensure relevant content. Topics include climate-informed decision-making, financial planning, and income diversification which will be distributed through toolkits developed thus empowering farmers to secure livelihoods and build resilient communities safeguards food security,

strengthens livelihoods, and advances sustainable development.

- Activity 1.2.2.1: Design and deliver tailored workshops in collaboration with agricultural extension services, NGOs, and local experts, focusing on integrating climate risk into agricultural and financial planning.
- Activity 1.2.2.2: Facilitate peer learning and develop case study materials that highlight successful examples of climate risk management in agriculture
  Activity 1.2.2.3: Develop, translate and distribute climate risk and financial planning toolkits (Climate-informed crop calendars, planting techniques…)

Output 1.2.3: An adaptation-oriented partnership with financial institutions to facilitate access to credit and insurance established.

Engaging microfinance institutions, banks, and insurance companies to develop tailored financial products for smallholder farmers vulnerable to climate risks is crucial for economic resilience. This initiative aims to create financial products for farmers who face climate variability. A guarantee fund will mitigate risks for financial institutions, facilitating access to credit and insurance for small-scale farmers, especially women and youths. The project will also support local governments in developing financial inclusion policies. This partnership-driven approach empowers farmers to invest in climate-resilient practices and recover from losses, securing their livelihoods and contributing to agricultural sector stability. By involving key financial stakeholders, the project bridges the gap between the financial sector and smallholder farmers, ensuring comprehensive understanding and addressing of climate risks in financial product development. A supportive financial ecosystem enhances farmers' adaptive capacity, positioning them to thrive in the face of climate change.

- Activity 1.2.3.1: Establish partnerships with microfinance institutions, banks, and insurance companies to develop and offer financial products specifically tailored for smallholder farmers facing climate risks.
- Activity 1.2.3.2: Implement a guarantee fund in collaboration with local governments and financial institutions to reduce lending risks for financial providers.
- Activity 1.2.3.3: Coordinate with local governments to support policy frameworks that promote financial inclusion of farmers, focusing on creating an enabling environment for farmers to access credit, insurance, and other financial services necessary for climate risk management.

Component 2: Enhance the resilience of ecosystems and the most vulnerable populations to the impacts of climate change through concrete adaptation measures

Objective: *Leverage sustainable land practices (beekeeping and syntropic agroforestry) as integrated approaches for improving agricultural productivity, enhancing ecosystem health, and increasing climate resilience.*

This component promotes Ecosystem-based Adaptation (EbA) in rural Burundi. EbA harnesses biodiversity and ecosystem services to help communities adapt to climate change. It's holistic, restoring, managing, and conserving ecosystems while providing socioeconomic benefits. In this project, EbA is integrated with beekeeping and syntropic agroforestry, enhancing resilience, productivity, and livelihoods. Targeted interventions focus on rural, isolated farmers and communities. The integrated approach aims to address climate change impacts by enhancing ecosystem services, revitalizing value chains, and mitigating adverse effects. It focuses on key agricultural sectors like bananas, palm oil, macadamia, cashew, mango, avocados, tea, coffee, oranges, cassava, cotton, and chilies. Rainwater dependence in Burundi's agriculture underscores the need to address extreme weather events like floods, droughts, and climate-induced diseases. Variable and fluctuating climate conditions reduce productivity. This component focuses on enhancing stakeholder capacity and knowledge in occupational safety and health, particularly the health impacts of climate change and environmental degradation on food production and processing. Adaptation and resilience activities empower farmers to respond effectively to future climate shocks or changes, mitigating their negative impacts through planning, preparedness, and effective management[69]. A key pillar of this component is promoting Sustainable Land Management practices (SLMP) via syntropic agroforestry to improve water catchment areas and soil health in Burundi's rural areas. These practices mitigate climate change vulnerability, contribute to capacity development in adaptation, and reduce socio-economic inequalities, including gender disparities. SLMPs also counteract the impacts of rising temperatures, water stress, and potential water crises, enhancing resilience in disaster-prone areas. Integrating climate-resilient

[69] https://publications.iadb.org/publications/english/document/Adaptation-Solutions-Taxonomy.pdf

agriculture techniques like beekeeping with agroforestry into forest buffer zones prevents deforestation and encroachment. Beekeeping also protects wildlife by limiting poaching and promotes biodiversity through pollination, benefiting crops and wild plants. Apiculture as a watershed management intervention maintains healthy ecosystems with low human pressure, supported by environmental policies and practices in Component 4. Initial SLMP promotion includes agroecological production, pasture management with forest curtains via beekeeping, nursery plant production, and sustainable native forest management through beekeeping as alternative livelihoods. These practices strengthen sustainable food forest management and enhance adaptive management focused on forage evaluation and water harvesting in dry areas. Through these efforts, Component 1 lays the foundation for resilient agricultural practices and sustainable livelihood development in the face of climate challenges. Activities for this component are highlighted under outcomes 2.1 and 2.2 in outputs 2.1.1, 2.1.2, 2.1.3, and 2.2.1.

Outcome 2.1: Increased agricultural productivity and ecosystem health through integrated beekeeping and Syntropic agroforestry practices.

Output 2.1.1: Guidelines on syntropic agroforestry and apiculture practices developed and enhanced.

The development of comprehensive guidelines will merge best practices in syntropic agroforestry with sustainable beekeeping methods, creating a foundational blueprint for integrating these disciplines. Through field assessments in various agro-ecological zones, these guidelines will be tailored to meet the specific needs of each region, ensuring their relevance and applicability across diverse environmental contexts. The specific activities under this output are:

- Activity 2.1.1.1: Develop comprehensive guidelines that combine best practices in syntropic agroforestry with sustainable beekeeping methods.
- Activity 2.1.1.2: Conduct field assessments to customize guidelines for different agro-ecological zones.
- Activity 2.1.1.3: Facilitate expert reviews of guidelines to incorporate the latest research and innovations.
- Activity 2.1.1.4: Organize stakeholder workshops for feedback and final guideline refinement.

Output 2.1.2: 20 Demonstration sites showcasing effective integration of apiculture with syntropic agroforestry techniques developed.

The establishment of demonstration sites is a crucial activity that transforms the concepts learned during training sessions into tangible, practical examples that local farmers can learn from and replicate. Collaborating with local communities, the project will identify and prepare diverse locations across various ecological zones, ensuring that these sites represent the diverse agricultural contexts found in Burundi as well as undertake training for integrating beekeeping with syntropic agroforestry practices, resulting in increased knowledge and skills for sustainable agricultural productivity and ecosystem health. The specific activities under this output are:

- Activity 2.1.2.1: Identify and prepare site locations for establishing demonstration sites in collaboration with local communities.
- Activity 2.1.2.2: Design and establish syntropic agroforestry systems to illustrate different combinations of crops and bee-friendly flora that can coexist beneficially.
- Activity 2.1.2.3: Install, manage and showcase integrated apicultural practices with diverse forestry species that are beneficial for both crops and honeybees, such as nectar-producing trees and shrubs.
- Activity 2.1.2.4: Undertake training to 24,000 farmers on apiculture with syntropic agroforestry practices, resulting in increased knowledge and skills for sustainable agricultural productivity and ecosystem health.

Outcome 2.2: Improved soil stability and water catchment health in agricultural lands

Output 2.2.1: Soil and water conservation techniques and farmers capacity enhanced through syntropic agroforestry practices.

In Burundi, where rainfall can cause substantial soil erosion and water runoff in hilly and sloped areas, soil and water conservation techniques are crucial. Rainwater harvesting and water retention features within these systems assist to address water scarcity and irregular rainfall patterns exacerbated by climate change, thereby enhancing the resilience of agricultural systems. The specific activities under this output are:

- Activity 2.2.1.1: Undertake SLM practices (contour planting and terracing design) to reduce erosion and runoff.
- Activity 2.2.1.2: Implement surface water harvesting and water retention features within agro-ecological systems.
- Activity 2.2.1.3: Produce and educate stakeholders on organic matter retention for soil health and water conservation.

- Activity 2.2.1.4: Facilitate exchange visits of lead farmers to the 20 Demonstration sites under Output 2.1.2 to gain experiences and learn strategies for effective soil and water management.

Component 3: Develop and promote value-added products to expand income opportunities and improve market access for economic resilience and stability.

Objective: *Diversify income sources for smallholder farmers through the development and marketing of value-added crop and livestock products, enhancing market access and economic stability*.

Component 3 focuses on enhancing economic diversification and broadening market access for smallholder farmers through an Intersectional Approach (IA) integrates various sectors and stakeholders to achieve comprehensive outcomes. IA's cross-sectoral collaboration involves private sector innovation, governmental support, and community engagement to uplift smallholder farmers economically. Within the component and broader project, IA orchestrates collaboration between agricultural advancements, market connectivity, and value addition to create a robust economic environment resilient to climate change. This approach prioritizes environmental sustainability and ensures economic stabilization and diversification for smallholder farmers are integrated with climate adaptation strategies. By creating a symbiotic relationship between economic growth, rural economy resilience, and environmental stewardship, IA fosters a sustainable and resilient future for smallholder farmers.

This component also aims to overcome barriers to lucrative markets for smallholder farmers through training in value addition and processing techniques, along with essential certifications, enhances product quality and marketability. This initiative transforms the economic landscape by equipping farmers with tools and knowledge to increase product value, leading to higher returns and climate-resilient practices. Farmer cooperatives or associations strengthen collective action and negotiation power, amplifying farmers' voices in the marketplace. Cooperative development fosters community resilience, enabling farmers to confront and adapt to climate change challenges.

The project also develops product standards and implements certification schemes to align agricultural practices with global market demands. Certifications like organic and fair trade open premium markets to smallholder farmers, increasing their income potential. This strategic move promotes sustainability and ensures farmers are rewarded for their commitment to climate-resilient agriculture, encouraging continued adoption and innovation.

By staying informed about market trends and consumer preferences, the project will ensure a dynamic approach to supporting smallholder farmers. This commitment to innovation ascertains sustainable economic and environmental strategies remain relevant and effective, securing a resilient future for rural communities in the face of climate change. Through these efforts, Component 3 aims to integrate economic empowerment with climate resilience, ensuring smallholder farmers survive and thrive in environmental challenges. This strategic approach is essential for establishing sustainable pathways for rural development and climate adaptation.

Outcome 3.1: Enhanced income diversification for smallholder farmers through value-added livestock and crop food value chains products.

Output 3.1.1: 24,000 Farmers trained on processing and value addition of livestock and crop food products.

Under this output, a series of training modules will be developed to educate farmers on value addition techniques specifically tailored for livestock and crop value chains. This initiative aims to enhance the economic resilience of rural communities by diversifying their income sources and increasing the market value of their products. The specific activities under this output are:

- Activity 3.1.1.1: Develop tailored training modules on livestock and crop food processing techniques, value addition practices, and quality control, ensuring content accessibility
- Activity 3.1.1.2: Establish farmer-led processing hubs to facilitate collective action, access to shared equipment, and knowledge exchange
- Activity 3.1.1.3: Organize community-based training sessions and demonstration workshops to provide hands-on experience in processing techniques, such as drying, packaging, preservation, and others.
- Activity 3.1.1.4: Develop and distribute educational materials and toolkits (e.g., manuals, videos, and online resources) that farmers

Output 3.1.2. 60 Inclusive community crop nurseries are established for producing genetically diverse and climate resilient crop planting material.

Access to good seedlings is a significant challenge in improving the productivity of crops and related products in Burundi. This challenge becomes even more pressing in context of emerging pests and diseases that spread from farm to farm through the sharing of planting materials by farmers. The specific activities under this output are:

- Activity 3.1.2.1: Develop/foster partnerships with research institutions and seed banks to source genetically diverse and climate-resilient crop varieties in nurseries
- Activity 3.1.2.1: Provide training and capacity-building workshops for local farmers and nursery managers on best practices for nursery management…
- Activity 3.1.2.3: Facilitate the distribution of planting materials to local farmers, with a focus on creating an equitable access system.

Output 3.1.3: Certification, SPS (Sanitary and Phytosanitary) framework, and quality assurance for livestock and crop value chain established.

Future efforts will involve collaboration with certification bodies to streamline the process for obtaining organic and fair-trade certifications for bee and agroforestry products. This process will enable farmers to access premium markets and ensure their products meet international standards, thus opening up new avenues for economic growth. Trainings on SPS standards will be conducted to educate farmers on compliance with these international market requirements, ensuring their products can compete globally. The specific activities under this output are:

- Activity 3.1.3.1: Develop a national certification scheme in collaboration with local authorities and international standards organizations
- Activity 3.1.3.2: Establish a Sanitary and Phytosanitary (SPS) regulatory framework by working with agricultural experts, veterinary services, and policy makers to create guidelines for controlling diseases and pests.
- Activity 3.1.3.3: Develop training modules and train farmers, livestock producers, and agribusinesses on the importance of quality assurance and SPS standards

Output 3.1.4: Market linkages for livestock and crop food products established locally, and internationally.

To further enhance the economic resilience of farming communities, the project will focus on strengthening the value chains for livestock and crop products by establishing critical market linkages at local, regional, and international levels. This initiative aims to create direct market linkages that can provide farmers with stable and lucrative outlets for their products. An e-commerce platform dedicated to connecting farmers with consumers directly will be developed, enabling farmers to tap into the burgeoning online market. The enhanced visibility and market presence of bee products, facilitated through participation in trade fairs and engagement with online market platforms, will not only increase income for farmers but also promote SLM that contribute to climate adaptation and resilience.

- Activity 3.1.4.1: Facilitate partnerships between farmers, cooperatives, and agribusinesses with local and international buyers, traders, and export firms
- Activity 3.1.4.2: Establishment of formal agreements to ensure consistent market access and fair pricing.
- Activity 3.1.4.3: Develop a digital marketplace platform that connects producers to buyers

Outcome 3.2: Increased market access and fair-trade opportunities for crop and livestock value chains.

Output 3.2.1: 24 Farmer cooperatives or associations established for better market negotiation.

The project will initiate the formation of farmer cooperatives or associations, a strategic move to enhance farmers' collective bargaining power and facilitate access to broader markets. Community meetings will be pivotal in discussing the logistics and benefits of such formations, aimed at encouraging farmers to pool resources and share knowledge, thereby strengthening their market presence and negotiation capabilities. The specific activities under this output are:

- Activity 3.2.1.1: Identify and mobilize farmers in target regions to form cooperatives or associations, focusing on collective bargaining and improved market access for their livestock and crop products.
- Activity 3.2.1.2: Facilitate legal registration and governance training for the newly formed cooperatives, ensuring they operate under clear leadership, structure, and regulatory compliance.
- Activity 3.2.1.3: Provide financial literacy and business management training, enhancing their capacity to negotiate better prices, access credit, and manage profits.

Output 3.2.2: Enhanced visibility and market presence of agricultural products through participation in trade fairs and engagement with online market platforms.

The strategy includes securing spaces for cooperative members at national and international trade fairs, a move designed to significantly boost the visibility and market presence of livestock/crops products and other agricultural goods. The specific activities under this output are:

- Activity 3.2.2.1: Organize participation in regional and international trade fairs to showcase agricultural products, enabling producers to network with buyers, investors, and other key stakeholders.
- Activity 3.2.2.2: Develop marketing materials and promotional campaigns on the quality, sustainability, and unique selling points increasing visibility among potential buyers.
- Activity 3.2.2.3: Train farmers and cooperatives on digital marketing and e-commerce strategies to effectively use online platforms, and other digital tools.

Output 3.2.3: Comprehensive workshops delivered on marketing strategies and brand development specifically tailored for livestock and crop products.

Engaging marketing professionals to deliver workshops on brand building, digital marketing, and customer engagement will equip farmers and cooperative members with the skills necessary to effectively promote their products in a competitive market. Mentorship programs with successful agribusiness entrepreneurs will facilitate knowledge transfer, providing practical insights into navigating market challenges and seizing opportunities. This comprehensive approach to building marketing capacity among farmers and cooperatives is integral to achieving the project's objectives of enhancing climate resilience through economic empowerment and sustainable agricultural practices. The specific activities under this output are:

- Activity 3.2.3.1: Design and deliver workshops on branding and packaging specifically for bee and agroforestry products.
- Activity 3.2.3.2: Provide training on market analysis and consumer preferences for livestock and crop products, enabling producers to tailor their products to meet market demands.
- Activity 3.2.3.3: Offer practical sessions on developing marketing strategies that include digital marketing, social media, and content creation tailored to livestock and crop value chains.
- Activity 3.2.3.4: Conduct market research to identify consumer trends and opportunities for product positioning.

Component 4: Enhancing knowledge Management, awareness creation and information sharing

Objective: *Influence policy frameworks and governance mechanisms to support the sustainability and scalability of climate-adaptive practices in agriculture and agroforestry.*

This component focuses on the transformative approach of Community-based Adaptation (CbA) to enhance the resilience of rural communities to climate change impacts. CbA prioritizes participatory strategies that involve local communities directly in planning, decision-making, and implementing climate adaptation measures. It emphasizes the use of local knowledge and capacities to develop and execute adaptation strategies tailored to local needs and circumstances. This approach empowers communities and ensures adaptation actions are grounded in the socio-cultural, economic, and environmental realities of the local context, enhancing their effectiveness and sustainability.

The initiative will focus on crafting localized adaptation strategies through comprehensive vulnerability assessments conducted in collaboration with local stakeholders. These strategies will address key challenges like water scarcity, agricultural productivity declines, and ecosystem degradation, protecting livelihoods and conserving natural resources. This process ensures adaptation plans are relevant, robust, and tailored to the specific needs of the communities involved. To empower communities, the project will engage them through participatory processes throughout adaptation planning and implementation. Workshops and dialogues will serve as platforms to ensure local voices are heard and central to adaptation strategy development. This inclusive approach fosters a sense of ownership among community members, crucial for long-term adaptation sustainability.

The project will also strengthen local governance structures, recognizing their critical role in climate adaptation. Training programs will be developed for local government officials and community leaders, covering climate science, adaptation planning, and community engagement techniques. This initiative will empower communities to effectively adapt to climate change, establishing a robust framework for sustained action. Advocacy for supportive legal and policy frameworks will be prioritized, ensuring that community-led adaptation efforts are facilitated rather than hindered.

Collaborations with legal experts and policy advocates will be pursued to identify legal barriers to community-based adaptation and work towards regulatory reforms that empower communities. By aligning national policies with the realities of local adaptation needs, this initiative aims to create an environment conducive to meaningful, grassroots-level community-based adaptation.

Enhancing access to climate finance will be another key focus area. The project aims to improve communities' access to national and international climate funds by building their capacity to develop fundable project proposals. This will be crucial in unlocking the financial resources needed for implementing comprehensive adaptation activities. To foster a collaborative and informed adaptation community, the project will establish knowledge-sharing platforms. These platforms will facilitate the exchange of adaptation strategies, best practices, and lessons learned among communities, enriching their collective understanding of effective adaptation and building a sense of solidarity among those facing similar climate challenges. Prioritizing the integration of traditional knowledge with scientific understanding will ensure that adaptation strategies are both culturally appropriate and effective. Documenting traditional practices, facilitating intergenerational knowledge exchanges, and validating traditional knowledge through scientific methods will be key components of this approach. Innovative approaches and technologies will be explored to support Community-Based Adaptation (CbA), with a focus on utilizing digital tools such as geographic information systems (GIS), mobile applications, and other technologies that enhance community participation in monitoring and evaluating adaptation interventions. Finally, ensuring that adaptation strategies are gender-sensitive and inclusive of marginalized groups will be a foundational principle of Component 4. This will involve actively engaging women, youth, and indigenous peoples in decision-making processes and tailoring interventions to their specific vulnerabilities and needs. Through these concerted efforts, Component 4 will lay the groundwork for a resilient future that is responsive to the needs and aspirations of rural communities facing the challenges of climate change. The activities for this component are highlighted below under outcomes: 4.1 and 4.2 in outputs 4.1.1, 4.1.2, 4.1.3, 4.2.1, 4.2.2, and 4.2.3.

Outcome 4.1: Enabling policies, strategies, and legal frameworks developed and adopted, enhancing project sustainability.

Output 4.1.1: Policy advocacy campaigns and stakeholder engagement meetings conducted.

The project will organize stakeholder forums to gather insights and opinions from a diverse range of participants, including farmers, policymakers, and environmental sector representatives. These forums will influence the drafting of new agricultural and environmental policies. The project's output aims to enhance the policy landscape for sustainable agriculture and climate adaptation. By organizing stakeholder forums and digital advocacy campaigns, the project seeks to shape agricultural and environmental policies that reflect the needs of farmers and align with global best practices. International engagement will ensure that local policies are informed by global insights, fostering comprehensive climate resilience strategies.

- Activity 4.1.1.1: Organize multi-stakeholder forums ensuring inclusive discussions that inform the drafting of new agricultural and environmental policies that promote climate adaptation and sustainability.
- Activity 4.1.1.2: Implement digital advocacy strategies, including social media campaigns, webinars, and online petitions, to raise public awareness and generate support for sustainable agriculture and climate-resilient policies.
- Activity 4.1.1.3: Facilitate policy dialogue sessions to align national policies with global best practices and the latest scientific research, creating policies that strengthen climate resilience.

Output 4.1.2: Policy briefs and recommendations based on project findings developed.

Create actionable policy briefs targeting legislative changes to support sustainable agriculture and climate resilience. Clearly explain the connection between sustainable farming practices, climate resilience, and policy frameworks. Present a compelling case for legislative reform. Emphasize the advantages of adopting recommended practices and policies, supported by impact assessments. Organize dissemination events to engage over 500 stakeholders and create a supportive policy environment for climate adaptation.

- Activity 4.1.2.1: Develop Data-Driven Policy Briefs on Sustainable Agriculture and Climate Resilience
- Activity 4.1.2.2: Conduct impact assessment studies to reinforce the policy recommendations with quantifiable benefits.
- Activity 4.1.2.3: Organize policy dissemination events, involving key stakeholders from government, civil society, and the private sector including a policy toolkit.

Output 4.1.3: Workshops and forums with policymakers, community leaders, private sector and stakeholders on sustainable practices and climate adaptation conducted.

The project will develop training modules and organize a series of local regional workshops to explore the scalability of successful climate-resilient farming models across different geographies within the country. These workshops will serve as platforms for knowledge exchange, enabling farmers, scientists, policymakers, private sector and community leaders to share experiences and strategies for scaling up climate adaptation efforts. By involving at least 2,000 participants across various sectors, the project aims to foster a collaborative approach to addressing the challenges posed by climate change. Furthermore, recognizing the critical role of the private sector in driving innovation and investment in climate adaptation, the project will engage with this sector to identify legislative and regulatory hurdles that currently impede engagement in sustainable agriculture. This assessment will pave the way for the development of more inclusive policies and strategies that encourage private investment in climate-resilient agricultural practices and create public-private partnership (PPP). This initiative will facilitate the dissemination of cutting-edge research and innovative adaptation strategies to a broad audience.

- Activity 4.1.3.1: Organize a series of local regional workshops on scaling climate-resilient farming models across different geographies.
- Activity 4.1.3.2: Develop interactive training modules and deliver training sessions for community leaders using participatory methods
- Activity 4.1.3.3: Launch a fellowship program for young leaders to engage in policy advocacy and governance related to climate resilience
- Activity 4.1.3.4: Establish a public-private partnership (PPP) forum to facilitate ongoing discussions and collaborations between the public and private sectors towards climate resilience.

Outcome 4.2: Strengthened governance frameworks aid community adaptation to climate change.

Output 4.2.1: Multi-stakeholder platforms for knowledge exchange and coordination established based on strengthened extension services/Lead farmers program (ToT Model).

This output envisions establishing a Climate Resilience Innovation huB (CRIhB) that fosters collaboration and knowledge sharing among diverse stakeholders, including agriculture, environmental science, and policymaking. The CRIhB will serve as a central repository for disseminating cutting-edge research, innovative adaptation strategies, and successful practices. An integral component of this output is the Trainer of Trainers (ToT) model, which aims to train a network of selected community leaders and extension workers in climate-resilient agricultural practices. These trained individuals will further educate their communities, effectively amplifying the reach of the project's reach and ensuring widespread adoption of climate adaptation strategies. Additionally, an annual climate resilience conference will be organized to showcase innovative solutions and facilitate networking among stakeholders.

- Activity 4.2.1.1: Establish and operationalize the Climate Resilience Innovation huB (CRIhB) that serves as a central repository for experts, practitioners, and community members.
- Activity 4.2.1.2: Develop and implement the Trainer of Trainers (ToT) program on climate-resilient agricultural practices.
- Activity 4.2.1.3: Undertake community trainings on ToT topics related to climate resilience
- Activity 4.2.1.4: Conduct Baseline, Capacity Needs Assessment, and KAP Survey of All Stakeholders

B. Section Economic, social and environmental benefits

Wide benefits to Burundi in terms of socio-economic and environmental aspects. The proposed solution will generate impacts from economic, social and environmental perspective to alleviate poverty for all stakeholders (farmers, public authorities, rural farmers/communities) and mitigate/adapt to climate in the target country-Burundi in terms of medium and long terms.

i). Economic co-benefits

Agriculture is the most efficient way to improve the lives of poor communities in rural, remote areas of developing countries, especially Sub-Saharan Africa. It creates significant positive changes for individuals and provides income for communities through various uses. Key factors for Burundi's economic prosperity include climate change adaptation **and income stability.** Initiatives to adapt farmers to climate change led to increased earnings and an additional economic benefit of $6.5 million annually. Enhancing value added and expanding income-generating prospects improves farmers'

resilience to climate variations, yielding an additional $1.2 million annually.

Enhanced production and market access through climate-resilient agricultural technologies, continuous technical support, and training in organic farming and drought-resistant crop varieties will lead to surplus production and higher prices. This will benefit both female and male farmers and support the shift towards climate-resilient and nutritious agricultural value chains. Measures to reduce contaminants and enhance product quality, lessen harvest losses, and add value to produce under Output 3.1.1, alongside efforts to expand market access for agroforestry and bee products in Output 3.1.3, will diversify smallholder farmers' livelihoods and increase income sources. This will also lead to increased domestic produce exportation and reduced national debt due to a shift towards organic farming.

Targeted climate and agricultural advisories under Component 1 will further reduce crop losses and provide economic advantages. The project aims to connect smallholder farmers with innovative climate services and enhance gender-sensitive information dissemination, including through digital platforms. This empowers farmers, especially women, to plan and mitigate climate-related risks effectively. The anticipated economic gains include preventing financial losses from crop failures and optimizing production under favorable conditions. Regional estimates suggest that farmers adjusting their practices based on weather advisories could see their annual incomes rise by 67 percent. Assuming an average annual household income of USD 693.5 and two productive years within the project's five-year lifespan, affecting approximately 60 percent of the project's direct beneficiaries (24,000 households), this equates to an average income boost of around USD 2,316.29 per household over five years for 14,400 households, or a total income increase of about USD 33,354,576 for the project. These figures are conservative, considering the cumulative positive impact of the project's risk reduction, adaptation strategies, and the potential for over 60% of targeted households to benefit.

Access to finance and risk management facilitates households to handle minor shocks by establishing risk reserves and accessing microcredit for productive ventures. Combining with insurance schemes, these mechanisms enhance resilience to both minor and major shocks, contributing to insurance premium payments. Warehouse receipts safeguard against minor shocks, and microinsurance doubles women's savings in various countries. Receipts and microinsurance as collateral for loans increase access to financial services. In Kenya, Uganda, and Tanzania, credit access doubled after five years of ACRE Africa's microinsurance interventions. Farmers secured loans at least three times larger than non-participants in 13 countries. This enhanced access allows participants to invest in agricultural inputs, tools, and livestock, promising at least a 60 percent increase in credit access among targeted female farmers. Non-quantifiable economic benefits include farmer empowerment, especially women and youths, from rural Farmer cooperatives mobilization and services under Output 3.1.3 and Output 3.2.1. This prepares them to face climate-change challenges in selected value-chains. The Apiculture industry (non-timber agroforestry and honey) can increase foreign exchange earnings and contribute to GDP. This can be achieved through high-quality products and revenue for farmers in the long term.

- Proactive measures for bee and tree loss management (farming sector, public authorities; medium & long term).
- Economic resilience: farm diversification improves crop resilience (Farming sector; medium); honey technology diversification enhances sector resilience & food security (outside; medium & long term).
- Increased agricultural quantity produce for Burundi farms (Public sector, Farmers; medium term).

ii). Social co-benefits

The project aims to deliver substantial social benefits, particularly for vulnerable smallholders, by improving their livelihoods and resilience. It adopts an inclusive approach to ensure its services reach those most in need, fostering social capital, economic empowerment, and social inclusion. Key demographics include women and youth, who face barriers to accessing agricultural resources. Research by the Food and Agriculture Organization (FAO) shows that equal resources to women farmers can increase agricultural output by four percent in developing countries, potentially reducing undernourishment by up to 17%. The project emphasizes ensuring at least 57% of beneficiaries are female to replicate these effects and boost agricultural productivity, improving food security and nutritional outcomes. It's structured around three main components: bolstering agricultural resilience, supporting post-production activities for income security, and promoting agro-ecotourism and market access for income diversification. The project integrates microinsurance, blockchain traceability, and other tools to enhance participants' resilience. This holistic approach is expected to significantly reduce reliance on negative coping strategies, with 40% of beneficiary households becoming more resilient to shocks.

The project prioritizes Gender Equity and Social Inclusion (GESI), ensuring women and youth are key drivers of success. It allocates at least 60% of activities and benefits to women, including female youth, to empower them in design, testing, learning, and adoption of innovative solutions. This approach recognizes women and youth's significant contributions without competition with men. Gender considerations are central to the project's design and implementation,

addressing gender inequalities in agriculture and value chains. Gender-sensitive analysis, value chain assessments, and equitable decision-making are conducted to understand and address roles, challenges, and opportunities for men, women, and youth. The project aims to economically empower women and youth, recognizing their crucial role in innovation and adaptation. Measures like free childcare enable women's participation in training and awareness sessions. Engaging communities through Focus Group Discussions (FGDs) and during proposal development is crucial. At least 57% participation by women is committed to gender inclusivity. The project aims to facilitate equitable youth participation and adapt logistical aspects to accommodate women farmers' schedules. It provides free childcare to eliminate barriers and conducts a Social and Environmental Safeguards (SES) assessment to mitigate potential negative impacts. This comprehensive approach ensures ethical execution and benefits the diverse needs of the communities.

Fieldwork, including experimental design and typology surveys, considers gender dynamics in agricultural practices. It explores how men and women manage individual plots or operate as independent farmers to tailor interventions that respect and address their unique challenges. Three key strategies combat gender inequalities and boost women's empowerment: (i) identifying gender-specific adaptation needs and capabilities; (ii) promoting gender-equitable participation in decision-making; and (iii) ensuring gender-equitable access to finance and advantages resulting from investments in adaptation measures. The project aligns with several areas of the UNFCCC Gender Action Plan.

The project aims to enhance gender equality and women's empowerment in climate adaptation strategies. It includes capacity-building for women in agriculture, knowledge management through educational materials and an online repository, improved tracking and reporting on gender-related mandates, and strengthening integration of gender considerations within UNFCCC bodies. Additionally, it promotes a fairer distribution of workload and economic benefits between genders through labor-saving technologies and household methodologies. Promoting female role models is also crucial to inspire women and youth. With 57% of beneficiaries being women, the project enhances agricultural efficiency and sustainability while paving the way for a more inclusive society.

iii). Environmental co-benefits

The project aims to address environmental challenges in Burundi, focusing on benefits to vulnerable communities and considering the gender impact. Sustainable agricultural practices, conservation, and community engagement create a model for inclusive environmental stewardship. To note, Burundi faces deforestation[70], driven by global warming and agricultural demands, resulting in 10% tree cover loss from 2001 to 2021. Below highlight the co-benefits of the project:

Soil health and agricultural sustainability are key concerns. Extensive soil erosion and degradation due to unsustainable practices lead to annual losses of 3 to 30 tons per hectare, reducing soil fertility, organic matter, and water retention capacity. This impacts land productivity and crop yields, increasing the risk of landslides exacerbated by changing rainfall patterns. The project proposes conservation agriculture, good agricultural practices (GAPs), and organic production methods to combat these challenges. These approaches enhance soil fertility and reduce erosion, addressing environmental issues while improving agricultural output and sustainability.

Biodiversity and Ecosystem Services. The project aims to strengthen natural resources, biodiversity, and ecosystem services in target areas. Sustainable agro-ecological technologies like conservation agriculture, syntropic agroforestry and organic farming are integrated to prevent biodiversity loss from chemical misuse. Improving the natural resource base supports the agricultural community and ensures local ecosystem viability.

Reducing environmental pressure through sustainable livelihoods is the project's strategy. Climate adaptation training, asset creation, and productivity improvement build economic resilience against shocks. Increasing income and diversifying livelihoods, especially through components 2 and 3, and risk transfer activities under component 1, lessen dependency on ecosystem goods and services. This approach addresses climate change impacts like floods, landslides, and temperature-related droughts.

Land restoration through community engagement and apiculture promotes tree planting for bee forage, providing an alternative income source and encouraging tree preservation and planting, improving water catchment areas and environmental health. The project will visualize climate change vulnerabilities through maps, fostering soil erosion prevention and landscape restoration.

Restoring forest cover on degraded lands through natural regeneration, afforestation, reforestation, and agroforestry enhances environmental health and protects pollinators. Food Forestry management plans will be developed and implemented under output 2.1.2, with capacity building for climate-resilient practices. Education on biodiversity and pesticide impacts will secure pollinator health and food security.

[70] Global Forest watch

C. Consistency with Sustainable development strategies

The project aligns perfectly with Burundi's national development strategies and its commitments under key international agreements, such as the UN Convention on Biological Diversity, the Convention to Combat Desertification, the UN Framework Convention on Climate Change, and the Paris Agreement. The project targets the key objectives of the updated NDC for Burundi (2030), which primarily focuses on adaptation. It also highlights agriculture and health as priority sectors for adaptation, with the aim of further identifying adaptation priorities in the National Adaptation Plan. The Burundi National Communication reports to the UNFCCC (2021 and 2022) and presents the country's climate profile, identifying the sectors and regions most vulnerable to climate change impacts. Several sectors are particularly vulnerable, including agriculture and forestry, which are the two sectors the project will prioritize.

By adhering to Burundi's Nationally Determined Contributions and directly contributing to the priorities outlined in its National Adaptation Programme of Action, such as installing erosion control mechanisms in sensitive areas and promoting drought-resistant crops, the project integrates global environmental objectives with local adaptation needs. This strategic alignment underscores the project's commitment to addressing climate change impacts while fostering sustainable development. It demonstrates a holistic approach to environmental conservation and climate resilience in Burundi. It's worth noting that many of the measures recommended in the reports and on which the project aligns are also part of the Land Degradation Prevention initiative. These measures include reducing deforestation for agricultural land and creating green jobs as mitigation strategies.

The UNFCCC 2022 report identifies capacity building needs at the national level, which the project will address through its second component. The report also emphasizes the importance of strengthening strategic planning for climate change adaptation at the local and regional levels, as well as in the sector-level planning process. This can be achieved through the project's fourth component. The Project also contributes to the objectives and priorities set out in the following national policies and national strategies:

Table 2: Alignment with National Strategies and Sub-National Strategies

Strategic plan	Year	Priorities	Project alignment
1. Strategic plan: Third national communication on climate change (TNCCC). [71]	2019	• Strengthening skills in weather forecasting and climate risk modelling, along with providing comprehensive agro-meteorological support. • Foster, encourage, and aid in the development of community-led adaptation strategies for agriculture and livestock to address climate change impacts. • Incorporating climate and environmental considerations into agricultural enhancement strategies, including the creation of risk assessments and emergency response measures.	• Rolling out information services that encompass climate risk modelling software, alongside training for local personnel on its use. • Establishing a knowledge management framework to facilitate access to, and the sharing of, information about adaptation practices, tools, and technologies among stakeholders. • Implementing intelligent farming practices and crafting disaster and drought response strategies to adjust agricultural and livestock practices to the realities of climate change. • Conducting climate risk evaluations and deploying adaptation practices, tools, and technologies, with subsequent adjustments to strategies and action plans as necessary.
2. Strategic plan: Nationally Determined Contributions (NDC)[72] / National Strategy and Action Plan on Climate Change (2012)	2021	***Adapting and Managing Climate Risks*** • Manage climate risks and predictions proactively through probabilistic assessments and predictive analysis, enabling pre-emptive action. • Safeguarding both water-based and terrestrial ecosystems. • Educate and empower communities to strengthen their resilience against the impacts of climate change. • Implement effective monitoring, evaluation,	*Adapting and Managing Climate Risks* • Deployment of information services designed to analyse and predict disaster and drought risks, initiating proactive response strategies. • Utilization of apiculture as a method to prevent land degradation and preserve ecosystems. • Strengthening the capability of institutions and communities to enhance resilience against climate change, specifically within the agricultural sector. • Establishment of systems and tools for monitoring, evaluation, and the dissemination of knowledge regarding climate change

[71] https://unfccc.int/sites/default/files/resource/Burundi%20TNC%20executive%20summary.pdf

[72] Republic of Burundi (2018). Nationally Determined Contribution: http://www4.unfccc.int/ndcregistry/PublishedDocuments/Burundi%20First/CPDN%20BURUNDI.pdf

		and knowledge-sharing systems for tracking and managing climate change impacts. • Advance the practice of climate-smart farming, incorporating weather and climate information into agricultural planning and decision-making.	impacts. • Implementation of climate-smart methodologies, including innovative tools and technologies, to boost crop production.
		Capacity-building, knowledge management and communication. • Improve the mechanisms for managing, sharing, and distributing data and information. • Enhance the system for communication and exchange of information and data. • Strengthen the systems for monitoring climate change impacts through detailed observations and research.	• Capacity-building, knowledge management and communication. • Standardize and centralize the collection, management, and dissemination of weather data. • Centralize and standardize the communication of data and information, supported by comprehensive toolkits and information services. • Integrate monitoring and evaluation processes to systematically assess the effects of flood and drought incidents.
3. Strategic plan: Burundi national development plan NDP Burundi 2018-2027.[73]	2018	• Boosting Burundi's economy by improving overall national productivity. • Enhancing Burundi's economic strength through the generation of employment opportunities.	• Utilizing beekeeping practices to prevent soil erosion, thereby enhancing crop cultivation potential. • Adopting microinsurance and financial strategies to maximize agricultural yields. • Establishing connections with purchasers to boost sales and foster job creation.
4. Strategic plan: National Agriculture Strategy 2018-2027.[74]	2018	• Sustainable and efficient use of natural resources, especially focusing on land and water. • Strengthening resilience against climate change impacts. • Enhancing the capabilities of institutional and organizational frameworks.	• Introducing innovative adaptation strategies, tools, and technologies (such as information services and microinsurance) to facilitate better access to natural resources and bolster resilience to risks posed by climate change. • Conducting capacity-building initiatives for both institutions and communities to foster climate change resilience, particularly within the agricultural sector.
5. Strategic plan: Technology Needs Assessment Adaptation.[75]	2016	Agriculture and Livestock sector • Implementation of soil conservation systems. • Establishment of community-based early warning mechanisms.	• Productivity and food security by adopting agroecosystem management techniques focused on the conservation of soil, water catchments, and effective crop management. • Deployment of both physical devices and software solutions for weather monitoring.
6. Programme: Community Disaster Risk Management in Burundi	2012	• Establishment of early warning systems to alert communities about risks and vulnerabilities induced by climate change, including newly emerging threats. • Conducting assessments of risks to livelihoods and infrastructure with an analysis that specifically considers gender differences. • Policy measures are initiated based on forecasts of climate change, aiming for proactive adaptation.	• Launching information services that include systems for weather alerts to inform the public in a timely manner. • Development and application of a mechanism to assess adaptation benefits, enabling climate risk analysis and scoring. This mechanism helps in tailoring interventions to support groups most vulnerable to climate change impacts, including women and children. • Analysing the effects of climate change risks and designing appropriate adaptation strategies to be integrated into policies and planning documents.
7. Strategic plan: National Climate	2012	• Incorporate strategies for mitigating disaster risks within sustainable development policies and planning processes.	• Include innovative adaptation methods, tools, and technologies (such as blockchain and insurance models) in strategic planning and policymaking.

[73] https://www.presidence.gov.bi/wp-content/uploads/2018/08/PND-Burundi-2018-2027-Version-Finale.pdf
[74] http://extwprlegs1.fao.org/docs/pdf/Bur190783.pdf
[75] https://unfccc.int/ttclear/misc_/StaticFiles/gnwoerk_static/TNA_key_doc/e2a748d4d7fb46a886411a2739cf72d7/eb976df133a34e74b758e3e22fd15490.pdf

Change Strategy and Action Plan[76]		• Enhance the resilience to natural hazards by bolstering the infrastructure, systems, and capabilities of relevant institutions. • Ensure that considerations for minimizing risks are embedded within strategies for emergency response and recovery operations.	• Support the enhancement of institutional and community resilience against climate-related risks through comprehensive capacity-building initiatives, underpinned by financial support, insurance solutions, and practical toolkits. • Integrate insurance as a strategic approach within broader measures and practices aimed at reducing the impact of disasters in planning frameworks.
8. Strategic plan: National Strategy and Action Plan to Combat Soil Degradation 2011-2016.[77]	2011	• Enhancement of soil fertility and restoration of ecological balance in areas affected by degradation. • Strengthening the capabilities of both institutions and communities in effective soil management practices.	• Deployment of information services designed to aid in the management of soil health. • Adoption of climate-smart agricultural methods, such as agroforestry and beekeeping, to boost soil biomass. • Promotion of intelligent agricultural practices alongside capacity-building efforts to improve soil management techniques. • Establishment of a knowledge management framework that enables access to, and the sharing of, soil management information among stakeholder groups.
9. Strategic plan: National Action Plan for Adaptation (NAPA)[78]	2007	• Promote the adoption of crops that are resilient to drought and have shorter growth cycles. • Educate key stakeholders, including policymakers and community members, on strategies for adapting to climate changes. • Advance the accuracy and timeliness of weather forecasts for upcoming seasons	• Foster the adoption of intelligent agricultural practices, as well as the use of cutting-edge tools and technologies. • Strengthen the capabilities of various stakeholders through training to increase their ability to cope with climate-related challenges, using innovative adaptation methods, tools, and technologies. • Develop and deploy information services that include systems for early warnings.

D. Cost-effectiveness of the proposed project

The cost-effectiveness of the proposed project is a pivotal aspect, demonstrating significant benefits over the current situation of no project intervention scenario. To understand this cost-effectiveness, it's crucial to consider both the direct and indirect costs of climate change impacts on Burundi and how the project's interventions aim to mitigate these costs effectively. The direct costs of climate change in Burundi include losses in agricultural productivity due to increased frequency of extreme weather events such as droughts and floods, leading to food insecurity and increased food prices. Without the project, these costs are ongoing and likely to increase as climate change impacts worsen. For instance, if we assume a conservative annual loss in agricultural productivity of 61%, given the agriculture sector's contribution to Burundi's GDP (around 40%), this translates to substantial economic losses each year.

Component 1: Integrating the economic rationale behind enhanced climate services with the specifics of Component 3, we find a comprehensive strategy aimed at fortifying agricultural resilience against climate variability through cost-effective measures. The introduction of blockchain traceability, Warehouse Receipt System and index-based microinsurance as part of this strategy represents a pivot towards significantly more efficient risk management practices. By slashing operational and transaction costs by approximately 50-60%, this approach stands out as a markedly more accessible alternative to traditional indemnity insurance, particularly for the agricultural sector in Burundi. Highlighting the practical impacts, consider the deployment of index-based microinsurance to cover 24,000 farmers. This wide-reaching implementation not only facilitates the broad and efficient distribution of financial risk management tools but also ensures that the savings from lower premium costs extend the benefits of insurance to a broader segment of the farming community. The efficiency and cost-effectiveness of this component are underscored by the projection that a 25% reduction in annual crop loss, with each farmer potentially avoiding $500 per farmer in losses, would collectively prevent $12,000,000 in losses annually across the participating farmers. This estimation not only demonstrates the immediate financial benefits but also reflects the potential for substantial economic impact through the reduction of vulnerability to climate-induced crop failures. Furthermore, drawing on global and regional

[76] Nile Basin Initiative (2013): Climate Change Strategy. http://www.nilebasin.org/index.php/media-center/publications/doc_down- load/104-nbi-climate-change-strategy

[77] http://obpe.bi/images/pdf/Strategie_Degration_des_terres.pdf

[78] Burundi Ministry for Land Management, Tourism and Environment (2007), in Baramburiye et al. (2013)

analyses, the justification for such an approach is bolstered by studies showing the immense return on investment from similar initiatives. For instance, investments in reliable weather forecasting in India reaped benefits 50 times the initial investment in just a year, with a projected increase in benefits over the following years. Closer to the project's context, in Burundi, farmers who adjusted their agricultural practices based on weather advisories witnessed up to a 53% increase in their annual income. These outcomes not only highlight the direct benefits of climate services and risk management tools but also underscore the broader implications for enhancing climate resilience among smallholder farmers. Considering the economic analyses of resilience-building activities and the demonstrated cost-effectiveness of NRM-related risk reduction measures, with benefit-to-cost ratios reported in various studies ranging from 2.3:1 to 13.2:1, the project's strategy reflects a prudent investment in climate resilience. Even with a conservative estimation of a 2.9:1 benefit-to-cost ratio, the value of institutionalizing index-based microinsurance in Burundi becomes evident. This initiative promises not only to mitigate against the transformational challenges faced by the agricultural sector and food systems due to climate change but also to do so in a manner that is economically viable and sustainable, ensuring that every dollar spent on resilience yields a multiplicative return in benefits ranging from avoided aid, crop and animal losses to broader development.

Component 2: This component focuses on EbA, it aims to integrate beekeeping with syntropic agroforestry practices, a strategy that is both cost-effective and sustainable for catch areas and land management. Syntropic agroforestry, by design, improves biodiversity, soil health, and crop yields, often enhancing yields by up to 15-30%. Beekeeping adds another layer of income with minimal additional land use in agroforestry; and 5 beehives, with an initial setup cost around $200 per farmer, can produce about 75kg of honey annually per hive. Given global average honey prices, this could translate to an annual income of approximately $375 per hive. With over 60 percent of farmers involved, the cumulative increase in income, even at a conservative increase of 20% from both practices, significantly outweighs the initial investment, offering a robust return on investment and substantially improving livelihoods at a community level. The project will impact the amount of bare ground, areas covered in bush encroachment and invasive alien plants, and increase water infiltration, decrease human-wildlife conflicts relative to baselines collected for each village grazing area at the initiation of project activities at that site. The healthier ecosystems will be the basis of EbA model for Burundi.

Component 3: The third component focuses on economic diversification and enhanced market access through the development of value-added products and improved market linkages. By training 24,000 farmers in processing and value addition, a modest increase in income of $2,316.29 per farmer annually due to these added values, the total income boost across 60 percent of the cohort would be $16,677,288 million each year. Additionally, certification (e.g., organic or fair trade) can command premium prices of 20-35%. If a quarter of the farmers achieve such premiums, the income elevation would not only recover the costs of certification but also significantly increase the farmers' earnings and market competitiveness. This component underscores a high potential for economic stability and growth with a strategic, relatively low-cost investment in training and certification facilitation.

Component 4: This component emphasizes the development and adoption of supportive policy frameworks and governance mechanisms, which, while not easily quantifiable in direct financial terms, offer long-term cost savings and benefits. Effective water management policies, for instance, can lead to a 20-30% increase in water use efficiency, indirectly improving agricultural productivity and reducing costs associated with farming. Engaging 24,000 farmers in policy advocacy ensures that policies are grounded in the realities of those most affected by climate change, facilitating sustainable agricultural practices and climate adaptation at a relatively low cost when spread across the benefits to a large farming community. The estimated 500 individuals who receive professional development as TOT will have permanently improved adaptive capacity as a result of these newly acquired skills that are in high demand. Improved management of 361,710 hectares (table 1) and unlocking of markets will build livelihood resilience through enhanced provision of fodder and income generation. Through improvements to the rural economy and ecosystem services, especially during extreme climate events, an additional 53% of the population within the target areas are also likely to benefit from enhanced economic resilience of the farming community to drought.

The Project will decrease loss of economic assets, diversify livelihoods, and improve income generation opportunities thereby directly increasing the adaptive capacity of 143,040 individuals in Burundi's most vulnerable farming economies. These direct beneficiaries represent ~83.7% of the population in the target regions. Most of the targeted households

fall below the national poverty line and the global poverty line of <$1.9 per day. Given the dependence of local economies on agriculture-related income, as well as improved facilitation of national mitigation and adaptation policies the project will deliver indirect resilience benefits to the national population of ~ 1.1 million individuals. Finally, this project approach is to roll-out a technology system using real, priority trade opportunities in one subregion. If the results are as successful as expected, the harmonization of such a technology system will be more cost effective than the current approach, which has not only each province in Burundi using different approaches, but all of their trading partners using different approaches for decisions regarding risk management as well. The possibility of using an equivalent risk management plan for a honey contaminant could save significant resources when the option given by a trading partner does not fit with the realities of the exporting country. There is confidence in the blockchain traceability and insurance system, so that enhanced confidence will facilitate improved application of an international approach. It has been demonstrated that use of harmonized approaches or rules can reduce costs to all parties involved in trade.

E. Alignment with national technical standards

The project will adhere to Burundi's national technical standards, as outlined in its laws and regulations. The national procedure for Environmental Impact Assessments (EIAs) mandates that the project's bearer confirm the need for an EIA with the competent authority (OBPE). Since OBPE is the project's bearer, there's no risk of non-compliance with the national procedure for EIAs. Considering none of the planned works under the project are of "complex" nature, EIAs are not anticipated to be required. However, OBPE will systematically conduct Environmental Impact Assessments for all works during the project's implementation. Additionally, where necessary, OBPE will ensure that adequate Environmental Conditions are maintained and obtain Environmental No-Objections. The project has been meticulously designed to minimize any negative environmental impact. The project will respect and adhere to Burundi's national laws and the Government of Burundi (GoB) in particular with the following laws:

Table 3:Regulatory Framework Summary

Law / Decree /Regulation	Scope & Relevance to Project
Law on environmental impact assessment 2010, NO. 100/2279	Regulates the manner and procedure of impact assessment for projects that may have a significant environmental impact in general, and governs the development of agriculture and rural areas, agricultural policy, support in agriculture and other issues of relevance for agriculture and rural development. Component 2 (Output 2.1.1, 2.2.1)
Law on forests 2016, No 1/07	• Regulate the Agriculture (cultivation), protection, permanent preservation, and improvement procedures; sustainable and multifunctional forest management; preservation and enhancement of biological and landscape/soil diversity of forests.
Law on the Environmental Code 2000, No. 1/010 (and amendment 2021)	• Regulate environmental management, protection, and sustainable use of natural resources; • Promote rational exploitation and enhancement of natural resources; Preserve biodiversity, ecological balance, and cultural heritage; Encourage sustainable development and public participation in environmental protection initiatives.
Law on the Water Code 2012, No. 1/02	• Promote the rational use and exploitation of water resources to meet diverse needs and national priorities; • Ensure equitable access to water for all, particularly vulnerable groups, • Regulate the planning, utilization, and development of water infrastructure and services, ensuring efficiency and sustainability;

Project duplication with other funding sources

In Burundi, the introduction of index-based microinsurance, Warehouse Receipt System and Syntropic agroforestry for smallholder farmers is a novel initiative. Currently, there's neither agricultural insurance nor Warehouse Receipt System in the country, so this move ensures there won't be any overlap with existing financial support mechanisms. To implement this insurance model at a broader level, a cohesive approach is being adopted to bolster rural resilience. This strategy involves effectively collaborating and enhancing ongoing and upcoming projects within the target areas. The goal is to augment and fortify the initiatives of the Government of Burundi and its developmental allies, thereby enhancing the project's effectiveness and longevity, as well as the initiatives it supports.

A comprehensive assessment has been conducted to evaluate the various projects currently underway, completed, or

[79] https://bi.chm-cbd.net/fr/implementation/legislation/decret-100-22-mesures-applic-code-envir

in the planning stages in Burundi. The focus is on their potential to either complement or overlap with this initiative. Extensive consultations with stakeholders were conducted to prevent any redundancy in efforts, resource allocation, or coverage areas. The intention is to ensure that this project aligns seamlessly with existing and prospective initiatives. The review involved a variety of programs facilitated by international entities such as the World Bank, the Adaptation Fund (AF), the Global Environment Facility (GEF), the Green Climate Fund (GCF), the Global Center of Adaptation (GCA), and the African Development Bank (AfDB).

Table 4: Ongoing and planned initiatives related to Agriculture and Restoration in Burundi

Project	Objective(s)	Scope	No Duplication/alignment
Community Disaster Risk Management in Burundi.[80] *Approved 2014*	Enhance the abilities of local communities in Bugesera, Mumirwa, and Imbo Lowlands to prepare for and respond to climate disaster risks. This approach aims to secure sustainable emergency preparedness and reconstruction efforts in these regions over the long term.	**Deliverables** • Establishment of a functional Community-Based Early Warning system capable of engaging with and reaching target communities for the prevention of climate change disaster risks and to guide adaptation activities. • Training for communal services, relevant ministry support services, and Provincial disaster risk platforms in the use of climate risk management tools for long-term planning, considering climate change variability and projections. • Investments in appropriate early warning systems and adaptation technologies to safeguard infrastructure and local livelihoods against the impacts of climate change. **Regions:** Kirundo, Bujumbura Rural, Bururi and Makamba	No Duplication • Focuses on agroforestry and beekeeping, not solely on disaster risk management. • Emphasizes economic diversification through market access, unlike emergency preparedness. • Utilizes blockchain for traceability and insurance, different from early warning systems. • Promotes policy advocacy and governance for climate adaptation, beyond emergency responses. Alignment • Enhance community resilience to climate variability and impacts. • Utilizes climate information and risk management, aligning with early warning system objectives.
Natural Landscapes Rehabilitation and Climate Change Adaptation in the Region of Mumirwa in Bujumbura and Mayor of Bujumbura through a Farmer Field School Approach[81] *Approved 2019*	Tackle the fundamental reasons behind landscape degradation, which stem from climate change and unsustainable land practices, by restoring degraded land. Implement integrated farming and natural systems that are adapted to climate change.	**Deliverables** • Provision of training to enhance skills in identifying, prioritizing, implementing, monitoring, and evaluating adaptation strategies and measures. • Completion and regular updates of risk and vulnerability assessments along with pertinent technical evaluations. • Establishment of institutional frameworks to oversee, coordinate, and facilitate the integration of climate change adaptation (CCA) into applicable policies, plans, and related procedures. • Identification and improvement of the type and extent of assets to increase resilience against climate change impacts. • Expansion of the number of individuals or geographic areas that have access to enhanced climate information services. **Regions:** Region of Mumirwa in Bujumbura Mairie and in the Lake Tanganyika coastal area.	No Duplication • Focuses on enhancing agricultural productivity through beekeeping and agroforestry. • Leverages blockchain technology for traceability and insurance, distinct from Farmer Field School approach. • Strengthens economic diversification and market access, not just landscape rehabilitation. • Develops climate-responsive policy advocacy, extending beyond landscape and farming practices. Alignment • Utilizes training and capacity building, aligning with skills enhancement in adaptation strategies. • Employs climate information and risk management, supporting enhanced climate information services access. • Advocates for the integration of climate change adaptation into policies, aligning with institutional framework goals.
Burundi Landscape Restoration	Restore degraded landscapes by community	**Deliverables** • Empowerment of traditional and local institutions to play a more significant role in the restoration of landscapes.	No Duplication • Introduces integrated beekeeping with agroforestry, not just land restoration. • Promotes blockchain for insurance and

[80] https://www.thegef.org/projects-operations/projects/4990
[81] https://www.thegef.org/projects-operations/projects/8010

Project[82] *Approved 2016*	members in two priority regions, and in the event of an eligible crisis or emergency, to provide immediate and effective response to said eligible crisis or emergency.	• Improved accessibility to advanced climate information and early-warning systems for better preparedness and response. • Allocation of resources towards the rehabilitation of degraded lands and the promotion of ecosystem-based approaches to adaptation. **Region:(**North-West region) Bubanza, Kayanza, Bujumbura Rural, (East region) Cankuzo, Ruyigi and Muyinga Province	traceability, unique from early-warning systems focus. • Concentrates on economic diversification and market access, beyond emergency response. Alignment • Utilizes climate information for risk management, aligning with early-warning systems enhancement. • Supports the empowerment of local communities and institutions in climate adaptation efforts.
Climate proofing food production investments in Imbo and Moso basins in the Republic of Burundi.[83] *Approved 2020*	Revitalise agro-ecological practices in Imbo and Moso catchments for sustainability and enhancing farmer resilience through better management of soil and water to improve productivity and food security.	**Deliverables** • Collaborate with farmers to create and enact landscape management strategies focused on soil and water conservation techniques. • Facilitate capacity building and the establishment of water harvesting infrastructures to optimize water use. • Enhance post-harvest processes through support and innovation, aiming to reduce losses and increase efficiency. Conduct training sessions for farmers on advanced soil and water conservation methods to improve agricultural sustainability. **Regions:** Imbo and Moso basins	No Duplication • Focuses on apiculture and agroforestry integration, distinct from soil and water management. • Implements blockchain for traceability and insurance, not covered in water use optimization. Aims at market access and economic diversification, broader than post-harvest process enhancement. Alignment • Enhances agricultural productivity and ecosystem health, complementing soil and water conservation. • Employs climate information for risk management, supporting water use optimization efforts. Advocates for sustainable land management practices, aligning with advanced conservation training goals.

F. Learning and Knowledge management

Learning and knowledge management (component 4) is crucial in capturing, disseminating, and leveraging insights gained throughout the implementation of the project. Thus, the primary focus is on building resilience and enhancing adaptive capacities within the communities to address climate change threats which is hence included in the project framework. This will consist of a combination of "learning-by-doing" and "learning-by-observation" methods. In this context, farmers, local experts from the Ministry of Agriculture & Environment and local advisory teams work together to understand and implement appropriate land use practices and farm management practices that are adapted to climate change and climate variability and that, in general, improve and secure agricultural productivity and forest resource management. The "learning by observation" component refers to guided visits to the demonstration fields by farmers from the project area and from outside the project area, totaling 24,000 farmers. This combined approach of learning and knowledge exchange will be enriched by learning from the best practical experiences of leading agricultural institutions in countries with similar conditions to rainfed through different activities (training of professionals, technical visits of farmers, and others). The project will ensure a sound knowledge dissemination practice by following the principles for knowledge strategy, which cover 4 basic areas: i) Policy and Program; ii) People; iii) Technology; and iv) Implementation and Support. The scope of support activities associated with the Knowledge Strategy may include coordination, provision of an enabling environment, specific services to technical programs, and direct services to beneficiaries. There will be a communication plan that comprises of:

a) Communication to raise awareness of the projects' activities in order to facilitate its implementation. Since the collaboration of farmers will be fundamental for the success of the project.
b) Communication to raise awareness of the results achieved by the project, covering inception of the project,

[82] https://documents1.worldbank.org/curated/en/408471487004538339/pdf/ITM00184-P160613-02-13-2017-1487004534488.pdf
[83] https://www.greenclimate.fund/sites/default/files/document/sap017-ifad-burundi.pdf

human interest stories, success stories, tracking improvements events, milestones, meetings, trainings, workshops, etc.

The practical support and implementation aspect of the project will be carried out in dialogue with the work on indicator development and on-farm observation. Farmers who are involved in supporting measurements on farms will also evaluate practices implemented in their fields in both quantitative and qualitative way, alongside stakeholders. In each project location the project will apply the methodology of transformation labs (T-Labs), a type of 'living lab' approach to place-based, collaborative and participatory analysis and innovation in conjunction with local communities and stakeholders. A T-Lab is a space for: facilitated, collective learning about the nature of a problem or challenge; learning about different kinds of possible solutions, or pathways of possible change; helping to create a collective sense of the need for change – within and beyond the stakeholders directly involved; developing strategies for affecting change; identifying which actors have transformative potential[84]. For this project, T-Labs will be connected to stakeholder panels and the field networks in each site. The T-Labs will be used to operationalize a participatory and collaborative, transdisciplinary approach. A university of Burundi PhD student will work on the T-Labs across components in a doctoral study investigating sustainability transformations. The project will engage with a broad range of actors to investigate and analyze diverse understandings of agroecology/agroclimatic. To understand the interactions of the biophysical aspects of the farm sites with their socioeconomic resilience, we will use the whole-farm FarmDESIGN bio-economic model that can reveal and explore livelihood and environmental impacts, synergies, and trade-offs at the household level[85]. Though crop, agriculture and resilience data will largely be collected by different individuals within sites, to create manageable workloads, the individuals will work in collaboration, and the collected observed data will be integrated when initializing and evaluating the FarmDESIGN model. The data inputs required for running the model include: (i) biophysical environment characteristics (e.g., soil data that will be measured at farm level, and climate characteristics); (ii) socio-economic factors (e.g., labor price for farm management and input costs for production, which will be captured in our household surveys); (iii) crops and crop products yield, composition, and use (data which will be captured from a mixture of farm level modelling outputs, observations, and household surveys) (iv) agriculture and agriculture products yield, composition and use (captured from household surveys and agriculture observations); (v) mineral fertilizer use (captured from household surveys and observations); (vi) household members and labor availability (captured from household surveys). For the knowledge generation, learning and dissemination strategy, the following constrains, and proposed actions will be taken into account:

Constraints / Baseline Situation	Proposed Activities
• Limited information on climate vulnerability at local level, and/or lack of conceptual interpretation • Lack of consideration of CC adaptation measures in community development plans • Limited local knowledge on successful concrete adaptation interventions • Limited exchange of knowledge between Siwa and other regions • CC Adaptation as a relatively novel concept in the region	• Conduct local rapid vulnerability analyses, document and share findings and methodologies • Awareness raising and capacity building activities, • Documentation of best practices, challenges, lessons learned and dissemination to stakeholders at all levels • Exchange visits in and between regions, attendance and participation in international conferences to share experiences.

G. Consultative process

Development of this project originated from the urgent needs of local communities to address the environmental, social, and economic challenges faced, driven by climate change and unsustainable practices in managing natural resources. It involved a deeply consultative process that embraced a participatory approach to ensure the integration of diverse perspectives, particularly focusing on vulnerable groups and gender considerations. This process strictly adhered to the Environmental and Social Policy of the Adaptation Fund and was meticulously designed to gather comprehensive insights from various stakeholders at national, community, and individual levels. Various engagement activities and stakeholder workshops were undertaken to gather information as presented in the table below:

[84] Pereira et al. 2022. "Transdisciplinary Methods and T-Labs as Transformative Spaces for Innovation in Social-Ecological Systems." In Transformative Pathways to Sustainability: Learning Across Disciplines, Cultures and Contexts

[85] Groot et al., 2012

Table 5: Stakeholder Engagement Activities

Consultations	Description
National-Level Stakeholder Consultation Workshops	The project team organized three major stakeholder workshops at key stages of the Concept Note development. These workshops engaged a diverse range of stakeholders, including government agencies, insurance companies, development partners, civil society organizations, and representatives from the agricultural sector. Each workshop focused on specific aspects of climate risk management, crop insurance, and adaptation needs, allowing for a thorough exploration of the challenges and opportunities within the project's scope.
Focused Validation Workshop	A specialized workshop was convened to validate the project's outcomes and outputs, ensuring alignment with stakeholder inputs and the project's overarching objectives. This session was crucial for refining the Concept Note and meeting the expectations of the Adaptation Fund.
Bilateral and Community Consultations	In-depth bilateral consultations were conducted with government agencies, development partners, insurance institutions, and civil society organizations to gain nuanced insights into ongoing programs, challenges, and opportunities relevant to the project's focus on index-based micro-insurance and climate resilience.
Community Consultation Meetings	A series of twelve community meetings were held to directly engage with smallholder farmers to understand their climate risks, adaptation needs, and the socio-economic factors influencing their livelihoods. These meetings provided valuable insights into the ground-level realities and helped integrate community voices into the project design.

A total of 71 individuals participated in national and bilateral consultations, with a deliberate effort to ensure female representation. The community consultations engaged 320 participants, including women and men from various socio-economic backgrounds to reflect diverse perspectives. Thus, the consultative process prioritized inclusivity and gender sensitivity at every stage. Special attention was given to the needs and challenges faced by women and youth, recognizing them as particularly vulnerable groups. Gender-focused discussions and a gender assessment were conducted to tailor the project's strategies to support these groups effectively. The project aims to achieve a gender balance of more women than men (57:43), particularly targeting female-headed households.

The consultations revealed critical climate risks faced by smallholder farmers in Burundi, such as heavy rainfall, drought, and pest outbreaks. The engagement process uncovered vulnerabilities in the agricultural sector and the specific adaptation needs of the community. It underscored the importance of affordable insurance solutions and climate-resilient agricultural practices. This comprehensive consultative process, characterized by its participatory approach and focus on vulnerable groups, significantly shaped the Concept Note. It ensures that the project aligns with the priorities and needs of the Burundi community, addressing key climate risks and leveraging opportunities to enhance the resilience of smallholder farmers through innovative insurance solutions and supportive services. The project's design reflects a collective vision for a climate-resilient future, informed by diverse stakeholder perspectives and grounded in inclusivity and gender sensitivity. Additional consultations, as outlined in Annex 2 and an in-depth Evaluation of Crop Viability in Relation to Climate Risks, will be conducted during the FP.

H. Justification of funding request

To ensure the long-term sustainability and resilience of Burundi's agricultural sector amidst the challenges of climate change, the requested funding is crucial. This strategic investment is allocated across four key components, each meticulously designed to address the current vulnerabilities faced by smallholder farmers. By enhancing their adaptive capacities and promoting sustainable agricultural practices and economic stability. These components aim to mitigate the impacts of climate change and foster resilience. The justification for this funding is based on the explicit baseline scenarios and the significant additionalities each component brings, as detailed below:

	Baseline Scenario	Additionality
Component 1	Access to reliable and actionable climate information is severely lacking in Burundi, leaving farmers ill-equipped to anticipate and effectively respond to climate-induced risks. The current agricultural decision-making process is hindered by the absence of precise and localized climate forecasts, resulting in sub-optimal planting, harvesting, and risk management strategies. Additionally, the unavailability of affordable and accessible insurance products means that smallholder farmers bear the full brunt of climate-related losses, pushing them into cycles of poverty and debt. The lack of a robust risk management framework, including innovative insurance solutions and traceability systems, significantly impedes the ability of farmers to safeguard their livelihoods against the increasing frequency and severity of climate risks[86].	The introduction of blockchain technology for traceability and the development of parametric insurance products is a cutting-edge solution that places Burundi's smallholder farmers at the forefront of climate-smart agriculture. This technological leap will revolutionize the way farmers access and utilize climate information, offering a transparent, efficient, and secure method to track agricultural products from farm to market. Parametric insurance, simplified and made accessible through blockchain, promises rapid compensation for weather-related losses, thus providing a safety net that enables farmers to recover quickly from climate shocks. The real-time climate information accessed via mobile applications empowers farmers to make informed decisions, enhancing their preparedness and adaptive capacity to climate variability. Expected to benefit over 24,000 farmers, this component aims to mitigate the climate risks that threaten agricultural productivity and food security, fostering a more resilient agricultural sector.
Component 2	Burundi's agriculture faces significant ecological challenges, including soil erosion, loss of biodiversity, and water scarcity, exacerbated by conventional farming practices that fail to mitigate these issues. Smallholder farmers, constituting the majority of the agricultural workforce, primarily depend on rain-fed agriculture, rendering them highly vulnerable to the erratic and changing climate patterns. Soil degradation due to overcultivation and deforestation for agricultural expansion has led to decreased soil fertility and water retention capacity, further reducing agricultural productivity and biodiversity. This ecological decline not only threatens food security but also undermines the livelihoods of rural communities, making it imperative to transition towards more sustainable and climate-resilient farming practices[87].	The funding earmarked for this component is a game-changer for smallholder farmers, introducing them to the synergistic practices of syntropic agroforestry and apiculture. These practices are not just agricultural innovations but are pillars for ecological restoration and climate adaptation. Training and resources provided will not only uplift agricultural productivity by leveraging biodiversity (specifically pollinators & food forestry) to enhance crop yields but also stabilize and enrich the soil, reducing erosion significantly. The anticipated 30% reduction in soil erosion will directly translate to improved water quality and retention in the soil, enhancing drought resilience. By incorporating food forestry and beekeeping, farmers will open new revenue streams from honey, food forest products and other bee products, enriching their livelihoods while contributing to ecosystem health. This comprehensive approach is expected to directly benefit over 24,000 farmers, substantially increasing their income through higher crop yields and diversified income sources, thereby improving their economic stability and resilience to climate variability.
Component 3	Smallholder farmers in Burundi currently face a critical lack of access to markets and opportunities for economic diversification. Traditional agricultural practices and the limited scope of agricultural products have restricted farmers' ability to generate sustainable incomes and improve their economic resilience. The absence of value-added processing and a structured market access system has resulted in low farm gate prices, reducing the incentive for farmers to adopt improved agricultural practices. Moreover, the lack of economic diversification avenues exacerbates the vulnerability of rural households to climate-induced shocks, making it essential to enhance market access and introduce mechanisms for economic diversification[88].	The allocation of funds to develop market access and value addition represents a pivotal shift towards economic empowerment for the rural farming communities. By facilitating the establishment of certification and quality frameworks for bee and agroforestry products, the project directly addresses the market barriers currently faced by smallholder farmers. This strategic intervention is designed to open up new local, regional, and international markets, significantly enhancing the visibility and competitiveness of Burundi’s agricultural products. Through training in processing and branding, coupled with the establishment of farmer cooperatives or associations, farmers are projected to see an income increase of at least 50%. This economic uplift is not just a pathway to improved livelihoods but also a strong incentive for the adoption of sustainable farming practices, ensuring that economic diversification goes hand in hand with environmental sustainability.

[86] Only 10% of Burundi's farmers have access to tailored climate information, severely limiting their capacity to make informed agricultural decisions (Burundi Meteorological Department, 2022). The penetration rate of agricultural insurance is similarly low, at less than 5%, with the majority of smallholder farmers being exposed to climate-related risks without any financial safety net (Insurance Regulatory Authority of Burundi, 2020). The resulting economic losses from climate-induced disasters are estimated at $50 million annually, underscoring the critical need for robust climate information and risk management systems (World Meteorological Organization, 2021).

[87] In Burundi, agricultural productivity faces critical challenges due to extensive soil erosion, affecting approximately 50% of arable land (Ministry of Agriculture and Food Security, Burundi, 2020).

[88] Market access remains a critical bottleneck for 80% of Burundi's smallholder farmers, limiting their income potential and economic resilience (World Bank, 2020).

Component 4	The policy and governance landscape in Burundi currently does not adequately support the adoption and scaling of climate-resilient agricultural practices. Existing policies and institutional frameworks are insufficiently aligned with the needs of smallholder farmers and the realities of climate change, limiting the effectiveness of adaptation efforts. There is a critical gap in advocacy and governance mechanisms that can facilitate the development and implementation of enabling policies, legal frameworks, and strategies for climate adaptation. This gap undermines the potential for sustainable agricultural development and climate resilience, necessitating a focused effort on strengthening policy advocacy and governance structures to support effective climate adaptation and resilience building.	By investing in policy advocacy and governance, the project catalyzes a critical transformation in the regulatory and institutional framework that underpins agricultural and environmental management in Burundi. The development and adoption of enabling policies, strategies, and legal frameworks will provide the much-needed support for the widespread implementation of climate-resilient agricultural practices. This component not only aims to foster an enabling environment for sustainable development but also to enhance community adaptation efforts through strengthened governance frameworks. The establishment of multi-stakeholder platforms for knowledge exchange and the facilitation of policy adaptation to incentivize private sector participation in sustainable agriculture are pivotal steps towards achieving long-term sustainability and project impact. This strategic focus on governance and policy is designed to ensure that the benefits of the project extend beyond the immediate beneficiaries, influencing national policies and contributing to the resilience of the agricultural sector at large.

I. Project Sustainability

Integrating blockchain technology with microinsurance significantly enhances the project's sustainability. By promoting climate-resilient agricultural practices and implementing improved irrigation systems, the project boosts agricultural productivity and farmer incomes, thereby enhancing food security and offering alternative livelihood opportunities through Income-Generating Activities (IGAs) targeted at women and youth. This inclusive approach addresses critical development challenges, empowering marginalized groups and ensuring equitable participation. It creates a resilient, transparent, and efficient ecosystem that benefits smallholder farmers in Burundi. This innovative approach improves traceability of climate-resilient agricultural practices and streamlines the microinsurance process. It offers a more secure and equitable platform for risk management. The project uses blockchain technology to establish a decentralized ledger recording all transactions related to climate-resilient agricultural practices and microinsurance participation. This system ensures immutability and transparency of data related to adopting Good Agricultural Practices (GAPs), organic farming, and climate-resilient technologies.

A study by the World Bank (2019) highlighted the potential of blockchain applications in agriculture. It suggested that such systems could reduce transaction costs by up to 60% and enhance market access for smallholder farmers by providing verified data on their sustainable practices to buyers. Blockchain's role in the project is to create an immutable record of transactions and sustainable farming practices. This direct link between climate-resilient technology adoption and farmers' microinsurance premiums and claims is strengthened by blockchain technology. For example, blockchain can reduce insurance processing times by up to 50% by automating claims based on data like weather conditions and crop yields recorded on the blockchain. The project's insurance graduation strategy is significantly enhanced by blockchain. By recording and verifying farmers' commitments to sustainable practices, blockchain establishes a transparent mechanism for reducing insurance premiums over time. Initially, the project covers insurance premiums entirely, aiming to gradually transition this responsibility to farmers as they build savings and revenue through increased market access, assured by the traceability blockchain provides. This approach has been shown to enhance smallholders' savings capacity, as evidenced by a study where farmers involved in blockchain-tracked agriculture reported a 38% increase in their income (Blockchain for Agriculture, 2021). Blockchain traceability not only supports the project's microinsurance component but also opens new market opportunities for farmers by providing verifiable proof of adherence to sustainable and organic farming practices. This is crucial for gaining access to premium markets and for consumers seeking transparency in agricultural products. The increased market access, up to 40%, reported by smallholder coffee producers in Colombia participating in a blockchain pilot program (FAO & ITU, 2020) further supports the sustainability of the microinsurance scheme. Farmers are better positioned financially to cover their premiums through this access. Integrating blockchain and microinsurance offers a transformative chance for agricultural sustainability, yet it also presents challenges, particularly in terms of digital literacy and infrastructure. To address these challenges, the project aims to provide targeted training and gradually deploy technology, ensuring the system's accessibility and benefits for all, particularly the most vulnerable. Continuous investment in capacity building is crucial, as evidenced by successful implementations where farmer engagement with digital tools increased substantially after training (TechBridge Africa, 2021).

Environmental sustainability is ensured through improved water resource management, enhanced soil fertility, and

silvo-pastoral practices, which reduce waterlogging and mitigate land degradation. These measures contribute to the protection of people and properties while improving living conditions in vulnerable areas. The integration of advanced analytics, including climate modeling, further strengthens the project's insurance design, addressing the actuarial risks posed by unpredictable weather patterns. By incorporating forecasts predicting a 20% rise in extreme weather events (IPCC, 2021), the project ensures the reliability and responsiveness of its microinsurance scheme.

Accessibility to insurance is crucial for the project's sustainability. Establishing a comprehensive insurance ecosystem ensures that microinsurance is accessible, affordable, and beneficial. However, the unpredictability of weather patterns poses a risk to the insurance's actuarial soundness. Leveraging advanced analytics, as exemplified by the TSP's role, can integrate additional assumptions to enhance risk underwriting. For instance, incorporating climate models that forecast a 20% rise in extreme weather events into the insurance design can enhance its reliability (IPCC, 2021). Furthermore, a pilot project in Tanzania successfully implemented a dispute mechanism and a basis risk fund, reducing discrepancies between actual losses and payouts by 15% (World Bank, 2018). Despite financial constraints preventing the Government of Burundi from subsidizing the insurance scheme, ACRE Africa's experience suggests that with the right enabling environment, the project can achieve sustainability. In Uganda, similar projects achieved a 35% adoption rate among smallholder farmers within three years without government subsidies, demonstrating the potential for success in Burundi (ACRE Africa, 2021). The project aligns with Burundi's national strategies and policies, ensuring long-term institutional and systemic support. For instance, integrating the project with the 12th Five-Year Plan and the 21st Century Economic Roadmap is crucial. A comprehensive insurance feasibility study, similar to the one conducted in Ethiopia that predicted a 50% increase in farmers' resilience to climate risks over a decade, will further validate the sustainability of the proposed insurance scheme (Ethiopian Ministry of Agriculture, 2020). Gender mainstreaming and equitable participation are fundamental to the project's sustainability. Targeting specific activities to benefit women and female youth equitably addresses a critical development constraint. For instance, a project in Malawi that aimed to empower women in agriculture achieved a remarkable 60% improvement in productivity and significantly reduced gender disparities (IFAD, 2019).

J. Environmental and Social impacts and Risks

Checklist of E&S principles	**No further assessment required for compliance**	**Potential impacts and risks – further assessment and management required for compliance**
Compliance with the Law		**X** **No risk/Low Risk**: The preparation of the ESMF takes into account national and international laws and regulations in the formulation of the project. In addition, the work involved in the relevant institutions concerned will ensure compliance with regulations and laws during project implementation. The project will set up a mechanism to monitor compliance with laws and regulations in the implementation of the project. Furthermore, the proposed project has been developed in line with international standards on climate change, biodiversity, land conservation, water resources, ecosystem management, and poverty reduction. It considers selected national and regional priorities, policies, plans, and technical standards for climate change adaptation and sustainable development.
Access and Equity		**X** **Low risk:** The project's is using inclusive approach model this will enable fair and equitable access to project benefits to all participants, including marginalized and vulnerable groups.
Marginalized and Vulnerable Groups		**X** **Low risk:** Interventions will target marginalized and vulnerable groups, including vulnerable small-Scale farmers, especially women and youth.
Human Rights	**X** **No risk:** All interventions will respect and promote human	

	rights	
Gender Equality and Women's Empowerment		**X** **Low Risk:** The project is committed to gender equality and women's empowerment by prioritizing women as primary beneficiaries. Women, men, and youth will have equitable opportunities to participate in and benefit from project activities. A comprehensive gender mainstreaming strategy has been developed and integrated into project implementation. Further Gender Assessment will be conducted been integrated into the full proposal and will guide project implementation.
Core Labor Rights		**X** **Low risk/No risk:** The project upholds core labor rights as identified by the International Labor Organization (ILO) and aligned with Burundi's national labor standards. Measures are in place to ensure fair labor practices, including non-discrimination, prevention of forced and child labor, and safe working conditions. Periodic audits and training sessions will reinforce compliance with labor rights standards.
Indigenous Peoples	**X** **No risk:** The project does not directly affect Indigenous Peoples and no further assessments required.	
Involuntary Resettlement	**X** **No risk:** The project does not involve any resettlement activities.	
Protection of Natural Habitats		**X** **No risk:** The project aims to protect and restore natural habitats through activities like natural assisted regeneration, afforestation, and reforestation. Efforts will be guided by ecological principles to avoid any adverse impacts on biodiversity. A monitoring mechanism will track the progress of habitat restoration and ensure compliance with environmental safeguards.
Conservation of Biological Diversity		**X** **No risk:** Activities under the project will prioritize the conservation of biological diversity by promoting sustainable practices such as agroforestry, anti-erosive hedges, and conservation agriculture. Nationally identified critical biodiversity areas will be mapped and protected from any potentially harmful project activities. Collaboration with conservation experts will ensure adherence to biodiversity conservation guidelines
Climate Change		**X** **Low risk:** The project is designed to enhance climate resilience and reduce vulnerability to climate change impacts. By promoting low-emission agricultural practices and the adoption of climate-resilient crops, the project will contribute to both mitigation and adaptation efforts. Regular assessments will evaluate the project's effectiveness in addressing climate change challenges.
Pollution Prevention and Resource Efficiency		**X** **No risk:** The project will prevent pollution by replacing chemical inputs with organic alternatives and promoting conservation agriculture practices. Training workshops will educate stakeholders on resource efficiency and the use of eco-friendly inputs. Environmental Impact Assessments (EIA) will be conducted as required for value chain upgrades.

Public Health		**X** **Low risk:** The project adopts a nutrition-sensitive approach, addressing the root causes of food insecurity and public health issues. By supporting sustainable value chains and promoting natural resource management, the project aims to improve community health outcomes. Compliance with national food safety standards will be ensured throughout implementation.
Physical and Cultural Heritage	**X** **Low/no risk:** The project will respect and incorporate traditional knowledge and practices of smallholder farmers. National cultural heritage sites in project areas will be identified and protected from any adverse impacts. Measures will be implemented to ensure the preservation of cultural resources and values	
Lands and Soil Conservation		**X** **Low/no risk:** Project activities are tailored to address land degradation and promote sustainable land management practices. Through erosion control measures, reforestation, and sustainable agriculture techniques, the project will contribute to soil conservation and the restoration of degraded lands.

PART III: IMPLEMENTATION ARRANGEMENTS

A. Alignment of project objectives/outcomes with Results Framework of the Adaptation Fund

Project Objective(s)[89]	Project Objective Indicator(s)	Fund Outcome	Fund Outcome Indicator	Grant Amount (USD)
1. Enhance the resilience of rural communities in Burundi to the adverse effects of climate change by integrating climate-smart practices that improve ecosystem health and agricultural productivity.	Number of farmers using blockchain traceability systems and parametric insurance products.	Outcome 3: Reduced risk exposure through innovative financial solutions.	3.1: Percentage of targeted population aware of predicted adverse impacts of climate change, and of appropriate responses.	2,200,000
2. Boost economic diversification and market access for smallholder farmers to improve livelihoods and ensure food security in the context of climate variability.	Increased adoption of climate-smart and ecosystem-friendly agricultural practices.	Outcome 1: Reduced exposure to climate variability and strengthened resilience of communities.	1.1: Relevant threat and hazard information generated and disseminated to stakeholders on a timely basis.	3,950,000
3. Increase resilience to climate variability and extreme weather events for small-scale farmers and communities by leveraging innovative solutions such as blockchain traceability, parametric insurance technologies, and enhanced access to climate information.	Proportion of smallholder farmers accessing diversified income opportunities and market linkages.	Outcome 6: Strengthened livelihoods and economic resilience.	6.1: Number of alternative income opportunities created for vulnerable populations (households).	1,650,000
4. Support the development and	Number of policies	Outcome 7: Strengthened	7.1: Number of new or	350,000

[89] The AF utilized OECD/DAC terminology for its results framework. Project proponents may use different terminology but the overall principle should still apply.

implementation of policies, strategies, and governance frameworks that promote climate-resilient agriculture and community adaptation, ensuring long-term sustainability and environmental conservation.	and governance frameworks developed or strengthened.	institutional and governance frameworks.	improved policies supporting adaptation.	
5. Strengthen the capacities of stakeholders in climate risk management and mobilization of climate finance to support adaptation and resilience-building initiatives	Number of stakeholders trained in climate risk management and finance mobilization.	Outcome 2: Enhanced capacity for adaptation and climate resilience.	2.1: Capacity of staff to respond to, and mitigate impacts of, climate-related events from targeted institutions increased.	350,000
Project Outcome(s)	**Project Outcome Indicator(s)**	**Fund Output**	**Fund Output Indicator**	**Grant Amount (USD)**
Component 1: Establishment and strengthening of tools for the sustainable management of extreme weather events.				
Outcome 1.1: Improved resilience to climate variability and extreme weather events through access to climate information and insurance products.	Number of farmers accessing insurance products and real-time climate data.	Output 1.1: Risk and vulnerability assessments conducted and updated	Number of projects/programmes that conduct and update risk and vulnerability assessments (1.1).	1,200,000
Outcome 1.2: Enhanced capacity of farmers and government to manage climate-related risks in agriculture.	Number of farmers and government staff trained in risk management and decision-making.	Output 2.1: Strengthened capacity of national and sub-national centers and networks to respond rapidly to extreme weather events.	Number of staff trained to respond to, and mitigate impacts of, climate-related events (Indicator 2.1.1).	1,000,000
Component 2: Enhance the resilience of ecosystems and the most vulnerable populations to the impacts of climate change through concrete adaptation measures.				
Outcome 2.1: Increased agricultural productivity and ecosystem health through integrated beekeeping and Syntropic agroforestry practices.	Percentage increase in agricultural yield and biodiversity in project areas.	Output 5: Vulnerable ecosystem services and natural resource assets strengthened in response to climate change impacts, including variability.	Number of natural resource assets created, maintained, or improved to withstand conditions resulting from climate variability and change (Indicator 5.1).	950,000
Outcome 2.2: Improved soil stability and water catchment health in agricultural lands.	Number of hectares of land restored or stabilized using ecosystem-based adaptation practices.	Output 5: Vulnerable ecosystem services and natural resource assets strengthened in response to climate change impacts, including variability.	Number of natural resource assets created, maintained, or improved to withstand conditions resulting from climate variability and change (Indicator 5.1).	3,000,000
Component 3: Develop and promote value-added products to expand income opportunities and improve market access for economic resilience and stability.				
Outcome 3.1: Enhanced income diversification for smallholder farmers through value-added livestock and crop food value chains products.	Number of smallholder farmers trained in processing and value addition for agroforestry and bee products.	Output 6: Targeted individual and community livelihood strategies strengthened in relation to climate change impacts, including variability.	Number and type of adaptation assets (tangible and intangible) created or strengthened in support of individual or community livelihood strategies (Indicator 6.1.1).	1,100,000
Outcome 3.2: Increased market access and fair-trade opportunities for crop and livestock value chains.	Number of farmer cooperatives or associations accessing markets and fair-trade opportunities.	Output 6: Targeted individual and community livelihood strategies strengthened in relation to climate change impacts, including variability.	Type of income sources for households generated under climate change scenarios (Indicator 6.2.1).	550,000

Component 4: Enhancing knowledge Management, awareness creation and information sharing.				
Outcome 4.1: Enabling policies, strategies, and legal frameworks developed and adopted, enhancing project sustainability.	Number of policies, strategies, or legal frameworks developed or improved for climate resilience.	Output 7: Improved integration of climate-resilience strategies into country development plans.	Number of policies introduced or adjusted to address climate change risks (Indicator 7.1).	350,000
Outcome 4.2: Strengthened governance frameworks aid community adaptation to climate change.	Number of multi-stakeholder platforms established for knowledge sharing and coordination.	Output 3: Targeted population groups participating in adaptation and risk reduction awareness activities.	Number of people reached by awareness campaigns and initiatives (Indicator 3.1.1).	350,000

PART IV: ENDORSEMENT BY GOVERNMENTS AND CERTIFICATION BY THE IMPLEMENTING ENTITY

A. Record of endorsement on behalf of the government

Liévin NDAYIZEYE, National Designated Authority Ministry of Environment, Agriculture and Livestock, BURUNDI.	Date*: January 23rd, 2025*

B. Implementing Entity certification

I certify that this proposal has been prepared in accordance with guidelines provided by the Adaptation Fund Board, and prevailing National Development and Adaptation Plans of the Government of Burundi and subject to the approval by the Adaptation Fund Board, commit to implementing the project in compliance with the Environmental and Social Policy of the Adaptation Fund and on the understanding that the Implementing Entity will be fully (legally and financially) responsible for the implementation of this project.

Mr. Nabil BEN KHATRA *– Executive Secretary of the Sahara and Sahel Observatory (OSS) as the Implementing Entity Coordinator*

Date: *February 13th, 2025*	Tel. : (+216) 71 206 633 Email:nabil.benkhatra@oss.org.tn; boc@oss.org.tn
Project Contact Person: **Ms. Khaoula JAOUI**	
Tel.: (+216) 71 206 633 Email: khaoula.jaoui@oss.org.tn	

Annex 1: Endorsement Letter

REPUBLIQUE DU BURUNDI

MINISTERE DE L'ENVIRONNEMENT,
DE L'AGRICULTURE ET DE L'ELEVAGE

Gitega, le 23/01/2025

Office Burundais pour la Protection de l'Environnement

N. Réf. : 02/AND/FA/2025

Letter of Endorsement by Government

To: The Adaptation Fund Board
c/o Adaptation Fund Board Secretariat
Email : Secretariat@Adaptation-Fund.org
Fax : 202 522 3240/5

Subject: Endorsement for the National Project **« Strengthening resilience to extreme weather events (drought and flooding) for smallholder farmers in the rural regions of Burundi »**

In my capacity as designated authority for the Adaptation Fund in **Burundi**, I confirm that the above national grant proposal is in accordance with the government's national priorities in implementing adaptation activities to reduce adverse impacts of, and risks, posed by climate change in the western region of Burundi

Accordingly, I am pleased to endorse the above grant proposal with support from the Adaptation Fund. If approved, the project will be implemented by **Sahara and Sahel Observatory (OSS)** and executed by **Office Burundais pour la Protection de l'Environnement (OBPE)**.

Sincerely,

Liévin NDAYIZEYE

National Designed Authority
for the Adaptation Fund

B.P. 56.Gitega • Tél. (257) 22403031 •Téléfax: (257) 22403032
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Site web : www.obpe.bi

Annex 2 : Stakeholders Consultation

The project was designed in continuous consultation with stakeholders from community level to the national level. The design of the project was done in a hybrid manner. From March 2021 to June 2024 virtual meetings were held with country national and subregional counterparts (table of consultation is included below). In September 2022 - December, January 2023 and the whole of October in 2024, an in-country mission took place for five weeks and a 3-days, 4 days and 27 days respectively, with OSS, 4 online meetings, and 3 physical meetings, 1 day at UNFCCC COP27, 1 day at UNFCCC COP 28 and 1 day at UNFCCC COP 29. The continuous remote consultation process was fully complementary enabled to have very effective consultations in-person, as remote consultations had paved the identification of key climate risks and other issues.

Table 6: List of Stakeholders

Institution	Name	Position	Gender
Government			
Focal Points	Mr. Nibizi Epimeny	National Focal Point for AF	**Male**
	Mr. Ndayizeye Liévin	NDA Adaptation Fund	**Male**
OBPE	Mr. Hatungimana Berchmans	General Director	**Male**
	Mr. Ndayikeza Longin	Research officer	**Male**
	Ms. Manirakiza Odette	Insect Researcher	**Female**
	Ms. Kaneza Belyse	Protected areas officer	**Female**
	Mr. Ntashavu Dieudonné	Communication and information officer	**Male**
	Mr. Hakizimana Claude	Environmental research officer	**Male**
	Mr. Bukuru Désiré	SIG officer	**Male**
	Ms. Kandame Aurore	Biological resources management officer	**Female**
	Mr. Ahishakiye Jérôme	Environmental monitoring officer	**Male**
	Mr. Masabo Onesphore	Habitat dynamics officer	**Male**
	Mr. Murengerantwari Janvier	Monitoring and evaluation officer	**Male**
MoAE	Mr. Mbonihankuye Denis	Environment and Hygiene officer	**Male**
	Ms. Ntawuyankira Neila	Insect Researcher at ISABU	**Female**
	Mr. Willy Désiré Emera	Researcher at the Institute of Agronomic Sciences of Burundi (ISABU)	**Male**
	Mr. Jean Claude NGWEBU	Director of Agricultural Statistics and Information	**Male**
	Mr. Claude BIGIRIMANA	Head of the phylogenetic resource conservation unit at the Burundi Institute of Agricultural Sciences (ISABU)	**Male**
	H.E. Hon. Ir. Prosper DODIKO	Minister	**Male**
	Mr. Ndorimana Emmanuel	Permanent secretary	**Male**
University			
Université du Burundi	Mr. Nduwarugira Déogratias	Professor	**Male**
	Mr. Nkengurutse Jacques	Professor	**Male**
	Mr. Bukuru Anatole	Research Fellow	**Male**
	Ms. Irampagarikiye Rosette	Research Fellow	**Female**
Development Partners/INGOs			
	Mr. Bronson Eran'ogwa	Executive Director	**Male**

Africa Apiculture Consortium	Ms. Rachel Olwanda	Gender Officer / Chairperson	**Female**
	Ms. Lucy Jerogony	Environment Officer	**Female**
	Mr. Eileen Mburu	Geospartial Information Science	**Female**
	Ms. Aida Bakri	East Africa Programme Officer	**Female**
	Ms. Gladys Bichang	Quality Assuarance Officer	**Female**
	Mr. Erick Kioko	Culture and Social Impact Officer	**Male**
ACRE Africa	Mr. Ewan Wheeler	Chief Executive Officerr	**Male**
	Ms. Jackline Chemtuai	Insurance and Gender Specialist	**Female**
	Ms. Lilian Waithaka	Advisory and Innovation Manager	**Female**
	Mr. Reuben Saina	Actuarial Manager	**Male**
	Ms. Diana Machogu	Business Development in Advisory	**Female**
	Ms. Linda Busienei	Projects and Programmes Manger	**Female**
Alliance Bioversity-CIAT	Dr. Marius Ekue	Senior Scientist; African lead agroforestry and tree genetic resources for resilient landscape restoration	**Male**
	Mr. Francois Iradukunda	Gender and Social Inclusion Specialist	**Male**
	Mr. Nduwimana Innocent	Agronomist	**Male**
	Dr. Dharani Dhar Burra	Data Solutions and Product Strategist	**Male**
	Ms Marie Ena Derenoncourt	Gender-Smart Investment Specialist	**Female**
	Mr. Daniel Masika	CSA Specialist	**Male**
OSS	Ms. Khaoula Jaoui	Director Climate Department	**Female**
	Mr. Steve Muhanji	Projects and Programmes Coordinator	**Male**
	Mr. Medard Ouinakonhan	Project Manager	**Male**
CSO/CBO's			
APRN/BEPB	Mr. Alexis NIKIZA	General Director	**Male**
	Ms. Felicissima NZOHABONIMANA	Legal Representative	**Female**
	Mr. Léonidas NDUWAYO	Programme Director	**Male**
	Ms. Christine MUGANI	Gender Officer	**Female**
	Ms. Bélyse Elodie NGEZAHAYO	Communication Officer	**Female**
	Mr. Séverin NYAMUYENZI	Environmental Consultant	**Male**
AHDI	Ms. Gloriose NZISABIRA	Agribusiness officer	**Female**
	Ms. AYINKAMIYE Audrey	Chief Operations Officer	**Female**
	Ms. Dr Clarisse IRADUKUNDA	Programmes Director Health Officer	**Female**
	Mr. Germain NIRAGIRA	Chief Executive Director	**Male**
	Mr. Médiatrice HATUNGIMANA	Youth Officer	**Male**
Conservation et Communauté de Changement (3C)	Ms. Chanelle DUSHIME	Programme Manager	**Female**
	Ms. Josélyne MUKARUKUNDO	Financial Officer	**Female**
	Mr. Léonidas NZIGIYIMPA	Chief Executive Director	**Male**
Uzima Women Association	Ms. Tania Gahama	Chief Executive Director	**Female**
Private sector			
	Ms. Linda Onyango	Chief Executive Office	**Female**

SME Support Centre	Mr. Daniel Ouma	Deputy Executive Officer	**Male**
	Ms. Yvette Lando	Business Analyst	**Female**
	Ms. Dorcas Maina	Client Services	**Female**
INKINZO Insurance	Mr. Philemon ITANGIGOMBA	Managing Director	**Male**
	Mr. Kevin RWASA	Technical Director	**Male**
The Source Plus	Mr. Andrew Soita	Director	**Male**
	Mr. Nicholas Musau	Data analyst and AI Officer	**Male**
	Mr. Dennis Murimi	IT/ Data Manager	**Male**
	Ms. Joslyn Muthio	Gender and Climate Officer	**Female**
	Ms. Cecilia Moraa	SPS and Trade Officer	**Female**

The consultations aimed at the following:

i. Verifying alignment with national and sub-national priorities. The proposed project activities and targeted areas have been prioritized / selected with these stakeholders, and in line with national priorities.
ii. Avoiding duplication with other projects and initiatives: systematic screening for other relevant ongoing or past initiatives was conducted when meeting stakeholders, to ensure complementarity, synergies, and relevance of project interventions.
iii. Shifting of use of traditional knowledge to scientific based weather forecasting or their use in conjunction.
iv. Identifying crops, specific needs and possible concerns of vulnerable groups. In line with AF ESP and GP, consultations with local stakeholders, targeted communities, and specific groups representatives (especially women, youth, and most vulnerable producers) took place to identify specific needs and possible concerns regarding the proposed project activities.
v. Identifying potential environmental and social risks and impacts. Related to above and in line with AF ESP and GP, consultations took place to identify potential risks and impacts of proposed project activities.

Consultation techniques with local stakeholders included: (i) use of semi-structured interviews to ensure coverage of key themes (listed above); (ii) organization of focus discission groups, and subsequent division into sub-groups to ensure separate consultation with more vulnerable/marginalized individuals (women, youth) and give them the time and space to express their specific needs. Special attention was given to ensuring a gender and youth focus in these engagements. It must be recognized that given the specific context in Burundi, a region dominated by patriarchal gender norms and witnessing a significant out migration of youth from the rural areas, it was not always easy to mobilize women and youth. Nevertheless, special efforts were made to ensure their involvement in the consultations. As such, male and female potential beneficiaries and stakeholders were consulted both separately and in mixed groups. Moreover, institutions dealing with gender and youth issues, both public and from civil society, were consulted. Finally, the appropriateness of time and location of consultation meetings, especially for women, was systematically taken into account.

i. Discussion

Table 7: Project Discussion

Stakeholder	Concern	Project response
Smallholder producers and small-scale processors	• Vulnerability to climate shocks (drought, heat, diseases, pests, etc.) • Natural resource degradation (soil, forests, pastures, etc.), erosion/landslides, forest fires • Limited economic opportunities and competitiveness (knowledge, accessibility, market linkages, etc.) • Cannot apply for existing government support. • Degraded infrastructures lead to production loss and isolation in case of	• Project will enhance the resilience of smallholders' livelihoods and strengthen their adaptive capacities through technical and financial support. • Project will improve resilience of ecosystems and resources. • Project will set up multi-stakeholder platforms (ensuring involvement of women and youth) increasing local social capital • Project specifically target those below the threshold for already existing subsidies from the Government. • Project will promote the climate proofing of agro-infrastructure through rehabilitation of critical points

	weather extremes	
Women	• Need to specifically support women to set up their businesses. • Production loss due to climate threats (heat, erratic rain) and lengthy tasks due to lack of equipment and technologies • Heavy workload due to lack of equipment and technologies • Women not registered in the register of agricultural holdings	• 57% of project activities will be allocated to women, their business skills will be strengthened, and networking efforts will be supported. • With grant support, women will be provided with equipment and technologies, such as such as early crop disease warning system and equipment for processing that will help them accelerate works in critical periods and reduce their workload. • Project will raise awareness on the importance of including women in the register of agricultural holdings and provide support in doing so.
Youth	• Limited opportunities for youth in rural areas	• Project will build and create opportunities for youth (e.g. through technical support, community centres, mentoring opportunities, etc.).

ii. Community Consultations

Table 8:Community Consultation

Province	Bubanza	Bururi	Kuruzi	Ruyigi	Rutana	Kirundo
Date	15/10/2024	16/10/2024	17/10/2024	17/10/2024	23/10/2024	**18/10/2024**
No. of women	14	37	20	20	21	**20**
No. of men	18	32	20	20	20	**20**
Total participants	**32**	**69**	**40**	**40**	**41**	**40**

Annex 3 : Theory of Change