

BURUNDI SAP

FEASIBILITY STUDY

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INTRODUCTION

This feasibility study for the Climate Proofing Rural investments under the National Program for Food Security and Rural Development in Imbo and Moso includes the logical framework, the timetable for implementation, the stakeholder consultations, the theory of change and the climate data. The logical framework presents the objectives of the project, the components, outputs, key activities, the main targets, means of verification and assumptions made. The timetable provides the envisaged sequencing of the activities to achieve each of the outputs. The stakeholder consultations provides the basis for the selection of the objectives of the project to address identified barriers. The project goal, objective, components, activities and barriers being addressed are visually depicted in the theory of change. The rationale for the project and justification for seeking climate financing is provided in the climate data, maps and analysis that are included as part of the feasibility study.

LOGICAL FRAMEWORK

	Description	Indicators	Baseline	Targets (mid-term)	Targets (final)	Sources and means of verification	Assumptions
Core Indicators		(Core indicator, adaptation) Total number of direct and indirect beneficiaries; Number of beneficiaries relative to total population	Direct: 0 Indirect: 0 Total/population: 0	Direct: 120,000 Indirect: 167,777 Total/population: 2,5%	Direct: 240,000 (50% of women and 15% youth) Indirect: 333,540 (50% of women and 15% youth) Total/population: 5%	Baseline survey, Mid-term and impact survey	Socio-political stability Adequate and conducive institutional and legislative framework
Objective related to GCF RMF Impact Areas	A1. Increased resilience and enhanced livelihoods of the most vulnerable people, communities, and regions	A1.1 Number of males and females benefiting from the adoption of diversified, climate-resilient livelihood options (including fisheries, agriculture, tourism, etc.)	0	A1.1 80,000 (50% women and 15% youth) ¹ Male: 40,000 Female: 40,000	240,000 (50% women and 15% youth) Male: 120,000 Female: 120,000	Training and field reports; District development and economic reports; Project evaluation reports	There will be strong commitment from the communities and local leadership to address land degradation in the two beneficiary basins Absence of serious political events in project countries

¹ These will mostly be smallholder farmers in the upper and middle catchment whose current unsustainable soil and water conservation practices are leading to increased siltation in the lower catchment food production investments.

	A2. Increased resilience of health and wellbeing, and food and water security	A2.2 Number of food secure households (in areas/periods at risk of climate change impacts)	0	80,000 vulnerable individuals (50% women and 15% youth) Male=40,000 Female=40,000	240,000 vulnerable individuals (50% women and 15% youth) Male=120,000 Female=120,000	Interim Evaluation Report; Final Evaluation Reports	The infrastructure developed will be used to support food production
	A3.0 Increased resilience of infrastructure and the built environment to climate change	A3.1 Value of physical assets made more resilient to climate variability and change, considering human benefits	USD 30 Million	USD 40 Million	USD 57 Million	Final Evaluation Reports	The catchments for the farmlands in which the investments are made by PNSADR-IM are all reached by this GCF project
Outcomes	A5.0 Strengthened institutional and regulatory systems for climate-responsive planning and development	A5.1 Institutional and regulatory systems that improve incentives for climate resilience and their effective implementation	0	One National Policy on Sustainable Land Management (SLM) reviewed and adopted	Three Policies and accompanying district level regulations on Sustainable Land Management (SLM) reviewed and adopted	National Action Plan; National and Regional Stakeholder Engagement and Policy Reports; Draft Basin Management Regulations	Local institutions and partners have resources to mainstream SLM into their programmes and activities There will be strong commitment from the communities and local leadership to address land degradation in the two beneficiary basins
	A7.0 Strengthened adaptive capacity and reduced exposure to climate risks	A7.1 Use by vulnerable households, businesses and public-sector services of GCF-supported tools, instruments, strategies and	0	20,000 (Households and MSMEs)	45,000 (Households and MSMEs)	Project progress reports; Burundi Hydro Meteorological Department (B HMD) reports; Surveys of project beneficiaries	Farmers remain committed and continue with adopted SLM practices within their farms.

	A8.0 Strengthened awareness of climate threats and risk-reduction processes	activities to respond to climate change and variability A8.1 Number of males and females made aware of climate threats and related appropriate responses	0	70,000 persons (50% women and 15% youth) Male=35,000 Female=35,000	150,000 persons (50% women and 15% youth) Male=75,000 Female=75,000	Interim and Final Evaluation Reports; Surveys; Field Reports	Extension officers will mainstream sustainable land management practices in their day to day training programme
Components	Component 1. Improvement of soil and water management through the adoption of best practices in agro-ecosystem management by land users	1.1 Percentage of upper and mid catchment farmers successfully implementing and benefiting from SLM practices 1.2 Percentage increase in production (crop and livestock) for upper, middle, and lower catchment farmers contributing to climate resilience and food security 1.3 Percentage reduction in flooded acreage within the	1.1 Less than 10% 1.2 0 1.3 40% during the long rains; 30% during the short rains	1.1 25% 1.2 10% 1.3. 10% during the long rains; 15% during the short rains	1.1) 50% 1.2 15% 1.3 30% during the long rains; 20% during the short rains	Field reports District development and economic reports Project evaluation reports Surveys of land degradation, agro-ecological systems	Strong commitment from the communities and local leadership to address land degradation in the two beneficiary basins Farmers will be willing to adopt SLM practices within their farms Extension officers will mainstream SLM practices in their day to day training programme There will be no political or civil strife in the project areas and the country as a whole Sufficient growth of water conserving

		irrigated land in the two basins during both the long and short rains	1.4 7 times a year	1.4 6 times a year	1.4 4 times a year		vegetation and timely maintenance of soil stabilization and water conservation structures
		1.4 Reduction in annual canal desilting frequency in the downstream irrigation schemes within the two basins	1.5 0	1.5 10,000	1.5 15,000		
		1.5 Hectares of land under Sustainable Land Management (SLM) practices	1.6 0	1.6 1,200	1.6 2,470		
		1.6 Hectares of irrigated land in the lower catchment protected from increased siltation	2.1 Less than 5%	2.1 30%	2. 100%		
	Component 2. Capacity building of actors at all levels on best agro-ecosystem management practices for enhanced soil	2.1 Percentage of division extension officers trained on SLM from the 35 districts in the project area	2.2 0	2.2 25,000	2.2 100,000		
		2.2 Number of participating farmers requesting extension					

	and water conservation	services on SLM and other agro-ecosystem management practices	2.3 0	2.3 70,000	2.3 150,000		
	Component 3. Development of an enabling environment for water and soil conservation	2.3 Number of actors (farmers, marketers, and owners of Small and Medium Size Enterprises) trained and supported to adopt and enhance SLM practices for arable and mixed farming systems	3.1 0	3.1 One National Policy on SLM reviewed and adopted	3.1 Three (3) Policies and accompanying district level regulations on SLM reviewed and adopted		
		3.1 Number of policies and regulation on Sustainable Land Management (SLM) practices reviewed at both the national and district level	3.2 0	3.2 Priority policy and legal issues identified and agreed upon at community and basin levels for sustainable land management	3.2 Priority policy and legal issues for sustainable land management documented and shared with policymakers		
		3.2 New documented localized evidence for policy development and review available (materials produced)	3.3 0	3.3 One National draft on policy recommendations	3.3 Two district level SLM regulation recommendations developed to regulate		

		3.3 Draft of the reviewed policy recommendations for soil and water conservation available		developed to support decisions and regulatory mechanisms at national and district levels	steep hills farming and other SLM practices at district level		
Outputs	Output 1.1. Increased adoption of sustainable land and soil water management practices	1.1a Number of participatory land use plans developed for steep slopes, riparian areas, forests, and protected areas	1.1a 0	1.1a 50	1.1a 50	Land use plans Project progress reports Training reports Farmer field school records	Local institutions and partners are willing to mainstream sustainable land management into their programmes
		1.1b Number of participatory land use plans adopted	1.1b 0	1.1b 50	1.1b 50		
		1.1c Area transformed through SLM and higher productivity	1.1c 0	1.1c 10,000	1.1c 15,000		
		1.2a Number of participating farmers supported to acquire and install on-farm rainwater harvesting facilities	1.2a <100	1.2a 500	1.2a 1,500	Project progress reports	
	Output 1.2. Increased on-farm rainwater harvesting at household level	1.2b Capacity of installed rainwater harvesting facilities	1.2b 0	1.2b 100,000 liters	1.2b 300,000 liters		Land use plans institutionalised as part of the local planning process and sufficient resources allocated
		1.3a Number of green small business	1.3a 0	1.3a 50	1.3a 150	Project progress reports	

	Output 1.3. Increased incentives for the development of green Micro, Small and Medium Enterprises that spur soil and water conservation action	(owned by men, women and youth) supported to become self-sustaining through a business incubation facility					
		1.3b Proportion of farmers practising SLM (especially women and youths) with access to markets for SLM products and that can sell 90% of their market-oriented produce	1.3b 0	1.3b 50%	1.3b 90%	Training reports	Farmers will apply the acquired knowledge for sustainable land use within their plots
		2.1a Number of agricultural extension officers from the 35 beneficiaries' districts undertaking refresher courses on SLM practices	2.1a 0	2.1a 30%	2.1a 30%	Local surveys on poverty, health, income, vulnerability etc Project progress reports	Farmers will be willing to adopt rainwater harvesting practices Farmers will be willing to take time off for the training There are sufficient local innovations that need support
	Output 2.1. Building capacity of actors in	2.1b Number of lead farmers (including all groups: men, women and youth) trained on SLM practices to	2.1b 0	2.1b 165 lead (5 per district, 50% women)	2.1b 330 lead (5 per district, 50% women)	Training reports Farmer field school records	Farmers are willing to adopt on-farm value addition practices There will be ample market for SLM produce Extension officer will be willing to participate in the training

	improved agro-ecosystem management for enhanced soil and water conservation	enhance peer to peer learning					
	Output 2.2. Establishment and operationalisation of FFS	2.2.a Number of operational FFS 2.2.b Number of farmers trained through FFS	2.2.a 0 2.2.b 0	2.2.a 33 2.2.b 330	2.2.a 66 2.2.b 660	Farmer field school records Project progress reports	Lead farmers will be willing to participate in the training
	Output 3.1. Enabling policy and regulatory framework for SLM practice established	3.1a Priority SLM policy and legal gaps identified and agreed at national, community and micro catchment levels and shared with policy makers 3.1b Number of actors sensitised on the needs for policy and regulation changes in community SLM by-laws 3.1c Number of policy roundtables organised and held between researchers, government and local communities (with	3.1a 0 3.1b 0 3.1c 0	3.1a 0 3.1b 500 persons 3.1c 2	3.1a One (1) policy analysis document 3.1b 1050 (30 per district) persons 3.1c 4	National and regional stakeholder engagement reports Draft basin management regulations Policy roundtable reports	Farmers will be willing to participate in the training Local institutions and partners willing to mainstream SLM into their programmes and activities Local institutions and partners willing to upgrade the capacity of their staff in sustainable land management Participating farmers available for training and interested in implementing the basin

		representation from all groups, men, women and youths)					management regulatory mechanisms
Activities	Activities	Description				Inputs	
	1.1.1 Research to generate localized knowledge on best SLM practices suited for the agro-ecosystems	The research work will identify the best practice for each of the identified micro-catchments. This is expected to inform practices that the project will promote in each micro-catchment to avoid any chances of mal adaptation.				Studies to be conducted by a consultant	
	1.1.2 Co-creation workshops	After the most appropriate agro-ecosystem management practices are identified, the project team together with the local farmers will develop a catchment management plan that the project will support to implement. This plan will be the main guiding tool on which and how SLM practices will be promoted and implemented.				Workshop venue A local consultant for workshop facilitation and dissemination of the evidence Transport allowances	
	1.1.3 Training workshop	After developing the catchment management plans, local farmers will be trained on the various aspects of the plans and how to develop, construct and manage water and soil conservation structures on their farms and also how to generate income from such practices.				Training/workshop venue Training materials Training consultant Transport allowances	
	1.1.4 Establishment of demonstration farms	Apart from training farmer on SLM practices, demonstration farms will be established in community lands where farmers will learn through doing some of the best SLM practices suited for their locality.				Farm preparation (labour) Farming supplies Operational activities Tree seedlings and other planting material	
	1.1.5 Seed/planting materials	Most of the vegetation to reinforce soil conservation structures will be sourced locally to avoid introduction of exotic species. To achieve this, there is a need to collect locally available seed and other				Labour Testing and Certification	

collection and certification	planting materials (cutting) to be propagated. Once these materials are collected, they will be certified through partner government institutions to ensure that they are disease free and can be used as planting materials. The collection will be done by community members for a fee; the beneficiaries will be mainly women and youth.	Transport Storage
1.1.6 Establishment of tree nurseries	Once the planting materials are gathered and certified, tree nurseries, mainly run by women and youths will be established to generate the required planting seedlings. There will be at least 5 tree nurseries per district, i.e. minimum tree nurseries will be 165.	Labour Land Farm supplies Water supply Seedling handling supplies
1.1.7 Development of farm level soil and water conservation structures	Soil and water conservation structures will be developed at farm level through subsidized labour. Once these structures are developed, they will be stabilized using planting materials generated in activity 1.1.6. Such structures will include: terraces, contour bunds, water ways, gabions, and ridge tillage among others.	Labour Planting/propagation materials Equipment/tools Construction supplies
1.1.8 Tree planting campaigns	For communally owned land, that is degraded, community tree planting campaigns will be organized just before the onset of the long and short rains. This will facilitate community ownership of the rehabilitated land. A small allowance of USD 5 (equivalent to current pay per day) will be paid to participants as an incentive for their participation.	Labour Planting materials Equipment/tools Constructions supplies
1.2.1 Support famers acquire on-farm rain water harvesting facilities	Rain water harvesting within the basin is limited mainly because of the initial investment required to acquire facilities for this, including gutters and tanks. Under this activity, farmers within the two basins will be provided with gutters and water tanks. Their contribution towards this will be the construction of the water tank beds and also provision of support in terms of labour required for the installation of the gutters and the tanks for diversion of water to surrounding gardens and storage at the household level as well as vegetated contour bunds and water pans on farm.	10,000lites water tanks Gutters, micro catchment water control structures such as contour bunds and water pans for storage. Labour
1.2.2 Capacity building of local artisans on the management	To ensure the sustainability of benefits accrued in activity 1.3.1, local artisans will be trained on the management and repair of the installed rainwater harvesting facilities. This will ensure that there is enough local expertise to support the rainwater harvesting ecosystem developed in the project.	Training venues Training materials Consultant

and repair of farm level water harvesting facilities		Transport allowance
1.3.1 Innovation challenge award scheme on SLM practices and produce thereof established	To promote the development of small and micro enterprises around the SLM practices and its derivatives, an innovation challenge award scheme will be established for local innovators to compete for a chance for their ideas to be incubated and turned into sustainable businesses. These types of innovation will be considered “green” as they will have several co-benefits of preserving the ecosystem, building climate resiliency and establishing means of livelihood for the innovators.	Labour Application forms Awareness creation materials and tools Award trophies/incentives Gala night supplies consultant
1.3.2 Business incubations	Once the best green innovations are established in activity 1.3.1 above, they will be taken through a business incubation process. Once these innovations are refined, tested and acquire the necessary approval for market introduction, the innovators will undergo trainings on business management, financial management, book keeping among other skills required to run a successful business. Mentors will also be assigned to the innovators to work with them in the business development process.	Labour Laboratory/testing facilities/partners Training venue Training materials Consultant
1.3.3 Building the capacity of farmers on “on-farm” value addition	Training farmers on “on-farm” value addition for their produce e.g. sun drying, better storage and threshing and cleaning. This would reduce post-harvest losses and increase farmer income and produce storage time.	Labour Storage materials Sun drying facilities Training facility Consultant
1.3.4 Support farmers acquire better on-farm handling and storage facilities	One of the major drivers of post-harvest losses is poor post-harvest handling that includes poor storage and on-farm processing. This activity will entail supporting farmers acquire better post-harvest handling facilities through subsidized rates.	Storage supplies/fixtures Post-harvest handling supplies
1.3.5 Linking farmers to markets		Consultant Transport allowances

1.3.6 Supporting farmer cooperatives get better markets for the farmer produce	<p>This activity will be aimed at increasing farmer market access by linking them with traders, processors, agri-food companies and large retailers. This will aim at creating a long-term business relationship rather than the current ad hoc marketing linkages.</p> <p>Cooperatives can play a major role in linking farmers to markets as they can act as centers for bulking and aggregations. Under this activity farmer cooperatives will be supported to ensure that their bulking facilities and procedure are state of the art and they can attract large market segment. In addition, these cooperatives will act as a pivotal point to implement some sustainability mechanisms that would help its member access international markets. Such standards will include the Global GAP, which is an internationally recognized set of farm standards dedicated to Good Agricultural Practices (GAP), among others.</p>	<p>Consultant</p> <p>Transport allowances</p> <p>Construction supplies</p> <p>Training venues</p> <p>Training materials</p>
2.1.1 Training of farmers through farmer field schools	<p>This activity will include experience sharing by farmers who have implemented SLM successfully through field visits to farmers and leaping the benefits, within the basin and regionally.</p>	<p>Consultant</p> <p>Workshop venue</p> <p>Transport allowance</p>
2.1.2 Training of lead farmers on soil and water conservation	<p>This activity will aim at building the capacity of lead farmers to understand the need to conserve soil and water and to adapt practices for the same within their farms. These lead farmers will act as the community lead expert on soil and water conservation and will be expected to pass on the knowledge to other community members.</p>	<p>Consultant</p> <p>Workshop venue</p> <p>Transport allowance</p>
2.1.3 Local benefits of SLM documented and shared widely	<p>This activity will include packaging the information generated in activity 2.2.1 below in appropriate formats that is palatable to local audiences, especially to local smallholder farmers. This will include production of best practice magazine and videos and sharing these resources widely within the two basins and even the region.</p>	<p>Consultant</p> <p>Workshop venue</p> <p>Transport allowance</p>
2.1.4 Generation of evidence at local level on the benefits of SLM	<p>This activity will aim at researching and sharing widely on the benefits (financial, food security, and risk reduction) accrued by local farmers who have implemented SLM practices within their farm in the two basins.</p>	<p>Consultant</p> <p>printing services</p> <p>Transport allowance</p>
2.2.1 Training of district level of agricultural		<p>Consultant</p>

extension officers	This activity will aim at updating the skills on soil and water conservation practices for the extension officers, through refresher courses. In addition, the extension officers will also be trained on stakeholder engagement to ensure they have the right skills to pass on the knowledge to farmers.	
3.1.1 Review of policies and regulations governing soil and water conservation	Burundi being a very hilly country requires ample policies and regulation on farming practices on steep slopes and other landscapes prone to erosion. As such, this activity will analyse the current state of policies on soil and water conservation and identify gaps within the policy or policy implementation.	Consultant
3.1.2 Stakeholder consultations	The outputs or recommendations from the policy review in activity 3.1.1 will be subject to stakeholder review and validation to ensure all interested parties voice their concerns or inputs and are considered in the final policy review.	Consultant workshop venue Transport allowance DSA
3.1.3 Drafting of draft policy and by-laws for soil and water conservation	After an in-depth policy analysis and stakeholder consultation, draft national policy on soil and water conservation will be developed and shared with policy makers for review and enactment. Draft regional by-laws will also be developed and shared with local administrative units for consideration in managing local agro-ecosystems.	Consultant workshop venue training materials Transport allowance DSA
3.1.4 Hold policy roundtables between policy makers, project team and researchers	After the policy analysis, the findings will be shared with policy makers through policy roundtables. During this meeting, potential policy reviews will be discussed and potentially how to enact and facilitate their implementations will be agreed upon.	

*Sometime referred as outcomes, please ensure consistency of terminology with annex 2b.

TIMETABLE AT PROJECT LEVEL

	YEAR 1				YEAR 2				YEAR 3				YEAR 4			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
OUTPUT 1. 1 INCREASED ADOPTION OF SUSTAINABLE SOIL AND WATER MANAGEMENT PRACTICES																
Activity 1.1.1 Generating localized evidence on the best suited agro-ecosystem management practices for the various micro-catchments within the basin																
Activity 1.1.2 Co-development, with both upstream and downstream smallholders, of landscape management plans that will be used to inform soil and water practices																
Activity 1.1.3 Support local farmers and communities to effectively implement the landscape management plans through financing prioritized activities																
OUTPUT 1.2 INCREASED ON-FARM RAIN WATER HARVESTING AT HOUSEHOLD LEVEL																
Activity 1.2.1 Supporting farmers acquire rainwater harvesting facilities at HH and landscape levels																
Activity 1.2.2 Building the capacity of local artisans to offer technical support to farmers in the manufacturing, installation and maintenance of these household systems and the capacity of farmers to construct and maintain them																
OUTPUT 1.3. INCREASED INCENTIVES FOR THE DEVELOPMENT OF "GREEN" MICRO, SMALL AND MEDIUM ENTERPRISES THAT SPUR WATER AND SOIL CONSERVATION ACTION																

Activity 1.3.1 Linking local innovators with “green business” incubation facilities within the region																
Activity 1.3.2 Supporting farmers improve on their post-harvest handling of produce from the PNSADR-IM value chains- maize, certified peanut seeds, certified soybean seeds, tomato, hybrid maize and fruit plants e.g. sun drying and improve storage																
OUTPUT 2.1 BUILDING CAPACITY OF ACTORS IN IMPROVED AGRO-ECOSYSTEM MANAGEMENT FOR ENHANCED SOIL AND WATER CONSERVATION																
Activity 2.1.1 Training extension officers and lead farmers in soil and water conservation practices																
Activity 2.1.2 Sensitization of lead farmers in peer to peer learning techniques																
OUTPUT 2.2 ESTABLISHMENT AND OPERATIONALIZATION OF FFS																
Activity 2.2.1 Recruiting farmers whose farm will serve as FFS																
Activity 2.2.2 Training farmers on the best soil and water conservation practices and supporting them to establish these structures within their farms																
OUTPUT 3.1 ENABLING POLICY AND LEGISLATIVE FRAMEWORK FOR SOIL AND WATER CONSERVATION ESTABLISHED																
Activity 3.1.1 Review of current policies and by-laws to identify gaps, generate evidence and make recommendations on how to improve them																
Activity 3.1.2 Hold stakeholder validation workshops and policy roundtables and promote participatory irrigation management transfer mechanisms, e.g. through the establishment of WUAs, for the selection of the most suitable strategy																
Reporting dates as per the FAA			IR*				MTR**								PCR**	FER**
							*								**	***

Project Staffing, Project Operationalization, Project Monitoring, Evaluation and Reporting	RECRUITMENT; LAUNCH WORKS HOP	MARKET STUDY			APR**				APR**				APR**			
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*IR=Inception Report

** APR=Annual Performance Report

*** MTR=Mid Term Report

**** PCR=Project Completion Report

***** FER=Final Evaluation Report

Please assure consistency with the project/programme level logical framework

Stakeholder Consultation Report

Climate proofing food production investments in Imbo and Moso
basins in Burundi

Prepared for:

A Project for Burundi to the Green Climate Fund (GCF)

by



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Executive Summary

The Government of Burundi is proposing a project to the Green Climate Fund titled “**Climate proofing food production investments in Imbo and Moso basins in Burundi**”. The Government, in partnership with International Fund for Agricultural Development have been implementing the food security and rural development project in two regions that are critical to food security and the economy of the country. The project has been implemented as per plan in both regions and in most cases surpassed expected results.

The primary goal of the stakeholder consultation process is to obtain insights on the climate change implications on the infrastructure and other investments in the two regions. A range of stakeholder perspectives were collected with the awareness of the projected increase in precipitation and longer dry seasons. There has been catastrophic flooding lately and increased frequency of occurrence of flooding; these came up often in the process. The stakeholder consultation process also provides an opportunity to continue to build on the positive stakeholder engagement that is a characteristic of the PNSADR-IM development project currently under delivery.

This report details stakeholders’ responses to the scoping team’s enquiries about the place of climate change in their ongoing activities supported by PNSADR-IM.

Key findings from a series of interviews, are outlined below.

Overall, stakeholders were:

- generally supportive of PNSADR-IM;
- aware that it had delivered beneficial outcomes and demonstrated evidence of its benefits;
- Generally aware that climate change was a threat to it as the activities and infrastructure developed under PNSADR-IM are often rendered ineffective particularly during the rainy seasons
- Irrigation infrastructure development was at 44% at mid-term and strongly in course for 100% completion
- The opening up of the production areas was at 60% at mid-term and projected to be achieved ahead of time.
- All planned activities for development of the rice sector were 68% complete at mid-term and already achieving rice self-sufficiency for Burundi
- Diversification of crops for nutrition was achieved to the level of 93% of planned activities with impressive uptake of

Key benefits of PNSADR-IM reported by stakeholders included:

- The nutritional situation has improved in the PNSADR-IM area. The prevalence of underweight is 22.6% compared to 26.9% (data from the baseline study), i.e. a decrease of 4.3% for this index. The proportion of women aged 15-49 and children under 18 who are food insecure has decreased significantly from 78.9% to 18.2% and 77.9% to 18.8% respectively
- Seven (7) Marsh User Associations (MUAs) already operational and comprising 22,093 members, including 5,207 women out of a total of 11,000 households expected (200%);
- 5,983 ha of watersheds have been protected
- 7,533 temporary jobs out of 4000 planned jobs (188%) have been created in watershed protection works, runway excavation, construction of sheds and milk collection centres, including 2972 jobs for women (39.45%) and 4271 jobs for young people (57%). 130 permanent jobs have been created in rice, crop and dairy cooperatives and community animal health workers;
- 210 km of the rehabilitated or created trails have made it possible for goods and people to move, and in particular for production to flow from the marsh to the conservation and marketing areas. The assessment of the effects of PNSADR-IM shows that transport costs and delays have been reduced;

- The application of the SRI through 154 rice CEPs, the training of farmers and supervisors on the intensive rice farming system (SRI) has increased rice yields by 40% in the Imbo region (from 3.8 tonnes to 5.3 tonnes/ha) and by 60% in the Moso region (from 2.3 to 3.8 t/ha);
- Access to rice storage through the establishment of storage warehouses has made it possible to store 1,801 tonnes of rice in the form of warrantage and improved access to financial services with credits estimated at 209,285 BIF/member following the facilitation of the programme, without any injection of own funds; 70% say they have improved food security through increased production, 90% say they have reduced the hunger gap, and 68% say they have improved food security for children under 5 years of age.
- The establishment of 7 dairy cooperatives has also made it possible to strengthen rural social capital through the development of organizational, administrative and financial management capacities.
 - 37.9% of cooperative members report having increased incomes;
 - 40% report having improved their agricultural production;
 - the % of people reporting the existence of a lean season has increased from 41.14% to 0%;
 - 87.2% report having improved food security for children under 5 years of age.
- Vegetable gardens have had a substantial impact on improving the nutritional situation of beneficiary households and schoolchildren. School completion rates have increased while dropout rates have decreased in schools that received the vegetable gardens supervised by PNSADR-IM.

These results are however threatened by climate change as the investments in the rice growing zones in the two regions get damaged or rendered ineffective following extreme weather events especially heavy rains. There are also major threats to small farms in households on the catchment areas upstream. This report outlines these threats/risks and experiences according to stakeholders and key informants. It forms the basis and justification of activities and interventions suggested as climate action to enhance adaptation to climate change.

Introduction

This report is structured as follows:

Part 1: Direct consultation with stakeholders - Qualitative Study

This part describes the approach and key findings from a series of interviews (key informants and beneficiaries), farmer groups and meetings that were carried out directly with stakeholders. These activities were conducted in accordance with the Environmental and Social Policy that applies to all activities financed by the Green Climate Fund (GCF). The exercise was particularly in respect of and conformity with the environmental and social management system for GCF and the environmental and social safeguards, Environmental and Social Policy, Gender Policy and Indigenous Peoples Policy of GCF.

Part 2: PNSADR-IM Implementation surveys - Quantitative research

This part describes the approach and key findings from observations made during the implementation of the public sector PNSADR-IM project co-financed and managed by IFAD. The surveys were done in both households and community groups who are beneficiaries of the project. They formed part of the Mid-term Review of the project carried out in late 2018 and the ongoing project monitoring and evaluation practices as expected in IFAD's project performance evaluation guidelines. These exercises include climate change adaptation experts to assess climate rationale and other climate related issues with respect to project implementation and impacts.

Part 3: Summary of findings from the stakeholder consultation process for input to the review's integrated analysis

This part provides a summary of key findings from the stakeholder consultation process overall. This stakeholder consultation report is one of the inputs to the GCF Funding Proposal development process. The findings are analysed in conjunction with other research conducted as part of the process as well as ongoing GCF engagement processes in Burundi. It also takes into consideration information availed by the official climate action and planning documents of Burundi. It ensures the voices of communities and individuals are integrated into project design and suggested implementation to keep it in line with internationally recognised safeguard policies, norms and practices.

Part 1: Direct Consultations with Stakeholders- Qualitative Research

This part of the report outlines the approach and results from a series of interviews, visits and desktop studies that were undertaken directly with stakeholders in accordance with the environmental and social management system for GCF and the environmental and social safeguards, Environmental and Social Policy, Gender Policy and Indigenous Peoples Policy of GCF. The interviews covered key informants in Burundi including FAO, World Bank, UNDP and the Government of Burundi (national and regional). They also covered direct beneficiaries in the PNSADR-IM target areas as well as targeted beneficiaries for the GCF project. The desktop reviews included reports on the design, implementation and evaluation of PNSADR-IM.

1.1: Methodology

The direct consultation through interviews offered an opportunity to explore a wide range of stakeholder perspectives. It does not provide definitive answers - rather, it aims to obtain the breadth of stakeholder input to the questions. It is worth noting that many stakeholders have a limited understanding of the climate change subject and their inputs/views may reflect this. For that reason, the stakeholder perspectives outlined in this report are considered as an input to the integrated analysis that will provide conclusions and recommendations. Footnotes or other

commentary are provided where reported stakeholder views have already been addressed in the PNSADR-IM documentation to-date.

1.2: Approach

There are 4 phases to the direct stakeholder consultation.

1. Mapping to identify the relevant stakeholders to consult with;
2. Matching the stakeholders with the most relevant consultation methods;
3. Conducting the actual consultation activities;
4. Analysing stakeholder input.

1.2.1: Stakeholder mapping

The consulting team worked closely with the PNSADR-IM team to identify the range of stakeholders that should be consulted for the design of the GCF project. Three broad stakeholder categories were identified:

1. **PNSADR-IM participants and beneficiaries involved in crop production:** People and groups with direct involvement in PNSADR-IM, such as rice growers, vegetable farmers, rice millers, farmer groups, youth groups, road maintenance brigades and other cross-cutting beneficiaries. PNSADR-IM beneficiaries provide input on the detailed aspects of the project from a practical, operational perspective. With regard to households involved in cultivation in the irrigation schemes targeted by PNSADR-IM, we note that the project has previously collected data in a stakeholder consultative way -directly consulting with a complete sample of the smallholder farmers within the irrigated plains. The resulting data and sampled communities were engaged during this process for climate change awareness and climate-related experiences. The PNSADR-IM will be the anchor for a new IFAD programme named Agricultural Production Intensification and Vulnerability Reduction Project (PIPARV-B).
2. **Interested parties:** People and groups with an interest in influencing the GCF Project design, operation and outcomes but who are not directly involved e.g. Government personnel without direct involvement in the PNSADR-IM and associated operations and UN Agencies. They also include organisations whose work is of interest either in climate action or agricultural development in Burundi such as World Bank and private sector including financial institutions. These groups have specialist knowledge and/or represent groups that are directly involved in PNSADR-IM.
3. **Parties not currently involved with PNSADR-IM and/or climate change action in Burundi:** People and groups that do not have direct involvement or stake on NSADR-IM but have the potential to contribute to the success of the GCF/climate finance aspects. These parties may want to become involved in the in the future and could potentially provide a useful perspective on barriers to the GCF Project success. It should be noted that the general public that have not been involved in the IFAD project are not included in this group, as they are unlikely to provide insights.

1.2.2: Matching stakeholders to direct consultation methods

Two direct consultation methods, were used to involve stakeholders:

1. **Interviews:** These were all held as face-to-face interviews. Interviews provided an opportunity to obtain detailed, individualised perspectives from key stakeholders. The consultation team went to the stakeholders as part of scoping for the case of beneficiaries; and it met the others in various locations to carry out the interviews.

2. **Interest group interviews/interactions:** Were held for 1-2 hours and provided an opportunity to actively explore the activities and experiences in an interactive way with a small group of stakeholders. These included farmer groups in the direct beneficiary set of stakeholders as well as interested parties like pilot briquette-making groups, rice processors, Hill Management Committees among others.

Direct consultation method	Stakeholders involved
Interviews	<p>Multiple interviews conducted</p> <ul style="list-style-type: none"> • Government officials: Ministry of Agriculture, GCF National Designated Authority, 4 Provincial Governors and officials • Key informant interested parties: World Bank, FAO, UNDP • Farmer and other community groups: savings and credits societies, rice grower groups, • Individual farmers across all the target locations
Interest group interviews/interactions	<p>Various groups were interviewed on location:</p> <ul style="list-style-type: none"> • Pilot briquette making youth group in Cibitoke Province • Various rice processors in all provinces visited • COOPEC (bank) regional officials in Moso region • Tree nursery operator groups • Hill Management Committees

1.2.3: Conducting stakeholder consultation activities

Prior to all consultation activities, stakeholders were provided with a briefing on the intention and goal of the discussions. The briefing sought to make it clear that the information required is either on what improvements could be made on the ongoing project and what they think is directly caused by weather. The information sought included:

- Overview of the PNSADR-IM benefits after rehabilitation or construction;
- Outcomes from the PNSADR-IM installations or construction to date;
- Benefits of the completed or ongoing developments;
- Current challenges based on the expectations created at initiation.

The questions by the stakeholder consultation team were always initially open to allow general opinion as part of the impact analysis/verification; then geared towards climate change with a view to getting both their appreciation of climate change impacts and views of suggestions to address them. The consultations used language most relevant to stakeholders and to improve the flow of questioning within each of the activities.

The general questions shaping the discussions were:

- **Impacts:** What expected impacts has PNSADR-IM activities had on key stakeholders? What unexpected impacts have there been (positive or negative)? What has worked well and what could be improved?
- **Role in local economy:** To what extent do barriers to food security and cultivation in irrigation schemes remain? Is the PNSADR-IM the most appropriate way to address current barriers? How does the ongoing project complement other government and community initiatives that have similar goals?
- **Effectiveness:** To what extent have these activities been effective in delivering food security and improved livelihoods? What changes to the design and operations would make it more effective?

- **Floods and other such events:** have there been flooding incidences since rehabilitation took place? How often does this occur? How is the siltation situation? Is siltation a serious challenge and why?
- **Cost-effectiveness:** is it cheaper to farm in the irrigated farmlands? Could increase in productivity be achieved at lower cost?
- **Future actions:** What can be done about siltation and water access in the irrigated areas? Are there weather-related issues the project seems to have neglected?

Each consultation exercise was supported by a guideline tailored, where required, for different categories of stakeholders. These guidelines supported consistency across the consultation. For example, the interview guide outlined a standard introduction and the sequence in which questions would be asked.

1.2.4: Analysing stakeholder input to the review

To analyse stakeholder inputs, the interview notes were reviewed and summarised. Key points were then categorised in accordance with pre-identified or hypothesised climate challenges. These were then corroborated with or integrated into the challenges identified at scoping or evaluation missions before.

1.3: Key Findings

This section of the report presents stakeholder perspectives on each of the issues outlined in advance.

Overall, stakeholders were:

- Strongly supportive of the PNSADR-IM;
- Explicit that it had delivered beneficial outcomes;
- Well-aware that there were weather-related threats to its continued benefits including better income households.
- Aware that flooding was from challenges upstream in the catchments

1.3.1: Impacts of existing IFAD project

The guiding questions used to explore impacts were:

- What expected impacts have been realised?
- What unexpected impacts have there been (positive or negative)?
- Are there any threats already experienced?

Stakeholders described a wide range of expected benefits that IFAD project has contributed towards, in their opinions. The impacts that were referred by stakeholders typically reflected their interests.

Rice farmers: The project has facilitated and supported the creation and operationalisation of seven (7) Marsh User Associations (MUAs) comprising 22,093 members, including 5,207 women out of a total of 11,000 households expected; this is 200% of target.

There are 17 cooperatives involved in rice production as a result of the project. This captures over 17,000 households. With increased productivity of 6-7 t/ha up from 2-3t/ha, these households have increased their incomes and hence, livelihoods.

Rehabilitated and protected irrigated farmlands: 5,983 ha of watersheds have been protected restoring them as cultivable irrigated farmlands. This not only increases land available for food production but also offers opportunity to many more smallholder farmers.

Improved road conditions for users: There has been rehabilitation and construction of rural access roads making transportation of people and goods (particularly farm produce) faster. The project has achieved rehabilitation and the creation of the current tracks to 158 km of slopes of 250 km planned (63.2%). It has established 40 road maintenance brigades for tracks out of 20 planned brigades (200%). The state of implementation of the key indicators is shown in the table below:

Indicator	Unit	target 2020	Directed at 9/30/2018	Achieved rate (%)
Study rehabilitation and creating performed tracks	km	250	187.835	75%
Km of tracks rehabilitated / created	km	250	158	63.2%
Maintenance Brigades tracks in place and operational	No.	20	40	200%

Part 2: PNSADR-IM Implementation surveys

2.1: Climate-related Challenges after Implementation as Observed by Project Team

There has been a myriad of discoveries about the impact of climate change by PNSADR-IM Project Management Team (PMU).



Burundi's roads remain largely unpaved and undeveloped. While climate considerations were made in the design of PNSADR-IM, there was serious underestimation for new roads due to the fact that these areas had no roads before and so to records and experience. Many stretched got badly damaged soon after construction after as little as one rainy season. Considerations for storm water drainage were made in the road designs but flash floods and storm

water in areas not usually affected arose.



Figure 1 : The provision for culverts to drain storm water runoff has been found to be inadequate in the slopes and PNSADR-IM has to extend these, making is more costly.

The climatic hazards that caused the destruction of the corn fields supported by PNSADR-IM, the vegetation plants installed on the contour lines and the multiplication of groundnuts. The stakeholders reported houses destroyed in the Moso region. The Government officials consulted in the region affected by these displacements by floods say the disasters leave them with the reconstruction of residences as well as feeding the displaced. Fatalities have also been reported.



The infrastructure developed ends up much more expensive to build and to maintain.

Similar observations have been made in the rehabilitated irrigation infrastructure in the two regions. The interviewed farmers note that the farmlands became cultivable after rehabilitation.

However, the farmers note that the benefits were short-lived as the rainy seasons are bringing with them silt and excessive water leading to floods in the cropland. This also fills the water channels in the irrigation schemes with sand and mud leading to stoppage of flow. Consequently, the farmers say, the costs of maintenance is pretty high as they have to unblock the channels and remove sand from the farms every season (twice a year).

Figure 2 Collage of heavily silted irrigated rice fields and channels in PNSADR-IM sites in Rutana, Moso Region.

2.2: Emergency Response Agencies

The Consulting Team consulted with the The International Organization for Migration (IOM) Burundi office and the Food and Agriculture Organisation (FAO) who validated the findings from Government and communities. They confirmed that some people are still living in camps after the last flooding season destroyed their homes and farms. The IOM keeps track of displacement statistics aggregated by cause. Natural disasters are kept separate. Of those flooding is the most notorious. The areas covered by this project were confirmed by IOM to be some of the most heavily impacted by floods with number of internally displaced persons (IDPs) being in the tens of thousands. Returning to their settlements gets delayed by the fear of recurring floods as earlier mentioned by the Governor of Rutana Region. Below is a summary of displacement by natural disasters.

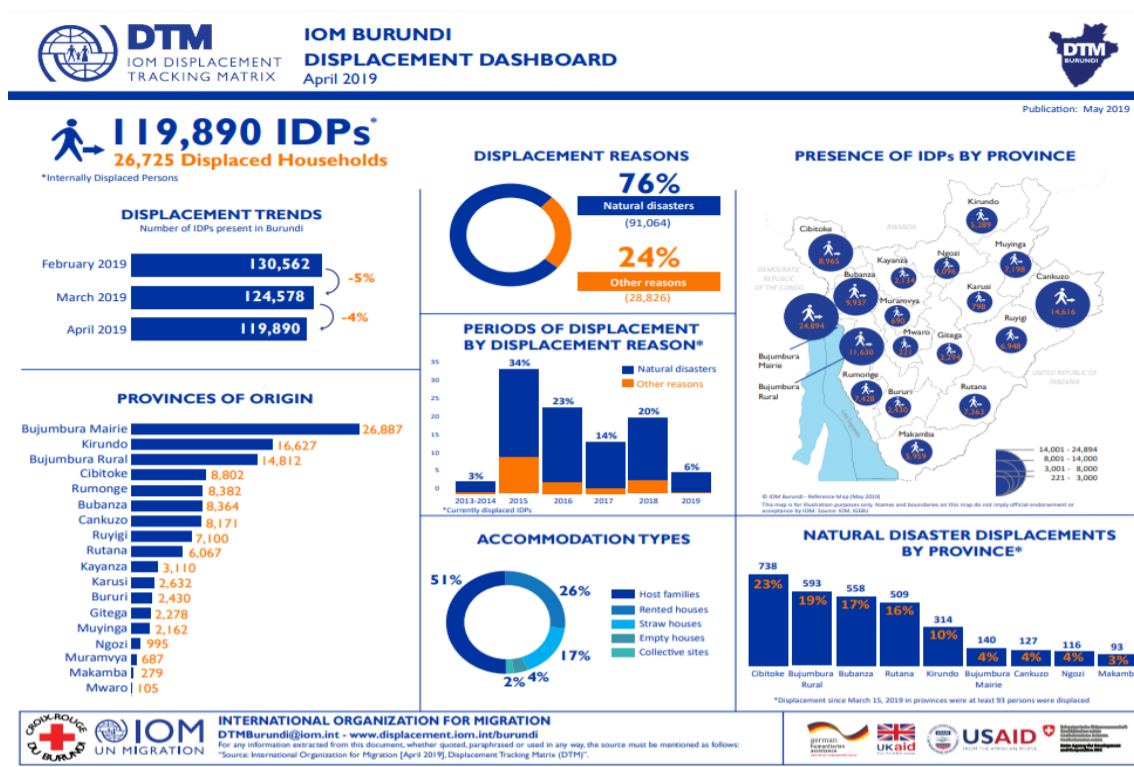


Figure 3: IOM's summary Displacement Tracking Matrix of Internally Displaced Persons caused by natural disasters

The FAO noted that the more favourable weather conditions, a 30-percent reduction in the number of IDPs, the decrease in food prices and the end of the malaria epidemic are some of the factors that in 2018 contributed to a slight improvement of the food security situation in Burundi. However, vulnerable families are still affected by the loss of productive assets, which continue to limit their food access. Furthermore, the outcome of the 2017/18 agricultural season remained below average, mainly due to climate events – hail, strong winds and floods – that have caused the loss of crops and livelihoods for more than 25 000 households, while maize fields are still affected by fall armyworm. The FAO further notes that the resilience of communities is undermined and the slightest shock has significant consequences.

3.The Stakeholders Engaged

3.1: The PNSADR-IM Project team

The PNSADR-IM Team has been running the project which ends in 2020 or 2021 thereby have had first-hand experiences in the field. The details are as described in Part 2 above.

3.2: Burundi Government Authorities

3.2.1: Governors

Cibitoke

The Governor of Cibitoke Region (province), Hon. Fidele MINANI and his officers, hosted the consulting team in the morning of October 12, 2019 [the sign-in sheet is attached in the annexes]. He and the officers in the agriculture and environment sectors discussed various challenges they have observed especially during their involvement in the execution of PNSADR-IM in their province. The concern of shortage of vegetation cover on the hilltops came up strongly. They observed that erosion is reaching crisis levels as rainfall intensity increases. "This leaves the

farms bare and even crops are being swept into the rivers. Much as a lot of this is caused by human activities of felling trees, the rainfall these days is like nothing we have ever seen”, says the Governor. The officials noted that the disappearance of trees on the hilltops (catchment) has been accelerated by high demand for firewood. The situation is so severe that there is no more trees to cut. The Governor is the one who supported the establishment of briquetting by CIRDI described above.

Ruyigi

The regional representative of the Governor of Ruyigi and the administration team hosted the consultation team on 13th October 2019. He observed that the Government is deeply concerned about flooding disasters in the province. It was noted that the flood waters originate from further away than the flood zones. This leaves the people affected not only helpless but also anxious as the floods could arrive anytime without any warning. They also noted that Kinyinya areas is continuously facing flooding leading to displacement, loss of property and in recent times, there has been fatalities. In Gatugu, the floods this year were historically violent and displaced hundreds of households and caused fatalities. The marshes in Rumpungwe river basin were said to have particularly high occurrence of soil erosion and hence siltation. The PNSADR-IM team confirmed that there was a study conducted on catchment protection in a bid to contain this problem.

Rutana

On October 14th, the consultation team met the Governor of Rutana and his officers. They observed that the Musasi River has become very destructive in recent years. Sections of Rutovu District which is outside the PNSADR-IM project area are some of the most affected. The Governor requested it be considered. An observation already obtained from PNSADR-IM team was that the floods are caused by rainwater collected in the hills in Bururi, a neighbouring province outside the PNSADR-IM area. The Governor expressed the concern that, focusing only on the currently project area will not eliminate the flooding in Gitanga and other communes. This places the Rutana Province in the way of risk that is beyond their control and roads are often cut-off. The conclusion was that there should be strong consideration to go beyond the current geographical coverage.

3.2.2: Ministry of Agriculture and Environment and GCF NDA

The consultation team was primarily hosted by the Ministry of Agriculture which is the custodian of PNSADR-IM. The team consulted with the Director General of Agriculture who is also the Focal Point of the National Designated Authority to the GCF. Consultations have been on various occasions over the past one year. The NDA has issued a letter of non-objection for this project in accordance with national procedures.

3.2.3: Imbo Rice Development Corporation (SIRDI)

A government institute that supports the rice-growing population, SRD Imbo takes care of the entire chain, from production to marketing of rice: supervision of rice growers, paddy collection, machining and marketing. It supports 17 cooperatives with 17,000 households.



Figure 4: Bridge/road destroyed by the same floods that destroyed 144 ha of paddy fields in Imbo near SIRD campus.

Irrigated rice cultivation is practiced in the plain of Imbo. This crop is managed by the Regional Development Corporation of Imbo (SRDI) on an area of over 5,000 ha. In the plain of IMBO where the IRDI frames more than 4,850 ha developed and irrigated including 4,000 ha of rice paddies. The average annual production is about 22,000 tons of paddy rice has risen from 5.5 tons / ha (or 14,300 tons) in 2014 to 6-7tons /ha (or 30,000 tons) in 2018.

The consulting team was hosted by SIRD team led by the Director General, Mr. Felix. They noted that IMBO faces lots of challenges that are climate instigated. They include roads broken by floods that frustrate transportation of inputs, produce and labour. The consulting team had come across such on the way to SIRD campus. “The most outstanding one in the history of Imbo was floods that destroyed 144 ha of irrigated cropland in the last season; the losses are huge for the affected families.” said the Director General. Discussions also included the possibility of including SRDI as a co-executing entity for the GCF project.

3.3: CIRDI Youth Group in Imbo (Cibitoke Province)

Led by and initiated by the Governor of Cibitoke in Imbo region, this youth group named CIRDI forms the basis of a biomass energy efficiency initiative that could drive down the destruction of vegetation cover on the slopes in the catchment. Touted as the only group or enterprise in Burundi to make biomass briquettes, it is a highly welcome initiative. The initiative is run by a youth group that has been supported by the provincial governor. They use rice husks and are experimenting with reeds and other readily available non-woody biomass materials. The youth buy the materials at a small fee from other youth engaged to collect rice husks (largely considered a waste by farmers who dispose it onto paddy fields for lack of another means to dispose it). These same youths also collect other materials and are paid for transporting it to the briquette processing location.

The youth say they were driven by the struggle they witnessed at homes of looking for firewood. “The hills are all bare now. There is nowhere to get firewood. When you plant a tree, it will require a lot of protection, otherwise it will become firewood for someone,” said the youth group leader Mr. Twagirayezu Arcade. The group now has a contract from the Prisons Department and the Military to supply all they can. These two departments are some of the largest consumers of wood for fuel. They currently mix the briquettes with wood as a way to reduce wood which also is a challenge to obtain for them. The group has a small capacity and would like to expand to meet their huge demand. “Everything we produce is taken. We Have an electric extruder and manual ones. The electric one is faster and easier to use but it has a cost. The manual one is hard but also

employs more youth,” says Ms Ndayikengurukiye Epide who is one of the three women in the group of 21 youth (attendance list of members present at the consultations on October 12, 2019 is attached in the annexes). They are able to pay their bills and earn a living from the business which is attracting attention from across the country.



The cost of setting up the operation remains a hinderance to many who consider it. Later in Moso, the consulting team shared this experience with various groups and authorities and the need for an alternative fuel for cooking. All agree that it is overdue to mainstream alternative biomass fuels and

briquettes are a viable option in the face of much biomass waste and diminishing woody biomass.

Part 3: Summary of findings from the stakeholder consultation process for input to GCF Project

This section of the report outlines the key findings against the hypotheses made by communities, government and PNSADR-IM project team and implementation partners. These findings are analysed in conjunction with other findings made by other players in the sector that include contractor and financial institutions lending to farmers in the target regions.

1. There is a need to protect the infrastructure (developed and/or under development) from flooding.
2. The cost of construction and maintenance of infrastructure is rising with climate-related events such as floods
3. The waters causing floods travel long-distances downhill and cause destruction in the lowlands/marshlands. The actions taken to address the issue must therefore have deliberate attention to the hills
4. Burundi's food security is heavily dependent on these two fertile regions of Imbo and Moso. The two are therefore high significance and high priority to the country's sustainable development.
5. This proposed project has unwavering and full support of the Government and other stakeholders.

Part 4: Stakeholder consultation during project implementation

This section outlines the process of stakeholder consultation that will be followed during project implementation through an engagement plan. The main stakeholders identified include the policy makers in the institutions and Government agencies, technical experts in the form of extension agents, Community Development Committees and their membership, Water User Associations and their membership and the smallholder farmers residing and cultivating in the Imbo and Moso basins. The community level stakeholders can be divided in women, men and youth as project level beneficiaries.

Stakeholders will be engaged at different levels and timings based on their groupings. Following the consultations held during design, further engagement will initially be through launching workshops and town-hall type meetings in the project locations. The beneficiaries will be engaged through sensitization sessions on the project activities including expectations of their participation and steps of how they can register their interest to participate. The sensitization

will be followed by community mobilization including the geographical and direct targeting of the beneficiaries.

The targeting approach will be based on two main criteria – land tenure (owner or tenants) and possession of agricultural assets such as livestock. The process will be conducted as follows: (i) update of the existing baseline situation of the project area (ii) organization of participatory general assemblies to define the typologies of households by assets (land and animals); (iii) update of a survey on hills and marshlands (iv) inception meetings with the provincial and communal administration and communal community development committees (CCDCs) to validate in a participatory manner the hills that will be targeted by the project, (v) visits to potential beneficiary households, (vi) validation of the lists by the CCDCs and the technical services and administration, (vii) validation of the lists of beneficiaries by the committees in general assembly.

Subsequent engagement will involve the training and capacity building sessions such as the Farmer Field Schools, the annual planning and progress review meetings at the central level and quarterly sessions at the local levels. The review process at the local level will enable participatory monitoring of the project activities through the CCDCs, Water User Associations and farmer groups.

- GCF Results**
1. Increased resilience of most vulnerable people and communities
 2. Increased resilience of health and well-being, and food and water security
 3. Increased resilience of infrastructure and the built environment to climate change

Paradigm Shift – The Goal: Increased resilience to climate change of the livelihoods and food and water security of communities in selected watersheds and basins

Project Objective: Farmers' resilience to climate change built in the upper, middle and lower catchment and agricultural productivity and food security increased through adoption of better agro-ecosystem management practices to conserve land and water resources

Outcome 1: Improvement of soil and water management through the adoption of best practices in agro-ecosystem management by land users

Output 1.1: Increased adoption of sustainable soil and water management practices

- Generating localized evidence on best-suited agro-ecosystem management practices for the various micro-catchments
- Co-development, with both upstream & downstream smallholders, of landscape management plans to inform soil & water practices
- Support farmers & communities to implement landscape management plans through financing prioritized activities

Output 1.2: Increased rainwater harvesting on-farm and HH level

- Supporting farmers acquire rainwater harvesting facilities for water conservation at the HH and landscape levels
- Building the capacity of local artisans to offer technical support in the installation and maintenance of these systems and the capacity of farmers to construct and maintain them

Output 1.3: Increased incentives for development of "green" SME to spur water and soil conservation

- Linking local innovators with "green business" incubation facilities within the region to reward sustainable innovations, train farmers on business skill development and access to finance
- Supporting farmers in improving on post-harvest handling of produce from the PNSADR-IM value chains, e.g. sun drying and improving storage, thus enhancing overall productivity and incentivizing alternative businesses

Outcome 2: Capacity building of actors at all levels on best agro-ecosystem management practices for enhanced soil and water conservation

Output 2.1: Building capacity of actors in improved agro-ecosystem management

- Training technical service providers, i.e. extension officers and lead farmers, on the best soil and water conservation practices to facilitate the use of peer-to-peer learning models through the FFS approach.
- Sensitization of lead farmers in peer-to-peer learning approaches (FFS)

Output 2.2: Establishment & operationalization of FFS

- Recruiting farmers whose farm will serve as FFS
- Training farmers on the best soil and water conservation practices and supporting them establish these structures within their farms

Outcome 3: Development of an enabling environment for water and soil conservation

Output 3.1: Enabling policy and legislative framework for soil and water conservation established

- Reviewing of current policies and by-laws to identify gaps, generate evidence and make recommendations on how to improve them.
- Holding stakeholder validation workshops and policy roundtables and promoting participatory irrigation management transfer mechanisms, e.g. through the establishment of WUAs

Social barriers

1a. Limited awareness of alternative more sustainable practices

1b. Cultural norms

Financial barriers

2a. Limited financial base to invest in these practices

2b. Limited financial literacy and access to financial services

Regulatory barriers

3a. Insufficient regulatory framework

3b. Limited incentives for soil and water

Institutional barriers

4a. Limited institutional capacity to provide necessary technical and material support to farmers

4b. Limited site-specific R&D

Risk 1: Smallholder farmers may shift to or continue practising the current unsustainable farming practices post-project

Risk 2: Hilly slopes being open for livestock grazing and the risk of bush fires

Risk 3: Cultural practices related to slash-and-burn is a risk for the planned tree-planting near farmlands

Risk 4: Overcrowding the newly rehabilitated irrigation zones owing to the limitation of appropriate farmlands might lead to social conflicts

Risk 5 & 6: Flooding & siltation of the irrigation infrastructure during the project period may reduce the impact of the project

Assumptions

The infrastructure developed will be used to support food production

Farmers will adopt rainwater harvesting facilities

The catchments in which the investments are made are all reached by this GCF project

Farmers will apply the acquired knowledge for SLM

Farmers will adopt SLM practices

Extension officers will mainstream SLM practices in their trainings

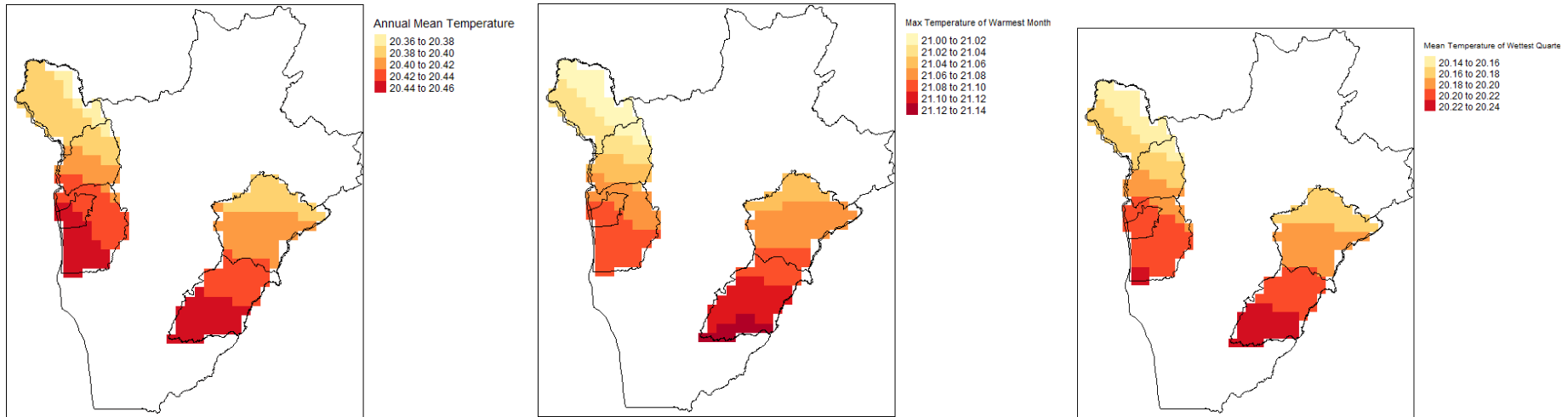
Local institutions and partners will mainstream SLM into their programmes

Sufficient growth of vegetation and maintenance of structures

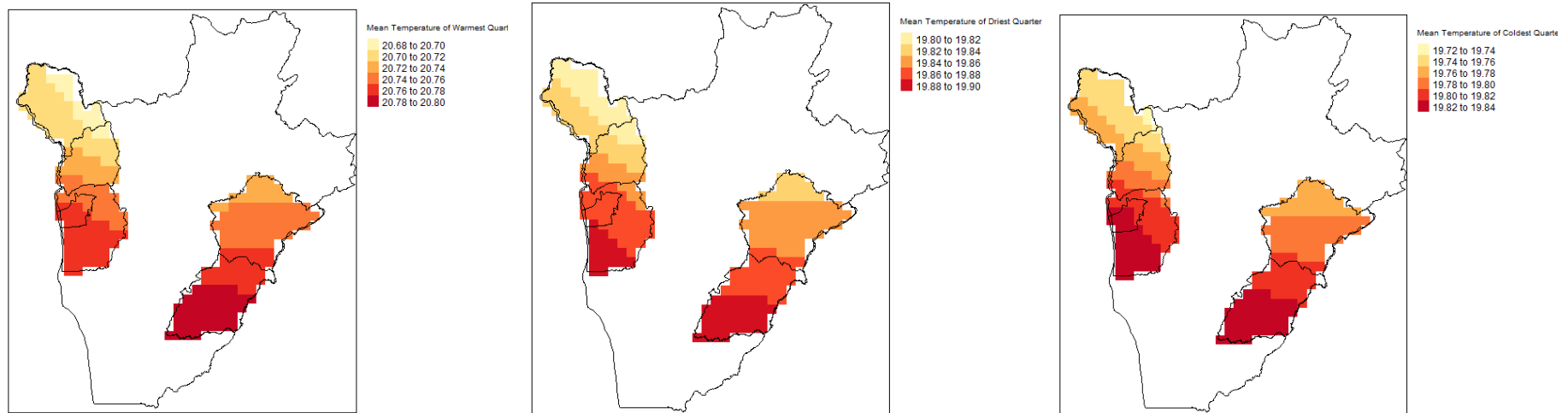
The communities and local leadership will address land degradation in the two beneficiary basins

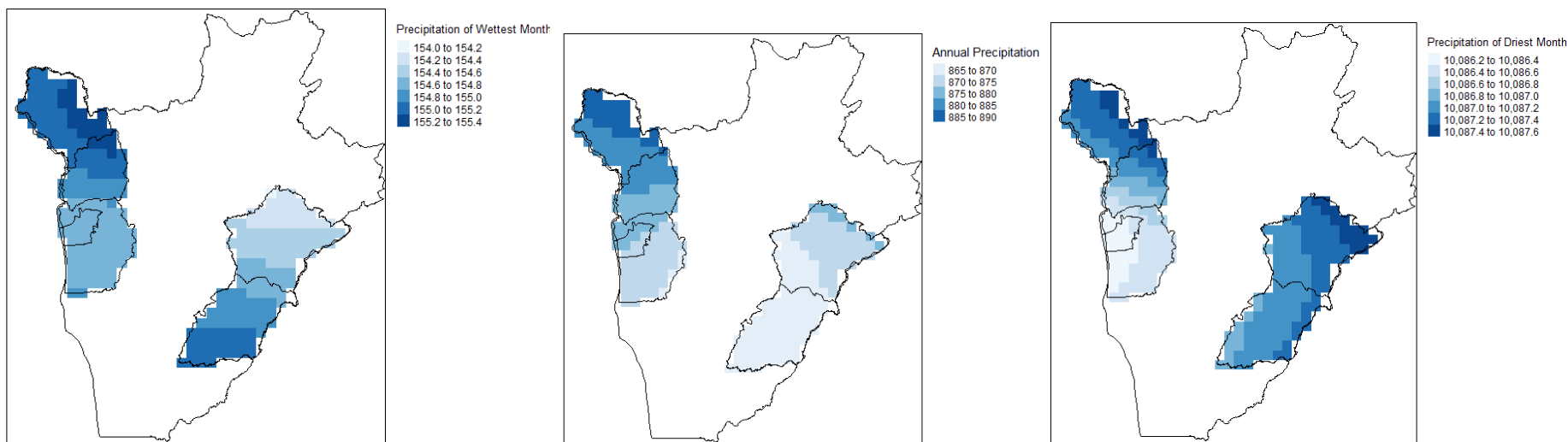
CLIMATE GRAPHS

Observational Data – Meteorological stations

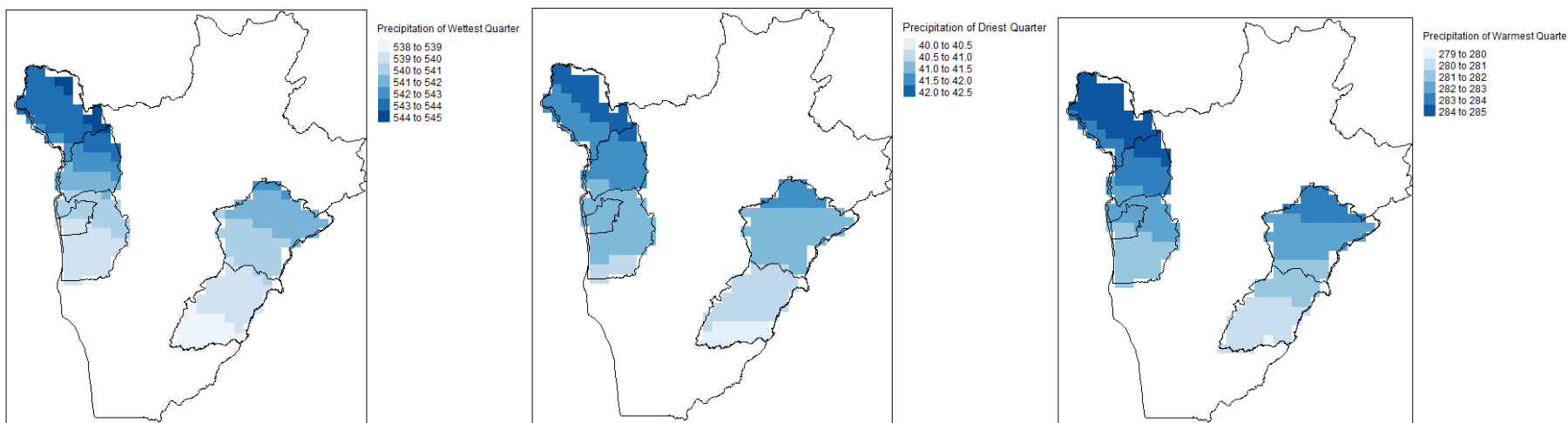


The observed temperature averages in the two basins are illustrated above and below with slightly higher values in the southern parts of both basins.



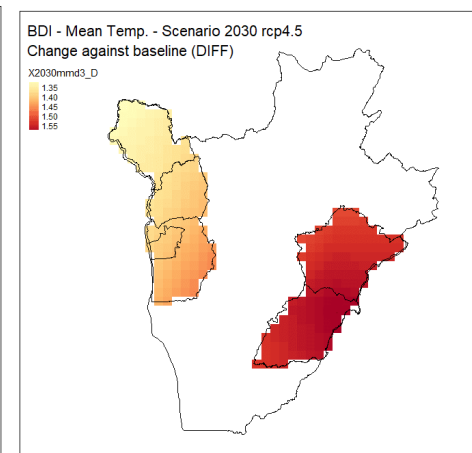
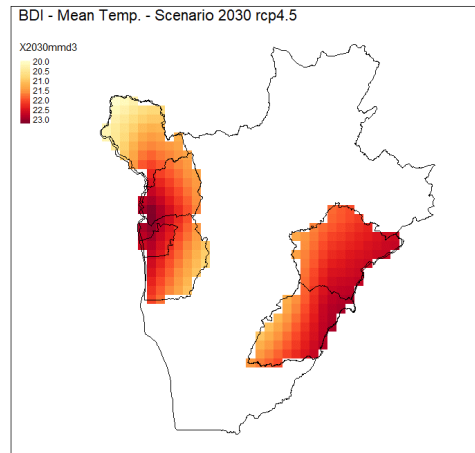
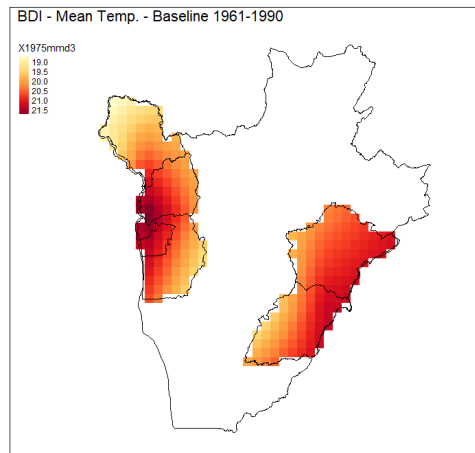


Observed precipitation averages are illustrated in the preceding and subsequent figures for both Imbo and Moso basins.



Source: Climate Information Platform for Copernicus

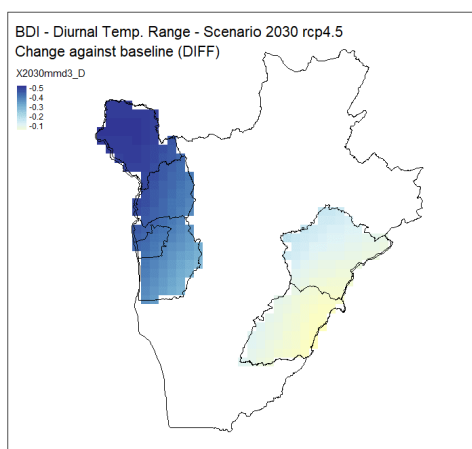
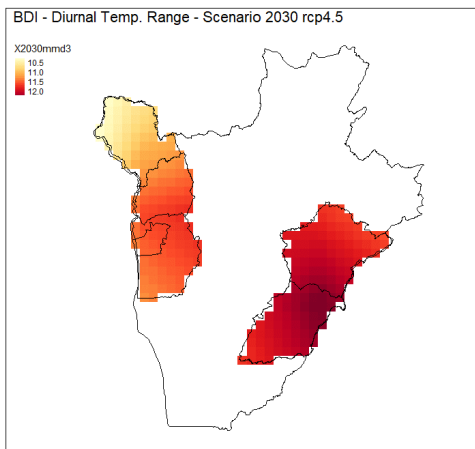
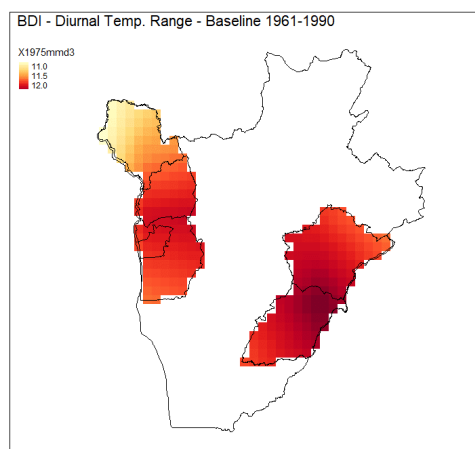
Mean Annual Temperature



Annual Mean Temperature (°C) depicts an increase for both the Imbo and Moso basins under the RCP 4.5. The higher temperature increases are expected in the Moso basin.

Productive Landscape Relevance: Increases in annual mean temperature will impact the productivity of crops in the area such as the maize crop and legumes. Ecosystems status will also be impacted.

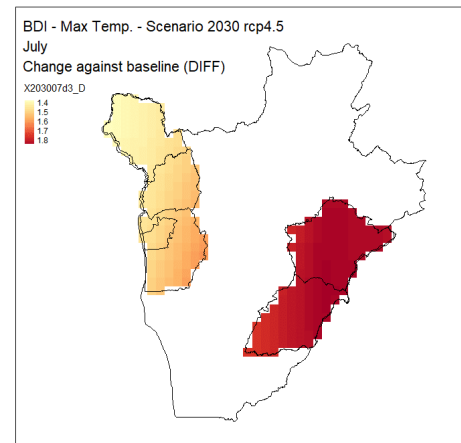
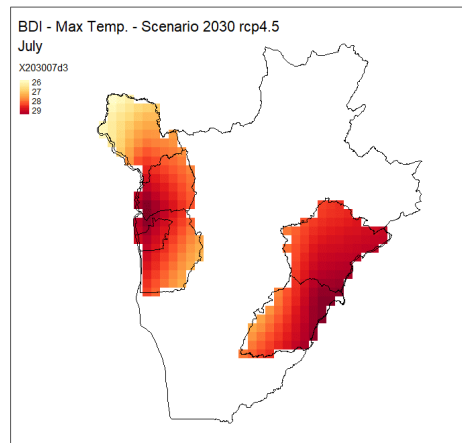
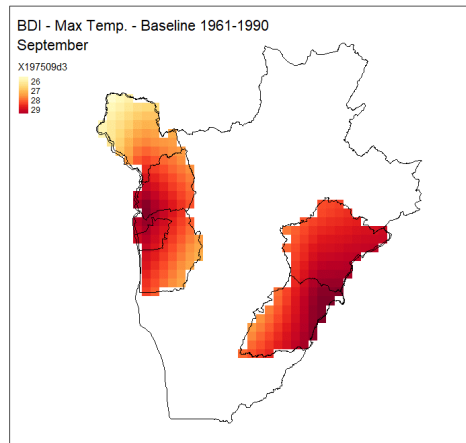
Mean Diurnal Range



Mean Diurnal Range (° C) depicts a slight decrease of the range in both basins, with the higher change in Imbo basin.

Productive Landscape Relevance the diurnal range indicates the relevance of temperature fluctuation for different species in the productive landscape.

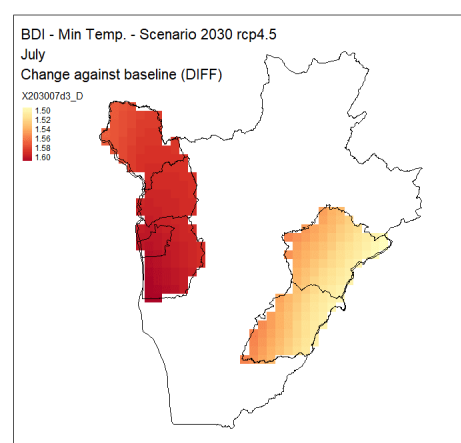
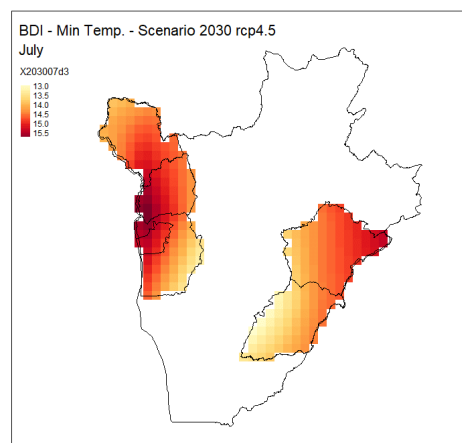
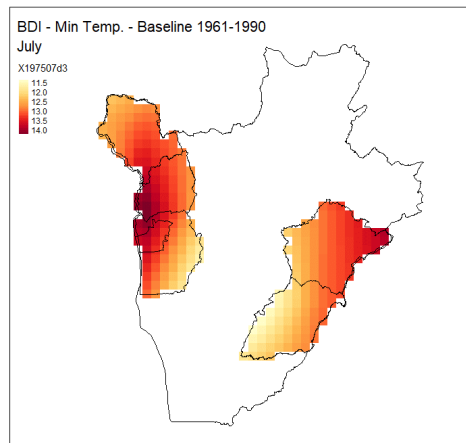
Maximum Temperature of Warmest Month



Max Temperature of Warmest Month (° C) depicts an increase in for the two basins with higher increase in Moso.

Productive Landscape Relevance
Temperature increases may lead to increased evapotranspiration and soil moisture loss and thus adverse impacts on the ecosystems, crop yields and water balance.

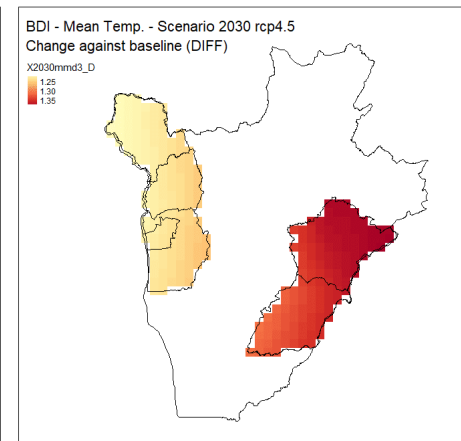
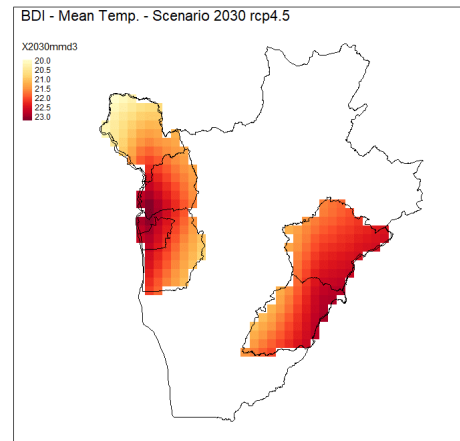
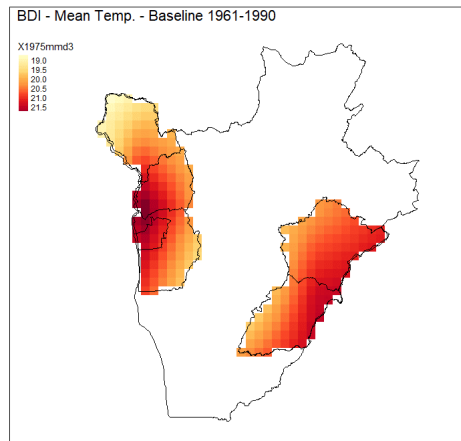
Minimum Temperature of Coldest Month



Minimum Temperature of Coldest Month depicts an increase in both basins with higher temperature increases expected in the Imbo basin.

Productive Landscape Relevance:
Increases minimum temperature may impact the productivity of specific crops in the area such as the maize.

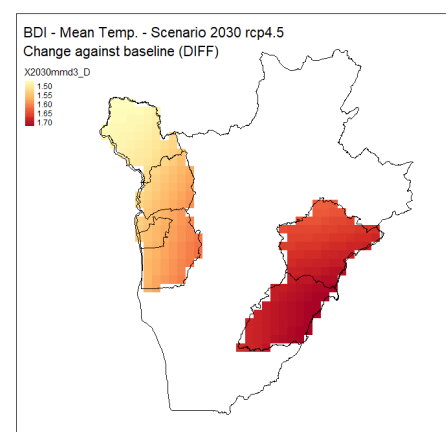
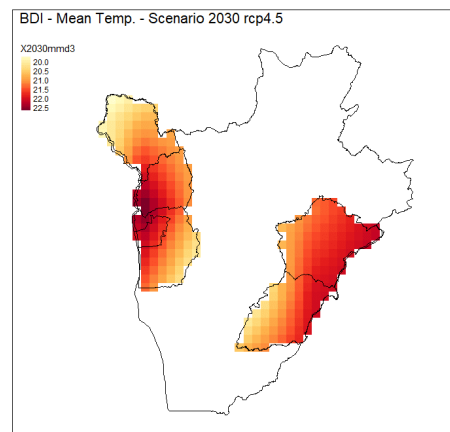
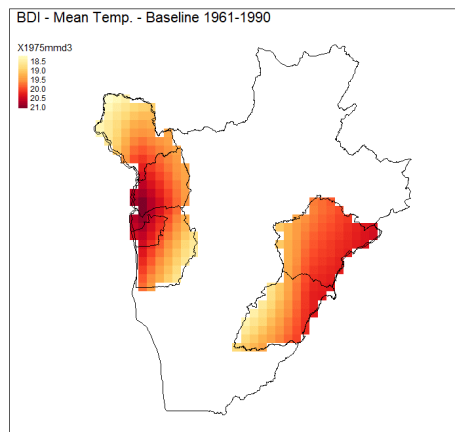
Mean Temperature of Wettest Quarter



Mean Temperature of Wettest Quarter depicts an increase for both the basins under the RCP 4.5. The higher temperature increases are expected in the Moso basin.

Productive Landscape Relevance: Increases in the wettest quarter mean temperature will impact the soil moisture content and thus the productivity of cultivated crops.

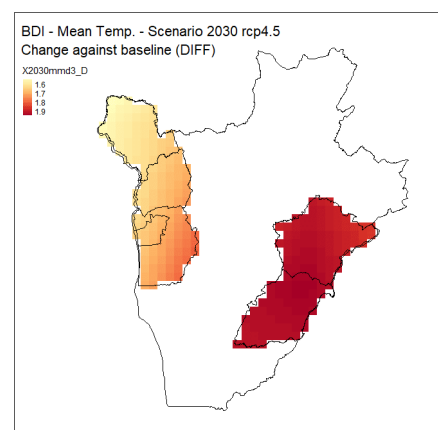
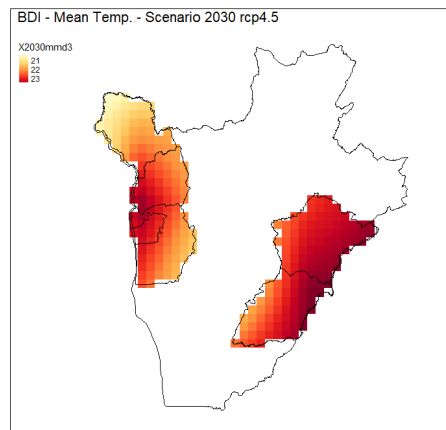
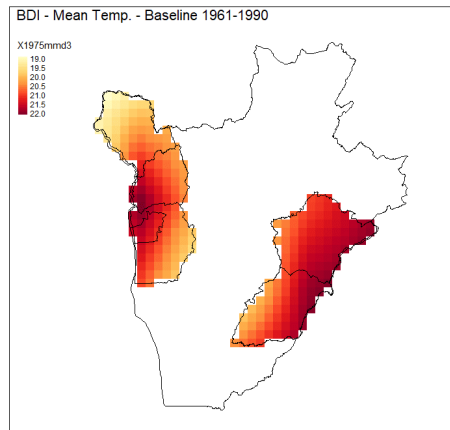
Mean Temperature of Driest Month



Mean Temperature of Driest Month depicts an increase for both basins with higher temperature increases expected in the Moso basin.

Productive Landscape Relevance: Increases in the driest quarter mean temperature will impact soil moisture content and adversely affect crop productivity.

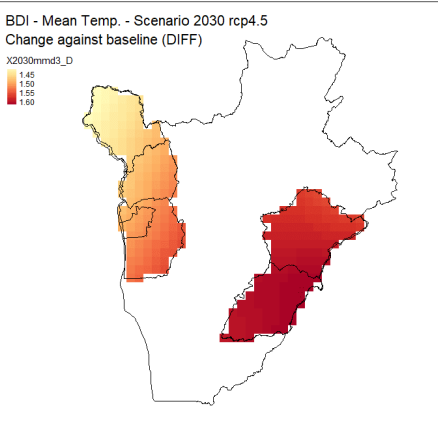
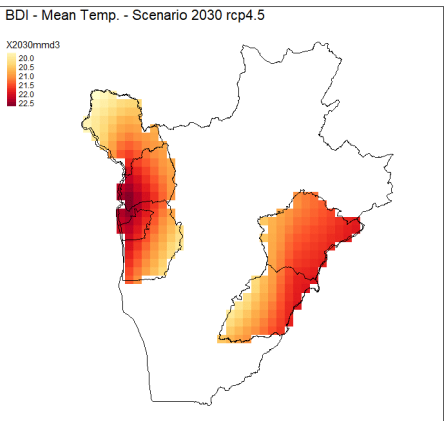
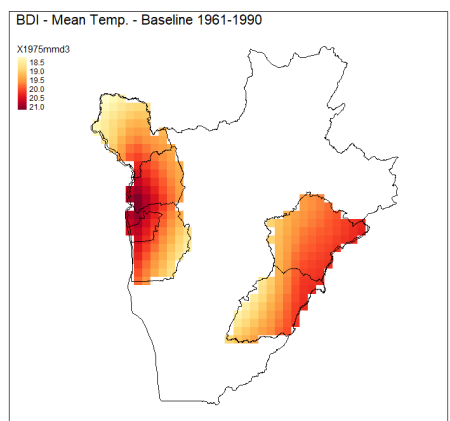
Mean Temperature of Warmest Quarter



Mean Temperature of Warmest Quarter depicts an increase in both basins with higher temperature increases expected in the Moso basin.

Productive Landscape Relevance:
Increases in mean temperature will impact the productivity of crops in the two basins.

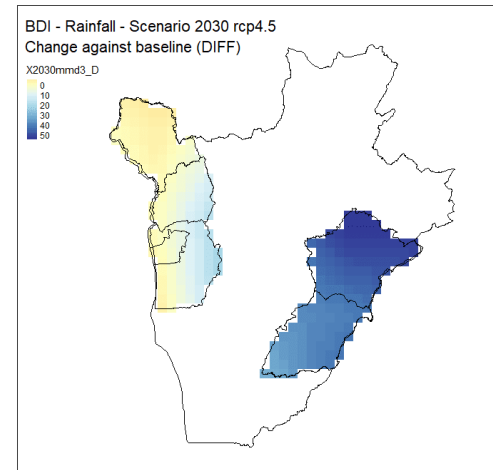
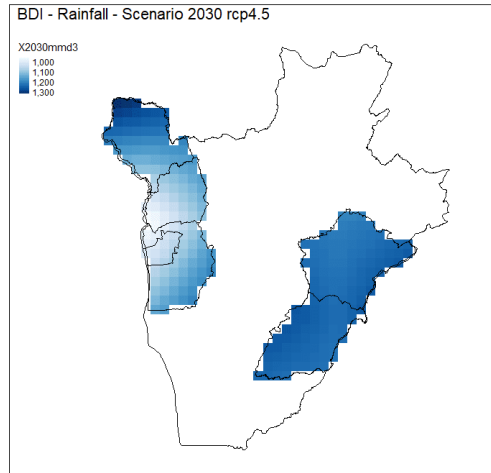
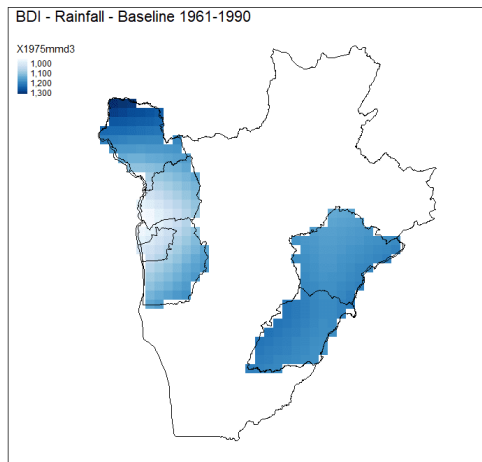
Mean Temperature of Coldest Quarter



Mean Temperature of Coldest Quarter depicts an increase in both basins with higher temperature increases expected in the Moso basin.

Productive Landscape Relevance:
Increases in mean temperature will soil moisture content and productivity of the agricultural landscape.

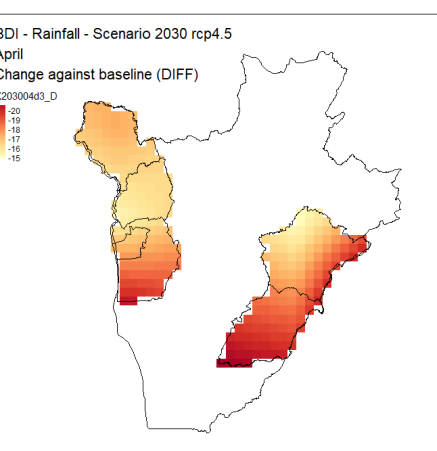
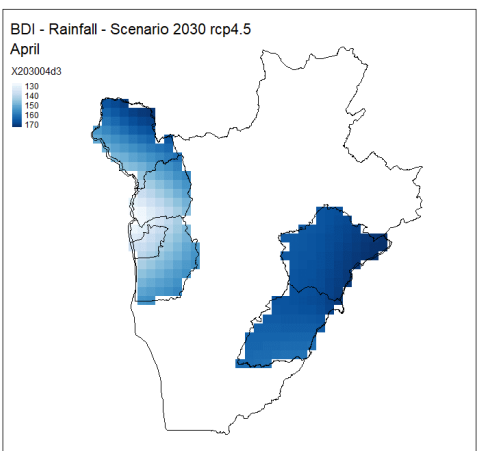
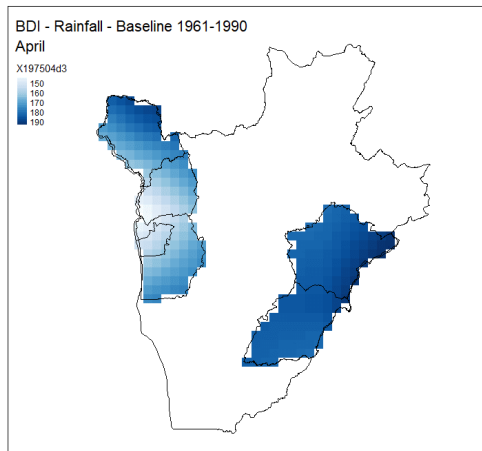
Annual Precipitation



Annual Precipitation depicts an increase in south east part of the Imbo basin and all of the Moso basin under the RCP 4.5. The higher precipitation increases are expected in the northern part of the Moso basin.

Productive Landscape Relevance: Increases in annual precipitation may result in increased rainfall intensity that will increase rates of soil erosion and thus adversely impact crop productivity.

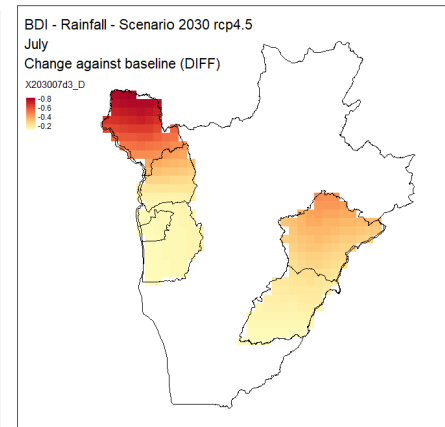
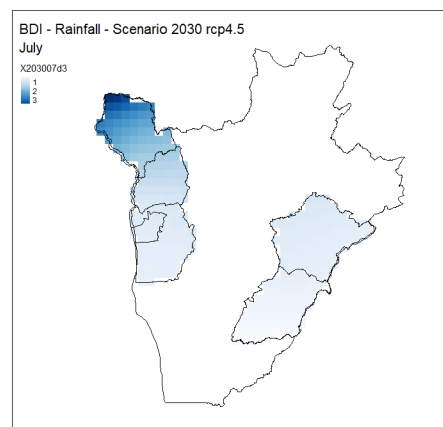
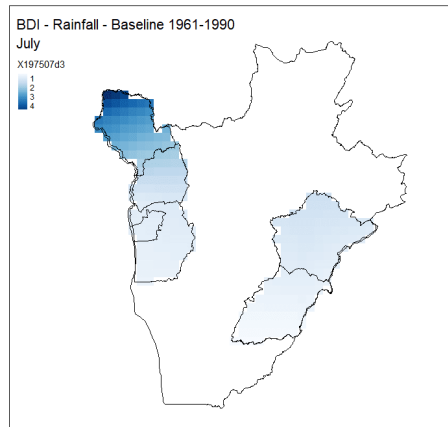
Precipitation in the Wettest Month



Precipitation in Wettest Month depicts a decrease for both the Imbo and Moso basins with the highest decreases anticipated in the south for Imbo and southern and eastern Moso.

Productive Landscape Relevance: The decrease in precipitation will result in reduced water balance in the agricultural landscape.

Precipitation in the driest month



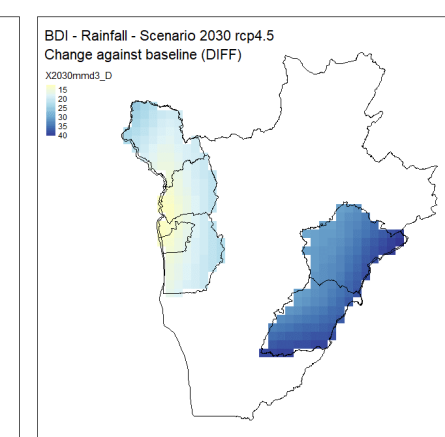
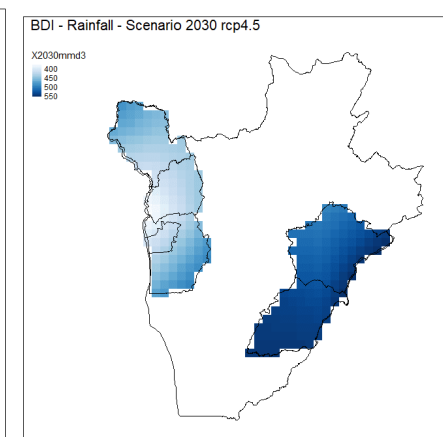
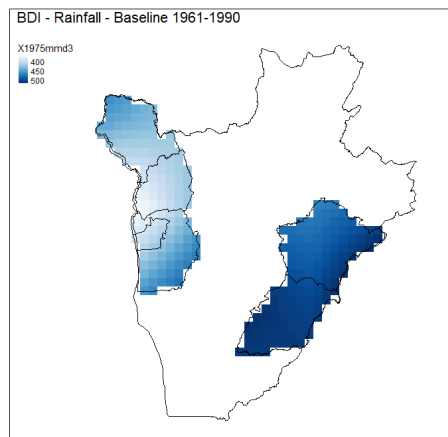
Precipitation in the driest month

depicts a slight decrease for both the Imbo and Moso basins with changes slightly more pronounced in the northern Imbo basin.

Productive Landscape Relevance:

Decreases in the precipitation over the driest month will impact the soil moisture content and thus productivity of the agricultural landscape.

Precipitation in the wettest Quarter



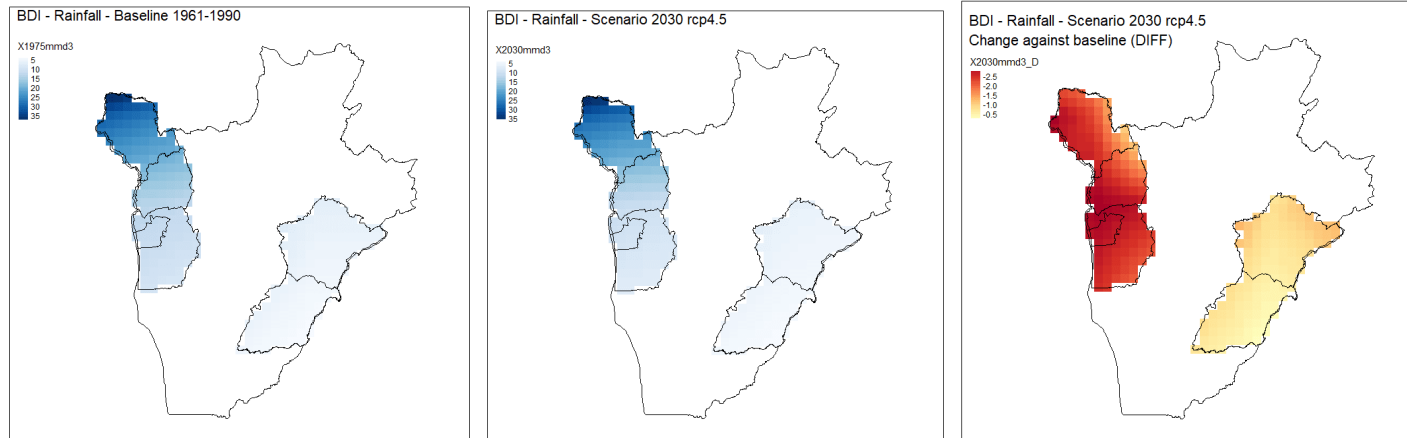
Precipitation in the wettest Quarter

depicts an increase for most of the Imbo basin and all of the Moso basin. The increased precipitation will be more pronounced in the south eastern Moso basin.

Productive Landscape Relevance:

Increased precipitation may result in increased rainfall intensity that will increase rates of soil erosion and thus adversely impact crop productivity.

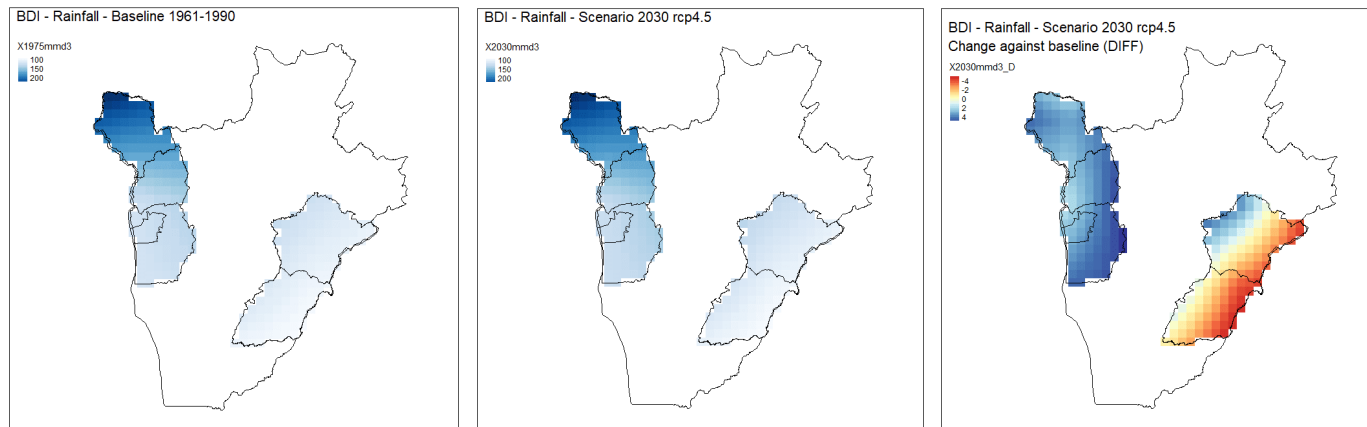
Precipitation in the driest Quarter



Precipitation in the driest Quarter depicts a decrease in the both basins with the changes in the Imbo basin being more pronounced.

Productive Landscape Relevance: decreases in precipitation will lead to reduced soil moisture levels and increased stress on the agricultural landscape.

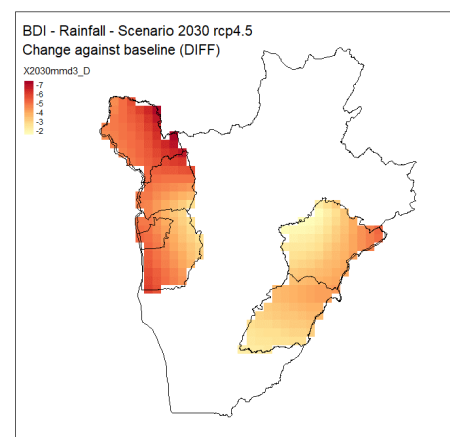
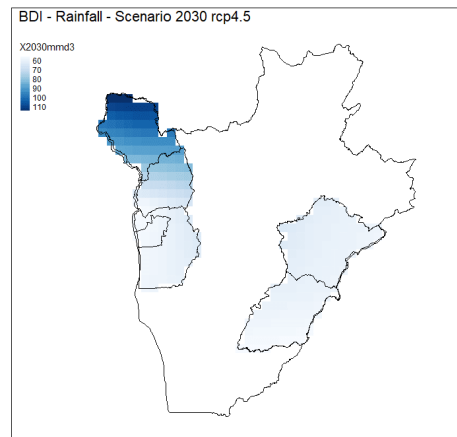
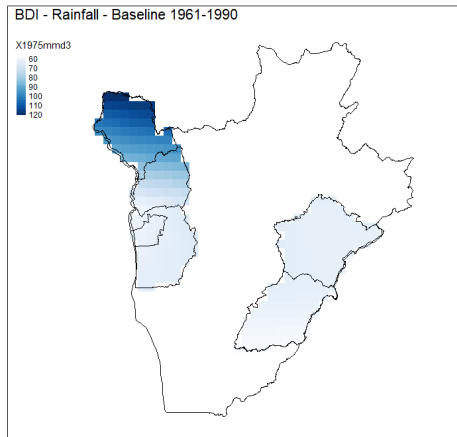
Precipitation in the warmest quarter



Precipitation in the warmest quarter depicts an increase in the Imbo basin and a mixed indication in the Moso basin. The eastern part of the basin is expected to have decreased precipitation.

Productive Landscape Relevance: Levels of precipitation have an impact on the agricultural productivity of the staple banana crop, maize and legumes.

Precipitation in the coldest quarter



Precipitation in the coldest quarter depicts a decrease in both the Imbo and Moso basins with changes being more pronounced in the former.

Productive Landscape Relevance: decreases in precipitation will lead to reduced soil moisture levels and increased stress on the agricultural landscape.

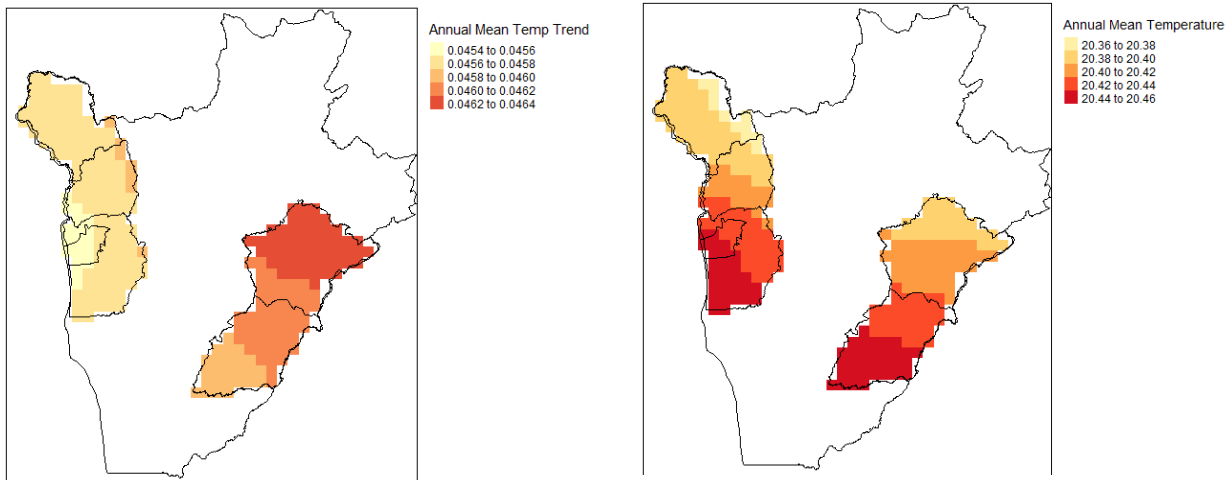
Observational data - Trends analysis of selected climate parameters

The trends analysis presented below is of observational data sets obtained from the nearest meteorological stations to the Imbo and Moso basins that have recorded monthly temperature and precipitation parameters consistently over the last 30 years (1989-2019).

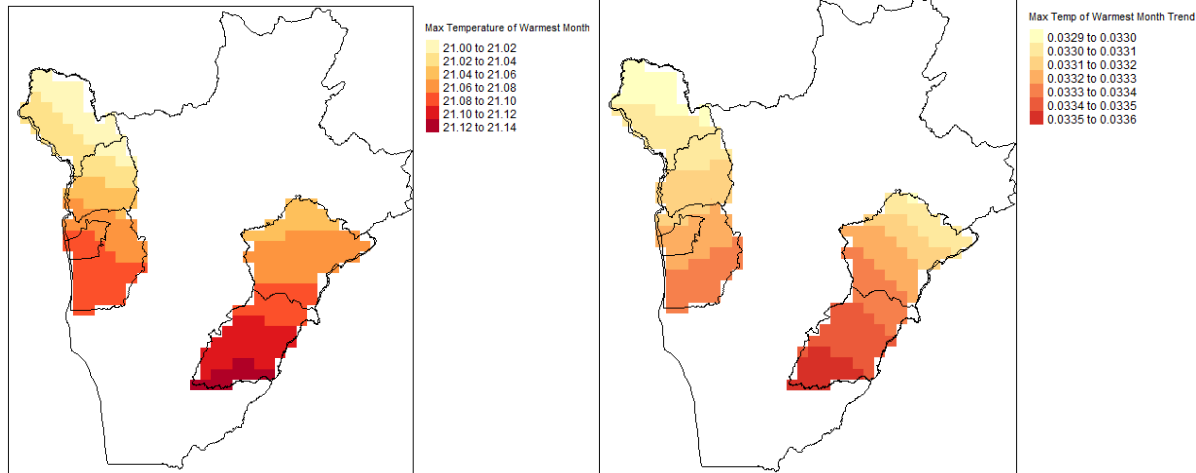
Temperature

The mean temperature trends analysis shows slight increases for the different selected indices with higher changes in the Moso basin. The highest increases have been observed in the mean temperature of coldest quarter, mean annual temperature and mean temperature of the warmest quarter.

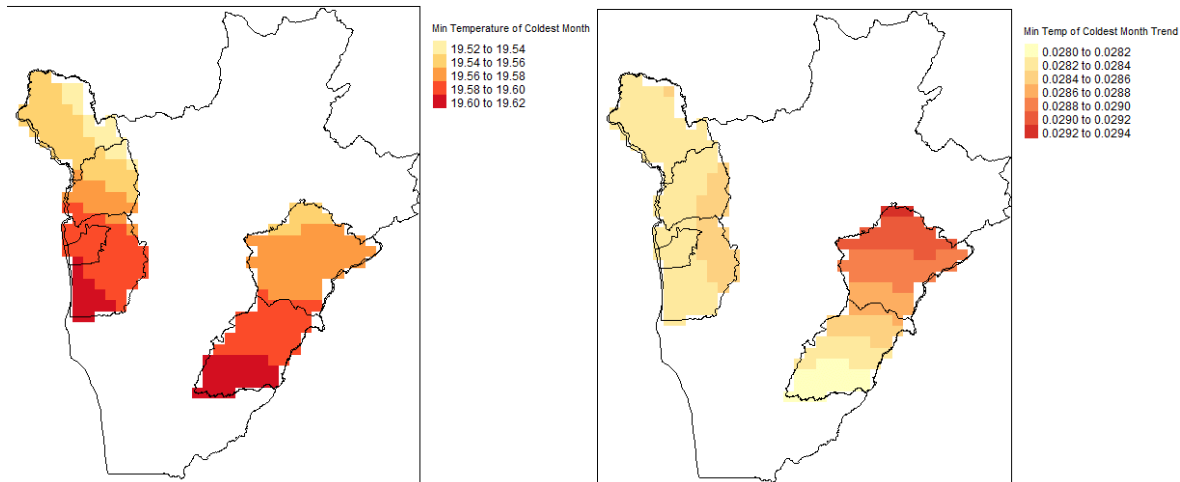
Annual Mean Temperature



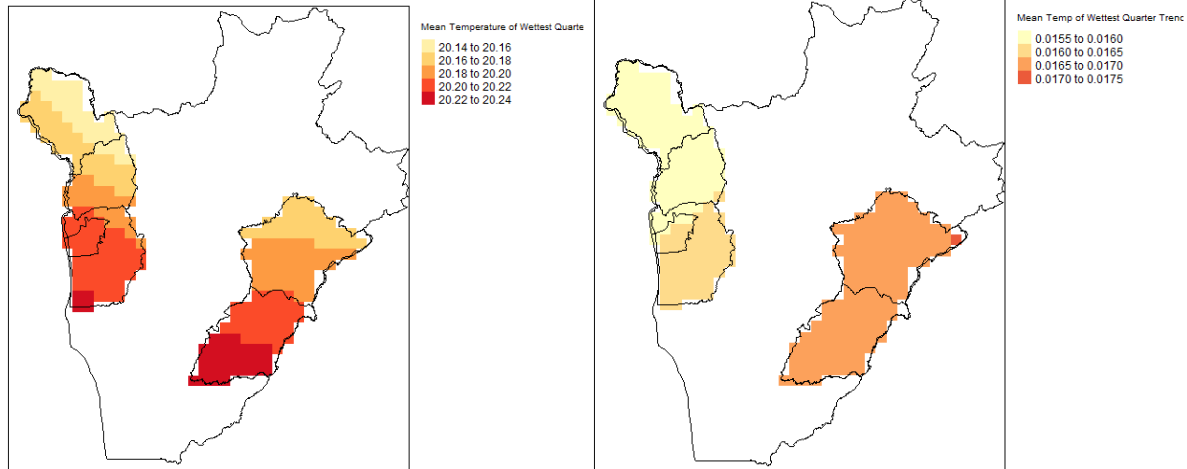
Max Temperature of Warmest Month



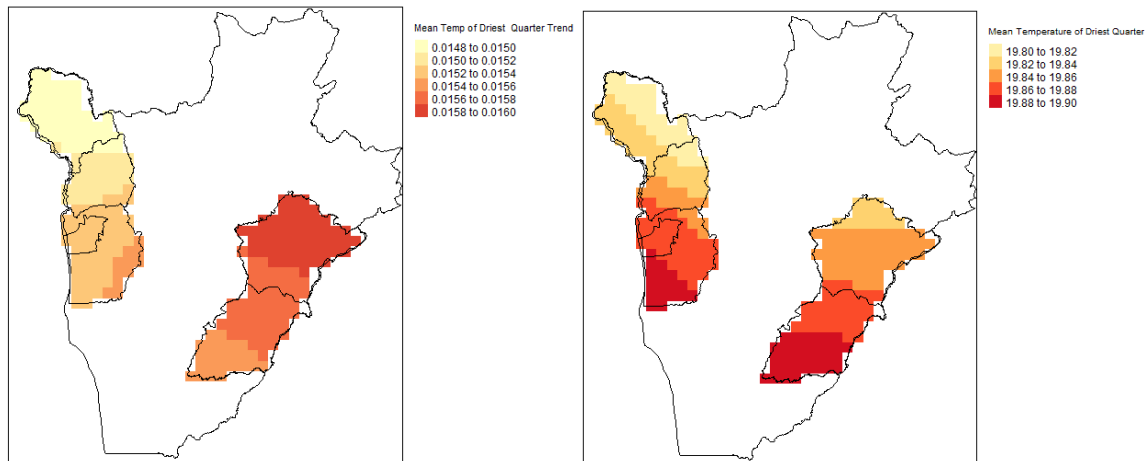
Min Temperature of Coldest Month



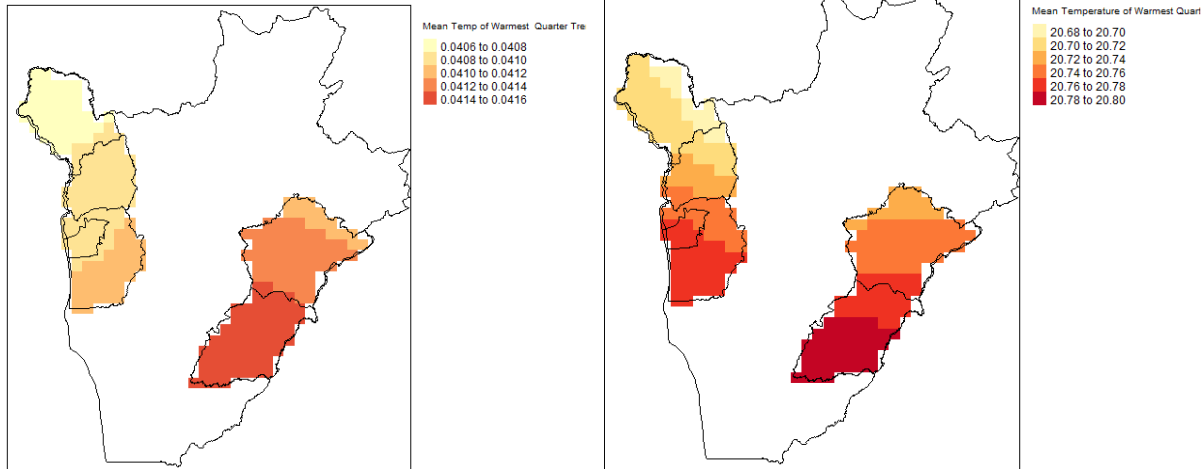
Mean Temperature of Wettest Quarter



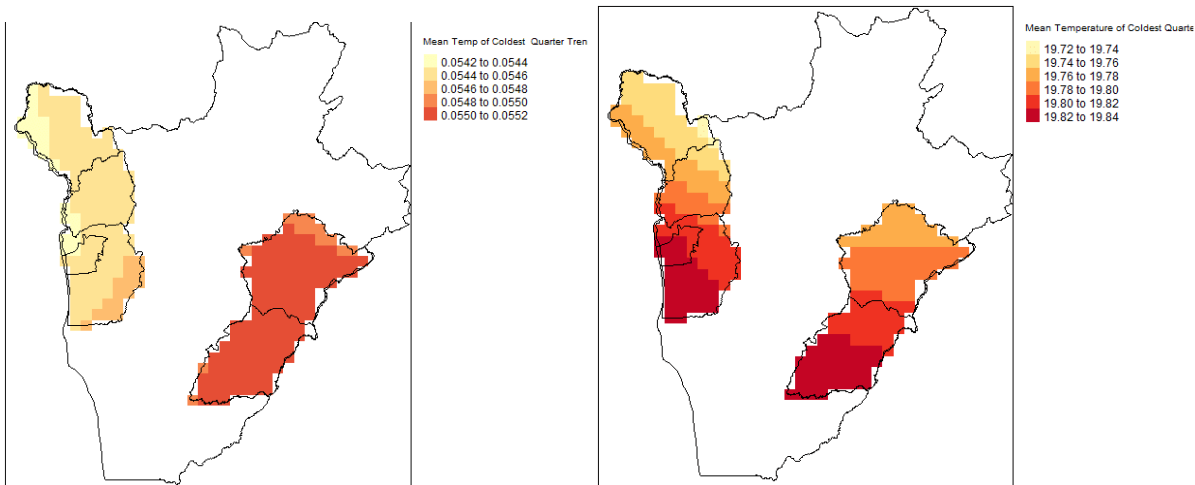
Mean Temperature of Driest Quarter



Mean Temperature of Warmest Quarter



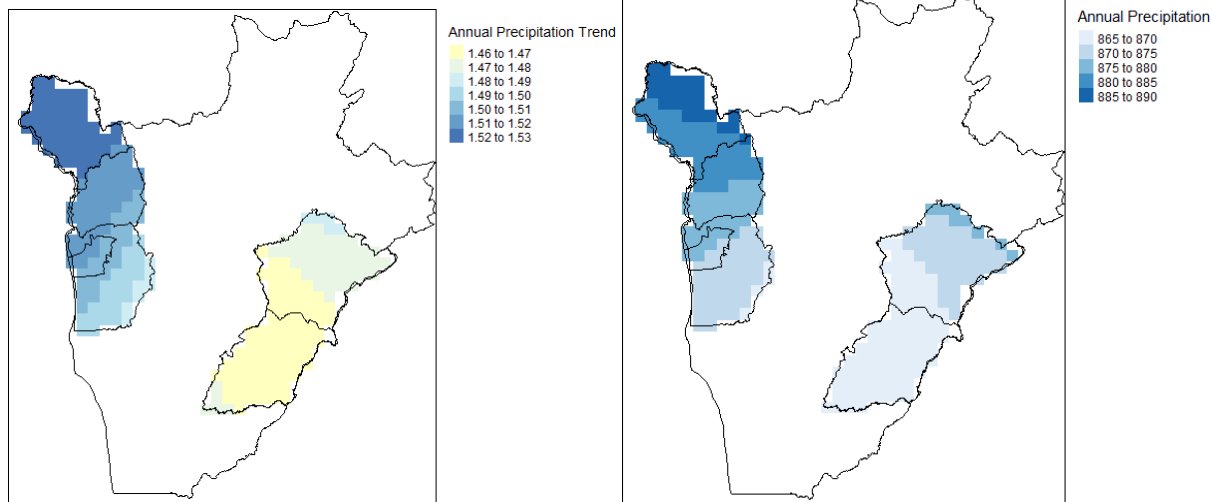
Mean Temperature of Coldest Quarter



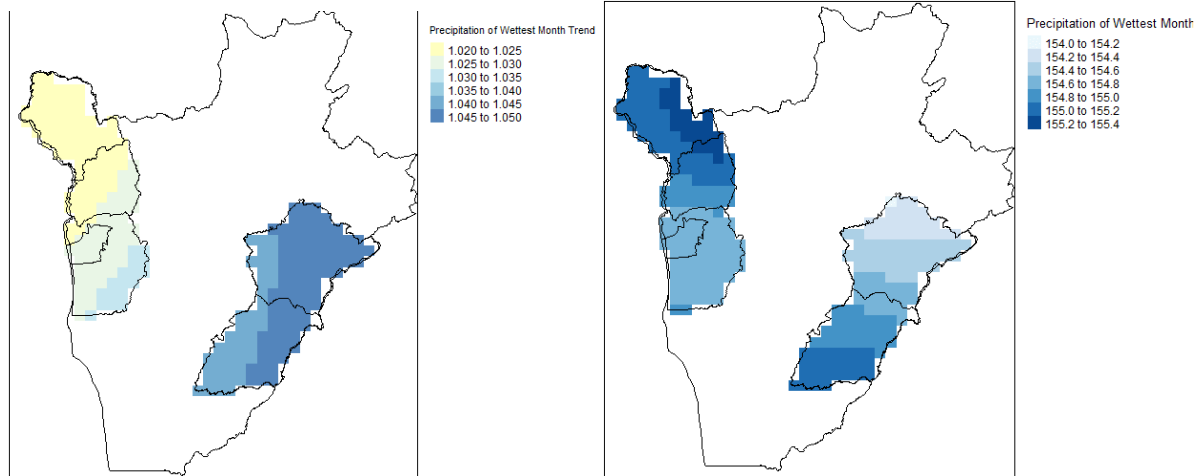
Precipitation

Precipitation trends analysis shows increases in the different selected indices. The highest increases have been observed in the precipitation of the wettest quarter, annual precipitation followed by precipitation in the wettest month and warmest quarter. The precipitation changes are more pronounced in Imbo basin for most of the selected indices.

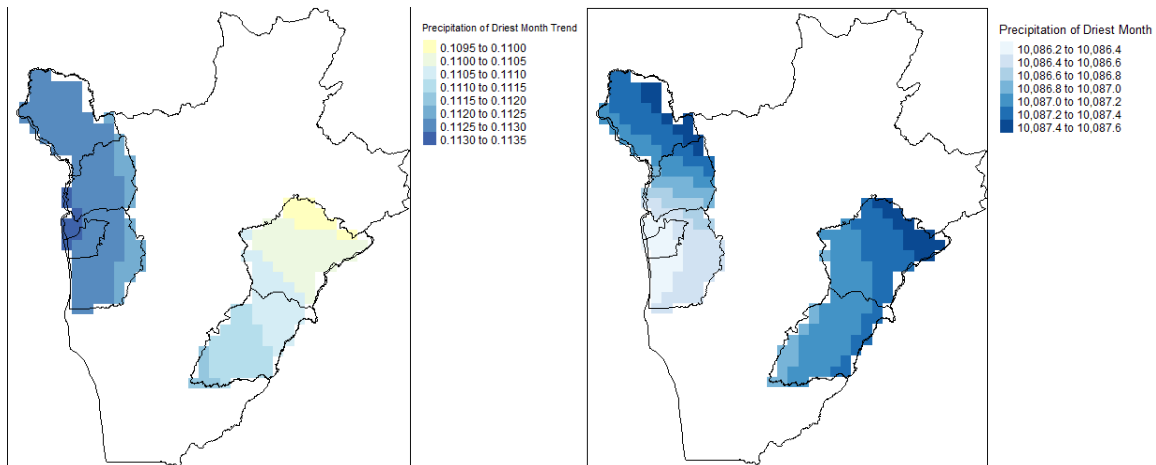
Annual Precipitation



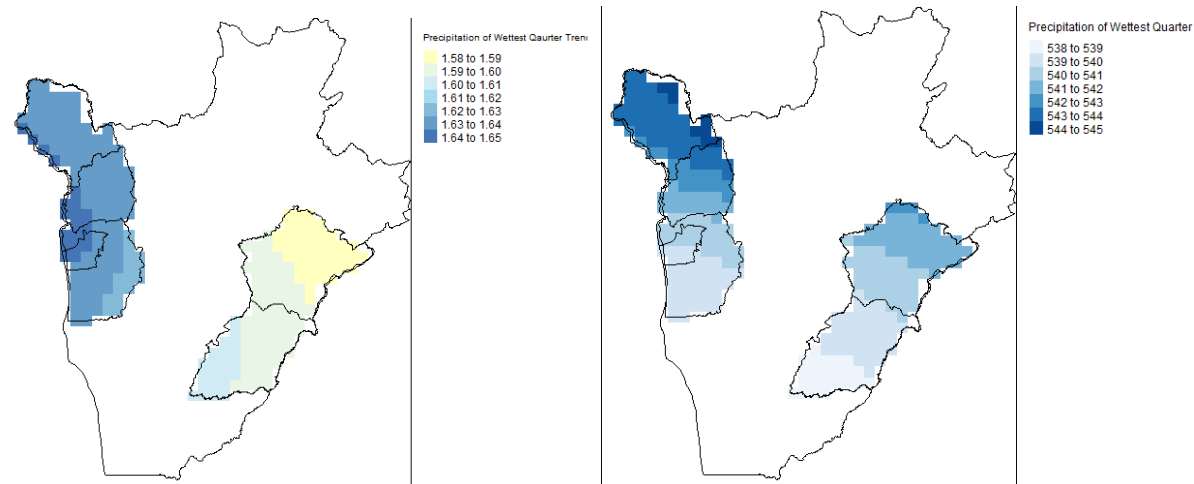
Precipitation of Wettest Month



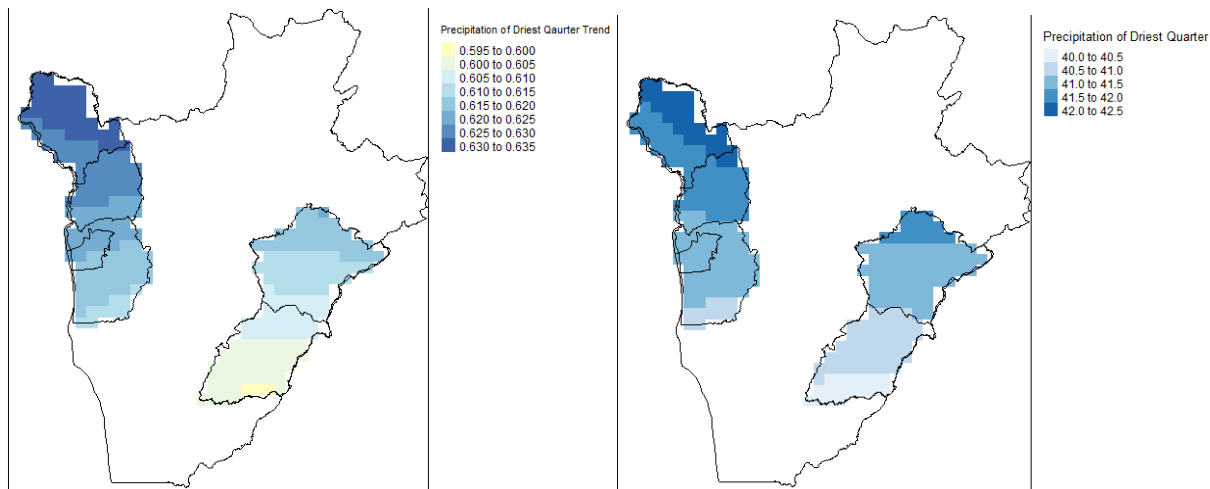
Precipitation of Driest Month



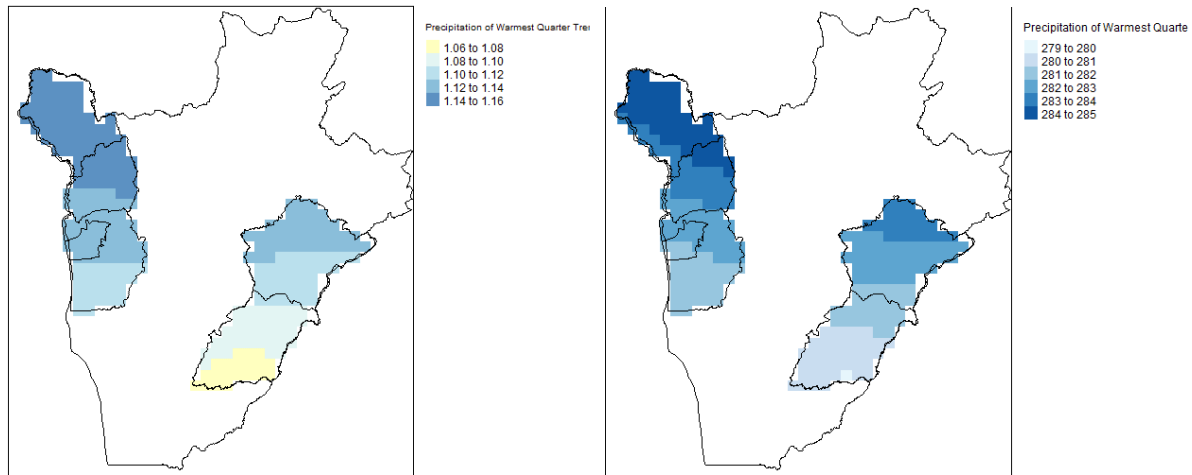
Precipitation of Wettest Quarter



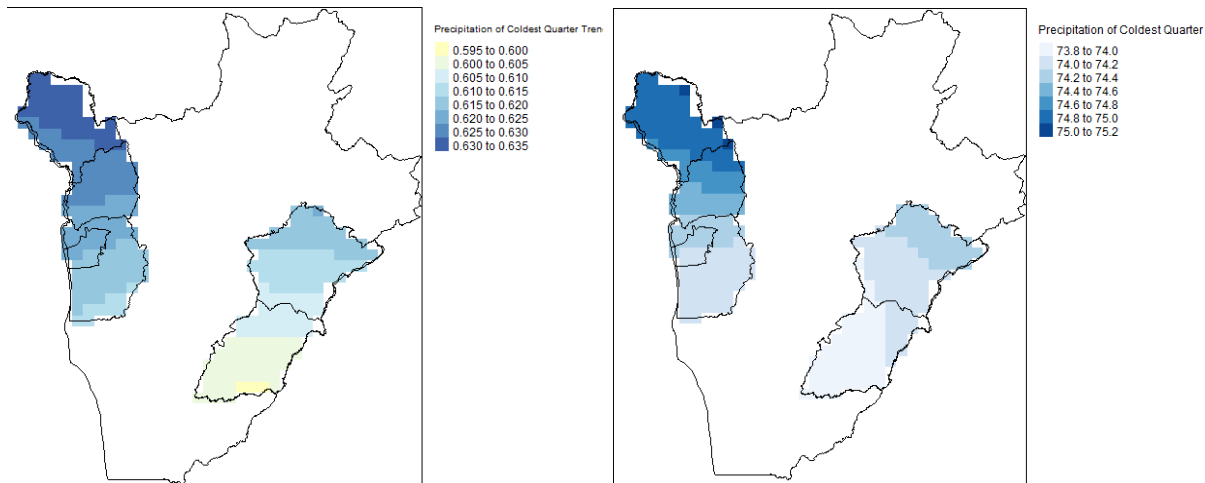
Precipitation of Driest Quarter



Precipitation of Warmest Quarter



Precipitation of Coldest Quarter



Change in temperature and precipitation patterns (RCP 4.5)

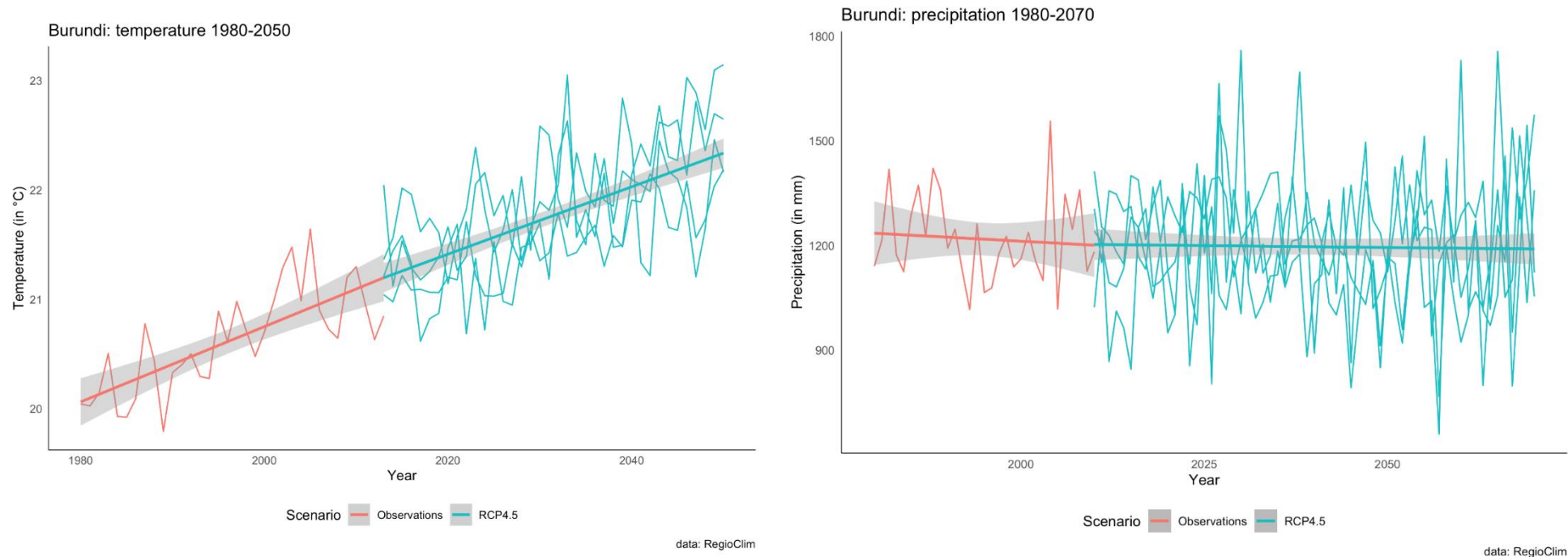


Fig. A1 Change in mean temperature since 1960 and projected RCP 4.5 scenario. Source: RegioClim (accessed June2020).

Fig. A2 Change in precipitation patterns since 1960 and projected RCP 4.5 scenario. Source: RegioClim (Accessed June 2020).

“Burundi's exposure to the mean wet precipitation climate changes to about **16.26% (median) in the period 2041-2050** compared to 19.07% in the period 1990-1999 in the high warming scenario (RCP8.5). The predictability of this level of precipitation is also projected to change with the standard deviation (a measure of volatility) ranging from **7.42 for the period 2041-2050** to **8.59 in the 1990s**.

Evolution of the extreme wet climate (SPI above +2)

Burundi's exposure to the extreme wet precipitation events changes to about **1.84% (median) in the period 2041-2050** compared to **0.62% in the period 1990-1999** in the high warming scenario (RCP8.5). The predictability of this level of precipitation is also projected to change with the standard deviation (a measure of volatility) ranging from **7.81 for the period 2041-2050** to **4.04 in the 1990s** (also in the high warming scenario).

Evolution of the extreme dry climate (SPI below -2)

Burundi's exposure to the extreme dry precipitation events changes to about **1.41% (median) for the period 2041-2050** compared to **0.77% for the period 1990-1999** in the high warming scenario (RCP8.5). The predictability of this level of precipitation is also projected to change with the standard deviation (a measure of volatility) ranging from **6.38 for the period 2041-2050** to **3.79 in the 1990s** (also in the high warming scenario)."

Citation Baarsch et. al (2019).

Regional distribution of rainfall

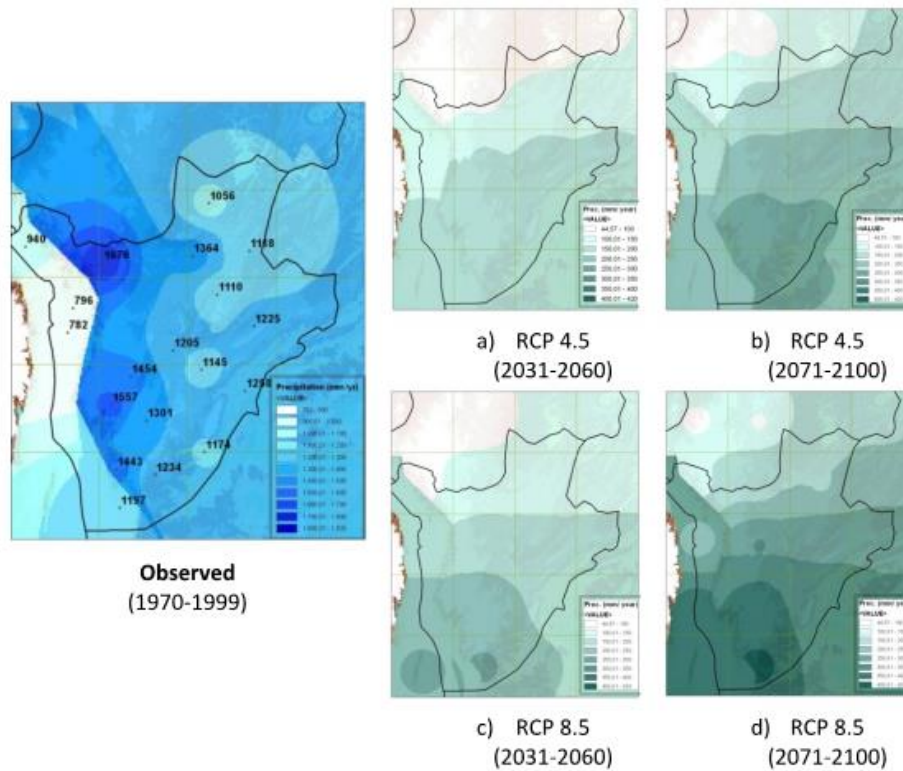


Fig. A3 Regional distribution of observed rainfall and of projected rainfall changes. Taking RCP 4.5 and the period 2031-2060 as reference, the increase will be strongest in the southern part including the erosion-prone shores of lake Tanganika and of the central north-south mountain ridge where changes amount to 150 – 200 mm or 10 % of rainfall. Source: Liersch et al., 2014.

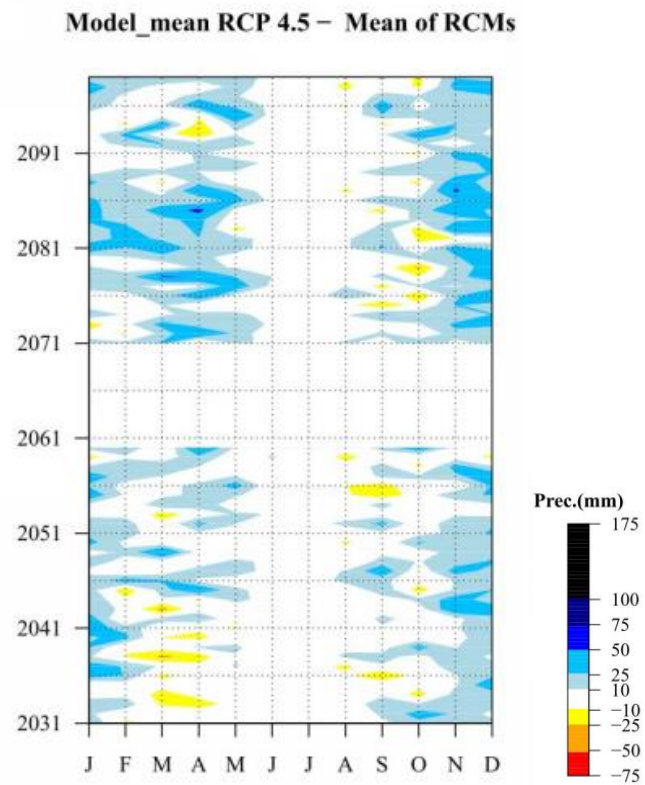


Fig. A4 Change in the seasonal distribution of rainfall indicating a decrease in March / April and August / September for the period 2031-2041, therefore prolonging the dry period and increasing drought risk and water deficits for rainfed agriculture (Liersch et al., 2014).

Flood risk

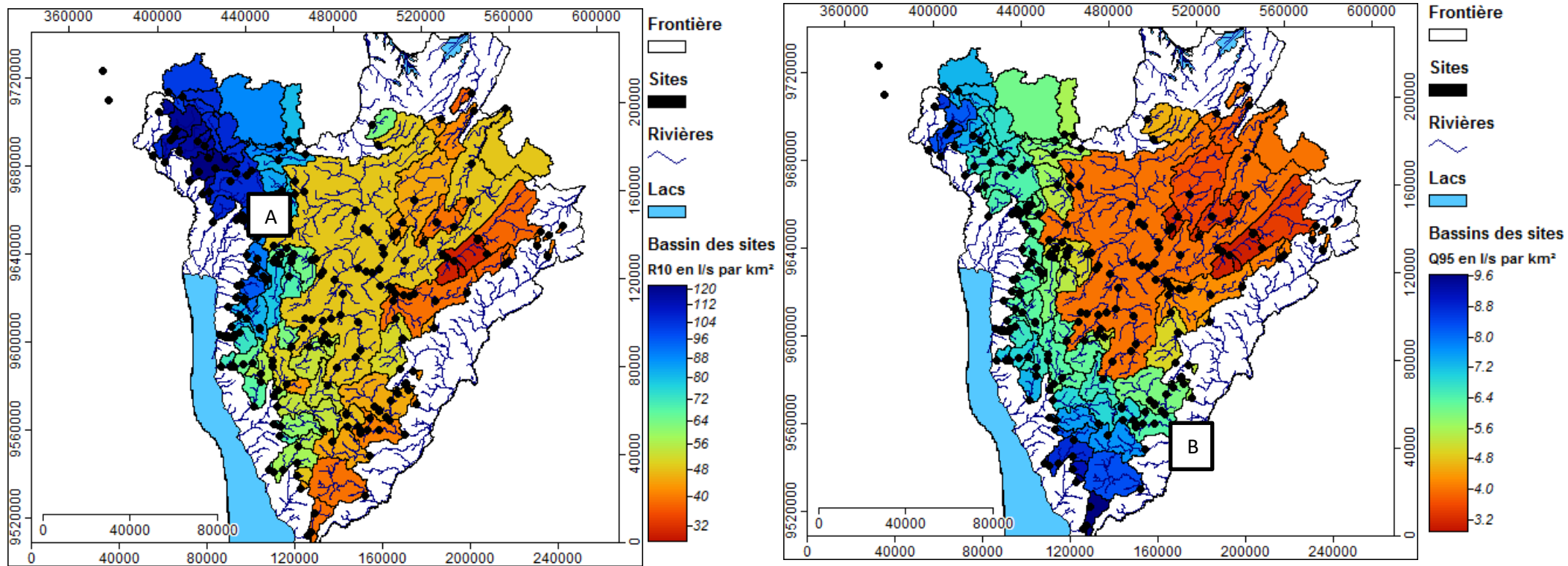


Fig. A5 Flood risk (above) given as the 10-year flood based on runoff data from Burundi and drought risk given as the 95% quantile of low flow during the dry season (Külls, 2014, Hydropower Atlas of Burundi for Sher Ing.)

Erosion rates

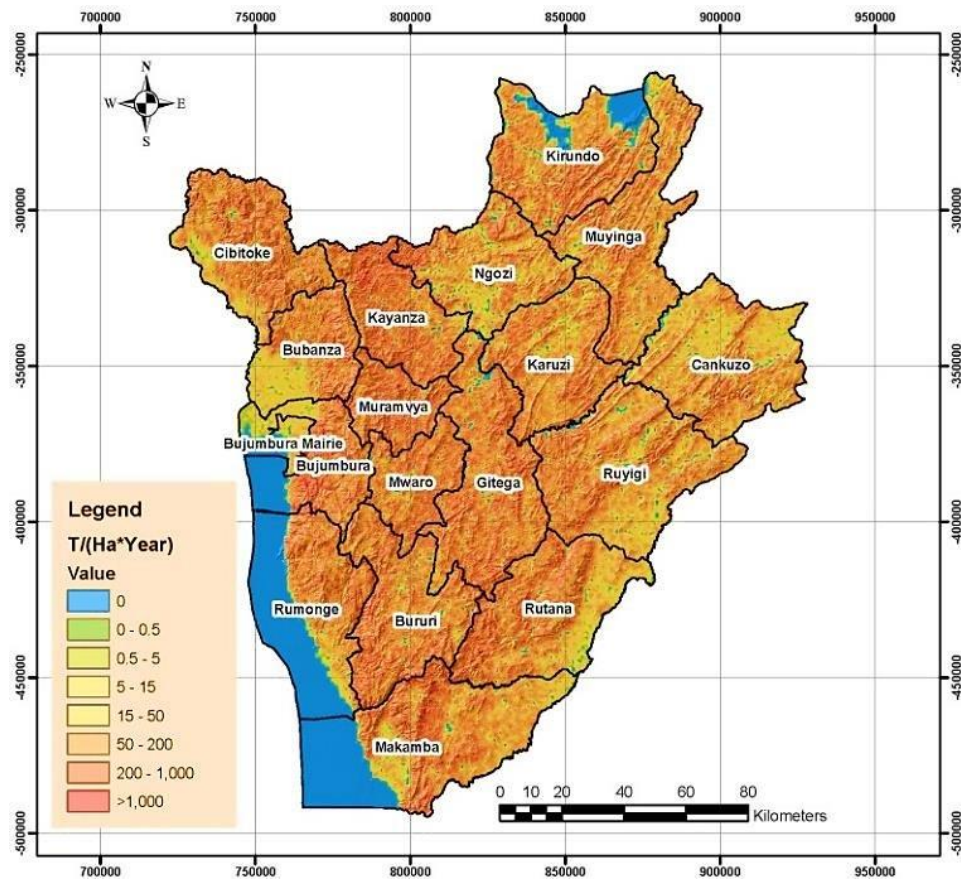
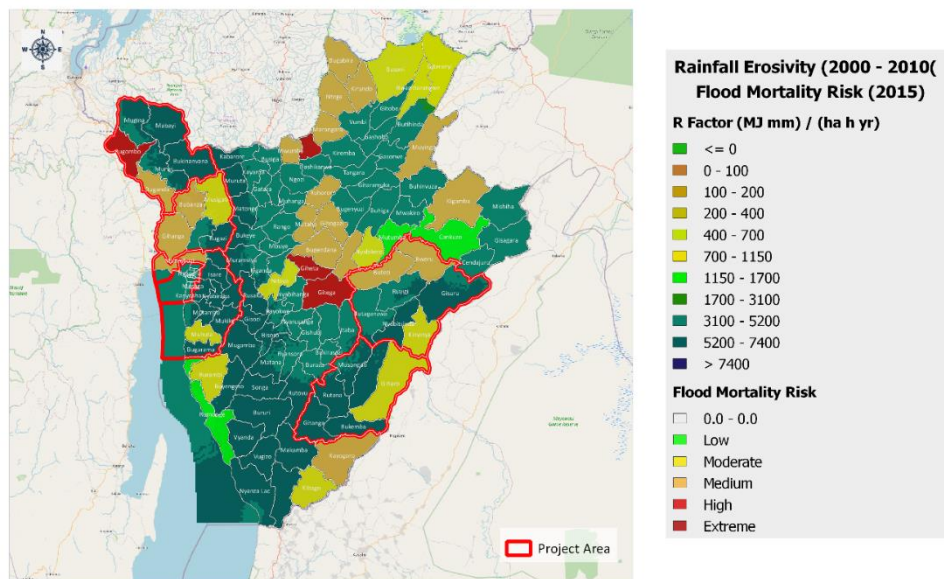


Fig. A6 Erosion rates of Burundi in T/ha per year. The erosion rates in the study area are classified as severe (50 to 200 t / ha per year). This corresponds to a soil loss of more than 1 cm per year.

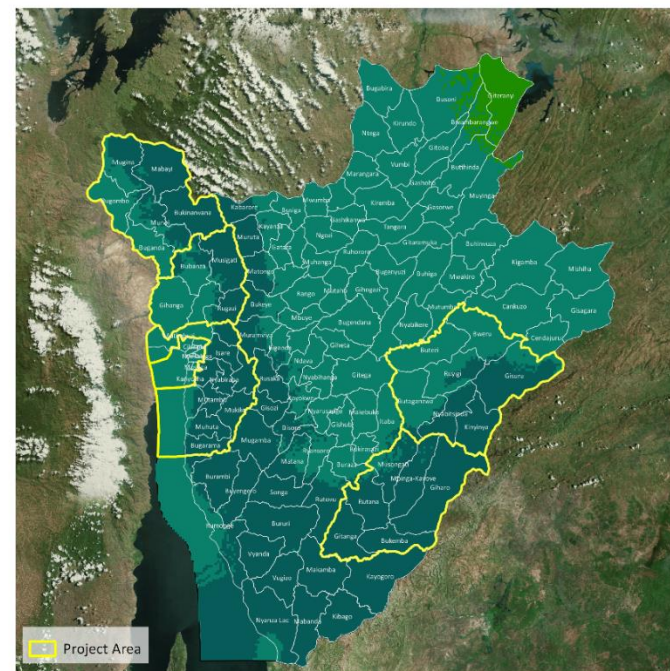
Republic of Burundi

Climate proofing food production investments in Imbo and Moso basins in Burundi



GAUL. 2019. European Soil Data Centre (ESDAC), OSM

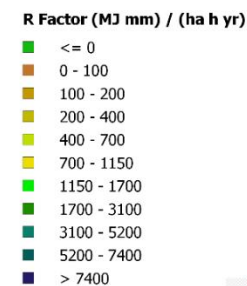
Fig. A7 Rainfall erosivity rates (2000-2010) and flood mortality risk (2015) in Burundi in the project area (on the left).



Republic of Burundi

Climate proofing food production investments in Imbo and Moso basins in Burundi

Rainfall Erosivity



GAUL. 2019. European Soil Data Centre (ESDAC)

Fig. A8 Rainfall erosivity rates (2000-2010) in Burundi in the project area (on the right).

References

Külls C. (2014) Hydro-Power Atlas of Burundi, Hydrological Study. For Sher Ingénieurs.

Liersch S., Rivas R., Fritzsche K. (2014) Climate Change Projections for Burundi - A Summary for Policy Makers. GIZ, April 2014.

Regioclimate data sets: <http://regioclimate.climateanalytics.org/> (Accessed June 2020).

Riveros Izana, C. (2019). Assessment of soil erosion of Burundi using remote sensing and GIS by RUSLE model.