



UNDERSTANDING CLIMATE CHANGE ADAPTATION GOVERNANCE AND BUILDING RESILIENCE AMONG LOCAL COMMUNITIES IN SENEGAL: A REVIEW

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1. Introduction

Systems thinking, and systems approaches, including in relation to resilience, are gaining attention as a means of wrestling with complexity of achieving development targets. However, in several countries, the value of systems thinking is yet to be demonstrated to policy makers (USAID, 2022), and in governance of natural resources. The uncertainties associated with climate change demands measuring whether changes to better equip people, households, communities, countries, and systems to future impacts under different climate scenarios. This requires measuring whether the transformational changes to systems, structures and institutions needed to manage future impacts are occurring now or not (USAID, 2022). Loss and damages resulting from climate change are a growing challenge for communities and governments around the world (Vanhala, 2021; IPCC 2022). This is especially true for low- and middle-income (LMIC) countries of the global South that cannot have access to bigger loans on equitable terms to recover from disasters, and who are unable to access the finance needed to adapt before shocks occur (United Nations Development Programme [UNDP] 2007). Moderating the risks associated with climate change, reducing poverty and inequality, involve both mitigation and adaptation (Hall & Weiss, 2012). Unquestionably, the rapid and urgent mitigation will also prevent crossing the 1.5 threshold thus reducing associated adverse impacts projected at higher warming levels . However, effective policies and governance systems focused on adaptation mitigation are urgently needed to enable resilience building. These policies and governance structures/processes may also assist in preventing the negative impacts arising from climate hazards (Ostrom, 2009; O'Brien et al, 2006).

Hence, a better understanding of existing governance processes could foster community resilience against climate change.

However, in Africa and across most developing regions, the understanding and application of the systems approach to measuring resilience, governance and adaptation to climate change remains a challenge due to myriad of reasons including but not limited to; low research gaps at local levels (Thornton et al., 2014), poor governance structure, as well as limited political will in promoting inclusive resources governance structures (Conway & Schipper, 2011; Thornton et al., 2014). Similarly, most resilience measurement has tended to focus on the ability to manage current shocks and stresses, neglecting other systemic structures (governance processes) that contributes to building adaptation to climate change and sustainable governance of natural resources (Linkov et al., 2019).

In attempt to transform the climate adaptation capacity of food, land and water systems and ultimately increase the resilience of smallholder production systems to withstand severe climate change effects like drought, flooding and high temperatures, The International Water Management Institute (IWMI), as part of the CGIAR's Building Systemic Resilience Against Climate Variability and Extremes (ClimBeR) initiative, is working to develop a bottom-up polycentric governance processes that provide opportunities for self-organization and learning across systems, and independent decision-making for climate change adaptation planning and implementation at the local level across food related sectors such as agriculture, natural resource, including forestry, water and energy. The ClimBeR initiative is working closely with country partners in Senegal, Zambia, Guatemala, Kenya, Morocco and the Philippines to integrate bottom-up multi-scale polycentric governance frameworks for reducing systemic cascading risks, and co-demonstrate transformative adaptation options with relevant actors to illustrate applicability across scale to target local investment. The system transformational objectives of ClimBeR operate on 4 work packages (WP4):

WP1: Reducing risk in production system-linked livelihoods and value chains at scale, through agricultural risk management, digital agro-climate services, climate-smart agricultural innovations, diversifying production systems and reducing nutritional impacts of climatic risks. WP2: Building production-system resilience through recognizing the relationships among climate, water, agriculture, security and peace, by providing robust science on the climate security, water and agriculture nexus, and designing evidence-based environmental, political and gender equitable solutions.

WP3: Developing adaptation instruments to inform policy and investment, integrating a top-down approach using participatory scenario workshops, in-country task forces and knowledge integration workshops; and a bottom-up collective imagination of futures, incorporating existing innovative grassroots practices and ensuring the inclusion of women, youth and marginalised groups.

WP4: Multiscale governance for transformative adaptation, through: developing and integrating bottom-up multiscale polycentric governance frameworks for reducing systemic cascading risks; co-demonstrating transformative adaptation options with relevant actors to illustrate applicability across scales; and co-developing “champions of change” to advocate for multiscale polycentric governance.

This report forms part of the ClimBeR WP4. The report present an in-depth information through literature review on understanding of climate change adaptation governance and building resilience among local communities with a specific focus on Senegal. This work focuses on the following four

Objectives:

- I. To examine the existing policies, governance structures, and decision-making processes in climate change adaptation issues at different governance levels for food related sectors (agriculture, natural resource, including forestry, water and energy)
- II. Identify key programmes/projects, knowledge gaps, social inclusion and equity gaps, in climate change adaptation issues at different governance levels for food related sectors (agriculture, natural resource, including forestry, water and energy)
- III. Unravel the challenges and opportunities in climate change adaptation issues at different governance levels for food related sectors (agriculture, natural resource, including forestry, water and energy)
- IV. Identify bottom-up approaches on climate adaptation and system transformation processes in Senegal.

The review is stemmed on the ultimate goal that better understanding of the impact of climate change on lives and livelihoods will lead to better-informed policymaking. In addition, policy coherence is important for achieving climate resilience, particularly because of the need to integrate, or mainstream, adaptation objectives into longer-term development processes across the different dimensions of sustainable development. In the continuum of policies, addressing the root causes of inequalities requires transformative policies that generate change in the fundamental attributes of systems, particularly the existing governance systems and norms that perpetuate inequalities.

2. Methodology:

2.1 Review scope and search criteria

This report is being conducted through an in-depth review of literature. The review was based on search criteria in table to identify papers and reports which outline and consider the objectives of this review (Marke, 2013). Specifically, the review focuses on papers regarding climate change adaptation governance/policies and institutions on food related sectors (agriculture, natural resource, including forestry, water and energy), with Senegal as the geographical context. Relevant literature from across Africa were also included. A total of 98 papers (Peer-review materials) were identified through a Google search using search terms in table 1, Eldis and ODI literature on the subject was also checked for relevance. The papers were reviewed and findings from the papers are presented (Marke, 2013: Darko & Atazona, 2013).

Table 1: Literature search terms

Search criteria/ search of terms	Search engines	Type of material
"The governance systems"	Google scholar/ web of science, Scopus	Research article/Technical report/grey literature
"Institutional structures, policies on climate change adaptation"	Google scholar/ web of science, Scopus	Research article/Technical report/grey literature
"Locally led adaptations, resilience to climate change"	Google scholar/ web of science, Scopus	Research article/Technical report/grey literature
"Natural resources managements"	Google scholar/ web of science, Scopus	Research article/Technical report/grey literature
"Resilience and risks to climate change"	Google scholar/ web of science, Scopus	Research article/Technical report/grey literature
"Farmer's adaptation strategies"	Google scholar/ web of science, Scopus	Research article/Technical report/grey literature
"Polycentric governance of resources"	Google scholar/ web of science, Scopus	Research article/Technical report/grey literature

“Natural resources governance and policies in Senegal”	Google scholar/ web of science, Scopus	Research article/Technical report/grey literature
“Senegal country profile: climate change”	Google scholar/ web of science, Scopus	Research article/Technical report/grey literature
“INDP of Senegal”	Google scholar/ web of science, Scopus	Research article/Technical report/grey literature
Inequalities, challenges of resources governance in Senegal”	Google scholar/ web of science, Scopus	Research article/Technical report/grey literature

2.2 Review structure and reporting style

The review process followed the Political Economy Analysis (PEA) approach (Whaites, 2017). Based on existing literature, political economy can be conceptualized as social, economic, cultural and political factors that structure, sustain and transform constellations of public and private actors, and their interests and power relations, over time (Perelman, 2000; Whaites, 2017). This approach was deemed fit for this assessment because PEA situates development interventions within an understanding of the prevailing political and economic structures and processes in society, and suggest opportunities to address or remove impediments to policy change and improved outcomes(Whaites, 2017). Thus, using the PEA approach allows for a broader and sector specific analysis of the governance structures, policies, institutions, social inequality, as well as knowledge gaps in climate change adaptation and resilience building among communities and stakeholders in Senegal. More specifically, PEA approach allows for the review/assessment of the possible Drivers of Change (DoC) within a defined sector, thereby helping to identify gabs, and pathways for achieving sustainability (Landell-Mills et al., 2007).

The DoC approach is a type of PEA and often addresses issues such as how policy and institutional reforms that benefit vulnerable people come about. The approach considers the relationships between three sets of elements: I. Agents - conceptualized as the individuals and organisations pursuing particular interests (such as the local actors/farmers). II. Institutions - defined as the formal and informal rules and relationships, including cultural norms, creating a set of incentives that affect the behaviour of agents (such government institutions and ministries/Civil society organizations). III. Structures - conceptualized as the contextual factors influencing the environment for institutions (such as regulations, policies and governance systems of climate change). The consideration of these elements in

the review process will help in better understanding of the challenges/gaps in climate change governance process in Senegal and this will guide better-informed policymaking recommendations for building resilient governance system.

A Narrative review style was used in reporting of the literature review (Bax et al., 2021) . The purpose of this type of reporting style is because it allows for detailed description of the current state of the research on specific topic/research (such as the governance/policies on climate change adaptations in Senegal) and to offer a critical analysis of the literature reviewed. The report is grouped under themes as specified in the review specific objectives. The review will end with a conclusion section which summarizes the findings regarding the state of the research of the specific study, the gaps identified and explains how the research fits within the ClimBeR project.

3. Geographical context: Senegal

Senegal is located at the western extremity of the African continent (see Fig. 1). It covers a total landmass of about 196,722 km² and has a Sodano-Sahelian climate which is characterized often by tropical in the south and semi-desert in the north (Rigaud et al., 2021; Sy, 2022). The average annual rainfall follows a decreasing gradient from the south to the north of the country, from 1,200 mm in the south to 300 mm in the north, with varying climatic zones: a humid zone in the south, a wooded savannah in the centre and a semi-desert zone in the north (Sy, 2022).

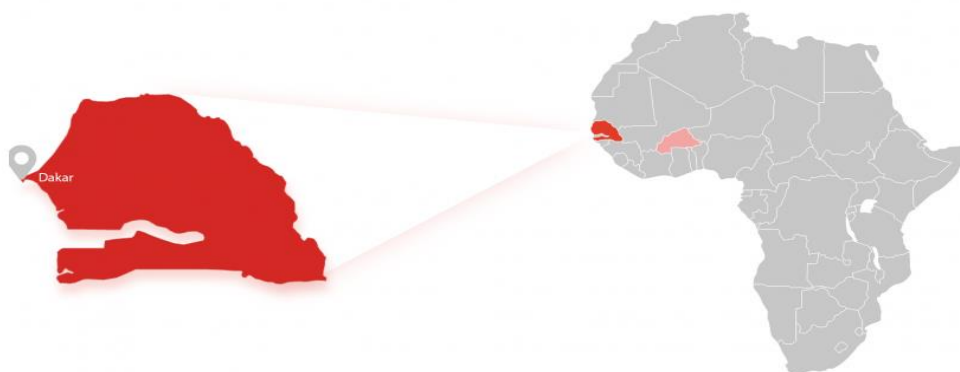


Figure 1: Map of Senegal

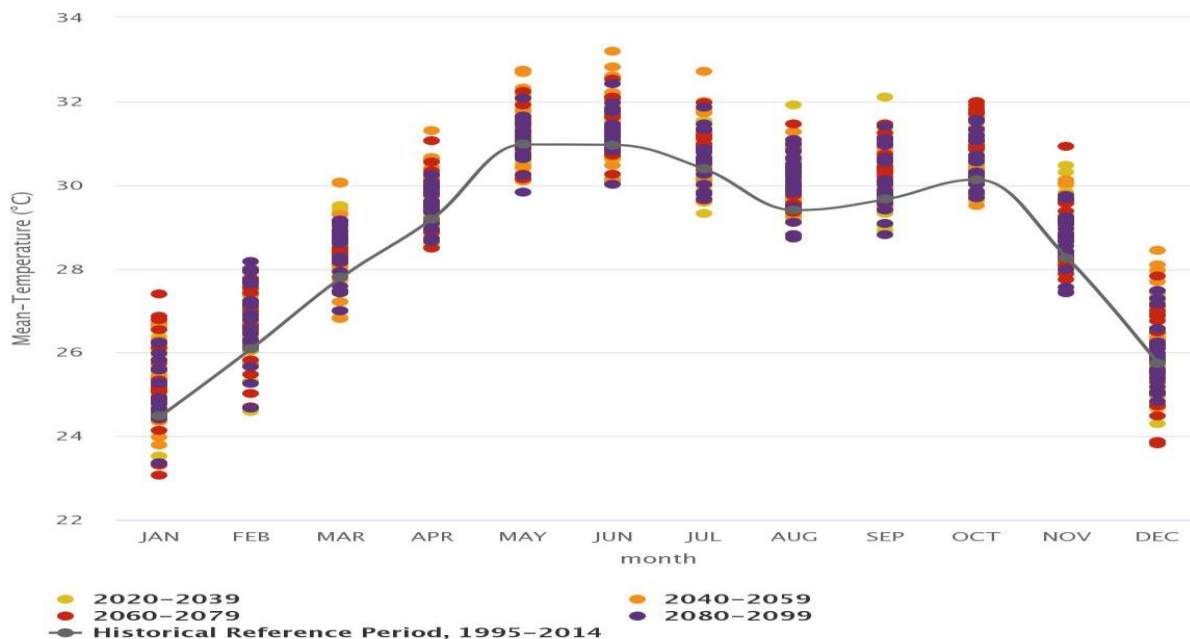
Demographically, the country's population is estimated at 17.7 million in 2022 (ANSD, 2022), with majority being youth, predominantly residing in rural areas. As at the in 2018/2019 fiscal year, the poverty rate in Senegal was estimated at 37.8% (EHCVM 2018/2019). The rural population is more affected by poverty;

more than half (53.6%) live below the poverty line of US\$1.90 per day per capita (Ki et al., 2005; Sy, 2013). Currently, the Human Development Index (HDI) of Senegal is 0.512, which places the country in the “low human development” category (Harttgen & Klasen, 2012). In terms of economic growth rate, Senegal experienced a decrease from 6.2% in 2018 to 4.4% in 2019 due to the slowdown of activity in all sectors of the economy (primary, secondary and tertiary) (ANSD, 2022). As in other developing countries, a large part of the Senegalese economy is based on primary production systems which, once affected by environmental crises, will weaken a country already facing a fragile socio-economic situation. According to Sy (2022), the loss of biodiversity, deteriorating vegetation cover, water, and wind erosion, salinisation, and acidification have resulted in soil degradation, reducing the suitability of soil for cultivation in most areas of the country.

3.1 Status and Trends of Climate Action in Senegal

Due its location in the Sahelian zone, Senegal is among one of the highly exposed and vulnerable countries in Africa in terms of climate change impacts (Mc Sweeney et al., 2010; MEDD-GCF, 2020). Several reports have linked the increasing temperature and unreliable rainfall patterns as major factors increasing climate risks that exposes and render weak, the foundations of the national economy and natural and human capital (USAID, 2017; Baarsch et al., 2017; Serdeczny et al., 2017). The deterioration of the natural capital of the national economy, such as agriculture, livestock, forest resources, and fisheries, illustrate the economic challenges of climate change in Senegal. An increase of temperatures between 1°C & 2°C by 2050, could have severe consequences on economic growth trends and a drop of about 25% in productivity in Senegal (Sy, 2022). A projection by the World bank (World Bank, 2021) on the variability, trends, and significance of change across future climate scenarios (shared socioeconomic pathways [SSPs]) indicates that Senegal will experiences appreciable increase in mean monthly temperatures across most part of the years in the future (Fig. 2). Thus, the Average annual temperatures in Senegal could rise by 1-3°C by 2060, with faster warming rates in semi-arid regions and the central basin and more frequent hot days and nights (Casado-Asensio, et al., 2021).

Projected Variability and Trends of Mean-Temperature across Season Cycle, 2020–2100; Senegal; SSP1–1.9, cams-csm1-0



(Source: World Bank, 2021)

Figure 2: Temperature variability, trends, and significance of change across future climate scenarios of Senegal

To address the challenges of climate change, the government of Senegal launched a development strategy called the Senegal Emerging Plan (PSE) (see Diop, 2019) for the period spanning up to 2035, as a commitment to achieving the sustainable development goals (SDGs). The PSE integrates the need to consider adaptation in economic and social development policies to increase the resilience of the country’s production systems to climate change impacts (Boidin, 2019). Moreover, this policy document draws attention to climate risks and stresses the need to consider unconditional commitments in the Nationally Determined Contribution (NDC) regarding both mitigation and adaptation to climate change. Senegal is making noticeable progress in implementing adaptation policies in several priority sectors under the NDC (Senshaw & Kim, 2018; Sy, 2022). For instance, the fisheries and livestock sectors have already finalised their respective national adaptation plans and stakeholders are developing climate resilience projects to mobilise funding. The agriculture, infrastructure, and food sectors are supported by the National Adaptation Plan – Global Environment Facility programme (NAP-GEF) to conduct vulnerability and adaptation studies in five regions of Senegal (Ziguinchor, Kédougou, Kaffrine, Matam, and Saint-Louis), which could result in a national sectoral adaptation plan and an avenue for seeking funds.

The coastal zones, water resources, and biodiversity are being supported by partners and financiers such as Agence Française de Développement (AFD), Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), Lux-Development (LuxDev), etc., to launch the process of developing their sectoral national adaptation plans. Sy, (2022) further outlined some initiatives identified as an opportunity to address climate challenges in Senegal as follows:

- The development of a reference and harmonised framework for climate policies in Senegal with the NDC, the NAPs, the National Communications, the Green Climate Fund Country Programme, & Climate Change Facilities;
- The establishment of a climate sensitive budgeting mechanism to facilitate the integration of climate change into the planning and implementation process of sectoral development policies;
- the existence of numerous projects and programmes that implement sustainable development actions with adaptation value, such as the Community Development Emergency Plan (PUDC), the City Modernisation Programme (PROMOVILLE), and the Food Security Support Project (PASA)
- the favourable international context with the establishment of several facilities to mobilise financing for adaptation, notably the Adaptation Fund (AF), the Green Climate Fund (GCF), the Global Environment Facility (GEF), the Climate Change Fund for Africa (CCAF), and the Global Centre on Adaptation (GCA);
- the establishment of mechanisms to strengthen national and local capacities in integrating climate into planning, developing climate resilience projects, and mobilising funding;
- the development of an institutional framework for monitoring and evaluating progress in the implementation of the country's adaptation commitments contained in the NDC
- the development of climate change adaptation planning documents at the local level, such as Integrated Territorial Climate Plans (PTCI), Local Climate Change Adaptation Plans (PLACC), the Rainwater Management and Climate Change Adaptation Project (PROGEP) supported by agencies such as UNDP, USAID and civil society/private organisations such as CSE, and IPAR)

3.2 Governance structures, and Management of Climate change adaptation in Senegal

Climate change governance requires collaboration among respective actors to develop a shared vision among diverse stakeholders and coordinated cross-sectoral planning to ensure policy coherence (Kusters et al., 2020). Several national institutions and private organizations exist in Senegal whose mandates and activities touch on climate change issues with considerable synergy to adapt to climate change in vulnerable productive sectors. These include government institutions, the private sector, the research community, and civil society, as well as bilateral and multilateral donor partners. In addition, multidisciplinary technical working groups (MTWG) also exist in the governance of climate change adaptation and planning in Senegal (Blundo-Canto et al., 2021). These groups are often involved in the planning, implementation, and coordination of climate action and adaptation policies using a cross-sectoral policy approach to ensure robust and efficient output. This approach is also anticipated to generate the buy-in needed for effective implementation of climate adaptation policies according to NDC and PNA priority sectors and among local actors (Sanogo et al., 2016; Sy, 2022). Each priority sector (agriculture, water resources, livestock, coastal zones, infrastructure, biodiversity) establishes one technical working group or cross-sectoral planning group (CSPGs) with representatives from government and academia to ensure the development and implementation of climate resilience projects and programs (Government of Senegal, 2015). Table 2 details the various governance and implementation structures of climate actions in Senegal

Table 2: Governance and implementation structures: institutions and actors responsible for climate adaptation and policy(s) in Senegal

Structure	Composition(s)/Actors (s)	Function(s)
National strategic authorities of climate action and adaptation policies implementation	Directorate of Environment and Classified Establishments (DEEC) under the supervision of the Ministry of Environment and Sustainable Development (MEDD) as focal point for the UNFCCC and the Global Environment Facility (GEF), the Designated National Authority (DNA) for the Clean Development Mechanism (CDM), the	<ul style="list-style-type: none"> Federate all actors involved in climate change issues (administrative technical services, private sector, NGOs, civil society, research structures, universities, technical and financial partners, local authorities, etc.) and to coordinate the planning, implementation and monitoring of climate change policies and programs at the highest level

	Adaptation Fund (AF), and the Green Climate Fund (GCF); the National Climate Change Committee (COMNACC)	
	National Commission of Sustainable Development (CNDD) coordinated by the DECC,	<ul style="list-style-type: none"> Responsible for developing a national sustainable development strategy and action plan and reporting to the United Nations Conference on Sustainable Development (CSD)
National entities facilitating climate action and adaptation policies implementation	i) National Agency for Civil Aviation and Meteorology (ANACIM)	<ul style="list-style-type: none"> Contributed significantly to actions on climate projections in Senegal
	ii) Centre for Ecological Monitoring (CSE)	<ul style="list-style-type: none"> Accredited as a National Entity to Adaptation Fund and Green Climate Funds (GCF) supporting the formulation and submission of project and programme documents targeting these fund resources;
	iii) Centre for Studies and Research on Renewable Energies (CERER)	<ul style="list-style-type: none"> Acting as the designated national authority for the UNFCCC technology transfer mechanism and playing a key role in the mastery, development, and dissemination of clean, climate-adapted technologies;
	iv) Enda Energie as a member of the Consortium Partner Knowledge Partner in the Climate Technology Centre and Network (CTCN)	<ul style="list-style-type: none"> promoting the accelerated transfer of environmentally sound technologies for low-carbon and climate-resilient development;
Agencies and institutions implementing and supporting programmes and projects on climate action and adaptation policies composed of	i) Sectorial ministries, directorates, departments, agencies, municipal assemblies, and councils	<ul style="list-style-type: none"> Plan, implement, and coordinate climate adaptation policies for priority sectors declined in NDC and PNA;
	ii) Academic institutions	<ul style="list-style-type: none"> Supporting the move from science development to implementation by addressing impacts of climate change research questions and capacity building for vulnerable communities and priority sectors for climate action;
	iii) Technical and financial partners (e.g.; Global Environment Fund [GEF], UNDP, World Bank, African Development Bank [AfDB], European Union [EU],	<ul style="list-style-type: none"> Recognize the role of the international community, especially development partners for resource mobilization, capacity development, and technology development for current and future adaptation action in priority sectors;

	International Fund for Agricultural Development [IFAD], and Food and Agriculture Organization [FAO])	
	iv) Civil society organizations (CSOs) as strategic partners for health sector development.	<ul style="list-style-type: none"> Actively engage the CSO community in planning, advocacy, education, and awareness raising, evidence-based research, as well as the monitoring and evaluation of health adaptation efforts at various levels in the country;
	v) Private Sector	<ul style="list-style-type: none"> Drive adaptation and climate risk reduction for priority sectors that achieve Senegal's sustainable development agenda and realize its nationally determined contributions (NDCs) to the Paris Agreement;
Multidisciplinary technical working groups (MTWG)	cross-sectoral planning group (CSPGs),	<ul style="list-style-type: none"> the planning, implementation, and coordination of climate action and adaptation policies in Senegal. Uses a cross-sectoral policy approach to ensure robust and efficient output. Each priority sector (agriculture, water resources, livestock, fisheries, health, coastal zones, infrastructure, biodiversity, and GRC) establishes one technical working group or cross-sectoral planning group (CSPGs) with representatives from government and academia to ensure the development and implementation of climate resilience projects and programs

3.3 Financing Climate Change adaption in Senegal

Senegal has been benefiting from different sources of Climate related finance (Marchat et al., 2005). Most theses finance comes from different sources such as the state budget, multilateral, bilateral, and the private sector donors (Peterson & Skovgaard, 2019). For multilateral funding, the Global Environment Fund (GEF) has been the largest provider of grants to Senegal (CSE, 2020). Several other multilateral actors such as UNDP, World Bank, AfDB, EU, IFAD & FAO also support the sector (Peterson & Skovgaard, 2019). Some countries such as Luxembourg, France, Japan, the United States, and Germany

have also remained important sources of finance to Senegal. As part of the implementation of the Priority Action Plan of the Emerging Senegal Plan (PSE) 2014-2018, several sectors' finances take adaptation and climate action into account (Sy, 2022). In a brief, the agriculture sector has secured USD 412.5 million to support family farming, there is another USD 386.4 million to support the water and sanitation sector, USD 61.3 million for the climate resilience project: disaster risk management, and USD 72.9 million for the rainwater management and climate change adaptation project (PROGEP) (Sy, 2022). Private sector contributions is still quite marginal compared to the country's needs and potential. This is because with, micro, small and medium enterprises (MSMEs), access to finance is often among the greatest challenges preventing MSMEs and institutions from taking action on climate resilience (Casado-Asensio, 2021).

According to Sy (2022), local authorities and communities that could develop strategies to adapt to the impacts of climate change do not have access to these sources of climate finance due to a lack of capacity to mobilise funds or organise themselves to propose fundable or grantable projects. To resolve this challenge, the National Plan for Local Development (PNDL) and the Centre for Ecological Monitoring (CSE) are working on capacity building in climate finance and climate risk management for local authorities to support the process of implementing locally driven adaptation with the involvement of vulnerable and marginalized communities. The ultimate goal is to better integrate climate change adaptation issues into the local planning process and to build local institutional capacity for project development that facilitates access to climate finance and the inclusion of community developed adaptation technologies.

3.4 Knowledge and equity gaps, social inclusion challenges in climate change adaptation policies in Senegal

The analysis of the implementation process of climate action and adaptation policies in Senegal highlights a number of gaps and barriers. This gaps among others have the potential to disrupt the climate action goals that the country has committed to in accordance with the Paris Agreement. In addition, little adaptation impact might be achieved at the local level if adequate interventions are not made to address the following gaps:

- I. poor integration of climate risks in the planning of sectoral development policies;
- II. inequalities in access to climate financing between priority adaptation sectors and vulnerable territories;

- III. the weakness of technical and scientific capacity to transfer and take ownership of innovative adaptation strategies with a high impact on communities;
- IV. the low consideration of communities and local actors' adaptation needs; and
- V. the lack of a framework to monitor and evaluate performance in climate policies implementation, such as the Monitoring, Reporting, Verifying (MRV) system.
- VI. Although the relevance and coherence of adaptation strategies are often very clearly demonstrated in the project development or design phase, their effective integration into local development policies is a major challenge from both a technical and political point of view.
- VII. there is a complexity of integrating climate change adaptation initiatives in local communities due to the fact that climate consideration is reduced to a qualitative aspect that informs central decision-makers rather than a quantitative assessment of possible effects on development policies at the local level.
- VIII. implementing priority adaptation options contained in the NDC and NAP of Senegal does not clearly define a framework for integrating a locally led approach to adaptation
- IX. Inadequate research knowledge on the potential for the development and implementation of climate adaptation through locally driven adaptations in Senegal
- X. most adaptation strategies have been marked by exogenous adaptation practices and with restrictive local communities' participation.

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