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Collaborative Adaptation Research Initiative in Africa and Asia

Review of Current and Planned Adaptation Action in Mali

CARIAA Working Paper #11

Alicia Natalia Zamudio

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About CARIAA Working Papers

This series is based on work funded by Canada's International Development Research Centre (IDRC) and the UK's Department for International Development (DFID) through the **Collaborative Adaptation Research Initiative in Africa and Asia (CARIAA)**. CARIAA aims to build the resilience of vulnerable populations and their livelihoods in three climate change hot spots in Africa and Asia. The program supports collaborative research to inform adaptation policy and practice.

Titles in this series are intended to share initial findings and lessons from research and background studies commissioned by the program. Papers are intended to foster exchange and dialogue within science and policy circles concerned with climate change adaptation in vulnerability hotspots. As an interim output of the CARIAA program, they have not undergone an external review process. Opinions stated are those of the author(s) and do not necessarily reflect the policies or opinions of IDRC, DFID, or partners. Feedback is welcomed as a means to strengthen these works: some may later be revised for peer-reviewed publication.

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Abstract

In Mali, the impacts of climate change and variability, including droughts, floods, rising temperatures, and later onset of rainy seasons, present a challenge to the country's efforts to stabilize, recover from crisis, and prosper. While Mali might not experience dramatic changes to its climate in the coming decades, the country's fragility, its dependence on climate-sensitive sectors such as agriculture, its history of tensions and conflicts between resource-user groups and between pastoralists and the government, along with its low levels of development, make it highly vulnerable to this process. The Government of Mali has made considerable progress in drafting climate change policies and strategies, identifying adaptation priorities and starting a process for greening its national development plans. However, integration of climate risks across sectors, including agriculture, livestock, water, health, and energy, remains weak. Many current initiatives and proposed measures under the National Climate Action Plan focus on strengthening institutional capacities to implement adaptation strategies at the national, regional, and local levels, recognizing the need to build the capacity of local governing entities and speed up the decentralization process initiated many years ago. Among the ongoing adaptation projects identified, most focus on rendering the agricultural sector more resilient, while other vulnerable sectors, groups, and regions, including pastoralists living in the north and the fisheries sector, have received much less attention. This profile of adaptation action in Mali is one in a series of country reviews prepared to support the work of the Collaborative Adaptation Research Initiative in Africa and Asia (CARIAA) in its countries of engagement.

Résumé

Examen des mesures d'adaptation actuelles et prévues au Mali

Au Mali, les effets de la variabilité du climat, notamment la sécheresse, les inondations, la hausse des températures et le raccourcissement de la saison des pluies, compliquent les efforts du pays visant à atteindre une stabilité, à se rétablir à la suite de la crise et à prospérer. Bien qu'il soit possible que le Mali n'observe pas de changements climatiques importants dans les décennies à venir, la fragilité du pays, sa dépendance envers des secteurs sensibles au climat comme l'agriculture, ses antécédents en matière de conflits et de tensions entre les utilisateurs des ressources et entre les pasteurs et le gouvernement, ainsi que son faible niveau de développement en font un pays extrêmement vulnérable. Le gouvernement malien a fait des progrès considérables quant à l'élaboration de politiques et de stratégies relatives aux changements climatiques, à la détermination des priorités en matière d'adaptation et au lancement d'un processus d'écologisation de ses plans de développement nationaux. Cependant, l'intégration du risque climatique à différents secteurs, notamment l'agriculture, l'élevage, l'eau, la santé et l'énergie, reste faible. De nombreuses initiatives actuelles et mesures proposées en vertu du plan national d'action sur le climat sont axées sur le renforcement des capacités institutionnelles de mise en œuvre des stratégies d'adaptation à l'échelle nationale, régionale et locale, sur la reconnaissance du besoin de renforcer les capacités des autorités locales et sur l'accélération du processus de décentralisation lancé il y a plusieurs années. Bon nombre des projets d'adaptation en cours identifiés sont fondés sur le renforcement de la résilience du secteur agricole, tandis que d'autres secteurs, groupes et régions vulnérables, notamment les pasteurs vivant dans le nord et le secteur des pêches, ont reçu une bien moindre attention. Ce profil des mesures d'adaptation au Mali fait partie d'une série d'examens des pays préparés dans le cadre de l'Initiative de recherche concertée sur l'adaptation en Afrique et en Asie dans les pays où elle est déployée.

Acronyms

AEDD	Environment and Sustainable Development Agency | Agence de l'Environnement et du Développement Durable
AfDB	African Development Bank
ASSAR	Adaptation at Scale in Semi-Arid Regions
BMUB	Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety | Bundesministerium für Umwelt, Naturschutz Und Reaktorsicherheit (German government)
BRACED	Building Resilience and Adaptation to Climate Extremes and Disasters
CAF	Climate Adaptation Fund
CARIAA	Collaborative Adaptation Research Initiative in Africa and Asia
CGIAR	Consultative Group on International Agricultural Research
CIA	Central Intelligence Agency (U.S. government)
ClimDev-Africa	Climate for Development in Africa
CNCC	National Climate Change Committee | Comité National Changements Climatiques
CSCRP	National Strategy for Growth and Poverty Reduction | Cadre Stratégique pour la Croissance et la Réduction de la Pauvreté
DFID	Department for International Development (British government)
DRR	disaster risk reduction
FAO	Food and Agriculture Organization
FONGIM	Forum of International NGOs in Mali | Forum des ONG Internationales au Mali
GCCA	Global Climate Change Alliance
GEF	Global Environment Facility
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
IDRC	International Development Research Centre

IIED	International Institute for Environment and Development
IPCC	Intergovernmental Panel on Climate Change
LDCF	Least Developed Countries Fund
MA	Ministry of Agriculture, Livestock and Fishing
MEA	Ministry of Environment and Sanitation | Ministère de l'Environnement et de l'Assainissement
MET	Ministry of Infrastructure and Transport | Ministère de l'Équipement et des Transports
NAPA	National Adaptation Programme of Action
ND-GAIN	Notre Dame Global Adaptation Index
ODA	official development assistance
OECD	Organisation for Economic Co-operation and Development
PANC	National Climate Action Plan | Plan d'Action National Climat
PDA	Agricultural Development Policy | Politique de Développement Agricole
PDDSS	Decadal Sanitation and Social Development Plan | Plan Décennal de Développement Sanitaire et Social
PNCC	National Climate Change Policy | Politique Nationale Changements Climatiques
PRODESS	Sanitation and Social Development Programme | Programme de Développement Sanitaire et Social
RCP	Representative Concentration Pathway
SNCC	National Climate Change Strategy | Stratégie Nationale Changements Climatiques
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change

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Alicia Natalia Zamudio is a researcher with the CARIAA-supported review of current and planned adaptation in the CARIAA program's countries of focus. She studies the risks and opportunities climate change poses for developing countries, and helps decision-makers, civil society, and local communities build their capacity to better manage these risks.

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Synopsis

Climate risks	• More frequent droughts and associated desertification • Temperature rise in West Africa of projected 0.9°C by 2035, 2.1°C by 2065, and 4.0°C by 2100 under high warming scenario; warming mostly in the north and northwest regions of Mali • Less predictability in the start and end dates of the rainy seasons, with a tendency of delayed onset and later retreat • No consensus on projected rainfall patterns	**Key sources of vulnerability**	• Mali is classified as a least developed country, with one of the lowest scores on the Human Development Index and over 40% of its population living in poverty • Lack of access to adequate sanitation services, especially in rural areas • Large inequalities between urban and rural areas in general • High dependency on climate-sensitive agricultural sector, while only 14% of land is considered arable • History of tensions and conflicts over resource use; recent conflicts in 2012 and a remaining fragile situation

Vulnerable sectors	Illustrative potential impacts on vulnerable sector	Illustrative adaptation priority adaptation measures in each sector[1]	Projects in sector[2]
Agriculture	• Reduced production yields of main subsistence and commercial crops • Growing food insecurity	• Diversify income-generating activities • Adopt drought-tolerant species • Produce and use climate information • Restore degraded lands	64%
Health	• Increased incidence of water-borne diseases such as cholera, dysentery, and temperature-sensitive diseases such as malaria	• Establish information system on disease risks	0%
Fishing	• Reduced fish catches and revenues	• Establish aquaculture and diversify income revenue	0%
Energy	• Reduced hydroelectricity potential and predictability	• Adopt renewable energies (biofuels, solar energy)	5%
Water	• Increased water scarcity in some regions and increased floods in others depending on scenarios	• Increase water availability through improved catchment techniques and restoration of water sources • Increase groundwater usage	9%

[1] Based on Ministry of Infrastructure and Transport (2007); and Ministry of Environment and Sanitation and Environment and Sustainable Development Agency (2011c).
[2] Percentage of total identified discrete adaptation projects and programs based upon research undertaken as part of this review. Note that individual projects may address more than one sector.

Livestock	• Reduced livestock production linked to higher mortality rates • Changes in production systems towards smaller cattle and settlement • Potential exacerbation of conflicts between pastoralists and farmers	• Restore degraded lands • Develop fodder crops and adopt more adapted plant and animal species • Intensify livestock rearing	32% focused on pastoralism

Particularly vulnerable regions	**Particularly vulnerable groups**	**Status of climate governance (policies, institutions)**
• Northern regions are particularly vulnerable, as climate is very arid, the Sahara desert covers parts, and they are the poorest regions of the country. • Central and southern regions along the Niger River Basin are vulnerable to floods and changes in water resource availabilities. • Urban centres such as Bamako are vulnerable to extreme climate events damaging already poor infrastructure systems such as those for water supply and sanitation.	• Small-scale farmers • Pastoralists • Artisans	• *National Adaptation Programme of Action* (2007), *National Climate Change Policy* (2011), *National Climate Change Strategy* (2011), and *National Climate Action Plan* (2011) released. • Mali Climate Fund set up in 2012. • Formal integration of climate change into policies of most key sectors has yet to happen.

Introduction

The landlocked Republic of Mali is one of the largest countries in the world,[3] with a total area of 1,240,192 square kilometres. Located in Western Africa in the southern part of the Sahara desert, it shares land borders with seven other countries (Algeria to the north, Niger and Burkina Faso to the east and southeast, Côte d'Ivoire and Guinea to the south, and Senegal and Mauritania to the west). The country is divided into eight regions and one capital district, Bamako; the regions in turn are subdivided into 49 districts (*cercles*) and 703 municipalities (communes) (Central Intelligence Agency [CIA], 2015; Ministry of Environment and Sanitation [MEA], 2011). Mali is a flat country that has a climate spanning from subtropical to arid along a south-north axis. About 65% of Mali is classified as arid (World Bank, 2015b; CIA, 2015), including two of its four main agro-ecological zones: the Saharan zone and the central Sahel zone in the northern parts of the country (see Figure 1).

Mali is one of the poorest countries in the world, with over 40% of its population living in poverty, mostly in the northern regions (World Bank, 2015a). Its economic activity is largely confined to the southern portion of the country and riverine area of the Niger River. Despite the fact that only about 14% of the country's land area is considered arable, around 40% of the country's GDP is derived from agriculture production, especially rain-fed subsistence crops such as millet, sorghum, maize, and wheat (World Bank, 2015a; MEA, 2011; A. Coulibaly, 2006). Commercial crops such as cotton, sugar cane, and rice, along with gold mining, ensure the country's revenue. However, Mali remains dependent on foreign aid and remittances, and is subject to fluctuating commodity prices and harvest levels (World Bank, 2015a; CIA, 2015). Several events in recent years have negatively affected the country's economy: the 2012 collapse of state control over its northern territories, a military coup, terrorist activities in the north, and French foreign military intervention against Islamic fighters. Even though GDP has slowly risen since 2013, the country remains in an extremely fragile state (World Bank, 2015a).

Climate change has the potential to amplify Mali's fragility, which is driven by physical insecurity, weak governance, poor infrastructure, limited basic service provision, and low state legitimacy. Climate risks, especially recurrent droughts, have historically played a role in exacerbating these issues, causing significant damage to agriculture and livestock production in most rural areas of Mali and threatening food security. Climate risks have also been partly responsible for undermining social stability by heightening tensions between the minority nomadic population practicing livestock rearing and the majority population of sedentary pastoralists and agro-pastoralists. Mali's fragility and extremely low level of adaptive capacity due to its political, social, and economic situation make climate change a serious issue for the country.

[3] It is the 24th largest country in the world and the 8th largest country in Africa (CIA, 2015).

This paper provides a snapshot of Mali's current and planned efforts to support adaptation to climate change. Drawing upon available literature and key informant interviews, it has been prepared to support the work of the Collaborative Adaptation Research Initiative in Africa and Asia (CARIAA). Jointly funded by the U.K. Department for International Development (DFID) and the International Development Research Centre (IDRC), CARIAA aims to help build the resilience of poor people to climate change in three "hot spots" in Africa and Asia: semi-arid areas, deltas in Africa and South Asia, and glacier- and snow-fed river basins in the Himalayas. To achieve this goal, it is supporting four consortia to conduct high-calibre research and policy engagement activities that will inform national and subnational planning processes in 17 countries, including Mali.

The paper begins by summarizing current understanding of existing and projected climate risks in Mali, followed by a discussion of the factors related to its current development status that increase the vulnerability of the country and its people to changing climatic conditions, and the potential implications of these changes for key sectors and groups. Section 4 provides an overview of the critical policies and plans shaping Mali's efforts to address climate change adaptation at the national and subnational levels. To assess the extent to which efforts to address the country's critical adaptation priorities are presently under way, Section 5 paints a general picture of the scale, type, and focus of current and planned adaptation-focused programs and projects in Mali as well as the level of adaptation finance flowing into the country. Section 6 provides a profile of networks and communities of practice active in the field of climate adaptation. The paper concludes with an assessment of the general status of adaptation planning at the national and subnational levels in Mali.

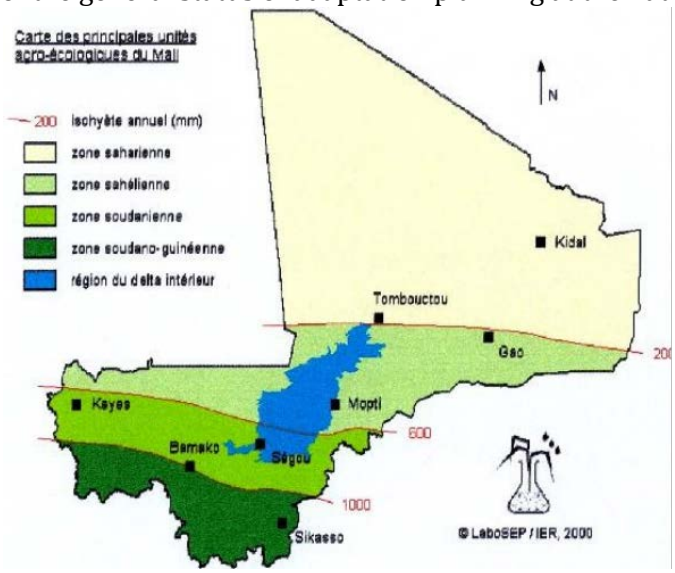


Figure 1 – Agro-ecological zones in Mali: namely, the northern arid Saharan zone, with annual rainfall from 0 mm to 200 mm; the central semi-arid Sahel zone, with annual rainfall between 200 mm and 600 mm; the southern semi-arid to sub-humid Sudan zone, with annual rainfall between 6,000 mm and 1,000 mm, allowing agriculture and livestock rearing; and the sub-humid Sudano-Guinean zone at the southern tip of the country with rainfall over 1,000 mm annually (A. Coulibaly, 2006; MEA, 2011).

1. Current climate and projected changes

While Mali's southern regions are subtropical and much wetter than the rest of the country, especially around the Niger River basin, its northern regions (covering 75% of the country) display high levels of aridity, reflecting the country's location in the Saharan desert (A. Coulibaly, 2006; MEA, 2011). The country is characterized by two seasons: a dry season that lasts nine months (October to June) in the north and six months (November to April) in the south, and a wet or winter season that lasts three months (July to September) in the north and six months (May to October) in the south.

Temperatures are high across the country, with annual mean temperatures ranging between 27°C and 30°C; slightly cooler temperatures—between 25°C and 27°C—are experienced in the mountainous regions of the north. Maximum temperatures can reach 45°C, while minimum temperatures are rarely below 10°C (Ministry of Infrastructure and Transport [MET], 2007). There are important seasonal and regional variations in temperatures across the country. This is especially the case for the north, where temperatures range from 27°C to 35°C in summer and 15°C to 25°C in winter. Seasonal variations are less significant in the south, although the summer months are the coolest of the year (mean of 23°C to 27°C) (McSweeney et al., 2011).

Rainfall is extremely variable and irregularly distributed across Mali and Western Africa in general. The timing and magnitude of rainfall is largely dictated by seasonal migration of the Inter-Tropical Convergence Zone. Relationships between the El Niño Southern Oscillation and the West African climate are fairly weak, although there is evidence that the West African monsoon is mostly influenced during the developing phase of the El Niño Southern Oscillation or the decay of long-lasting La Niña events (Daron, 2014). In Mali, the wet or winter season is characterized by humid winds coming from the Gulf of Guinea. Most of the rain falls at this time and is more abundant in the southern part of the country as rainfall diminishes with increasing latitude (MEA, 2015; MET, 2007). Average rainfall ranges from less than 100 mm per year in northern Mali to more than 1,000 mm in the south; overall the precipitation peak happens in August (MET, 2007).

Extreme climatic events affecting Mali are principally droughts and associated desertification, followed by floods, strong winds, sand and dust storms, and high temperature extremes (MEA, 2011, 2015; MET, 2007). Between 1980 and 2007, the country suffered five major droughts and two major floods that affected around 3 million people (MEA & Environment and Sustainable Development Agency [AEDD], 2011a). Despite these occurrences, Mali is not among the countries globally that are significantly affected by extreme weather events, ranking 110th of 181 countries on the 2015 Global Climate Risk Index. For the period between 1994 and 2013, extreme weather events caused an average of 0.162 losses per unit of GDP and the deaths of 0.040 per 100,000 inhabitants (Kreft et al., 2014).

1.1 Observed climate trends

The process of climate change has begun to be observed in Mali over the last several decades, with increasing temperatures, decreasing rainfall, and more frequent and intense extreme climate events such as droughts, floods, and strong winds (MEA, 2015). Temperatures across Western Africa have increased by 1°C on average over the past 50 years (Daron, 2014). In Mali, mean annual temperature has increased by 0.7°C since 1960 at an average rate of 0.15°C per decade and at a rate of increase of 0.25°C per decade for the dry season (McSweeney et al., 2011).

While rainfall is highly variable on interannual and interdecadal time scales, rainfall totals seem to have been decreasing. This was especially observed during the early 1980s, which were very dry years in Mali and other neighbouring Sahelian countries. While rainfall has recovered to some extent, daily rainfall observations indicate a decreasing trend, especially in the wet season (McSweeney et al., 2011; MEA,

2011). Other data estimate that precipitation decreased by 20% between 1971 and 2000 when compared to the period of 1951 to 1970 (MEA, 2015). Overall, rainfall trends remain weak (Daron, 2014).

1.2 Climate change projections

General circulation model results from the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) using the Representative Concentration Pathway (RCP) 8.5 indicate that mean annual temperatures in West Africa will rise by a median of 0.9°C (0.7°C to 1.5°C) by 2035, 2.1°C (1.6°C to 3.3°C) by 2065 and 4.0°C (2.6°C to 5.9°C) by 2100. Warming is projected to be greater than the mean increase during the months of December, January, and February and less than the mean during the months of June, July, and August (Christensen et al., 2013).[4] Warming will be more important in the already hot and dry north and northwest regions of Mali (MEA, 2015).

Model simulations of precipitation changes for the Sahelian and south Saharan regions of Africa generally show wide disagreement, with some studies predicting a drier Sahel during the second half of the 21st century and others projecting a wetter Sahel (Daron, 2014). Scenario projects in the IPCC's Fifth Assessment Report for the RCP 8.5 suggest the potential for a small annual increase of 1% by 2035 for West Africa (but ranging between a decrease

[4] These projections represent a 50% likelihood of occurrence, using 39 global models and the RCP 8.5 scenario for the time periods 2016–2035, 2046–2065, and 2081–2100 and against a baseline period of 1986–2005.

of 4% to an increase of 8%), a small increase of 2% (between -8% and +8%) by 2065, and an increase of 5% (between -10% and +16%) by 2100. The same models project an average annual decrease of about -2% by 2100 for the Saharan region. Considering that northern Mali is part of the Saharan region, the northern parts of the country will likely see either little difference or a small decrease in rainfall, while the rest of the country will see either no difference or a small increase (Christensen et al., 2013). Specific scenarios elaborated by Mali in 2003 also concluded that rainfall will not change significantly in the coming decades, or will slightly decrease and be characterized by more frequent droughts (MEA, 2015). While projections for rainfall differ widely, there is a tendency for less predictability at the start and end of the rainy season, with a delayed onset of rainy seasons and later retreat. In fact, some studies (e.g., Biasutti and Sobel, 2009, as cited in Daron, 2014) find that the overall length of the rainy season may be reduced in some parts of West Africa, which could in turn reduce the growing period.

2. Vulnerability to climate change

To set the stage for a discussion of Mali's vulnerability to climate change and its adaptation needs, this section provides an overview of the country's development context and actual and potential impacts of climate change on Mali's most vulnerable sectors, regions, and groups.

2.1 Current drivers of vulnerability

Mali is classified as a least developed country, a classification reflected in its status as having one of the lowest scores on the Human Development Index (0.407 in 2013) (United Nations Development Programme [UNDP], 2014b). Not surprisingly, the country's poor development progress is amply reflected in the basic statistics for its people, as presented in Table 1: just over 66% of the population lives in multi-dimensional poverty, life expectancy is only about 55 years for both women and men, 128 of every 1,000 children born in Mali will not live to their fifth birthday, the proportion of GDP spent on education remains lower than the regional average, and only 22% of the population has access to improved sanitation facilities (UNDP, 2014b). Within this general picture are geographical differences, as the majority of poor people live in rural areas and particularly in the country's northern regions. For example, while chronic malnutrition affects 27.8% of all children under five years of age, this number rises to 30.8% when only children in rural areas are considered (UNDP, 2013).[5]

[5] Based on the most recent data available, which is 2010 (UNDP, 2013).

Table 1 – Key indicators of development progress for Mali				
Category	**Indicator**	**Year**	**Value**	**Source**
Human development	Human Development Index (score[d]/rank[d] out of 187 countries)	2013	0.407 / 176	UNDP (2014a)
	Population in multi-dimensional poverty (%)	2013	85.6%	
	Under-five mortality rate (per 1,000 live births)	2013	128	
	Adult literacy rate (15 years of age and above)	2013	33.4[c]	
	Improved water source, rural (% of population with access)	2012	54%	World Bank (2015b)
	Improved sanitation facilities (% of population with access)	2012	22%	
	Access to electricity (% of population)	2010	16.6%	
Gender	Gender Inequality Index (value[e]/rank[d] out of 187 countries)	2013	0.673 / 176	UNDP (2014a)
Demographics	Total population (in millions)	2013	15.301[a]	UNDP (2014a)
	Average annual population growth rate	2010	3.2%	
	Population, urban (% of population)	2011	36.2% [b]	
Economic development	GDP (in current $US, millions)	2013	10,942.72	World Bank (2015b)
	GDP growth (annual %) (average of period of 2010 to 2013)		2.6%	
	Agricultural land (% of land area)	2012	34.1%	
Governance	Corruption Perceptions Index – score[f]	2014	32	Transparency International (2014)
	Corruption Perceptions Index – rank[d] out of 174 countries	2014	32 / 115	
	Fragile States Index – score out of 120[g]	2014	89.9	Fund for Peace (2014)
	Fragile States Index – status	2014	Very High Warning	
	Expenditure on education, public (% of GDP)	2012	4.7%[c]	UNDP (2014a)
	Expenditure on health (% of GDP)	2011	6.8%	

Environment	Population living on degraded land (%)	2010	No data	UNDP (2014a)
	Change in forest area, 1990/2011	2013	-11.8%	

[a] Projections based on medium-fertility variant
[b] Because data are based on national definitions of what constitutes a city or metropolitan area, cross-country comparison should be made with caution.
[c] Data refer to the most recent year available during the period specified
[d] Where 1 or first is best
[e] Where 0 is best
[f] Where 0 is highly corrupt and 100 is very clean
[g] Where 120 is very high alert, and 0 very sustainable

Despite the continuing development challenges of the country, there has been some progress in recent years. Malnutrition among children under five years of age has declined (from 26.7% in 2006 to 18.9% in 2010) (UNDP, 2013) and adult literacy has increased (from 26.2% in 2006 to 33.4% in 2013) (World Bank, 2015a; UNDP, 2014a). A greater proportion of the rural population has access to improved water sources (up from 43% in 2005 to 54% in 2012). However, there are still striking differences between urban and rural access to potable water, with people living in urban areas having much greater access than rural households (UNDP, 2013).

Additionally, in spite of promising steps toward addressing gender inequality in Mali through actions such as adopting the *National Gender Policy*[6] and establishing a high-level advisory body to support implementation of this policy, Mali continues to rank as one of the most unequal countries in the world[7] (UNDP, 2014a; UNDP, 2013). For example, although some progress toward education parity has been made, the number of women with some secondary education is less than half of that of men. Also, the maternal mortality ratio is still elevated, with 540 deaths per 100,000 live births in 2013 (UNDP, 2014b).

The vulnerability of Mali to shocks and stresses, including those related to climate change, is further exacerbated by its demographic trends, dire economic situation, and weak governance. Mali's population is currently estimated to be 15.3 million people, with a high and stable population growth rate of around 3%. A majority of the population (about 64%) lives in rural areas. While the population density varies from very low in the north to much higher in the central and southern regions of the country, the growth rate is putting pressure on Mali's natural resource base, particularly around southern urban centres (MEA, 2015). A high conversion rate of marginal and forested lands into agricultural lands has

[6] *Politique Nationale Genre du Mali.*

[7] Mali ranks 176th out of 187 countries in the gender inequality index (UNDP, 2014a).

contributed to a loss of soil fertility and increased erosion (MEA, 2011). As a result, the Niger River and lakes are at major risk of siltation.

Most of Mali's economic activity is confined to the southern region and riverine area of the Niger River (CIA, 2015; World Bank, 2015a). Agriculture remains a cornerstone of its economy, despite the fact that about only 14 % of the country's territory is considered arable. The sector accounts for around 40 % of the country's GDP and, along with fishing, employs around 80 % of the population. Food security in Mali is closely linked to agriculture production, which is mostly rain fed, and how it is affected by extreme climate events; droughts and high desertification rates severely affect agriculture production and associated food security, especially in the poor northern regions of the country.

A mix of agriculture, livestock rearing and agro-pastoral systems can be seen in the southern parts of country, due to more favourable climatic conditions, while livestock production takes places exclusively in the Sahelian zone. Nomadic pastoralists are found in the Sahara zone (MEA, 2011). Fishing is practiced in all water bodies, with the main production zones being the Central Niger Delta, Lake Sélingué, and Lake Manantali (A. Coulibaly, 1996). Fishing has increased near urban centres such as Bamako, Kayes, Ségou, Sikasso, and Gao. Commercialization of fish is dominated by women (B. Coulibaly, 2009).

The country's dependence on agriculture extends to the industrial sector, which makes up about 23% of GDP and is concentrated around processing agricultural commodities. Along with cotton, gold is a key export commodity for the country; together they constitute 80% of national exports (CIA, 2015; World Bank, 2015a). Although the country is developing its iron ore extraction industry to diversify earnings away from gold, overall its economy remains vulnerable to fluctuating commodity prices and harvesting success. It is also dependent on foreign aid and remittances (CIA, 2015; World Bank, 2015a).

The country's economy was significantly affected in 2012 by a series of political and security factors that began with the collapse of state control over its northern territories and was followed by an inconclusive military coup and French foreign military intervention against Islamist fighters' progress from the north to the south of the country. GDP growth dropped to -0.4% in 2012, down from a rate of about 5% per year between 1996 and 2011, and has been slowly growing again since 2013 (World Bank, 2015a).

The drivers of these conflicts are diverse, but include lack of government legitimacy linked in part to its settlements programs in the north targeting nomadic groups, including the Tuaregs; worsening levels of perceived corruption in 2014 compared to 2012; low levels or lack of government capacities to provide basic needs and services to the population; and an increased presence of Islamic terrorist groups. Tuareg rebellion is a long-standing conflict. Moreover, droughts and desertification in the north have been linked to massive movements from the north to the south, leading to conflicts between pastoralists and farmers (MEA & AEDD, 2011a; S. Fontaine, personal communication, 2015; Transparency International, 2014). Conflicts since 2012 had resulted in an estimated 151,150 internally

displaced persons in 2014 (CIA, 2015). The country remains in an extremely fragile state, scoring 89.9 (out of 120) on the Fragile States Index (Fund for Peace, 2014).

2.2 Vulnerability of key sectors, regions and groups

While Mali might not experience dramatic changes to its climate in the near future, the country's fragility, its dependence on climate-sensitive sectors such as agriculture, its history of conflicts over resource use between farmers and pastoralists, and its low levels of development makes it highly vulnerable to climate change and variability. This finding is reflected in Mali's very high vulnerability ranking on the Notre Dame Global Adaptation Index (ND-GAIN), which also finds a growing vulnerability trend (see Table 2) (ND-GAIN, 2015).

Table 2 – Mali's position in ND-GAIN (ND-GAIN, 2015)

	World rank	Score	Trend
Vulnerability	174 (of 180)	0.588*	---
Readiness	135 (of 184)	0.354**	↑
Overall	161 (of 178)	38.4	↑

* Lower score on a scale of 0 to 1 indicates lower vulnerability
** Higher score on a scale of 0 to 1 indicates higher preparedness

ND-GAIN's vulnerability assessment is based on an analysis of a country's exposure, sensitivity, and ability to adapt to climate impacts in six sectors: food, water, health, ecosystem services, human habitat, and infrastructure. The Government of Mali has identified most of these sectors as being vulnerable to climate risks. These were first identified during the elaboration of the country's National Adaptation Programme of Action (NAPA) and include, from the most vulnerable to the least vulnerable sectors: agriculture, health, fishing, energy, water resources, livestock rearing, forest-fauna, habitat (biodiversity), transport, industry and education (MEA, 2015; MET, 2007). Table 3 gives examples of how these sectors are affected by climate change, and they are further discussed below. According to the studies undertaken to elaborate the NAPA, the social groups most vulnerable to climate change are small-scale farmers and pastoralists, as well as artisans (MEA, 2011).

In terms of its readiness to improve resilience and more efficiently respond to climate and other challenges, the country exhibits low capacity, as reflected by its ranking on the ND-GAIN Readiness Index. This is measured as a function of economic, governance, and social criteria. Mali scored most poorly in its governance capacity (which includes measures of a country's political stability and violence levels), which is linked to its past and current fragility situation.

Table 3 – Climate change impacts on key vulnerable sectors in Mali (MEA, 2011, 2015; MEA & AEDD, 2011a; MET, 2007)

Sector	Likely impacts of climate change
Agriculture	• General reduction of production yields across localities, particularly of corn, cotton, millet, and sorghum • Associated negative effect on the country's exports and entire economy as well as on food security and poverty • Increased soil erosion and wildfires, affecting food security
Health	• Increased incidence of water-borne diseases (such as cholera and dysentery) linked to stagnant waters and floods, which would damage sanitation systems or inundate safe drinking water supply infrastructure • Increased frequency and length of droughts, affecting food security and leading to malnutrition and other health issues such as diarrhea • Higher temperatures, leading to the incidence of diseases such as malaria and meningitis spreading to new locations
Fishing	• Loss of fish due to inhospitable habitat • Transportation difficulties caused by impact of higher temperatures on refrigeration
Energy	• Decreased rainfall, higher evaporation rates, and higher temperatures, as well as higher variability in rainfall patterns that could reduce hydroelectricity potential and predictability • Decreased fuel wood production
Water	• Under one scenario: potential for reduced surface water and groundwater resources, including drying out of some surface water points and decreases of rivers and lake water tables; water quality would also decrease • Under a second scenario: potential increase in water resources and more intense and frequent floods, which would damage sanitation and water supply systems and increase health risks
Livestock	• Increases in animal mortality linked to higher incidence of diseases due to increased temperatures • Decreases in livestock production due to reduction in grasslands • Reduced groundwater tables, leading to changes in pastoralists' migration routes • Potential shift from livestock rearing to sedentary agricultural production systems • Potential shift in livestock production from larger animals to smaller camelids and ruminants • Potential exacerbation of existing conflicts between pastoralists and farmers

Irrigated and rain-fed agriculture will be negatively affected by greater climate variability, including more frequent droughts and changes in rainfall patterns, leading to reductions in production yields of corn, cotton, millet, and sorghum (MEA, 2015). The Ministry of Environment and Sanitation has estimated that corn's productivity deficit would vary

between 51 tonnes to 1,518 tonnes by 2025 in relation to 1961–1990 conditions, and cotton's productivity deficit could reach around 3,500 tonnes by 2025 depending on location, since its production is very water intensive. Impacts on the cotton industry in particular could have a strong negative effect on the country's exports and foreign exchange earnings (MEA, 2015).

In general, increased flooding could lead to an increase in diarrhea and other water-borne diseases, as floods damage the country's already insufficient sanitation and water supply infrastructure. Moreover, due to temperature increases, malaria and other diseases such as meningitis are spreading; the incidence of meningitis is moving from the country's north to the south. Furthermore, recurrent droughts and declines in productivity from rain-fed agriculture may be expected to cause greater incidence of malnutrition.

The fishing sector could also be negatively affected by the loss of fishing grounds as some water holes dry out with higher temperatures and fish habitats become inhospitable with changes in oxygen levels and increased water temperature. Moreover, transportation of refrigerated goods is rendered more difficult with higher temperatures, as ice availability is low in the country. This could result in risks for human health due to unsafe food storage.

In terms of energy, changes in rainfall patterns, greater irregularity of rainfall, and decreasing precipitation may be expected to severely impact electricity production from hydropower; the Ministry of Environment and Sanitation predicts reductions in hydroelectricity of up to 22% by 2025. This change would impact the economy as a whole (MEA, 2011).

Impacts on water resources are and will be important. However, the direction of change is radically different depending on the two scenarios recently elaborated for Mali (MEA, 2015). According to the first scenario, which reflects business as usual levels of greenhouse gas emissions, by 2025 surface water resources would decrease by 35% and renewable groundwater sources would decrease by 13% in relation to the 1961–1990 period. Combined with more frequent droughts, some surface water points would dry out in rural areas and the water tables of rivers and lakes would decrease. This would in turn increase the concentration of water pollution and reduce water quality. Water scarcity would also lead to increases in wildfires and soil erosion, and would compromise food security. According to the second scenario, in which efforts are undertaken globally to reduce greenhouse gas emissions, by 2015 water resources would increase by 18% for surface waters and by 9% for renewable groundwater resources in relation to the 1961–1990 period. The scenario also suggests that more intense and frequent floods would continue to damage sanitation and water supply systems (such as in Bamako), with risks of increasing water-borne diseases (such as cholera and dysentery).

Climatic changes and variability are already negatively affecting the livestock sector. Livestock production is decreasing and is projected to further decline due to reduced quantity and quality of natural grasslands, the result of heightened soil erosion rates and

desertification, which are linked to higher temperatures and droughts. Higher temperatures will also increase disease incidence and thus induce higher cattle mortality rates. Moreover, reduced groundwater tables will lead to changes in pastoralists' migration routes, compounded by higher pressure from degraded grasslands and increased population pressure. Shifts from the raising of larger animals to smaller camelids and ruminants will continue, and there could be a shift from livestock rearing to sedentary agricultural production systems as well. As a result, existing conflicts between pastoralists and farmers could be heightened.

3. Adaptation planning context

This section provides an overview of the policies, plans and strategies that have the potential to advance adaptation efforts in Mali. It summarizes the institutional arrangements in charge of and involved in climate change in the country and provides an assessment of the extent to which climate adaptation has been mainstreamed into national sectoral policies and plans. Table 4 provides a general assessment of the country's progress in establishing a comprehensive and effective system for adaptation planning and action.

Table 4 – National adaptation planning context: Summary of progress as of May 2015

Indicator	Progress
Climate change recognized in country's guiding development vision/plan	Yes, partly in Mali 2025: National Prospective Study (Mali 2025) and in the National Strategy for Growth and Poverty Reduction (CSCRP) 2012–2017
National-level coordinating entity for climate change established and active	Partially; the AEDD and the National Climate Change Committee (CNCC) have been established, but the CNCC is not very active and the AEDD has been slow in fulfilling its mandate
Climate change policy and/or law in place	The National Climate Change Policy (PNCC) (2011) still needs to be approved by the government
Climate change strategy published	Yes, the National Climate Change Strategy (SNCC) (2011)
Climate change action plan published	Yes, the National Climate Action Plan (PANC) (2011)
Adaptation plan published	Yes, the NAPA (2007)
Climate change fund or national adaptation fund operational	Yes, the Mali Climate Fund was set up in 2012

Climate change units established in key ministries	Not present
Climate change integrated into national sectoral policies	Only to some extent in a few sectors (e.g., sanitation); actual formal integration has yet to happen in most key sectors

3.1 National-level development policy context

Mali's long-term development vision is outlined in Mali 2025: National Prospective Study[8] adopted by the government in 2000 (Government of Mali, 1999). Its vision is:

> Conjuguer sagesse, authenticité et dynamisme pour faire du Mali, une Nation prospère, performante et moderne dont le peuple aura "su se saisir résolument de son propre devenir pour demeurer un Peuple uni dans sa riche diversité, tourné vers un But commun et ayant une Foi indéfectible en son avenir.

This may be translated as:

> To combine wisdom, authenticity, and dynamism to make Mali a prosperous, performing, and modern nation whose people will "know to seize their own future to remain a united People in its rich diversity, turned to a common Goal and having an unwavering Faith in its future."

Mali 2025 is built around five strategic objectives, eight sub-objectives and 29 strategic orientations. The five strategic objectives are as follows when translated: (i) a united nation on a diversified and rehabilitated cultural base, (ii) a political and institutional organization that ensures development and social peace, (iii) a strong, diversified, and open economy, (iv) an improved environmental setting, and (v) improved quality of human resources.[9] Under its fourth strategic objective, fighting against desertification and other climate-related impacts are cited. The second strategic objective focuses on improving Mali's political and social organization aims to strengthen long-term equitable access to social services by i) increasing equitable access to drinkable water, ii) increasing equitable access to sanitation, iii) establishing sustainable natural resource management systems, and iv) developing access to appropriate shelters and land tenure security (Government of Mali, 2011). While climate adaptation is not clearly addressed in this objective, its aim addresses current vulnerabilities and will indirectly help Mali deal with climate impacts on its scarce water resources.

[8] *Etude Nationale Prospective Mali 2025.*

[9] (i) une nation unie sur un socle culturel diversifié et réhabilité ; (ii) une organisation politique et institutionnelle garante du développement et de la paix sociale ; (iii) une économie forte, diversifiée et ouverte ; (iv) un cadre environnemental amélioré ; (v) une meilleure qualité des ressources humaines.

Mali 2025 and the Millennium Development Goals frame the country's third National Strategy for the Fight Against Poverty,[10] called the *National Strategy for Growth and Poverty Reduction (CSCRP) 2012–2017*, which is the reference document for the development and implementation of the country's current economic and social policies (Government of Mali, 2011). The Government of Mali decided to "green" the third of its strategic frameworks for poverty reduction by integrating sustainable development considerations. Therefore, 1 of the 10 critical challenges that the CSCRP aims to tackle is adaptation to climate change and sustainable management of the environment and natural resources (Government of Mali, 2011). However, this integration is limited to only three indicators and does not tackle productive sectors (AGRECO, 2014).

Additionally, the Government Programme of Action 2013–2018[11] lists the national government's priorities (Government of Mali, 2013b). These are articulated around six axes: i) establishment of strong and credible institutions, ii) restoration of security of people and goods throughout the national territory, iii) implementation of an active national reconciliation policy, iv) reconstruction of Malian schools, v) construction of an emerging economy, and vi) implementation of an active social development policy (Government of Mali, 2013b). Its approach is much more sectoral than the CSCRP and does not really take into account sustainable development or climate change risks.

3.2 National-level climate policy context

Mali completed its initial National Communication to the United Nations Framework Convention on Climate Change (UNFCCC) in 2000 and its NAPA in 2007 (MET, 2007). In 2011 the country completed additional components of its climate governance framework, namely the *National Climate Change Policy* (PNCC),[12] the *National Climate Change Strategy* (SNCC) to operationalize the Policy, and a National Climate Action Plan (PANC) to translate the objectives of the Strategy into concrete actions. A second National Communication (MEA, 2011) was also elaborated in 2011. Nevertheless, the priority adaptation needs and 19 adaptation actions identified in the NAPA remain the primary reference for elaboration of adaptation measures in the country and guided the actions present in the PANC. The Government of Mali's AEDD and UNDP have developed a strategy for a green and climate resilient economy, but it still needs to be approved (AEDD & UNDP, 2011; S. Fontaine, personal communication, 2015). This strategy foresees a specific governance structure to enable its implementation that includes a technical secretariat to be led by the AEDD.

Overall, as summarized in Table 4, Mali has made considerable progress with respect to documenting its climate change goals and objectives and identifying how they might be

[10] *Stratégie Nationale de la Lutte contre la Pauvreté*
[11] *Programme d'actions du gouvernement 2013-2018*

[12] While the policy was drafted in 2011, it was only approved by the Ministers Council in 2014 and has yet to be approved by the Parliament (S. Fontaine, personal communication, 2015).

achieved. However, some of these policies and strategies, including the PNCC, have yet to be formally approved by the Parliament, and their implementation has been further slowed down by the 2012 crisis, from which the country is still trying to recover (S. Fontaine, personal communication, 2015).

The overall objective of the PNCC is to contribute to poverty reduction and sustainable development by bringing solutions to the climate change challenge that do not limit Mali's socio-economic development (MEA & AEDD, 2011a). It provides the reference framework for improving coordination and synergies between the different climate change interventions and their integration into sectoral policies. It was elaborated after Mali 2025 and therefore is supposed to be aligned with its goals. The policy has six specific objectives: i) facilitate better integration of climate change in sectoral policies and strategies for socio-economic development and into planning processes at national and subnational levels; ii) strengthen people's adaptive capacity and the resilience of ecological, economic, and social systems to the effects of climate change by integrating adaptation measures in the most vulnerable sectors; iii) build capacity in prevention and management of climate risks and natural disasters; iv) contribute to the global effort to stabilize greenhouse gas emissions in the atmosphere, and promote international and regional cooperation; v) promote national research and technology transfer in the field of climate change; and vi) strengthen national capacities on climate change (MEA & AEDD, 2011a).

The SNCC identifies eight strategic axes along which specific actions will be needed (MEA & AEDD, 2011b):

i. Adopting and operationalizing the National Institutional Framework for Climate Change
ii. Organizing and promoting access to climate change financing
iii. Strengthening national capacities in climate change
iv. Strengthening awareness and information on climate change
v. Strengthening climate change follow-up
vi. Integrating climate change into sectoral policies
vii. Integrating climate change into subnational policies
viii. Incentivizing private sector engagement in climate change

Specific actions for implementing the SNCC are described in turn in the PANC, which identifies 148 actions along the strategy's eight strategic axes. Nearly 70% of these actions are related to the sixth strategic axis, which focuses on integrating climate change into sectoral policies. Of these actions, 40% target adaptation, while 20% focus on mitigation, 18% on strengthening climate change governance, and 16% on specific capacity building actions (MEA & AEDD, 2011c). Therefore, the country logically prioritizes adaptation over mitigation. The adaptation actions identified in the PANC are primarily those identified in the NAPA in 2007 but which had not yet been implemented (MEA & AEDD, 2011c).

Table 5 provides a list of adaptation priorities identified in the PANC and Mali's Second National Communication. Many of these measures target specific regions of the country, while others are to be implemented nationally. Many of the adaptation actions target the most vulnerable sectors identified by the government, including the agriculture and livestock sectors. Two other sectors identified as highly vulnerable—health and water—are targeted to a lesser extent but are expected to be complemented by extensive adaptation actions being proposed in the PANC. The least vulnerable sectors—transport, industry, and education—are not targeted by specific adaptation actions. Many actions are aimed at strengthening capacities to manage climate change—at the national and regional level—in accordance with the third strategic axis of the SNCC (strengthening national capacities in climate change) and its sixth strategic axis (integrating climate change into sectoral policies). Additional measures proposed in the PANC focus on integrating climate change in development planning, disaster risk management, climate change mitigation, and generating climate information and evidence of climate impacts in various sectors. Intentions to elaborate a National Adaptation Plan have not yet been formulated (S. Fontaine, personal communication, 2015).

Table 5 – Priority adaptation actions by sector identified in the NAPA (MEA & AEDD, 2011c; MET, 2007)[13]

Sector	Adaptation priority actions
Agriculture, livestock, fishing, forestry	• Adopt enhanced and adaptable crop varieties for the main crops: millet, sorghum, corn, and rice • Raise awareness and increase adoption of animal and plant species that are most adapted to climate conditions • Create and use better meteorological information systems (early warning systems) to inform agricultural production and contribute to food security • Establish aquaculture and diversification of income revenue • Diversify income-generating activities • Strengthen capacities of cereal banks • Restore degraded lands through implementation of water and soil conservation and restoration actions to improve agriculture, forestry and livestock rearing • Develop fodder crops • Promote food for livestock banks and intensive livestock rearing • Plan upstream land for promotion of irrigated crops through micro-dam construction among other actions • Equip boreholes with solar pumps or turbines (for watering livestock)* • Improve catchment of runoff water and restoration of water points (backwater, ponds, and lakes)*

[13] For a complete list of climate change actions, including adaptation and mitigation, please refer to the PANC (2011).

	• Improve wildfire management • Promote jatropha oil*
Water resources	• Improve catchment of runoff water and restoration of water points * • Equip boreholes with solar pumps or turbines*
Energy	• Adopt renewable energies, namely through use of the plant *Typha australis*, promotion of jatropha oil,* and removal of barriers to solar energy use
Health	• Establish an information system on disease risks related to climate change
Other natural resources	• Raise awareness and improve regulation on conservation of natural resources (through the development of local reforestation and agroforestry conventions)
Knowledge communications and capacity building	• Raise awareness and improve communication for building capacity of population on adaptation practices
*Indicates adaptation actions that meet needs related to more than one sector.	

3.3 Institutional structure for climate governance

Formally, Mali is a republic with a parliament, an executive power represented by the president and its government, a legislative power through its National Assembly, and a judiciary power with its Supreme Court, Constitutional Court, and other judiciary courts. With respect to climate change, two main entities are responsible for leading and overseeing implementation of policies and measures to deal with climate risks in Mali: the National Climate Change Committee (CNCC), set up in March 2011, and the AEDD, established in 2010 (Global Climate Change Alliance [GCCA], 2012; MEA, 2015). Both were established to support implementation of the SNCC's first strategic axis.

The CNCC is chaired by the Minister of the Environment and Sanitation and is composed of representatives of various public administrations, public and private sectors, academic and research institutions, and civil society. The CNCC plays a key role in promoting implementation of national climate change policies and plans (the PNCC, the SNCC, and the PANC). It is divided into four thematic groups: adaptation, mitigation, technology transfer, and finances and national capacity strengthening (MEA, 2015). However, the CNCC has not been very active, and there is discussion at the moment about trying to reactivate it (S. Fontaine, personal communication, 2015).

The AEDD, formerly the Technical Secretariat of Environmental Management Framework, is the executive entity in charge of coordinating the national response to climate change and evaluating implementation of the PNCC, the SNCC, and the PANC. It also acts as the permanent Secretariat to the CNCC and is part of the National Environmental Council (MEA,

2011, 2015). The AEDD is a division of the MEA. It has encountered difficulties in fulfilling its mandate, partly due to recurrent changes in ministers and public servants. For example, the MEA was previously the Ministry of Environment, Water and Sanitation, and has recently been changed to the Ministry of Environment, Sanitation and Sustainable Development[14] (S. Fontaine, personal communication, 2015).

The Mali Climate Fund was set up in 2012 to mobilize resources from domestic and international (bilateral, multilateral, and private) sources to support implementation of Mali's climate change strategies and plans. One of the first climate funds operational in Africa, it launched its first call for proposals in March 2014, after reaching a financing agreement between the Government of Mali, Sweden, and the UNDP in 2013, and has already selected three projects to be funded (S. Fontaine, personal communication, 2015; UNDP, 2015). The Fund is administered by the UNDP's Multi-Partner Trust Fund Office, with the AEDD acting as the technical secretariat. The Fund is framed by the SNCC's second strategic axis (UNDP, 2015). It is meant to provide services such as strengthening public-private partnerships and financing governmental entities to support the implementation of the SNCC (UNDP, 2015). The Fund received US$46 million in 2014, out of the US$250 million estimated as needed for the period 2012–2017 to implement the third, sixth, seventh, and eighth strategic axes of the SNCC. The Fund draws money from the Least Developed Countries Fund (LDCF), the Adaptation Fund, and any development partner and private sector entity that wishes to donate to this fund. Most money disbursed to date has come from the German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB), Sweden, the European Union, and the Malian government.

Allocation of finances from the Fund through a specific account in the national treasury is technically to be framed by investment plans detailed in the budgets submitted by ministries as part of the annual budgeting process, as well as by projects proposed in partnerships between the government, NGOs, and UN agencies. However, at the moment, only projects proposed in partnership with UN agencies are accepted; methods to allow the ministries and other partnerships to submit proposals are being discussed (S. Fontaine, personal communication, 2015). Approval of projects and initiatives is handled by the Pilot Committee Fund, chaired by the Minister of Environment and Sanitation and composed of four government representatives, as well as donors, civil society representatives, and the United Nations Residents Office. An independent panel of experts first reviews proposals and advises the Pilot Committee. The Pilot Committee is supervised by the CNCC and therefore has been built around existing national structures to ensure better functioning and capacity-building opportunities (UNDP, 2015). Monitoring and evaluation of the Mali Climate Fund is to be done through an annual audit of its activities and an impact evaluation to be undertaken every three years using macroeconomic indicators (UNDP, 2015).

[14] For consistency reasons, the Ministry of Environment is referred throughout this document as the Ministry of Environment and Sanitation (MEA), as it is still referred to on the official government website: http://www.environnement.gov.ml/.

In addition to the Mali Climate Fund, starting in 2015, decentralized Climate Adaptation Funds (CAFs) of £500,000 each will be established in three *cercles* in Mali. The CAFs are part of the three-year project called Decentralising Climate Funds in Mali and Senegal, led by the Near East Foundation (International Institute for Environment and Development [IIED], 2015).

Mali has nearly all the key institutional arrangements and national policies, strategies, and plans in place to support implementation of its adaptation measures. However, some of these elements are relatively young or not yet very effective, such as the AEDD and the recently activated Mali Climate Fund. Moreover, despite the will to take a multisectoral approach as described in the SNCC, there are still no focal entities or climate change units in different ministries, and the recurrent changes in ministries and public servants render policy implementation more challenging.

3.4 National-level sectoral policies

The country emphasizes the need to incorporate adaptation measures and climate change considerations in the policies of the most vulnerable sectors. In fact, this is the first objective of the PNCC and the object of several measures in the PANC following the fourth strategic axis of the SNCC. Moreover, the political mandate to integrate climate change considerations, and environmental considerations more generally, in all policies has been framed in the CSCRP, adopted after the elaboration of the climate change policies. However, implementation of mainstream efforts and integration of climate considerations in national sectoral policies have been slowed down by the 2012 political crisis from which the country is still trying to recover. Consequently, integration into sectoral policies remains weak (S. Fontaine, personal communication, 2015).

Nevertheless, the country has taken some steps to address the environment in general, and climate change considerations in particular, in its sectoral policies. Its "greened" CSCRP should in principle frame these policies. The *National Environment Protection Policy*[15] adopted in 1998 remains the main legal instrument for environmental policy in the country. It highlighted the need to integrate environmental protection across sectors, and as a result environmental considerations are partly integrated into the *Water Code*[16] of 2002 and the *Agricultural Orientation Law*[17] of 2006.

Mali adopted a *National Water Policy*[18] in 2006, a *National Water and Sanitation Strategy* in Rural and Semi-urban settings[19] in 2000 and an updated *National Strategy for Drinking Water and Sanitation Availability*[20] in 2007 (Programme Solidarité Eau, 2015). The *National Water Policy* cites climate hazards as a factor influencing water resources, and its second

[15] *Politique Nationale de Protection de L'Environnement*
[16] *Code de l'Eau*
[17] *Loi d'Orientation Agricole*
[18] *Politique Nationale de l'Eau*
[19] *Stratégie Nationale de Développement de l'Alimentation en Eau Potable et de l'Assainissement en Milieu Rural et Semi-Urbain*
[20] *Stratégie Nationale de Développement de l'Alimentation en Eau Potable et de l'Assainissement*

objective is to contribute to the development of agricultural and pastoral activities by ensuring their security in relation to climate hazards, in order to fight poverty and contribute to food security. However, it does not include specific targets or measures to deal with these hazards.

Mali has adopted several policies and strategies within its health sector, starting from the *Strategies of Primary Health Care 1978*, *Health and Population Sectoral Policy* 1990, the *Decadal Sanitation and Social Development Plan (PDDSS) 1998–2007*, the second *Sanitation and Social Development Programme (PRODESS) 2005–2011*, and the current PDDSS 2014–2023. The fourth strategic objective of the PDDSS 2014–2023 is to promote a healthy environment. Sanitation and climate risks to health are specifically cited, and three priority interventions are described: i) integrated monitoring of climate change impacts on health, ii) researching and monitoring negative climate change impacts on health, and iii) strengthening adaptation capacities to respond to negative climate impacts on health (Secrétariat Permanent du PRODESS, n.d.).

The *Agricultural Development Policy* (PDA) of 2013 acts as the framing document for all policies and sectoral strategies for the agricultural sector, including livestock and fishing. It is founded on the *Agricultural Orientation Law*. Vulnerability of the sector to climate variability, especially droughts, floods, and low water flows, is mentioned as the first limiting factor. Moreover, its second of six objectives is to sustainably manage natural resources and the environment by taking climate change into account.[21] The PDA also identifies the need to develop climate adaptation mechanisms as one of its intervention axes under that specific objective, along with the need to protect biodiversity, secure equitable access to lands, preserve and restore soils, promote renewable energies, and adopt integrated water management practices, among others. The policy provides guiding principles and strategies but does not identify specific actions or targets to be undertaken. In addition to the Policy, a *National Investment Programme for the Agricultural Sector*[22] has been put in place. Within the dispositions contained by the *Agricultural Orientation Law*, a National Fund for Agricultural Development[23] was also established in 2010. The Fund is supposed to provide compensation for losses from climate hazards—called *guichet catastrophe naturelles*—and cites the implementation of the SNCC as a measure to undertake.

The *National Livestock Development Policy*[24] does not refer to climate change, perhaps understandably, as it dates back to 2004 and no newer policy or strategy related to the livestock sector in particular has been elaborated. In contrast, agricultural sectoral strategies are more recent or have been updated.

[21] "Assurer la gestion rationnelle des ressources naturelles et de l'environnement en prenant en compte les changements climatiques" (PDA, 2013, p. 14).
[22] *Programme National d'Investissement du Secteur Agricole*
[23] *Fonds National 'Appui à l'Agriculture*
[24] *Politique Nationale de Développement de l'Elevage*

The Government of Mali has announced several decrees regarding disaster risk reduction (DRR), including establishing a national platform for DRR and adopting various plans: national contingency plans, an emergency plan,[25] a *National Risk Reduction and Disasters Strategy*[26] (PreventionWeb, n.d), and an *Action Plan for Implementation of the National Strategy for Disaster Risk Reduction in Mali 2014–2018*. [27] The Action Plan includes specific actions related to climate change adaptation; it indicates that the government plans to integrate disaster risk reduction and climate change adaptation into the primary and secondary curriculum and to implement pilot community-based adaptation projects that will protect vulnerable communities through integrated management of hazards. However, no national platform for DRR has yet been established, and it seems that most strategies and actions plans still remain to be presented to the National Assembly (Global Facility for Disaster Reduction and Recovery, 2014). The main national actor on DRR is the General Directorate of Civil Protection.

In terms of gender, Mali adopted its *National Gender Policy* in 2009 (Ministère de la Promotion de La Femme, de l'Enfant et de la Famille, 2011a) and has an Action Plan for 2011–2013 (Ministère de la Promotion de La Femme, de l'Enfant et de la Famille, 2011b). However, these policies do not refer to climate change as a risk, or to climate hazards more generally.

Table 6 provides an overall assessment of the extent to which climate change has been integrated in these key sectoral policies and strategies. As shown, despite integration of climate change into sectoral policies being an objective of the climate change policies and strategies, actual formal integration has not yet happened in most key sectors. However, it is important to note that climate strategies and the institutions in charge of coordinating and implementing them are still quite recent and also were put in place after the main national development strategy documents, such as the CSCRP, had been adopted.

Table 6 – Integration of climate change into national sectoral strategies, policies, and plans: an assessment of progress

Policies	Absent	Climate change mentioned as potential risk	Possible actions for reducing risk identified	Targets identified for specific adaptation measures
National Water Policy (2006)		✓		

[25] *Plan d'Organisation de Secours*
[26] *Stratégie Nationale de Réduction des Risques de Catastrophes*
[27] *Plan d'Action pour la Mise en Ouvre de la Strategie Nationale de Reduction des Risques de Catastrophes au Mali 2014–2018*

Decadal Sanitation and Social Development Plan (2014–2023)		✓	✓		
Agricultural Development Policy (2013)		✓			
Action Plan for Implementation of the National Strategy for Disaster Risk Reduction in Mali (2014–2018)			✓		
National Livestock Development Policy (2004)	✓				
Gender Action Plan (2011–2013)	✓				

3.5 Sub-national policies

Mali's decentralization process started in 1993 and gives large responsibility to subnational government entities—called *collectivités locales* or "local authorities"[28]—in terms of natural resource management (MEA, 2011). Other delegated domains include health, education, water, and land planning and exploitation (including benefit distribution from forest and fauna management) (MEA, 2011). According to the decentralization process, collectivités locales have to elaborate communal environmental action plans and integrate them in the communal development plans. These communal environmental action plans are a planning and guiding tool, and list all actions to be taken to reduce natural resource degradation and preserve the environment. This, in theory, gives a special entry point to integrate environmental considerations, including climate change, in subnational development plans (AGRECO, 2014; Ministry of Agriculture, Livestock and Fishing [MA], n.d.).

However, local-level government entities have very limited institutional, technological, and financial capacity to manage climate risks and implement local adaptation strategies (IIED, 2015; S. Fontaine, personal communication, 2015). Moreover, all finances are still centralized through the state, rendering the adoption of any measures at the subnational

[28] These local-level government entities are divided in 703 *communes* (districts), 50 *conseils de cercles* and 9 regional assemblies (MEA, 2011).

level extremely challenging. In fact, most elected politicians do not know the environmental legislation and the responsibilities being attributed to their governance level (AGRECO, 2014; MA, n.d; S. Fontaine, personal communication, 2015). Only 11 communes had developed an environmental action plan when the Second National Communication was prepared (MEA, 2011).

Based on a review of current and planned adaptation projects and programs undertaken as part of this review (see Section 5.1), many projects focus on strengthening the institutional capacities of government decision-makers and planners at the national or local levels, as well as building their capacity and mainstreaming climate adaptation into sectoral and development planning. For example, two projects can be cited as specifically aiming to strengthen local-level capacities and integrate climate change adaptation into local development plans, responding to the decentralization gap identified. The project Innovative Development Planning for Climate Change Adaptation aims at "identifying financing mechanisms at a decentralised level and developing innovative methods and tools for integrating adaptation measures into decentralised development strategies" (BMUB, 2015). A similar project, Decentralising Climate Funds in Mali and Senegal, aims to strengthen local government capacities to implement climate adaptation strategies through the establishment of local CAFs and help provide evidence to national policymakers on how local adaptation strategies can be adopted. Both include activities focused on working with financing mechanisms at a decentralized local level to help implement climate adaptation. Many other projects, including those identified in the NAPA, include components of local adaptation capacities without necessarily making it their central objective.

Additionally, several measures proposed in the PANC aim to build local government entities' capacities and integrate climate change in subnational policies. For example, a measure aims to create climate change focal entities and build their capacity to take a proactive role, and another aims to elaborate Regional Climate Action Plans[29] (MEA & AEDD, 2011c).

4. Current and planned adaptation programs and projects

This section provides a snapshot of the adaptation projects and programs under way in Mali, including an overview of ongoing projects and a brief analysis of the climate finance flowing into the country.

4.1 Adaptation projects and programs

To understand the extent of adaptation action under way in Mali, we undertook a review to identify adaptation programs and projects being implemented in the country that started

[29] *Plan d'Action Régional Climat*

after January 2012, as well as those planned for implementation in the near term. Projects with a specific focus on supporting climate change adaptation, as reflected in their title and/or objectives, were identified through a review of donor websites, captured in a database, and classified by their type and area of focus. For details on the methodology used to identify and classify the programs and projects included in this review, please refer to Annex A.

The review found 22 significant projects in Mali financed in part by international donors that are either currently being implemented or have recently been completed. All of these projects are presented in Annex B, and a snapshot of key facts about these projects is presented in Table 7. We recognize that the projects identified through this review do not capture all of the projects and initiatives being implemented in Mali that are helping to build its adaptive capacity and reduce its vulnerability to climate change; rather, the review captures only discrete adaptation-focused projects in accordance with the strict criteria for selection described in the methodology. Moreover, most projects target more than one sector, which Table 7 takes into account.

Table 7 – Sector of focus of current adaptation projects and programs identified in Mali

Sector of focus	Priority sectors for adaptation	Number of projects active in sector*	Percentage of total projects identified**	Geographical Scale	
Agriculture	✓	14	64%	National projects	8
Pastoralism	✓	7	32%	Regional projects	10
Forestry	✓	4	18%	Global projects	4
Ecosystems (conservation; restoration)	✓	3	14%	**Total**	**22**
Water (freshwater supply)	✓	2	9%		
Private sector	✓	1	5%		
Energy	✓	1	5%		
Government	✓	9	41%		
Civil society	✓	3	14%		
Gender		5	23%		
Climate		6	27%		

information			
Disaster risk management	✓	3	14%
Security		1	5%
Social protection		1	5%
Multisectoral		1	5%
Other		1	5%

*Individual projects may address one or more sectors.
**Calculated by the number of projects active in this sector relative to the total number of projects identified, reflecting the potential for a single project to be addressing adaptation needs in more than one sector.

The greatest number of projects focus on enhancing the capacity of Mali's agro-pastoral sector to cope with climate change and ensure food security through building the capacity of farmers, adopting drought-tolerant seeds and other technologies, and mainstreaming climate change consideration in agricultural and livestock sector planning at the national and subnational level. This is not surprising, since agriculture is the most vulnerable sector of the country, and ensuring food security remains a great challenge for Mali due to recurrent droughts, poverty, and instability. To address this challenge, the Food and Agriculture Organization (FAO) and the Malian government, via the AEDD and the Ministry of Rural Development, signed a cooperation agreement in February 2015 to enhance agro-pastoralists' capacities to respond to climate change. Projects under this agreement will take place between January 2015 and December 2018 with funds of nearly US$2 million from the Global Environment Facility (GEF) and nearly US$13 million in co-financing (MaliActu.net, 2015). Notably, there are twice as many projects focusing on agriculture (encompassing crop farmers and agro-pastoralists) than on pastoralists, even though pastoralists have been identified as a key vulnerable group in the country.

A number of other ongoing projects focus on governance. These projects do not necessarily exclusively focus on strengthening institutional capacities of government decision-makers or planners at the national or local levels, but often have a strong component focused on building this capacity and mainstreaming climate adaptation into sectoral and development planning. In contrast, a limited number of projects focus on building the capacity of civil society organizations. Interestingly, nearly half of these projects focus on strengthening institutional capacities at the local level and/or helping to formulate and integrate climate change adaptation into local development plans, including those identified in the NAPA. These include the previously described projects, Innovative Development Planning for Climate Change Adaptation, funded by BMUB, and Decentralising Climate Funds in Mali and Senegal, funded by DFID. This focus is consistent with the decentralization process that Mali has undertaken since 1993 and the previously described need to strengthen the

institutional and technical capacities of municipalities (MA, n.d.; MEA & AEDD, 2011; S. Fontaine, personal communication, 2015).

Several projects under way in Mali aim to scale up the production and use of renewable energy in the country. Examples include the Project for Scaling-Up Renewable Energy in Mali, funded by the African Development Bank (AfDB) as part of the Climate Investment Funds' Scaling-Up Renewable Energy Programme in Low Income Countries (AfDB, 2014), and a project funded by the Global Environment Fund Trust Fund and voluntary contributions that supports the production and use of jatropha oil. Although the primary focus of these projects is climate mitigation (and therefore they are not included in this review's database), they directly respond to actions identified in the NAPA. This prioritization is striking, as Mali is one of the few countries in West Africa to implement several projects that have both mitigation and adaptation components. Some energy projects do specifically aim to understand the impacts of climate change on the energy sector and develop national climate-resilient and low-carbon energy strategies. This includes the Energy, Ecodevelopment and Resilience in Africa project funded by the Climate and Development Knowledge Network.

Despite fishing being described as a vulnerable sector in the NAPA and the Second National Communication, no project was found that specifically targets the climate resilience of fishers or of fishing habitats. Moreover, of the surveyed projects, few focus primarily on water resources (freshwater supply), despite this being one of Mali's more vulnerable sectors. Several projects pay particular attention to women or state an intention of adopting a gender-sensitive approach.

On the other hand, many initiatives aim to produce or increase understanding of the climate information often needed to inform policies. One such initiative is the regional Climate for Development in Africa (ClimDev-Africa) Programme, led by the African Climate Policy Centre, which aims to address the need for improved climate information in Africa and strengthen its use in decision-making. Mali is also part of a multi-country project called the Adaptation at Scale in Semi-Arid Regions (ASSAR) project, launched under the CARIAA program. ASSAR intends to generate the evidence needed for enabling decision-makers to develop adaptation strategies in semi-arid regions in 10 countries across Africa and Asia.

Overall, six projects from the NAPA that address needs in various sectors have been approved for implementation using funds from the LDCF, for a total budget of US$18.97 million as of September 2014 (GEF, 2014). Two of these LDCF-funded projects have already been completed: Enhancing Adaptive Capacity and Resilience in the Agricultural Sector in Mali, implemented by the UNDP, and Integrating Climate Resilience into Agricultural Production for Food Security in Rural Areas of Mali, implemented by the FAO. Both projects were implemented in partnership with the MA (UNFCCC, 2014). Projects being implemented at the moment include Promotion of and Use of Jatropha Oil (not included in this project review); Strengthening Resilience to Climate Change through Integrated

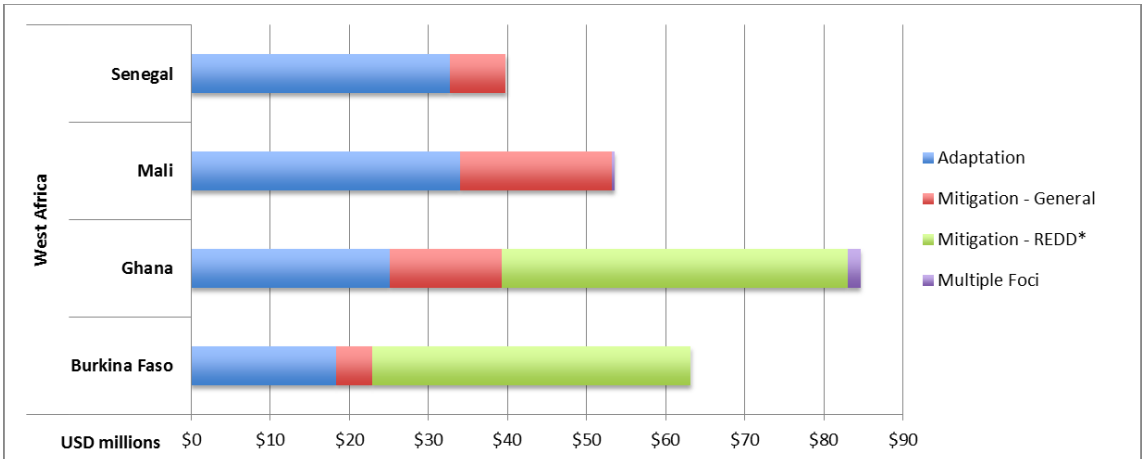
Agricultural and Pastoral Management in the Sahelian Zone in the Framework of the Sustainable Land Management Approach, led by the FAO; and Strengthening the Resilience of Women Producer Groups and Vulnerable Communities, led by the UNDP and the AEDD as part of the Climate Change Adaptation Facility project (UNFCCC, 2014).

Most areas of the country seem to be covered by ongoing adaptation projects, with the exception of two regions: Gao and Kindal, in the north and northeastern parts of the country, respectively. Moreover, Tombouctou, the other northern region, has been mentioned less often as a target area of projects. These regions are likely less of a focus of adaptation efforts because of the Malian government's very weak legitimacy and control in these regions, as well as its prioritization of the agricultural sector over other production systems.

Finally, it is relevant to highlight that most donors suspended their bilateral development cooperation with Mali after the *coup d'état* in 2012, which could explain why there was a greater number of adaptation projects under way in Mali prior to this date (De Vit & Parry, 2011). Many of the previously agreed bilateral funds were re-channelled to humanitarian aid at this time (Norad, 2015).

4.2 Climate finance

According to the Climate Funds Update, as of February 2015 Ghana had received approval for over US$70 million in climate finance, representing 15 climate change projects, including initiatives focused on both adaptation and mitigation. Among these, approximately half address adaptation issues, representing about US$20 million of the total financing. The major multilateral sources financing Ghana's adaptation projects are the Special Climate Change Fund and IFAD through ASAP. Ghana is also receiving financing from bilateral funds, notably the United Kingdom's International Climate Fund and Germany's International Climate Initiative. This places Ghana in the third-to-last position in the top 20 Sub-Saharan African countries receiving climate funding for adaptation from multilateral sources, with least developed countries such as Niger receiving significantly more. When compared to other lower-middle-income countries in Sub-Saharan Africa, however, Ghana falls in the middle, in the sixth position out of 12 countries receiving multilateral adaptation funding. From bilateral sources included in the Climate Funds Update, Ghana is the biggest recipient of adaptation funds in Sub-Saharan Africa (Climate Funds Update, 2015). Figure 2 shows how the amount of funding in Ghana compares with other countries in West Africa.



	West Africa			
	Burkina Faso	Ghana	Mali	Senegal
Adaptation	$18.3	$25.1	$34.0	$32.8
Mitigation - General	$4.5	$14.2	$19.2	$6.9
Mitigation - REDD*	$40.3	$43.7	$0.0	$0.0
Multiple Foci	$0.0	$1.6	$0.3	$0.0

Figure 2 – Comparison of approved funding from designated multilateral and bilateral climate funds to countries in West Africa since 2003, in USD millions (based on Climate Funds Update, April 30, 2015)

A slightly different picture emerges when examining official development assistance (ODA) and other official flows that support climate change, as tracked by the Rio Markers and collected by the Organisation for Economic Co-operation and Development (OECD). In 2013, Mali received approximately the same share of funding from integrated bilateral and multilateral climate-related flows for mitigation (US$66.38 million), adaptation (US$64.21 million), and for project with both mitigation and adaptation benefits (US$64.16 million) (OECD, 2015b).

However, this tendency is significantly reversed if one looks only at bilateral funding as tracked by the Rio Markers; since 2010, most bilateral funding commitments have been designated for climate adaptation. For example, in 2013 US$64.51 million was committed to adaptation, US$2.19 million for mitigation, and US$61.86 million for projects with both mitigation and adaptation benefits. While Mali is not a major recipient of ODA, its principal funders for adaptation include Germany, Netherlands, Japan, Spain, and Switzerland (OECD, 2015b).

In regards to the share of bilateral aid supporting development activities that identify adaptation as their *principal* objective, this proportion has more than doubled from 2010 to 2013 (see Figure 3). However, during this same time period, aid has overwhelmingly supported activities that identify adaptation as their *significant* objective (68.86%) over activities identifying adaptation as the *principal* objective (31.14%) (OECD, 2015a). Moreover, the amount of bilateral aid that supported adaptation—either as the significant

or principal objective—disbursed in 2013 (US$126.37 million) was much higher than the sum of all aid disbursed from 2010 to 2012 (US$113.57 million), despite the fact that most donors suspended their bilateral development cooperation with Mali after the *coup d'état* in 2012. Many of the previously agreed-upon bilateral development assistance contributions were then re-channelled to humanitarian aid. Perhaps some of this funding was labelled as having adaptation as a significant objective, or perhaps the amount of aid that resumed in 2013 after a successful election was much more focused on addressing adaptation needs than in previous years.

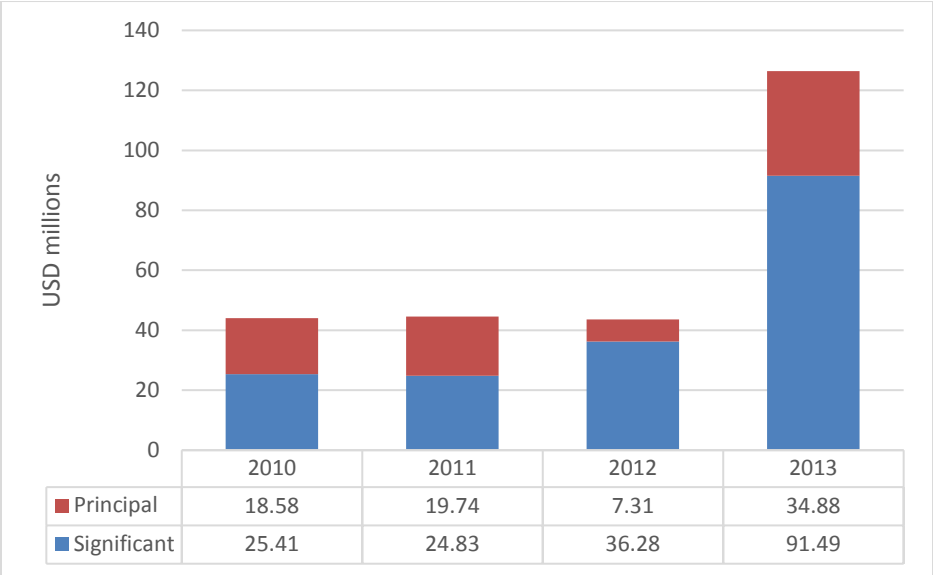


Figure 3 – Bilateral development aid to all sectors identified as having adaptation support as their principal or significant objective,[30] 2010 to 2013, constant 2012 prices (based on OECD, 2015)

5. Networks and communities of practice

Several networks and communities of practice focused on climate change exist in Mali, and Malians have the opportunity to participate in regional and international networks. At all levels, there is a mix between those networks and platforms dedicated specifically and exclusively to climate adaptation and those that engage more broadly in sustainable development and mention climate change actions and knowledge sharing as one of their side objectives. However, not all are very active or have significant capacity to influence

[30] Based on the definitions used by the OECD Rio Markers system, activities are considered to have supporting adaptation as their "principal" objective "when promoting the objectives of the UNFCCC is stated in the activity documentation to be one of the principal reasons for undertaking the activity. In other words, the activity would not have been funded but for that objective. Activities marked 'significant' have other prime objectives, but have been formulated or adjusted to help meet climate concerns" (OECD, 2011, p. 3).

policies and the adaptation landscape. This section identifies only the most active networks at the national level as well as the most significant NGOs.

The Mali Climate Network[31] is an important national network focused on raising awareness of climate change with specific programs for adaptation while at the same time also lobbying policy-makers and sharing knowledge on sustainable development more broadly. It has over 100 members, and is composed of civil society organizations and private enterprises. It was created in July 2008, and the national NGO Mali-Folkecenter Nyetaa acts as its secretariat. This platform is also part of the global Southern Voices Network. The Mali Climate Network has achieved high levels of attention and found interesting ways to engage with policy-makers, for example by spearheading the Environmental Pact. This initiative engaged candidate policy-makers during the 2013 presidential elections to make environmental management, fighting climate change, and sustainable development part of the government's priorities. The Pact symbolizes a moral contract between citizens and policy-makers.

Additionally, the Forum of International NGOs in Mali (FONGIM)[32] serves as the umbrella organization for 80 national and international NGOs in Mali and acts as the focal point for all NGOs for interactions with donors and other partners. FONGIM serves as a knowledge-exchange platform and a way to lobby politicians. It has nine thematic groups, including one on energy and climate led by the French development NGO Group for the Environment, Renewable Energy and Solidarity. FONGIM was created in 2010, expanding from the EU NGOs Forum in Mali created in 2002. FONGIM's permanent secretariat is led by Save the Children. Moreover, the Secretariat de Concertation des ONG Nationales du Mali is in charge of coordinating all national NGO actions, making it an important interlocutor.

Lastly, the Forum des Organisations de la Société Civile au Mali[33] is a forum connecting civil society organizations in Mali that also acts as an important focal group. This forum is divided into 13 thematic groups, including one focused on environment, one on water and sanitation, and one on the rural and agricultural economy.

6. Conclusions

While Mali might not experience dramatic climatic changes in the decades ahead, the country's fragility, its dependence on climate-sensitive sectors, its history of conflicts over resource use, and its low levels of development make it highly vulnerable to climate change and variability. The country faces recurrent droughts, high desertification rates, and increases in temperature in combination with scarce resources and heavily compromised food security, particularly in the arid and semi-arid regions in the north. Other parts of the country, such as the centre and southern regions, are susceptible to floods and rainfall

[31] For more information, see Reso Climat Mali (2013).
[32] For more information, see FONGIM (n.d.).
[33] For more information, see Forum des Organisations de la Société Civile au Mali (2011).

unpredictability. Moreover, 80% of the population is dependent on the agriculture, livestock, and fishing sectors, all of which are climate sensitive and make up most of the country's economy, along with gold mining. Additionally, climate risks exacerbate existing fragility drivers; they could increase conflicts over resources between farmers and pastoralists as well as further push people to migrate toward the south and continue disrupting traditional pastoralists' migration routes. Climate change adaptation must therefore be part of the country's priorities to ensure its transition to resilience and stability.

Mali's climate policies include its PNCC, its SNCC, and its PANC. The PANC aims to operationalize its policy and strategy in conjunction with the NAPA. These documents set clear adaptation priorities for the country, highlight the need to integrate climate risks into sectoral policies, and put institutional arrangements in place to adequately tackle climate change, for example through the recently functional Mali Climate Fund. However, despite considerable efforts to green its national development planning instrument, the CSCRP, integration of climate change considerations into sectoral and subnational policies remains weak. This is perhaps partly explained by the fact that most climate policy instruments were elaborated after the third CSCRP was approved, as well as by the conflict and economic crisis the country has been suffering, which have diverted attention toward humanitarian and emergency responses.

In fact, reconciling humanitarian and development needs and interventions, including adaptation measures, is one of the many important challenges that Mali faces. Many policies, including the PNCC, are yet to be formally approved by the Parliament, and recurrent changes in ministries, their mandates, and public servants, as well as a general lack of government legitimacy, all considerably slow down implementation. Additionally, local governing entities still lack the technical, financial, and institutional capacities necessary to understand, design, or integrate climate change and implement adaptation strategies at the local level, despite a formal decentralization process having started more than 20 years ago. Lack of information, including climate information, is also a challenge.

Thankfully, many adaptation initiatives currently taking place in Mali as well as actions identified as priorities in the PANC aim to increase institutional capacities at the national, regional, and local level, and in particular to empower local governing bodies to be able to integrate climate adaptation into their local development plans. Significant initiatives, such as ClimDev-Africa and the ASSAR, will also contribute to providing the much-needed climate information and evidence of successful adaptation measures at the local level, and will help to start measuring and evaluating the impacts of adaptation. Furthermore, most adaptation actions focus on increasing the resilience of the agricultural and livestock sector and thereby reducing poverty and food insecurity. These measures are taking place in most regions of the country, aside from the most northern areas. In fact, pastoralists in general and particularly those in the north might not be receiving the attention needed, perhaps compounded by and further exacerbating existing tensions. Finally, although the water and

fishing sectors have been identified as two of the key vulnerable sectors because they are suffering habitat loss from lakes drying out and floods, impacts which are likely to continue and grow under climate change, they seem to have received little attention.

While responding to these challenges and gaps will not be easy, Mali does have a good basis in its climate institutions and a pioneering financial instrument in the region, the Mali Climate Fund, supporting the move toward a green and resilient economy. Focus should be on implementing already drafted and identified priorities and measures as well as building national and local decision-makers' capacities to understand, integrate, and implement these measures. Funding will need to be sustained in the long term, and engagement of the private sector will need to be considered and incentivized. Adaptation interventions will also need to take particular note of the context where they are implemented to avoid maladaptation—in particular ensuring they do not exacerbate tensions or conflicts—as well as work toward reconciling humanitarian and longer-term development goals, including contributing to peacebuilding processes.

7. Annexes

Annex A: Methodology

This section presents the research parameters established to guide development of the standardized reviews of current adaptation action in the CARIAA program's countries of engagement. It sets forward definitions used in this study, particularly with respect to the identification, selection, and classification of programs and projects considered in the review. This methodology was previously developed by the International Institute for Sustainable Development to support a review of current and planned adaptation action in 12 regions, which was completed in 2011 for the Adaptation Partnership. Modest updates to this original methodology were made to support the current review undertaken for the CARIAA program. For more information, see Adaptation Partnership (2015).

A.1 Adaptation actions included in the review

Within the review, adaptation action was defined as "policies, programs, and projects designed and implemented specifically to address the current and projected impacts of climate change." Therefore, the review focused on examining policies, programs, and projects in which specific reference has been made to supporting adaptation to climate change or climate risk reduction.

Consistent with this definition, the review gave attention to discrete, time-bounded programs and projects designed and implemented specifically to support preparation for or implementation of practical adaptation actions within the broader context of achieving development objectives. Therefore, at least one of the following terms appeared in the title, goals statement, or objectives statement of each program or project included in the review: "adaptation," "climate change adaptation (CCA)," "climate risk management," or "climate vulnerability reduction."

Based upon these parameters, the following types of programs and projects were not included in the review: disaster risk reduction, prevention, or management projects, unless they specifically reference that this activity is being undertaken in support of CCA; primary scientific research studies (for example agrology, botany, or meteorology) on the potential impacts of climate change (for example on changes in crop production, glacial melt rates, or typhoon patterns); long-term monitoring efforts (whether climatic or socioeconomic) needed to inform decision-making; stand-alone workshops, conferences, and training programs; and capacity building to support participation in processes related to the UNFCCC (such as training for negotiators, enabling activities to prepare reports).

The following additional parameters were established to guide the selection of programs and projects incorporated in the study:

- *Official start date.* To ensure that only "current" projects were included in review, selected projects needed to have begun on or after January 1, 2012, with the

exception of projects that began before this date but were still ongoing as of January 1, 2015.

- *Official end date*. Ongoing projects are those who official completion day is on or after January 1, 2015. Projects completed after January 1, 2012, were classified as completed.
- *Funding characteristics*. Projects with a value of US$100,000 or more were included in the study. However, reflecting the greater level of adaptation action underway in Bangladesh and India, the minimum value of projects included in the reviews for these two countries was raised to US$250,000. Projects financed by international and domestic sources of funding were considered.

Additionally, identified projects were classified by geographical scale in accordance with the following definitions:

- Global: Projects involving countries throughout the world, including the profiled country.
- Regional: Multi-country projects within a particular subregion, be it a continent or subcontinental area (such as South Asia or West Africa), that includes the profiled country.
- National: Projects occurring within one country.

A.2 Type of project being undertaken

To better understand the orientation of the projects underway in the countries examined as part of the review, projects were classified by type using the following definitions:

- *Research*. Encompassing efforts to develop new knowledge or organize existing information so as to increase understanding of the links among climate change, human society, and ecosystems and inform adaptation decision-making.
- *Assessment*. Encompassing risk, impact, and vulnerability assessments, as well as monitoring of ecological and societal trends.
- *Capacity building*. Encompassing the provision of technical training, technical assistance, institutional strengthening, and education.
- *Knowledge communication*. Encompassing efforts to share information, knowledge, and practices related to CCA, including awareness raising and engagement of media.
- *Policy formation and integration*. Encompassing efforts to inform, develop, and implement CCA plans, strategies, frameworks, and policies at the local, subnational, national, and international levels.
- *Field implementation*. Encompassing physical measures to reduce vulnerability to the impacts of climate change, including the implementation of pilot projects, construction of infrastructure, development and modification of technologies, and management of physical resources.

- *Community-based adaptation*. Encompassing actions that directly engage community members in efforts to understand, plan for, and respond to the impacts of climate change.

A.3 Sector or area of focus

To further inform analysis of the range of adaptation action taking place in each country reviewed, programs and projects examined in the study were classified by sector using the following definitions:

1. **Food, fibre, and forests**. Defined as the management and use of terrestrial natural resources to directly improve human well-being. Its subcategories are:
   - *Agriculture*. Encompassing subsistence agriculture, commercial agriculture, and the rearing of confined domestic animals.
   - *Pastoralism*. Encompassing the use of domestic animals as a primary means for obtaining resources from habitats (UNEP, 2007), particularly in nomadic and semi-nomadic communities.
   - *Forestry*. Encompassing afforestation, reforestation, agroforestry, commercial forestry, community-based forest management, and woodland management.
   - *Fire management*. Encompassing monitoring, planning, and management to address the impact of fires on settlements and ecosystems, including forested and grassland ecosystems.
   - *Aquaculture.* Food production through the rearing of aquatic animals, such as fish, crustaceans, and molluscs, or the cultivation of aquatic plants in natural or controlled marine or freshwater environments.

2. **Ecosystems**. Defined as a system of living organisms interacting together and with their physical environment, the boundaries of which may range from very small spatial scales to, ultimately, the entire Earth (IPCC, 2001). Its subcategories are:
   - *Biodiversity protection*. Encompassing activities related to the maintenance of living organisms at various spatial scales, including the establishment and protection of parks and bioreserves.
   - *Ecosystem conservation*. Encompassing efforts to *maintain* the health of particular ecosystems, such as wetlands, grasslands, forests, mangroves, and coral reefs.
   - *Ecosystem restoration*. Encompassing efforts to *restore* the health of particular ecosystems, such as wetlands, grasslands, forests, mangroves, and coral reefs.

3. **Freshwater resources**. Defined as the management and use of freshwater contained in terrestrial ponds, lakes, rivers, and watersheds, among others. Its subcategories are:
   - *Freshwater fisheries*. Encompassing the catching, packing, and selling of fish and shellfish derived from lakes, rivers, and ponds, as well as through freshwater aquaculture.

- *Watershed management*. Encompassing management of the basins that supply water to different streams, rivers, lakes, and reservoirs, including integrated watershed management.
- *Freshwater supply*. Encompassing efforts to access and preserve freshwater for human consumption and use, including drinking water sources, groundwater resources, rainwater harvesting, and water infrastructure such as wells, dams, and dikes.

4. **Oceans and coastal areas**. Defined as the management and use of coastal areas and oceans. Its subcategories are:
   - *Coastal zone management*. Encompassing the management of land and water resources in coastal areas, including through integrated coastal zone management and the establishment and maintenance of coastal infrastructure.
   - *Marine management*. Encompassing the management and use of offshore ocean and sea resources.
   - *Marine fisheries*. Encompassing the catching, packing, and selling of fish, shellfish, and other aquatic resources found in the oceans and seas, including through marine and coastal aquaculture.

5. **Disaster risk management**. Defined by the United Nations International Strategy for Disaster Reduction (2009) as the "systematic process of using administrative directives, organizations, and operational skills and capacities to implement strategies, policies and improved coping capacities in order to lessen the adverse impacts of hazards and the possibility of disaster" (p. 10). It includes emergency response measures, preparation for extreme events and early warning systems. No sub-categories were established in relation to this macro project category.

6. **Migration and security**. Defined as efforts to support the movement of people and maintain their personal security in the face of incremental climate changes or climate shocks.
   - *Migration*. Encompassing preparations for and responses to the potential movement of people from one location to another due to climate change impacts.
   - *Security*. Relating to personal security and freedom from violence, crime, and war due to natural and human-induced disasters (UNEP, 2007) and encompassing peace building, conflict reduction, and conflict avoidance.

7. **Gender**. Defined as the social attributes and opportunities associated with being male and female and the relationships between women and men, and girls and boys, as well as the relations among women and among men. These attributes, opportunities, and relationships are socially constructed and are learned through socialization processes (United Nations Entity for Gender Equality and the Empowerment of Women, n.d.). This category includes efforts to understand the vulnerability of women to the impacts of climate change, gender-sensitive adaptation strategies, and measures to improve the

situation of women at the local and policy level, including through gender mainstreaming. No subcategories were established in relation to this macro project category.

8. **Business**. Defined as the purchase and sale of goods and services with the objective of earning a profit. Its subcategories are:
   - *Tourism*. Encompassing the adjustment and development of tourist facilities and operations to account for current and future vulnerabilities, including these actions in relation to ecotourism.
   - *Private sector*. Encompassing potential impacts of climate change and potential adaptation strategies on the diverse activities underway in the portion of the economy in which goods and services are produced by individuals and companies including industry, mining, and other economic sectors.
   - *Trade*. Encompassing the exchange of goods and services within and between countries.
   - *Insurance*. Encompassing the development, testing, and adjusting of insurance and risk-management schemes, including weather-based index systems.

9. **Infrastructure**. Defined as the basic equipment, utilities, productive enterprises, installations, institutions, and services essential for the development, operation and growth of an organization, city or nation (IPCC, 2001). Its sub-categories are:
   - *Energy*. Encompassing energy-related systems and infrastructure, including small-scale and large-scale energy generation through hydroelectric power generation, wind, solar, and other forms of traditional and new energy sources, as well as transmission networks.
   - *Transportation*. Encompassing the components of the system required to move people and goods, including roads, bridges, railway lines, shipping corridors, and ports.
   - *Waste management*. Encompassing sanitation, sewage systems, drainage systems, and landfills.
   - *Buildings*. Encompassing actions related to built structures such as houses, schools, and offices, including changes to building codes, building practices, and green ways of construction.

10. **Human settlements**. Defined as a place or area occupied by settlers (IPCC, 2001). Its subcategories are:
    - *Peri-urban areas*. Encompassing the outskirts of urban centres and the transition zones between rural and urban areas.
    - *Urban areas*. Encompassing municipalities, towns, and cities, as well as areas in these centres (such as slums).
    - *Rural areas*. Encompassing villages and other small settlements, as well as rural landscapes and integrated rural development.

11. **Human health**. Defined as a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity (WHO, n.d.). It includes efforts to assess vulnerabilities to and the impacts of climate change on human health directly and indirectly, and the development and implementation of appropriate adaptation strategies at the local, regional, and national levels. No subcategories were established in relation to this macro project category.

12. **Climate information services**. Defined as the production and delivery of authoritative, timely, and usable information about climate change, climate variability, climate trends, and impacts to different users at the local, subnational, national, regional, and global levels. It includes efforts to develop, adjust, and provide short- and long-term climate forecasts, including climate change projections, to different audiences. No subcategories were established in relation to this macro project category.

13. **Governance**. Defined as the institutions (laws, property rights systems, and forms of social organization) through which societies define and exercise control over resources (UNEP, 2007). Its subcategories are:
    - *Government*. Encompassing efforts to build the capacity of government officials, either at the national or subnational level, to prepare for and facilitate adaptation to climate change, including through the development of policies, plans, frameworks, and strategies, as well as the establishment and operation of climate change trust funds.
    - *Civil society*. Encompassing efforts to build the capacity of the public, including NGOs, to understand, prepare for, and respond to climate change.

14. **Social protection**. Based on DFID's definition of social protection, projects within this category focus on three sets of instruments to address chronic poverty and vulnerability:
    - *Social insurance*. Referring to "the pooling of contributions by individuals in state or private organizations so that, if they suffer a shock or change in circumstances, they receive financial support."
    - *Social assistance*. Encompasses "non-contributory transfers that are given to those deemed vulnerable by society on the basis of their vulnerability or poverty."
    - *Workplace safety*. Involves the "setting and enforcing of minimum standards to protect citizens within the workplace" (DFID, 2006, p. 1).

    Adaptation projects that focus on labour market interventions and social assistance would be included in this category. No subcategories were established in relation to this macro project category.

15. **Multisectoral**. Defined as actions that simultaneously address more than one sector in one or multiple locations. It includes efforts that address more than one sector, which are challenging to tease apart, and in the context of this review includes large, multi-

country projects in which the specific sector of focus is nationally determined and, therefore, varies from country to country. No subcategories were established in relation to this macro project category.

16. **Other**. To capture areas of focus not clearly identified in the previous categories.

Annex B: Projects and programs

Projects working to address vulnerability to the impacts of climate change in Mali are presented alphabetically in the table below.

Name of project	Objectives	Funder(s) and budget	Implementing agencies	Type of project	Sectors	Duration	Scale and location(s)
ASSAR	This project will enable proactive, longer-term approaches to climate change adaptation in semi-arid regions, while supporting the management of current risks. It draws on a number of disciplines to address the complex interactions among climate, biophysical, social, political, and economic dynamics. Research on each of these aspects will be integrated through transformative scenario planning, involving stakeholders throughout. The project will generate credible information that decision-makers and others can use to develop robust adaptation strategies.	DFID and IDRC through, CARIAA CA$13.5 million	University of East Anglia; International START Secretariat; Oxfam; Indian Institute for Human Settlements; University of Cape Town, South Africa	Research; capacity building; knowledge communication	Multisectoral	2014–2019	Global India, Ethiopia, Kenya, Uganda, Ghana, Mali, Botswana, Namibia, South Africa, Niger
Adaptation to Climate Change and Forests in West Africa	To develop policies and practices to support the sustainable management of forests in the savannahs of West Africa, and to increase the adaptive capacities of	French Global Environment Facility	French Agricultural Research Institute for International Development	Capacity building; knowledge communication	Forestry	2011–2015	Regional Burkina Faso, Mali

	local communities through improved livelihoods from forest ecosystem goods and services.		(CIRAD) and Center for International Forestry Research (CIFOR)				
Assessment of Vulnerabilities, Adaptive Capacities and Past and Current Adaptive Strategies of Agroforestry Systems in a Wide Range of Contexts	Participatory research about the vulnerability of rural communities to climate change was conducted in four regions in the Sahelian and Sudanian ecozones of Burkina Faso, Mali, and Niger. The results are expected to document local adaptation practices and elucidate the role of agroforestry systems in enhancing the resilience of rural communities to climate change.	Unknown	Consultative Group on International Agricultural Research (CGIAR); World Agroforestry Centre	Research	Agriculture; forestry; gender	2012–2015	Regional Burkina Faso, Mali, Niger
Building Resilience Without Borders in the Sahel	The project aimed to support 900,000 vulnerable women and men in Burkina Faso, Mali, and Niger to adapt to climate extremes. It aimed to facilitate change in three key areas: (1) "improving relevance of, access to and use of climate information services for planning and risk management;" (2) "scaling up access to and adoption of sustainable and climate-resilient livelihood options;"	DFID, through the Building Resilience and Adaptation to Climate Extremes and Disasters (BRACED) program £69,400	CARE; Réseau Billital Maroobé; SNV; and TREE AID	Assessment; capacity building	Agriculture; climate information	Unknown–2014	Regional Burkina Faso, Mali, Niger

	and (3) "promoting equitable, sustainable and climate-resilient governance of natural resources"(Wrobel et al., 2014).						
Building the Capacity of Civil Society Organizations in Africa and Asia	A component of the project aims to strengthen the effectiveness of civil society organizations to work with communities to adapt to climate change and ensure food security, to test innovative approaches that improve livelihood opportunities, and to support gender equality.	Canadian Department of Foreign Affairs, Trade and Development and the Aga Khan Foundation Canada, through the Partnership for Advancing Human Development in Africa and Asia CA$100 million (CA$75 million from Government of Canada; CA$25 million from Aga Khan Foundation)	Aga Khan Development Network agencies	Capacity building; knowledge communication	Civil society	2012–2017	Global Bangladesh, India, Pakistan, Tajikistan, Kenya, Tanzania, Uganda, Mali, Egypt, Afghanistan, Kyrgyzstan, Madagascar, Mozambique
ClimDev-Africa program	This project aims to increase the climate resilience of Africa's population, addressing the need for improved climate information in Africa and strengthening the use of	European Union; Finland; Nordic Development Fund; Sweden; UKAID; USAID	African Climate Policy Centre	Research; capacity building; knowledge communication	Climate information	2012–2015	Regional Ethiopia, Kenya, Tanzania, Uganda, Burkina Faso, Ghana, Mali, Senegal,

	such information for decision-making. ClimDev-Africa is an initiative of the African Union Commission, the United Nations Economic Commission for Africa, and the AfDB.	€8 million					Botswana, Namibia, South Africa, Egypt
Decentralising Climate Funds in Mali and Senegal	This project will support more effective climate adaptation planning and finance by local governments in Mali and Senegal in order to improve communities' resilience to climate change.	DFID, through the BRACED program Unknown budget	Near East Foundation; IIED, Innovation, Environnement et Développement en Afrique	Knowledge communication; policy formation and integration; field implementation; community-based adaptation	Disaster risk management; government	2015–2017	Regional Mali, Senegal
Energy, Ecodevelopment and Resilience in Africa	The project aims to: (1) develop national energy strategies in Benin, Mali, and Togo that take into account the impacts of climate change while meeting other development goals, such as ensuring healthy ecosystems, sustainable livelihoods, and low-carbon economic growth; (2) roll out national energy policy assessments; (3) develop national frameworks to implement climate-resilient and low-carbon national energy strategies; (4) undertake capacity-building activities to build the skills and expertise of policy-	DFID and the Netherlands, through the Climate and Development Knowledge Network £496,600	HELIO International	Capacity building; policy formation and integration	Energy; government	Jan 2013–Jan 2015	Regional Mali, Benin, Togo

	makers and practitioners; (5) help improve the institutional setting for good governance in the energy sector and ensure the long-term sustainability of energy strategies; and (6) support regional synergies and scale-up of the project's approach.						
GCCA Regional Program for West Africa	The program's overall goal is to support West African countries in tackling climate change so as to achieve the Millennium Development Goals. Its specific objective is to strengthen the capacity of national and regional stakeholders in mainstreaming climate change in development policies and strategies, and in implementing measures to adapt to climate change and increase the resilience of the population.	GCCA €4 million	ECOWAS (Economic Community of West African States) and CILSS (Permanent Inter-State Committee for Drought Control in the Sahel)	Assessment; capacity building; policy formation and integration	Climate information; government	Mar 2011–Feb 2015	Regional Burkina Faso, Mali, Senegal, Benin, Cabo Verde, Chad, Gambia, Guinea Conakry, Guinea-Bissau, Ivory Coast, Liberia, Mauritania, Niger, Nigeria, Sierra Leone, Togo
Great Green Wall for the Sahara and Sahel Initiative	The overall goal of the Great Green Wall initiative is to strengthen the resilience of people and natural systems in the Sahel and Sahara with sound ecosystem management, sustainable development of land resources, the protection of rural heritage, and the improvement of the living	World Bank; LDCF; Special Climate Change Fund; AfDB; FAO; European Union; Global Mechanism of the UNCCD LDCF, Special Climate Change	African Agency of the Great Green Wall	Capacity building; policy formation and integration; field implementation	Agriculture; pastoralism; forestry; ecosystem conservation; private sector; other: green infrastructure	2011–unknown	Regional Ethiopia, Burkina Faso, Ghana, Mali, Senegal, Egypt, Algeria, Benin, Chad, Djibouti, Mauritania, Niger,

	conditions of the local population. The initiative has three main objectives: (1) improve the living conditions of populations in the arid zones of Africa and reduce their vulnerability to climate change, climate variability, and drought; (2) improve the state and health of ecosystems in the arid zones of Africa and their resilience to climate change, climate variability, and drought; and (3) mobilize resources for the implementation of the Great Green Wall Initiative through the establishment of efficient partnerships between national, regional, and international stakeholders.	Fund, World Bank, and AfDB funds total US$3.108 billion; additional funds from European Union: US$1.9Million; Global Mechanism of the UNCCD: US$380,000; FAO: US$456,000					Nigeria, Gambia, Sudan, Togo
Innovative Development Planning for Climate Change Adaptation	The project aims to build capacities for climate change adaptation among national and local decision-makers, enabling them to identify appropriate and effective measures, integrate them into decentralized development planning, and implement them.	BMUB, through the International Climate Initiative €3 million	Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) and MEA	Capacity building; knowledge communication; policy formation and integration; field implementation	Government	2011–2015	National
Integrating Climate Resilience into	The project aims to help farming communities prepare for increasing	LDCF; Government of Mali	FAO; MA; MEA	Capacity building; knowledge	Agriculture, government	2011–2015	National

Agricultural Production for Food Security in Rural Areas	climate variability, which is likely to have major impacts on vulnerable farming systems critical to agricultural production and food security in Mali. The project helps farmers develop climate change adaptation strategies and tools using a two-pronged approach: 1) strengthening community-level capacity to explore and test new technologies and management methods through the existing and growing network of Farmers Field Schools (e.g., testing and adopting more resilient crop varieties and cultivars; and 2) mainstreaming climate change considerations into the agricultural sector planning at the national and provincial level.	US$6.975 million (LDCF: US$2.4 million; co-financing: US$4.575 million)		communication; policy formation and integration; field implementation			
Intelligent Agriculture, Savings Circles and Radio Messaging for Resilience in the Niger River basin	This project builds resilience to climate extremes at scale through a gender-responsive, community-centred disaster risk reduction and climate change adaptation approach. It fosters women's empowerment by promoting savings and internal lending	DFID through the BRACED program Unknown budget	Catholic Relief Services (lead organization)	Capacity building; knowledge communication; community-based adaptation	Agriculture; disaster risk management; gender	2014–unknown	Regional Mali, Niger

	communities and increasing demand for good governance and access to improved seeds and other technologies through market engagement, radio messaging, and targeted advocacy.						
Natural Resources Management in a Changing Climate	This project aims to expand the adoption of sustainable land and water management practices in the target area in Mali. There are four components to the project: (1) knowledge management, governance, and communication; (2) scaling-up of sustainable land management practices; (3) diversification of local livelihoods; and project coordination, monitoring, and evaluation.	World Bank US$21.43 million	AEDD	Capacity building; knowledge communication	Agriculture; pastoralism; forestry	Dec 2013 –Sept 2019	National
Participatory Design of Gender-Responsive Monitoring and Evaluation (M&E) Protocol to Assess Progress and Evaluate Concrete Results/ Transformation from Farmers'	The project aims to develop relevant tools to assess the added value and impact of climate services use on farmer livelihoods, testable across Climate Change, Agriculture and Food Security sites in East Africa, South Asia, and West Africa; and catalyze a community of practice across CGIAR centres around impact assessment of climate	CGIAR Climate Change, Agriculture and Food Security Program US$173,000	International Crops Research Institute for the Semi-Arid Tropics; International Fund for Agricultural Development; Climate Services Partnership, World	Research	Agriculture; gender; climate information	Jan 2013– Dec 2013	Global Bangladesh, India, Nepal, Burkina Faso, Ghana, Mali, Senegal, Niger

Use of Climate Services	services on resource-poor farmers under a changing climate. Activities include participatory design of gender-responsive M&E protocol to assess progress and evaluate concrete results/transformation from farmer use of climate services, and collection of baseline data against which to measure impact, with synthesis of traditional local knowledge climate indicators and knowledge gaps.		Meteorological Organization				
Partners for Resilience	This projects hopes to increase the resilience of citizens against natural disasters, climate change, and the deterioration of ecosystems through various intervention strategies: stimulating sustainable economic development; strengthening the capacity of local organizations and local authorities, by, among other things, making a risk assessment, natural disaster risk management plans, and warning systems; advocacy and stimulation of knowledge sharing between governments, civil society, knowledge institutes, and the private sector in the field	Netherlands €40 million	Dutch Red Cross (secretary); Red Cross Climate Centre; CARE Netherlands; Cordaid; Wetlands International	Capacity building; knowledge communication; policy formation and integration; field implementation	Agriculture; freshwater supply; disaster risk management; government; civil society; social protection	2011–2015	Global India, Ethiopia, Kenya, Uganda, Mali, Guatemala, Nicaragua, Indonesia, Philippines

	of natural disaster reduction and climate adaptation.						
Programme for the Support of the National Strategy for Adaptation to Climate Change in Mali	The project aims to increase the adaptive capacity of ecological and silvo-pastoral systems, and resilience in vulnerable regions of Mali to the impacts of climate change, by using integrated approaches to climate change adaptation.	GIZ €4.9 million	GIZ and Ministry for the Environment and Sanitation (Mali)	Capacity building; field implementation	Agriculture; pastoralism; government	Jul 2014–Dec 2019	National
Strengthening Agro-Pastoralists' Capacities (potential name)	The FAO and the Government of Mali via the AEDD and its Rural Development Minister signed a cooperation agreement in February 2015 to enhance agro-pastoralists' capacities to respond to climate changes.	GEF and Government of Mali GEF: US$2 million; co-financing: US$13 million	FAO and AEDD; probably other partners		Agriculture; pastoralism	2015–2018	National
Strengthening Community Initiatives for Resilience to Climate Extremes	The project will strengthen the resiliency of 260,690 people in Mali vulnerable to complex climate risks, including variable rainfall and drought, by helping communities identify, reinforce, and scale up their unique adaptive capacities; and strengthening social cohesion, climate-adapted livelihoods, and natural resource management.	DFID, through the BRACED program £4.9 million	International Relief & Development	Capacity building; knowledge communication; community-based adaptation	Agriculture; disaster risk management; gender; climate information; government	2014–unknown	National
Strengthening Resilience to	The aim of this project is to enhance the capacity of	LDCF; co-financing from	FAO; AEDD; MA; Ministry of	Capacity building;	Agriculture; pastoralism;	Jun 2013–Dec 2018	National

Climate Change through Integrated Agricultural and Pastoral Management in the Sahelian zone in the Framework of the Sustainable Land Management Approach	Mali's agro-pastoral sectors to cope with climate change by mainstreaming climate change adaptation strategies, practices and technologies adoption into ongoing agro-pastoral and agricultural development initiatives in the framework of the national sustainable land management approach and program.	the Government of Mali, Spain, and the Netherlands (all through FAO) LDCF: US$2.172 million; co-financing: US$9.670 million	Animal Production, in consultation with local governments	knowledge communication; policy formation and integration; field implementation; community-based adaptation	ecosystem restoration; security; climate information; government		
Strengthening the Resilience of Pastoralists and Agro-pastoralists through Trans-border Livestock Mobility	This project will strengthen resilience of 905,000 pastoralists and agro-pastoralists (women, men, and children) by securing, servicing, and promoting trans-border livestock mobility across Mauritania, Senegal, Mali, Burkina Faso, and Niger, by providing key services (fodder supplements, animal health) and by enabling communities and stakeholders to lobby for livestock mobility and for appropriate policy-making at local, national, and ECOWAS levels.	DFID; European Union; Acting for Life £6.28 million	Acting for Life (lead organization)	Capacity building; knowledge communication; policy formation and integration; field implementation; community-based adaptation	Agriculture; pastoralism; civil society	2015–2017	Regional Senegal, Niger, Mauritania, Mali, Burkina Faso
Strengthening the Resilience of Women Producer Groups and Vulnerable	The project aims to enhance women producer groups' capacities to secure livelihood production in a changing climate and to	LDCF; UNDP; Government of Canada	UNDP; AEDD; MEA	Capacity building; field implementation; community-	Agriculture; pastoralism; ecosystem restoration; watershed	2013–2016	Global Mali, Haiti, Sudan, Niger,

Communities in Mali	increase the socio-economic resilience in vulnerable *communes*. Given the importance of the traditional participation of women in natural resource management, activities explicitly support a gender-sensitive approach through gender-specific measures. Specific outcomes include: 1) ensuring access to water for the development of subsistence activities, including restoring fish habitats threatened by climate change; providing small-scale irrigation schemes in high climate risks zones; and supporting local water management activities; and 2) investing in climate-resilient farming practices and income diversification for household production, crop diversity, and nutrition.	US$22.06 million		based adaptation	management; freshwater supply; gender		Cambodia, Cabo Verde

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