



**CARIIA**  
*Collaborative Adaptation Research  
Initiative in Africa and Asia*

# Review of Current and Planned Adaptation Action in Botswana

*CARIIA Working Paper #7*

*Alec Crawford*



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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

Climate change presents a very real challenge to Botswana's continued development and relative prosperity. An increasing population and growing demand for water — from residential, commercial, and industrial sources, including mining — will interact with declining rainfall, rising temperatures, and increased rates of evapotranspiration across much of the country to exacerbate water scarcity and other existing vulnerabilities. Botswana is less vulnerable to the impacts of climate change than its neighbours due to its higher development status and associated readiness to address the impacts of climate change, rather than because of its level of exposure to climate change or its policy environment. Nevertheless, the country's climate vulnerability is closely tied to its existing high level of water scarcity. The government of Botswana has identified five key sectors as particularly vulnerable: water, health, crops, grasslands and livestock, and forestry. However, the government does not consider climate change a national priority, and the subsequent lack of guiding policy, legislation, and strategy on responding to the impacts of climate change, as well as a dearth of adaptation programs and projects within the country, will only exacerbate existing and expected climate-related threats. This report explores these issues in greater depth. It is one in a series of country reviews prepared to provide the Collaborative Adaptation Research Initiative in Africa and Asia with a snapshot of adaptation action in its countries of engagement.

## Résumé

Les changements climatiques représentent un véritable obstacle au développement continu et à la relative prospérité du Botswana. L'augmentation de la population et la hausse des besoins en eau dans les zones résidentielles, commerciales et industrielles, notamment des besoins du secteur minier, se heurtent à la baisse des précipitations, à la hausse des températures et à la hausse du taux d'évapotranspiration dans la quasi-totalité du pays, ce qui exacerbe la pénurie d'eau et d'autres vulnérabilités existantes. Le Botswana est moins vulnérable aux effets des changements climatiques que ses voisins en raison de son niveau de développement plus élevé et de sa disposition à s'attaquer aux effets des changements climatiques, plutôt que du fait de son niveau d'exposition aux changements climatiques ou de ses politiques. Cependant, la vulnérabilité du pays aux changements climatiques est étroitement liée à l'importante pénurie d'eau à laquelle il fait face actuellement. Le gouvernement du Botswana a déterminé cinq principaux secteurs particulièrement vulnérables : l'eau, la santé, les cultures, les pâturages et l'élevage, et la foresterie. Cependant, le gouvernement ne considère pas les changements climatiques comme une priorité nationale, et le manque de politique directrice, de législation et de stratégie de lutte contre les effets des changements climatiques qui en découle, ainsi que l'absence de programmes et de projets d'adaptation dans le pays ne feront qu'exacerber les menaces existantes et prévues liées au climat. Ce rapport examine ces questions plus en détail. Cet examen 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 qui donnent un aperçu des mesures d'adaptation dans les pays où elle est déployée.

## Acronyms

BOCONGO	Botswana Council of Non-Governmental Organizations
CARIAA	Collaborative Adaptation Research Initiative in Africa and Asia
CCA	climate change adaptation
DFID	Department for International Development
DRR	disaster risk reduction
DMS	Department of Meteorological Services
DWA	Department of Water Affairs
HDR	Human Development Report
IDRC	International Development Research Centre
IPCC	Intergovernmental Panel on Climate Change
IWRM	integrated water resources management
MEWT	Ministry of Environment, Wildlife and Tourism
MFDP	Ministry of Finance and Development Planning
MoA	Ministry of Agriculture
ND-GAIN	Notre Dame Global Adaptation Index
NDMO	National Disaster Management Office
NDP	National Development Plan
NPCWTNRCC	National Portfolio Committee on Wildlife, Tourism, Natural Resources and Climate Change
OECD	Organisation for Economic Co-operation and Development
SNC	Second National Communication to the United Nations Framework Convention on Climate Change
TI	Transparency International
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change

USAID United States Agency for International Development

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## Contents

Abstract.....	iii
Résumé.....	iv
Synopsis.....	x
Introduction.....	1
1. Current climate and projected changes .....	2
1.1 Current climate .....	2
1.2 Observed climate trends .....	3
1.3 Climate projections.....	4
2. Vulnerability to climate change .....	4
2.1 Development profile .....	4
2.2 Vulnerability of key sectors .....	7
2.3 Vulnerable regions and groups .....	8
3. Adaptation planning context.....	9
3.1 National-level development policy context.....	10
3.2 National-level climate policy context.....	11
3.3 Institutional structure for climate governance.....	13
3.4 National-level sectoral policies.....	14
4. Current and planned adaptation programs and projects.....	16
4.1 Adaptation projects and programs .....	16
4.2 Climate finance.....	18
5. Networks and communities of practice.....	20
6. Conclusions.....	21
7. Annexes .....	23
8. References.....	31

## Synopsis

<b>Climate risks</b>	<ul style="list-style-type: none"> <li>• Rising temperatures</li> <li>• Uncertain changes in rainfall patterns</li> </ul>	<b>Key sources of vulnerability</b>	<ul style="list-style-type: none"> <li>• Water scarcity, desert landscape</li> <li>• Poor soil fertility</li> <li>• High reliance on groundwater resources and low recharge rates</li> <li>• Continued reliance on fuel wood for significant portion of energy resources</li> </ul>	<ul style="list-style-type: none"> <li>• Reliance on food imports for food security</li> <li>• Economic reliance on water-intensive mining activities</li> <li>• High rates of HIV/AIDS infection</li> <li>• High incidence of drought</li> <li>• Relatively low levels of gender equity</li> </ul>
<b>Vulnerable sectors</b>	<b>Illustrative potential impacts on vulnerable sector</b>	<b>Illustrative adaptation priority adaptation measures in each sector (from Second National Communication)</b>		<b>Projects in sector<sup>1</sup></b>
Water	<ul style="list-style-type: none"> <li>• Increased water demand with hotter temperatures</li> <li>• Decreased water supply, compounded by increased demand due to population growth, economic development, and increasing temperatures</li> <li>• Decrease in annual dam yields</li> <li>• Average increase in unmet water demand</li> <li>• Declining levels of groundwater</li> </ul>	<ul style="list-style-type: none"> <li>• Implement water conservation measures, awareness campaigns</li> <li>• Develop national water conservation strategy</li> <li>• Assess water resources and scarcity</li> <li>• Develop programs to protect urban poor from price increases</li> <li>• Increase data availability/access and documentation</li> <li>• Diversify and increase water resources for rural areas</li> <li>• Adopt indigenous methods of water use</li> <li>• Implement integrated water resources management strategies</li> </ul>		40%
Health	<ul style="list-style-type: none"> <li>• Shift in malaria band westwards and southwards</li> <li>• Increased child morbidity and mortality with lack of fresh and clean water</li> </ul>	<ul style="list-style-type: none"> <li>• Implement malaria control programmes</li> <li>• Control diarrheal diseases and integrate management of childhood infections</li> <li>• Provide social safety nets for the health sector</li> </ul>		20%
Crops	<ul style="list-style-type: none"> <li>• Changes in growing season length</li> <li>• Decreases in crop productivity</li> </ul>	<ul style="list-style-type: none"> <li>• Intensify national irrigation network</li> <li>• Promote desalination, soil-water-crop management strategies, rainwater</li> </ul>	<ul style="list-style-type: none"> <li>• Diversify crops, improve crop varieties</li> <li>• Develop early warning systems, emergency response planning</li> </ul>	40%

<sup>1</sup> 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.

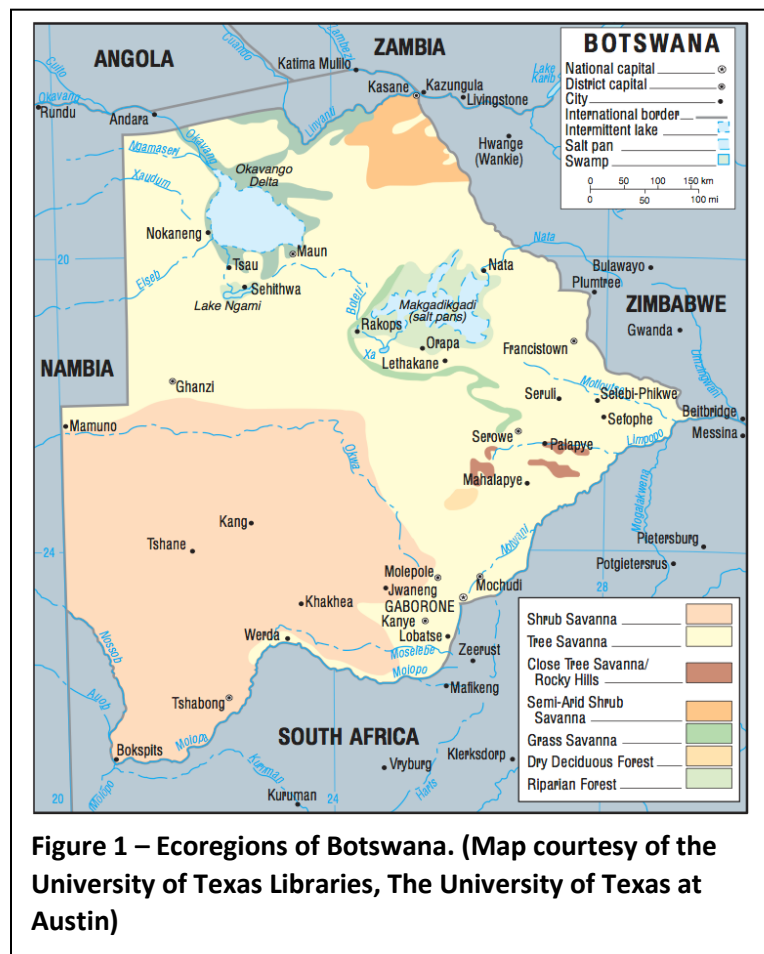
		<ul style="list-style-type: none"> <li>harvesting, treated wastewater to address water scarcity</li> <li>Promote zero tillage to improve soil structure</li> </ul>	<ul style="list-style-type: none"> <li>Improve access to farm inputs and credit, improve agricultural extension services</li> </ul>	
Grasslands and Livestock	<ul style="list-style-type: none"> <li>Shift toward undesirable plants</li> <li>Increased livestock morbidity during increasingly frequent drought events</li> </ul>	<ul style="list-style-type: none"> <li>Feed animals during drought (vs. grazing)</li> <li>Implement vaccination programs</li> <li>Move cattle to better pastures</li> <li>Introduce drought- and disease-tolerant livestock breeds</li> </ul>	<ul style="list-style-type: none"> <li>Fence grazing areas for individuals or groups</li> <li>Match livestock breeds to the local environment</li> <li>Diversify farm produce</li> </ul>	---
Forestry	<ul style="list-style-type: none"> <li>Thorn and shrub savannahs to expand at the expense of grasslands and moister forests and wetlands</li> </ul>	<ul style="list-style-type: none"> <li>Use less-preferred alternatives, non-indigenous supplements in the face of reduced forest products</li> </ul>		---
<b>Particularly vulnerable regions</b>		<b>Particularly vulnerable groups</b>		<b>Status of climate governance (policies, institutions)</b>
<ul style="list-style-type: none"> <li>Arid and semi-arid lands</li> </ul>		<ul style="list-style-type: none"> <li>Rural populations</li> </ul>		<ul style="list-style-type: none"> <li>Climate change policy and strategy being drafted</li> </ul>

## Introduction

Botswana is a sparsely populated, landlocked country in southern Africa bordered by Namibia to the north and west, South Africa to the south, and Zimbabwe to the east.<sup>2</sup> Most of the country is defined as arid or semi-arid and is inhospitable to human settlement; the sands of the Kalahari Desert cover three-quarters of Botswana's land area. The Okavango River, flowing from the Angolan Highlands, floods the northwest of the country from March to August each year to form the Okavango Delta, one of the world's largest inland deltas (see Figure 1).

Since achieving independence from the British in 1966, Botswana has enjoyed decades of stable civilian rule and democratic elections, and today boasts the highest levels of human development in sub-Saharan Africa (United Nations Development Programme [UNDP], 2014). It has achieved, or is on track to achieve, most of its Millennium Development Goals, lagging only in the areas of improving maternal health and reducing child mortality. The economy continues to grow at a strong pace (5.8% per year in 2015, according to the World Bank). This growth is underpinned by Botswana's rich mineral resource deposits, in particular its large diamond reserves (the world's largest diamond mine is in Botswana).

Botswana is less vulnerable to the impacts of climate change than its neighbours and more ready to address these impacts. This is in part a function of the country's development status and associated level of adaptive capacity, rather than a reflection of its exposure to climate change or its policy environment. Nevertheless, climate change presents a very real challenge to Botswana's continued development and relative prosperity. Its vulnerabilities are closely tied to the country's existing high level of water scarcity. An increasing population and increasing demand for water — from residential, commercial and industrial sources, including mining — will interact with declining rainfall, rising temperatures, and increased rates of evapotranspiration across much of the country to exacerbate water scarcity and



<sup>2</sup> Botswana also shares a very short border of a few hundred metres with Zambia in the north, at Kazungula on the Zambezi River.

other existing vulnerabilities. The government has identified five key sectors as particularly vulnerable: water, health, crops, grasslands and livestock, and forestry. But a lack of guiding policy, legislation, and strategy on responding to the impacts of climate change, as well as a dearth of adaptation programs and projects within the country, will further exacerbate existing and expected climate-related threats.

These issues are explored in greater depth within this report, which provides an overview of current and planned adaptation action in Botswana. It is one in a series of country reviews prepared to provide the Collaborative Adaptation Research Initiative in Africa and Asia (CARIAA) with a picture of the policies, programs, and projects designed and implemented specifically to address the current and projected impacts of climate change in its countries of engagement. Jointly funded by the United Kingdom's Department for International Development (DFID) and the International Development Research Centre (IDRC), CARIAA aims to help build the resilience of vulnerable 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, CARIAA is supporting four consortia to conduct high-calibre research and policy engagement activities that will inform national and sub-national planning processes in 17 countries, including Botswana.

This report begins by describing Botswana's current and projected exposure to climate risks. Section 3 outlines the factors that increase the vulnerability of Botswana and its people to climate change, describing the country's current development status and the potential implications of these changes for key sectors. Section 4 provides an overview of the critical policies and plans shaping Botswana's efforts to address climate change adaptation (CCA) at the national and sub-national levels. Section 5 describes the scale, type, and focus of current and planned adaptation-focused programs and projects in Botswana, as well as the level of adaptation finance flowing into the country, to assess the status of efforts to address the country's critical adaptation priorities. Section 6 provides a profile of in-country efforts to advance adaptation learning and knowledge sharing, as reflected in the presence of networks and communities of practice active in this field. The paper concludes with an assessment of the general status of adaptation planning at the national and sub-national levels in Botswana.

## **1. Current climate and projected changes**

This section provides an overview of the climate risk context in Botswana, beginning with a general description of the country's current climate and eco-climatic zones, followed by discussions of observed trends and projected changes to its climate over the remainder of this century.

### **1.1 Current climate**

Botswana has a subtropical climate that is largely defined by relatively low levels of precipitation. Most of the country is categorized as arid or semi-arid; much of it is desert and receives on average less than 250 mm of rainfall annually. Temperature and rainfall tend to vary on annual, decadal, and multi-decadal timescales across the region, with rainfall the more variable of the two: annual

rainfall in the centre of the country can swing from less than 100 mm in the driest years to more than 300 mm in the wettest (Daron, 2014). The wettest part of the country is the northeast, which receives on average 500 mm of rain (Department of Meteorological Services [DMS], n.d; Ministry of Environment, Wildlife and Tourism [MEWT], 2012). Rain typically falls in the austral summer months, between November and March, with precipitation levels peaking in January. The dry season, when little to no rain falls, runs from May to August (DMS, n.d.). The vast majority of the country's precipitation falls in erratic, unpredictable, and localized thunderstorms. Summer temperatures range from 18oC to 32oC in January, but they can climb as high as 42oC; in the winter, they average 21oC (July) but can dip down to 5oC (DMS, n.d.). The south and southwest experience the lowest temperatures. This temperature range is indicative of the country's desert ecosystem, which means that temperature variations can be significant through the day, with hot days and cooler nights (DMS, n.d.). The primary factors affecting the climate across the southern Africa region include altitude (Botswana is on a plateau, with an average altitude of 1,000 m); the warm Indian and cool South Atlantic oceans; the migration of the Inter-Tropical Convergence Zone, which largely dictates the timing and magnitude of summer rains; and the location of dominant atmospheric high- and low-pressure systems (Daron, 2014).

## 1.2 Observed climate trends

Temperatures in Botswana have increased across all seasons and regions since 1963. Temperatures in the interior have increased between 1.6oC and 2.0oC over the past 50 years, being most pronounced during the dry season (MEWT, 2012). The number of cold days and nights has decreased, while the number of warm days and nights has increased. Drought and flooding are both most common in northern Botswana, which typically has been the wettest part of the country (MEWT, 2012). This region saw a decrease in summer rainfall between 1963 and 2012 (Daron, 2014).

Temperatures in Botswana are expected to continue to increase in the years ahead (Daron, 2014): according to the Intergovernmental Panel on Climate Change (IPCC)'s Fifth Assessment Report, "it is virtually certain that there will be more frequent hot and fewer cold temperature extremes over most land areas on daily and seasonal timescales as global mean temperatures increase" (IPCC, 2013). Modeling by the IPCC for southern Africa suggests that temperatures could rise by 1.1oC by 2035 (ranging from 0.6oC to 1.6oC), 2.5oC by 2065 (from 1.7oC to 3.4oC), and 4.5oC by 2100 (from 3.3oC to 6.3oC) (Christensen et al., 2013, p. 14SM-36).<sup>3</sup> The country's Second National Communication to the United Nations Framework Convention on Climate Change (SNC) supports this trend: it expects temperatures to increase by an average of 2oC across the country by 2030, with warming most pronounced over the Kalahari in the west (MEWT, 2012).<sup>4</sup> An increase in temperature will increase evapotranspiration across the country, which is expected to place additional stress on already vulnerable systems (Daron, 2014).

<sup>3</sup> These projections represent a 50% likelihood of occurrence, using 39 global models and the Representative Concentration Pathway 8.5 scenario and against a baseline period of 1986 to 2005.

<sup>4</sup> This projection was calculated using the MAGICC/SCENGEN climate model.

### 1.3 Climate projections

It is more difficult to forecast precipitation for the country due to the combination of climatic factors that contribute to the region's existing climate variability. As reported in its SNC, the government expects total annual rainfall to increase in the south, the country's driest region, and to decrease in the north and east, those areas that historically have received more precipitation. Daron (2014) notes, however, that it is difficult to forecast expected changes in Botswana's precipitation levels due to historically inconsistent patterns for rainfall in the region; most models cannot agree on the direction or magnitude of rainfall changes by mid-century. It is likely, however, that multi-decadal variability in rainfall patterns will continue (Daron, 2014). As a result of predicted temperature increases, the government expects droughts to increase in frequency and severity, particularly by 2080 to 2100, with the largest changes experienced in western and northern Botswana (MEWT, 2012).

## 2. Vulnerability to climate change

The vulnerability of Botswana's population, its economy, and its environment to climate change will be determined by the nature of the changes to which they are exposed and by national capacities to manage, recover from, and adapt to these changes. This section introduces and explores the economic, political, demographic, social, and environmental factors within Botswana that influence its adaptive capacity. It also includes an assessment of the implications of these changes for key economic sectors within Botswana.

### 2.1 Development profile

Botswana is categorized as a country that has achieved a level of medium human development; as presented in Table 1, in the most recent Human Development Report of the United Nations Development Programme (UNDP), the country ranked 109th out of 187 countries (UNDP, 2014). This makes Botswana the most developed country in continental sub-Saharan Africa. The country achieved the Millennium Development Goal of halving its population living in conditions of extreme hunger and poverty in 2007. It has also achieved, or is likely to achieve, its targets for universal primary education, promoting gender equality, combating HIV/AIDS, malaria, and other diseases, ensuring environmental sustainability, and developing a global partnership for development (UNDP, 2012). Where Botswana continues to lag is in efforts to reduce child mortality rates and to improve maternal health (UNDP, 2012).

Botswana is one of the world's most sparsely populated countries, with a population of just 2 million that is growing at a rate of 0.9% per year (UNDP, 2014). Nearly two-thirds of the population lives in Botswana's cities, which is in part a function of the country's environment: nearly three-quarters of Botswana is covered by the inhospitable sands of the Kalahari Desert. Population is therefore concentrated away from the desert in the east of the country. Life expectancy at birth is 64.4 years, which is a considerable achievement given that just 10 years earlier, Botswana were expected to live an average of 41.4 years (UNDP, 2004; 2014). This low life expectancy was a result of the fact that HIV/AIDS has hit Botswana particularly hard; the country has one of the world's

highest rates of infection, at 23% of the adult population, trailing only Swaziland and Lesotho (UNDP, 2014). Improvements in life expectancy are a testament to the country's response strategy to the health crisis. The median age for Botswana is 22.8 years, and children are in school for an average of 8.8 years, four years longer than the average for sub-Saharan Africa (UNDP, 2014).

Botswana's economy is growing at a healthy rate of 5.8% per year (World Bank, 2015). Gross national income per capita is US\$14,792 (in 2011 dollars, adjusted for purchasing power parity), though it should be noted that there is a significant gap in income across gender lines: gross national income per capita for women is US\$11,491, while for men it is US\$18,054 (UNDP, 2014). In terms of contribution to GDP, the economy is dominated by the mining sector, particularly the extraction of the country's extensive diamond deposits: diamonds account for one-third of the country's GDP, 70–80% of export earnings, and one-third of government revenues (CIA, 2014). This dependence on a single luxury export makes Botswana vulnerable to global economic downturns. The mining sector also extracts copper, nickel, potash, coal, iron ore, and silver (CIA, 2014).

Other important economic sectors include tourism, financial services, subsistence farming, and cattle raising (CIA, 2014). Only 0.7% of Botswana's land is arable, and a negligible amount is irrigated; what agriculture exists is typically rain-fed, and the country depends heavily on food imports (MEWT, 2012). The main constraints to the agricultural sector are poor soils, inadequate economic infrastructure, scarce water resources, and recurrent drought (MEWT, 2012). Nevertheless, 41% of the rural population depends on subsistence agriculture for its income, with a focus on sorghum, corn, and millet (MEWT, 2012; Statistics Botswana, 2014). According to the most recent population and housing census, 30% of Botswana households receive their income from one or more agricultural or livestock activities (Statistics Botswana, 2014). Livestock is a more strategically and culturally important sector than crop production, with animals widely held for in-kind income (Adaptation Learning Mechanism, 2009; MEWT, 2012).

Much of Botswana's success can be attributed to its political stability; development gains have not been reversed by conflict or instability, and the country has enjoyed almost five uninterrupted decades of civilian leadership and democratic elections since independence in 1966 (CIA, 2014). The head of state is President Ian Khama, who is currently serving his second term. One area in which Botswana's parliamentary democracy lags is the number of elected female parliamentarians; women take up just 7.9% of seats in Botswana's parliament, which is well below average for sub-Saharan Africa (21.7%) and is among the lowest rates in the world (UNDP, 2014). Botswana is listed as clean on Transparency International (TI)'s 2014 Corruption Perceptions Index, ahead of Spain, Portugal, and Poland (TI, 2014). Finally, the country is currently in the process of developing a decentralization policy and implementation plan in order to better empower local governments.

The Kalahari Desert dominates Botswana's environment: nearly three-quarters of the country is covered by sand. Smaller areas with fertile soils exist in the southeast and in the northwest (Adaptation Learning Mechanism, 2009). The Okavango Delta, a large inland delta, forms in the northwest of the country where the Okavango River drains into the Kalahari Desert from neighbouring Angola. The delta reaches its maximum area in the dry months of June through August as waters arrive from the Angolan Highlands. This supports a significant wildlife population and, increasingly, is the focus of the country's tourism industry. Overall, Botswana has limited



surface water resources, and 66% of Botswana rely on groundwater resources as their main source of potable water. The country's water resources are already under considerable pressure even without the effects of climate trends: population growth, urbanization, and development pressures are increasingly driving up demand for the country's limited water resources (MEWT, 2012). Fuel wood is one of three main energy sources in the country (alongside coal and petroleum), which has put significant pressure on the country's limited forestry resources and led to significant deforestation in recent decades (MEWT, 2012).

<b>Table 1 – Key indicators of development progress for Botswana</b>				
<b>Category</b>	<b>Indicator</b>	<b>Year</b>	<b>Value</b>	<b>Source</b>
Human development	Human Development Index (score <sup>d</sup> /rank <sup>d</sup> out of 187 countries)	2013	0.683/109	UNDP (2014)
	Population in multidimensional poverty (%)	2013	No data	
	Under-five mortality rate (per 1,000 live births)	2013	53	
	Adult literacy rate (15 years of age and above)	2013	85.1 <sup>c</sup>	
	Improved water source, rural (% of population with access)	2012	93	World Bank (2015)
	Improved sanitation facilities (% of population with access)	2012	64%	
	Access to electricity (% of population)	2010	43.1%	
Gender	Gender Inequality Index (value <sup>e</sup> /rank <sup>d</sup> out of 187 countries)	2013	.486/109	UNDP (2014)
Demographics	Total population (in millions)	2013	2.021 <sup>a</sup>	UNDP (2014)
	Average annual population growth rate	2010	1.0%	
	Population, urban (% of population)	2011	62.9% <sup>b</sup>	
Economic development	GDP (in current \$US, millions)	2013	14,788.70	World Bank (2015)
	GDP growth (annual %) (average of period of 2010 to 2013)		6.2%	
	Agricultural land (% of land area)	2012	45.7%	
Governance	Corruption Perceptions Index (score <sup>f</sup> /rank <sup>d</sup> of 174 countries)	2014	63/31	TI (2014)
	Fragile States Index (score out of 120 <sup>g</sup> )	2014	64.5/ Warning	Fund for Peace (2014)
	Expenditure on education, public (% of GDP)	2012	7.8% <sup>c</sup>	UNDP (2014)
	Expenditure on health (% of GDP)	2011	5.1%	
Environment	Population living on degraded land (%)	2010	22.0%	

Change in forest area, 1990/2011	2013	-18.1%	UNDP (2014)
<sup>a</sup> Projections based on medium-fertility variant <sup>b</sup> Because data are based on national definitions of what constitutes a city or metropolitan area, cross-country comparison should be made with caution <sup>c</sup> Data refer to the most recent year available during the period specified <sup>d</sup> Where 1 or first is best <sup>e</sup> Where 0 is best <sup>f</sup> Where 0 is highly corrupt and 100 is very clean <sup>g</sup> Where 120 is very high alert, and 0 very sustainable			

## 2.2 Vulnerability of key sectors

According to the University of Notre Dame's Global Adaptation Index (ND-GAIN), which measures levels of vulnerability to climate change as well as the readiness of countries to respond to it, Botswana is the 71st most vulnerable country of the 180 countries included in the index (ND-GAIN, 2013). The country's vulnerability score is 0.410. Areas of particular concern are Botswana's dependence on food imports, its limited agricultural capacity, and its existing dam capacity. As indicated in Table 2, Botswana is less vulnerable than neighbours Namibia and Zimbabwe, though more vulnerable than South Africa. In terms of its readiness to respond to climate change, Botswana is well positioned: it ranks as the 34th most ready country globally with a score of 0.639, indicating that it is more prepared than its neighbours as a result of its strong economy, good governance, and social readiness (ND-GAIN, 2013). The main area of weakness in terms of readiness is education, namely low levels of enrolment in tertiary education (ND-GAIN, 2013).

**Table 2 – N D-GAIN scores and rankings for Botswana and its neighbours**

Country	Vulnerability*		Readiness**		Overall	
	World rank	Score	World rank	Score	World rank	Score
Botswana	110	0.410	34	0.639	54	61.5
Namibia	127	0.446	101	0.442	113	49.8
South Africa	51	0.320	88	0.470	74	57.5
Zimbabwe	122	0.428	180	0.250	146	41.1

\* Lower score indicates lower vulnerability. Vulnerability is measured for the following sectors: food, water, health, ecosystem services, human habitat, and infrastructure.  
\*\* Higher score indicates higher degree of preparedness. Readiness is measured by looking at the economy, governance systems, and social readiness.

The country's SNC identifies Botswana's sectoral vulnerabilities, which are summarized in Table 3 below. The main sectors of concern are water, health, crops, grasslands and livestock, and forestry, with water identified as the most affected sector (MEWT, 2012). Existing water scarcity and expected changes in the distribution, timing, and amount of rainfall are identified as key sources of vulnerability for the Botswana water sector moving forward. Increasing demand from residential, commercial, industrial, and agricultural users in a context of decreased precipitation and reduced groundwater recharge rates will place significant pressure on the country's water resources. In

particular, continued growth of the mining sector, so closely tied to the country's economic health, will increase demand for water resources (Department of Water Affairs [DWA], 2013). A general trend of reduced rainfall is expected to have significant knock-on impacts: the SNC predicts decreases of up to 13% in river flows and 19% in cereal production by 2050. An increased intensity of droughts and floods, along with changes to the growing season, are expected to have a significant impact on soil productivity, water supply, food security, human welfare, and poverty (National Disaster Management Office [NDMO], 2013). Lower run-off (by as much as 30 to 40%) and higher evaporation rates will reduce already low safe yields for dams, and could adversely affect tourism sites like the Okavango Delta (DWA, 2013).

<b>Table 3 – Key vulnerable sectors in Botswana</b>	
<b>Sector</b>	<b>Likely impacts of climate change</b>
Water	<ul style="list-style-type: none"> <li>• Increased water demand during winter months with temperature increase</li> <li>• Decreased water supply, compounded by increased demand due to population growth, economic development and increasing temperatures</li> <li>• Decreased annual dam yields</li> <li>• Average increase in unmet water demand</li> <li>• Declining levels of groundwater</li> <li>• Need to seek alternative water sources in the long-run, as the country is already semi-arid and likely to have serious water shortages in the near future.</li> </ul>
Health	<ul style="list-style-type: none"> <li>• Shift in malaria band westwards and southwards</li> <li>• Increased morbidity and mortality in children under five years of age, linked to compromised supplies of fresh and clean water and associated diarrheal disease</li> </ul>
Crops	<ul style="list-style-type: none"> <li>• Changes in growing season length</li> <li>• Decreases in crop productivity</li> </ul>
Grasslands and livestock	<ul style="list-style-type: none"> <li>• Shift toward undesirable plants</li> <li>• Increased livestock morbidity during increasingly frequent drought events</li> </ul>
Forestry	<ul style="list-style-type: none"> <li>• Thorn and shrub savannahs are predicted to expand at the expense of grasslands and moister forests and wetlands</li> </ul>

Source: MEWT, 2012

### **2.3 Vulnerable regions and groups**

The rural poor are most vulnerable to climate change, due to their reliance on groundwater resources and expected reductions in recharge rates (linked to reduced rainfall and increased evapotranspiration rates). According to the SNC, climate change, coupled with population growth and increased industrialization, will result in 97% of water demand in Kgalagadi District in the southwest going unmet by 2030 due to the district's reliance on groundwater, the highest rate in the country. For those reliant on surface waters, the southeast (i.e., the capital region) will be hardest hit, with 81% of water demand going unmet (MEWT, 2012). Gaborone, the capital, can expect a reduction in water supply of 11 to 12% over the next 15 years (MEWT, 2012). Climate

change projections also identify the north and west of the country as being increasingly exposed to more frequent storms (MEWT, 2012).

An assessment report from the Gender Affairs Department of the Ministry of Labour and Home Affairs on Botswana's progress in implementing the Beijing Platform for Action (2014) acknowledges that climate change is a threat to gender equity and women's development. This is due to the expected impact of climate change on water scarcity and rainfall variability (which is expected to increase the labour required to collect and distribute household water, a responsibility disproportionately held by women), agriculture and livestock productivity (which, due to the primary role of women in agriculture, is expected to lead to reductions in the income and food security of women), and the distribution of diseases such as malaria and cholera (which is expected to increase the burden for women as traditional caregivers within households) (Gender Affairs Department, 2014).

### 3. Adaptation planning context

While Botswana has made great strides in its development progress over the past three decades, it has not yet integrated climate risks or adaptation planning into its laws, policies, and strategies in a significant way. While climate-related laws and policies are in the process of being developed, as are policies for related sectors (water, gender, agriculture), few are currently in place, as indicated in Table 4. Stakeholders note that despite very real climate risks, the government has not yet made climate change a national priority. This section will examine the degree to which climate considerations have or have not been integrated into existing and upcoming laws and policies, and the existing institutional structures that support national responses to climate change.

<b>Table 4 – Botswana's national adaptation planning context: Summary of progress as of May 2015</b>	
<b>Indicator</b>	<b>Progress</b>
Climate change recognized in country's guiding development vision/plan	Yes, in National Development Plan (NDP) 10
National-level coordinating entity for climate change established and active	Yes, National Portfolio Committee on Wildlife, Tourism, Natural Resources and Climate Change (NPCWTNRCC)
Climate change policy and/or law in place	Not present, currently being drafted
Climate change strategy published	Not present, currently being drafted
Climate change action plan published	Not present
Adaptation plan published	Not present
Climate change fund or adaptation fund operational	Not present
Climate change units established in key ministries	No
Climate change integrated into national sectoral policies	Yes, but only to a limited degree in health and disaster risk management policies.

### 3.1 National-level development policy context

Botswana has made strong development progress over the past three decades, to the point where it is now near the top of all countries categorized as having medium human development in the most recent Human Development Report from the UNDP. In 1980, the country's score on the Human Development Report Index was 0.470; by 2013, that score had climbed to 0.683. The growth would likely have been even greater were it not for the impact that HIV/AIDS has had on the population: the country still has one of the highest infection rates in the world. Despite this, Botswana is considered the most developed country in continental sub-Saharan Africa.

Vision 2016 is Botswana's guiding development strategy. In it, the government presents its long-term vision of development for the country by the year 2016, which will mark 50 years since the country achieved its independence from Great Britain. The goal of Vision 2016 is to establish a nation that is educated and informed; prosperous, productive, and innovative; compassionate, just, and caring; safe and secure; open, democratic, and accountable; moral and tolerant; and united and proud. Established through participative consultations with stakeholders nearly two decades ago, Vision 2016 does not have a strong environmental component, nor does it mention climate change (Government of Botswana, 1997). This is likely a result of its age. Vision 2016 is implemented through six-year National Development Plans (NDPs), and it is within these NDP documents that one will find mention of climate change. Botswana is currently implementing its tenth NDP (NDP 10), which runs from 2009 to 2016.

NDP 10 integrates climate change in a number of ways. It acknowledges the need to redirect and refocus national research and development efforts into emerging, pressing challenges—including climate change. It calls for the mainstreaming of climate change into development processes, in order to make development more sensitive to the impacts of climate change. NDP 10 recognizes that a lack of action on adaptation could compromise the country's long-term development, and that there is a need to better understand the links between climate, society, and the environment, as well as concepts of resilience, vulnerability, and adaptation. Over and above recognizing the threat posed by climate change, NDP 10 also outlines specific actions to be taken to reduce Botswana's vulnerability. In an effort to address the vulnerability of climate-dependent rural populations, NDP 10 states that long-term, proactive, and context-specific adaptation policies will be pursued. It also calls for disaster risk reduction (DRR) plans to be strengthened and for rethinking how the country will approach the management of natural resources, biodiversity, and ecosystems. Specifically, the Environmental Protection Programme is mandated to develop adaptation strategies for economic diversification, agriculture, and malaria eradication; identify the most vulnerable sectors as well as critical areas for promoting early adaptation; and provide improved weather and climate data to support informed decision making (Government of Botswana, 2011). It is unclear how this mandate has been implemented since it was passed in 2009.

Botswana's national development policies and direction are also influenced by the government's commitment to achieving the Millennium Development Goals. As previously mentioned, Botswana has achieved or is on track to achieve its targets on poverty and hunger, education, gender equality, HIV/AIDS, malaria and other diseases, environmental sustainability, and development cooperation.

The country lags in efforts to reduce child mortality rates and to improve maternal health (UNDP, 2012).

### 3.2 National-level climate policy context

Botswana is currently developing its national policy, strategy, and action plan on climate change; it hopes to have the policy in place by 2016 (Ministry of Finance and Development Planning [MFDP], 2013). The government has contracted out the drafting of the new policy to external consultants; it is unclear the extent to which these capacities exist within the Ministry of Environment, Wildlife and Tourism (MEWT). Stakeholders note that while some capacity does exist for climate change policy making and programming at the government level, action by staff with these capacities is hampered by a lack of guiding policies and a lack of resources. At the time of its submission in 2012, the SNC noted that the government has not yet adopted climate change as a priority, and that the integration of climate risks and considerations into development programs was a challenge (MEWT, 2012). This remains the case, according to local civil society representatives.

The SNC identified a number of adaptation priorities across the five priority sectors listed above (water, health, crops, grasslands and livestock, and forestry; see Table 5). Additional adaptation priorities identified by the World Bank and cited in the DWA's 2013 integrated water resources management (IWRM) document include strengthening drought and flood risk monitoring, early warning, and management; investing in and improving water storage and infrastructure; implementing water demand management measures; and integrating climate risks into IWRM. It remains to be seen to what degree these priorities will be implemented or integrated into national climate change legislation.

Sub-national governments in Botswana have given no indication that they have developed or are starting to develop their own strategies for managing climate change risks. Reflecting the need for adaptation actions to be tailored to local circumstances and needs, the absence of these efforts may be perceived as an impediment to Botswana's efforts to reduce its vulnerability to climate change. The current process of developing a decentralization strategy may provide opportunities for addressing this concern.

**Table 5 – Key adaptation actions by sector identified in Botswana's SNC and key sectoral policies**

Sector	Adaptation priorities
Water	<ul style="list-style-type: none"> <li>• Implement water conservation measures and awareness campaigns: water pricing used as a tool, water accounts studies and implementations, water cuts and/or restrictions, more use of rainwater catchment systems, and desalination for hard water</li> <li>• Develop national water conservation strategy</li> <li>• Carry out forecasting studies to assess water resources and identify areas of scarcity</li> <li>• Protect urban poor as growing water demand results in water price increases</li> <li>• Increase data availability/access and documentation to intensify awareness</li> </ul>

	<ul style="list-style-type: none"> <li>• Diversify and increase water resources for rural areas to provide safer water resources.</li> <li>• Adopt indigenous methods of water use</li> <li>• Implement IWRM strategies: loss reduction, water recycling, rainwater harvesting, water pricing, water restrictions, and IWRM efficiency plans</li> </ul>
Health	<ul style="list-style-type: none"> <li>• Run malaria control program: vector control interventions, including insecticide-treated bed nets and indoor residual spraying; case management; monitoring and evaluation; public education and malaria campaign through print, electronic media, and radio</li> <li>• Control diarrheal diseases and integrate management of childhood infections through adequate public education; surveillance, reporting, and monitoring; infrastructure development, including water treatment plants and boreholes; access to safe/potable water and improved sanitation; technological/engineering Interventions such as clean water technologies and bio-latrines; medical interventions</li> <li>• Increase socio-economic development as a component of adaptation: intervention studies, appropriate action targeting improving resilience of vulnerable groups by providing social safety nets for the health sector</li> </ul>
Crops	<ul style="list-style-type: none"> <li>• Intensify national irrigation network use of desalination, soil-water-crop management strategies, rainwater harvesting, and treated wastewater to address increasing water scarcity</li> <li>• Implement conservation systems: adoption of zero tillage to improve soil structure and increase soil water infiltration</li> <li>• Diversify crops to lessen risks and increase productivity</li> <li>• Improve crop varieties toward varieties tolerant to disease, heat and drought, and toward early-maturing varieties</li> <li>• Provide seeds and fertilizer to help increase productivity (through the government's Integrated Support Programme for Arable Agriculture Development agricultural support scheme)</li> <li>• Use greenhouses/nets to improve growing conditions</li> <li>• Improve early-warning systems for better coordination and emergency and response planning</li> <li>• Improve access to farm inputs and credit, and improve agricultural extension services</li> <li>• Construct dams, well, and irrigation schemes</li> </ul>
Grasslands and livestock	<ul style="list-style-type: none"> <li>• Feed animals during drought (rather than grazing)</li> <li>• Vaccinate against opportunistic diseases that result from drought</li> <li>• Move cattle to better pastures</li> <li>• Focus on livestock breeds that are more drought- and disease-tolerant</li> <li>• Fence off grazing areas for individuals or syndicates</li> <li>• Match livestock breeds to the local environment</li> <li>• Diversify farm produce</li> <li>• Use fall-back grazing areas</li> <li>• Use mixed small-stock and large-stock herds of various breeds</li> </ul>



Forestry	<ul style="list-style-type: none"> <li>• Use less-preferred alternatives, non-indigenous supplements in the face of reduced availability of forest products</li> </ul>
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Source: MEWT, 2012

### 3.3 Institutional structure for climate governance

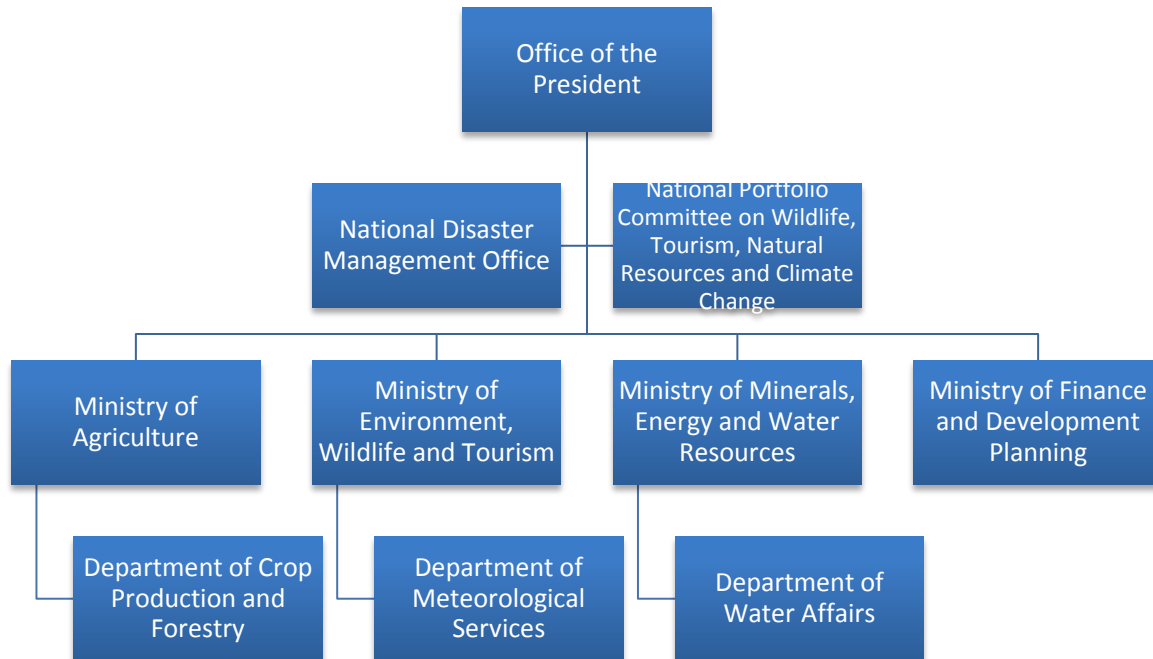
Oversight for work on climate change in Botswana is provided at the government level by the National Portfolio Committee on Wildlife, Tourism, Natural Resources and Climate Change (NPCWTNRCC), a select committee made up of eight parliamentarians mandated to provide national direction on climate change and to drive actions and response strategies. The committee was established in recognition of the fact that climate change needed to be more holistically addressed at the legislative level. In reality, according to stakeholders, due to the low priority given to climate change at the national level, this committee tends to convene only just before Conferences of the Parties for the United Nations Framework Convention on Climate Change (UNFCCC); it does not provide continuous guidance or governmental engagement on the subject throughout the year. It is unclear whether or how the committee's role will change with the drafting of new climate change legislation and policies.

At the ministerial level, climate change responsibilities fall under the MEWT, the ministry responsible for environmental management within Botswana (see Figure 2). Within the MEWT, the DMS takes the lead on climate change and has been named the focal point under Botswana's commitments to the UNFCCC. The main responsibilities of the DMS are the maintenance of regular climate observations, including those from a weather station that is included in the global climate observation network. In 2010, a National Climate Change Coordinator was appointed to provide resources and skills on the subject to the MEWT.

No other ministries within the government have embedded climate change specialists or departments, but three are particularly important for responding to the risks and challenges of climate change: the Ministry of Mines, Energy and Water Resources, specifically its DWA; the Ministry of Agriculture (MoA), particularly the Department of Crop Production and Forestry; and the MFDP. In addition, the National Disaster Management Office (NDMO), responsible for disaster preparedness and response, is housed within the Office of the President.

Support for climate governance and adaptation policy making and programming comes from the University of Botswana's Environmental Science Department (in terms of capacity building, research, and observation), the Water Utilities Corporation (responsible for urban water supply), the Rural Industries Promotion Corporation (responsible for solar energy and water harvesting), the Botswana Innovation Hub (for technology transfers, including adaptation technologies), and the national UN country office (which, through UNDP and in partnership with the government, established the Environmental Support Programme to address national capacity deficits).





**Figure 2 – Summary of the institutional structure for climate governance in Botswana as described above**

### 3.4 National-level sectoral policies

A number of national-level sectoral policies are relevant to the government of Botswana's response to climate change and its support of CCA, including those related to water, agriculture, and gender. A number of these policies are out of date and in the process of being revised and updated. As previously mentioned, the NPCWTNRC was established to help guide this policy-revision process. Policies currently being updated include those focused on water, agriculture, and gender; all three existing policies date back to the 1990s and as such do not feature climate change or variability in any way. While this may change with revisions to these and other policies, to date climate change remains weakly integrated into the government of Botswana's social, economic, and environmental policies and ministries (MEWT, 2012). Climate change does feature in the recently updated national DRR strategy and the national health strategy, as elaborated below. The inclusion in these revised policies, along with indications from related policy documents and Botswana's international commitments, suggests that CCA will play an increasingly prominent role in upcoming legislation and policy (see Table 6).

Botswana's most recent disaster risk reduction strategy (2013–2018) lists climate change as a factor influencing disaster risk. The strategy identifies drought, flooding, and wildfires as three principal threats to the population moving forward, and climate change as a force that is likely to increase the incidence or likelihood of these and other hazards. It also reiterates Botswana's commitment to the Southern African Development Community Disaster Risk Reduction Strategy and Plan of Action (2010–2015), which calls for the incorporation of CCA into DRR programs and measures, and the African Union's Extended Programme of Action for the Implementation of the

Africa Regional Strategy for Disaster Risk Reduction (2006–2015), which includes mainstreaming CCA into sustainable development.

Strengthening CCA is listed as a strategic goal of the DRR strategy, to be achieved by 2018. Specifically, this will include ensuring that the upcoming climate change policy and action plan are effectively implemented, though no adaptation-specific activities or approaches are highlighted. The strategy focuses on DRR activities relating to drought, flooding, and wildfires that, it can be argued, would be consistent with adaptation actions. Some of the required actions for preventing and mitigating climate-related disasters include constructing new dams and cross-border water supplies, installing water collection and storage containers at strategic locations, monitoring long-term weather patterns and water demand, assessing dam break impacts on existing development, mapping flood risks, and improving early warning systems for storms and weather events. The associated costs of DRR-related adaptation actions are not included in the document (NDMO, 2013).

The National Health Policy (for the period 2011–2021) also identifies climate change as a threat to the well-being of the population (Ministry of Health, 2011). The policy predicts the direct impacts of climate change on health will be an increase in the prevalence of malaria due to increases in temperature and rainfall (in some parts of the country), an increase in the incidence of cholera, and an increase in malnutrition due to reductions in domestic food production and crop yields. Despite identifying climate as a potential health risk, the policy does not offer response or adaptation strategies for addressing this threat (Ministry of Health, 2011).

Botswana's national agriculture policy was developed and adopted in 1991; there is no mention of climate change or adaptation in the original document, most likely a result of the time period in which it was written. As it has been nearly 25 years since the policy's adoption, the government is currently in the process of reviewing and updating the policy. The original policy focused on achieving food security, not just through national food self-sufficiency but also by recognizing the importance of food imports. The MoA website does not mention climate change as being part of its agriculture policy review process, nor is there a department or division within the Ministry that works to integrate or mainstream climate change across its activities (MoA, 2009). The Ministry is, however, involved in CCA projects at the local level through its crop and livestock extension officers.

The government is currently in the process of drafting a new national water policy and act; the current legislation on water was passed in 1968 (the Water Act) and as such is ineffective in dealing with climate change and the sector's contribution to adaptation. That said, in 2013 the government did adopt the IWRM and Water Efficiency Plan, which identifies climate change as a threat to national development, particularly when combined with expected increases in water demand and population (DWA, 2013). The plan notes that climate change is a cross-cutting issue which will impact all aspects of IWRM, and that a host of activities are required to ensure that water scarcity does not constrain national development and growth. These activities include improved water demand management, improved efficiency in water allocation and use, the promotion of the reuse of wastewater, increased rainwater harvesting, and investments in desalination. The plan notes that adaptation is urgently required, given the magnitude of possible climate change impacts and the significant cost of inaction (DWA, 2013).

A national gender strategy and policy is currently being drafted; as such, no assessment can be made of the extent to which climate change risks and considerations are integrated into Botswana's legislation on the topic. It will be important to integrate climate change into this new strategy, given the particular vulnerabilities of women to the impacts of climate change.

<b>Table 6 – Integration of climate change into national sectoral strategies, policies and plans: An assessment of progress</b>				
<b>Policies</b>	<b>Absent but policy under review</b>	<b>Climate change mentioned as potential risk</b>	<b>Possible actions for reducing risk identified</b>	<b>Targets identified for specific adaptation measures</b>
National water strategy	✓			
National health strategy		✓		
National agricultural strategy	✓			
National DRR Strategy		✓	✓	✓
National gender strategy	✓			

## 4. Current and planned adaptation programs and projects

The extent to which Botswana will be able to address the threat of climate change will be influenced by the range and type of adaptation-focused projects and programs supported by the government and its international development partners. This section provides an overview of these projects and programs — both current and anticipated — and of the size and orientation of finance flowing into and within Botswana to support adaptation action.

### 4.1 Adaptation projects and programs

We conducted a review of adaptation programs and projects in Botswana using online resources (see Table 7). For details on the methodology used within this component of the review, please see Annex A. We focused on those projects that aim to support CCA, as reflected in their title and/or objectives. Where possible, we captured these in a database and classified them by their type and area of focus. Annex B presents an overview of these ongoing projects. The review revealed that there was a very low level of adaptation programming in the country, and that which is happening is typically through regional, rather than national, projects. This is further reflected in the limited amount of funding that Botswana has received for adaptation activities, as discussed in Section 4.2.

One major constraint for CCA projects and programs in the country is Botswana's recent categorization as a middle income country; with this classification, a number of multilateral and bilateral donors withdrew their financial support from Botswana. As such, the funding available for the government and national NGOs to implement adaptation activities has decreased considerably.

<b>Sector of focus</b>	<b>Priority sectors for adaptation</b>	<b>Number of projects</b>	<b>Percentage of total projects</b>	<b>Geographical Scale</b>	
Water (watershed management; freshwater supply)	✓	2	33%	National	1
Health	✓	1	17%	Regional	4
Agriculture (crops)	✓	2	33%	Global	1
Grasslands and livestock	✓	0	0%	Total	6
Forestry	✓	0	0%		
Government		2	33%		
Multi-sectoral		1	17%		

The most concrete adaptation programs in Botswana, whether national or regional, focus on the management of the country's surface water resources, specifically the Okavango and Limpopo river basins. This aligns with the SNC, which listed water as the country's highest adaptation priority. While agriculture is partially addressed (as food security) by adaptation programming, grasslands and livestock are absent, despite their prioritization and cultural importance. Forestry is also largely omitted from adaptation programming, despite its vulnerability and its critical importance to national energy needs. One project specifically targets farmers (funded by IDRC; see below), but otherwise no details could be found on how specific vulnerable groups are being supported with adaptation action.

IDRC has been funding research activities in Botswana since 1976. Most recently, it supported the University of Botswana in a CA\$600,000 research project on climate change, food security, and health, which ran from 2010 to 2014. The project aimed to help farmers working in the Okavango Delta develop coping strategies for addressing the impacts of climate change on their health, food security, and environment (IDRC, 2010).

The Botswana Institute for Technology Research and Innovation is working with the Botswana College of Agriculture and other regional partners to develop decision support simulation tools, based on indigenous and traditional knowledge, to increase agricultural production and food security in Africa in the face of climate change. The regional project is funded by the African Union.

Botswana is included in the Adaptation at Scale in Semi-Arid Regions project, funded by IDRC and DFID through the CARIAA initiative. The project, which runs until 2019, will enable proactive,

longer-term approaches to CCA 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. The project will generate credible information that decision-makers and others can use to develop robust adaptation strategies.

The United States Agency for International Development (USAID) is currently contributing funds to two regional programmes with CCA components. The first, the Southern Africa Regional Environmental Program, will as part of its objectives implement adaptation strategies to help communities in the region strengthen resilience to potential local impacts of climate change, including fires, droughts, and floods (USAID, 2012). The Southern Africa Regional Environmental Program will work with the Permanent Okavango River Basin Water Commission, the Southern African Development Community, and Chemonics on the program, which started in 2010 and will end in 2015. The second relevant regional program, the Resilience in the Limpopo River Basin initiative, involves Botswana, Mozambique, South Africa, and Zimbabwe and aims to support the adoption of science-based adaptation strategies to reduce climate vulnerability and improve water management in the basin (USAID, 2012). It also aims to strengthen governance in the basin to address climate-related risks. The Resilience in the Limpopo River Basin initiative, which is being implemented by Chemonics, began in 2012.

Botswana is involved in the Climate for Development in Africa program, an initiative of the African Union Commission, the United Nations Economic Commission for Africa, and the African Development Bank that aims to strengthen climate resilience in the region through improved access to and use of climate information for decision-making. The program runs until the end of 2015.

## 4.2 Climate finance

Bilateral funding for CCA in Botswana has been limited to date. According to the Organisation for Economic Co-operation and Development (OECD), four donor governments (Australia, Germany, Japan, and Sweden) supported projects and programs with a focus on CCA between 2011 and 2013. Of the bilateral funding for CCA that reached the country, most was for projects or programs in which CCA was a significant, not principal, part of the activity (see Figure 3; OECD, 2015). Most of the bilateral funding in which adaptation featured prominently went into general environmental protection and disaster prevention and preparedness. Sweden was the most consistent funder of CCA projects and programs over that time, but its support of activities in Botswana concluded in December 2013. As mentioned, withdrawal of funding support to Botswana has been common in recent years due to the country's strong development progress.

According to the Climate Funds Update website, which tracks financing through designated multilateral and bilateral climate funds since 2003, as of April 2015 Botswana had received approval for \$US3.6 million in climate finance for two projects, neither of which focused solely on CCA (see Figure 4). Botswana received a grant of nearly \$US1 million from the Global Environment

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<sup>5</sup> The OECD Rio Markers visualization tool indicates that Botswana did not receive any funding for adaptation in 2010, the first year in which this information was tracked.

Facility to prepare both its third national communication to the UNFCCC and its first biennial update report; with its inclusion in these reports, CCA will be partially supported by the grant. The remaining \$US2.6 million (also from the Global Environment Facility) is to go to a mitigation project focusing on the production of biomethane. Botswana is one of just four sub-Saharan African countries receiving no funding for CCA from international designated climate funds (the others being the Republic of Congo, Djibouti, and Gabon).

The Food and Agriculture Organization of the United Nations (2013) reports that Botswana recently established a National Environmental Fund, which is designed to ensure access to sufficient resources to maintain and enhance the environmental activity agenda, particularly by supporting civil society. The extent to which this fund will include monies set aside for adaptation projects and programs is unclear.



**Figure 3 – Bilateral development aid in Botswana identified as having adaptation support as its principal or significant objective,<sup>6</sup> 2010 to 2013, constant 2012 prices (based on OECD, 2015)**

<sup>6</sup> 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, 2015, p.3).



\*Reducing emissions from deforestation and forest degradation

**Figure 4 – Comparison of approved funding from designated multilateral and bilateral climate funds to countries in Botswana since 2003 in USD millions (based on Climate Funds Update, April 30, 2015)**

## 5. Networks and communities of practice

Networks and communities of practice working on CCA remain fairly limited in Botswana. The Botswana Climate Change Network was established in 2013 and began advocacy and awareness-raising activities in 2014. In 2015, this focus expanded to include engaging with the government on climate change policy, as well as identifying potential adaptation projects to be implemented in Botswana, a process that is ongoing. The Botswana Climate Change Network represents Botswana within the Pan African Climate Justice Alliance, a large civil society platform dedicated to climate change and sustainable development work on the continent, with networks operating in 45 countries.

The Botswana Council of Non-Governmental Organizations (BOCONGO) is an umbrella organization for NGOs operating in the country and is expected to coordinate cohesive implementation of climate change initiatives in Botswana. BOCONGO’s mission is to help establish an enabling environment for NGOs operating in the country while also providing a platform for networking, lobbying, advocacy, and capacity building. Advocates hope that the organization will also help mobilize resources for the sector to promote its self-sufficiency. BOCONGO has called for the mainstreaming of climate change activities across all ministries and departments, and has criticized the lack of funding and policy on the subject in Botswana (Shabani, 2014). To date, though, BOCONGO’s activities remain largely focused on the country’s HIV crisis, not on environmental

issues. The Botswana Council of Churches is involved in some climate change advocacy within the country.

Stakeholder interviews reveal that there are a few additional civil society and academic organizations that are active on climate change in Botswana. The Kalahari Conservation Society is the oldest environmental NGO in Botswana, and is reported to be working on climate change initiatives. The Botswana Institute for Technology Research and Innovation, mentioned in the previous section, is a parastatal organization under the Ministry of Infrastructure, Science and Technology whose research agenda is dictated by national priorities; it is currently working on a climate change project, but the details are limited. Finally, the University of Botswana is a very active non-state actor, with a particularly strong focus on climate impacts in the Okavango River system through its Okavango Research Institute.

## 6. Conclusions

Botswana is comparatively less vulnerable to the impacts of climate change and variability than its southern African neighbours, in part a reflection of the country's stable government and its status as a country of medium human development (UNDP, 2014). Climate models predict, however, that the country will be exposed to increasingly negative climate trends, including higher temperatures, declining rainfall, increasing evapotranspiration rates, and more frequent and severe extreme weather events. These trends will have significant implications for a country already experiencing water scarcity and a high dependence on groundwater resources. Climate trends will increasingly test the adaptive capacity of both the state and its population, and when combined with existing water scarcities could threaten the country's agricultural, livestock, health, and forestry sectors. Further water scarcity will also hamper Botswana's mining industry, a pillar of the national economy and a sector whose continued production and growth will depend on access to water. A failure to address these challenges could threaten the country's growing prosperity and could even reverse its remarkable development progress.

Botswana's political and legislative bodies have been slow to respond to the threat that climate change poses. The state does not view climate change as a priority, and the country does not yet have a climate change policy. It has not adopted a strategy or action plan for addressing these pressing concerns, although each of these is currently in the draft stage. Likewise, the government has not yet integrated or mainstreamed climate change into existing policies on water, agriculture, or gender; new policies on each are expected, but the degree to which they will address climate risks or considerations remains unclear. Climate change does appear in national policies on health and disaster risk reduction and management. However, neither text mentions concrete ways to address and pay for the interactions between climate and health or between climate and disasters. In a somewhat encouraging step, the government has established a parliamentary committee to guide national direction and response on climate change, and has begun to increase the capacity of the MEWT to address these issues. Much work remains, however: a climate policy, strategy, and action plan must be adopted, and further efforts made to integrate climate change across all relevant government ministries and departments. Further capacities and resources are also needed at the government level to design and implement adaptation responses.



The country's SNC identifies five priority sectors that are particularly vulnerable to climate change: water, health, crops, grasslands and livestock, and forestry. The SNC also suggests appropriate adaptation activities required to address these vulnerabilities. In practice, very few adaptation projects and programs that directly address these priorities are underway or have been undertaken in recent years. For the most part, adaptation projects and programs in Botswana are included in larger regional initiatives for either southern Africa or for specific transboundary river basins; the review of adaptation action did not identify activities within these regional initiatives that address specific Botswana-based concerns and priorities. For those projects and programs that have been completed, it is often difficult to measure the degree to which the activities have built adaptive capacity or strengthened risk management. The dearth of adaptation action in Botswana is reflected in the limited funding it has received from bilateral and climate fund sources for addressing its climate risks. Botswana is only one of four sub-Saharan African countries to receive no adaptation funding from climate funds, and for bilateral funds received, adaptation was typically not the principal objective of the support. Further Botswana-based adaptation action, focused on the government's identified priority sectors — in particular the neglected sectors of livestock, forestry, and agriculture — is required.

The limited presence of civil society organizations and domestic NGOs actively engaged in CCA further restricts support for the issue in Botswana. In general, civil society is quite limited in Botswana; the country's small population means that there are simply not a lot of domestic NGOs operating there. Two main networks, the Botswana Climate Change Network and BOCONGO, exist for coordinating civil society action on climate change but neither has a strong online presence, which limits the ability of each to coordinate and advocate for concerted, multi-stakeholder responses to climate risks and threats. Strengthening the role of civil society organizations in national CCA debates and programming is a crucial step in improving domestic capacities to address these challenges.

## 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 agronomy, 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 bioserves.
  - *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 either recently completed or underway in Botswana are presented in the table below. They are organized according to whether they are being implemented only in Botswana (national projects), alongside other countries in Africa (regional projects), or as part a program that involves countries from around the world (global projects).

Name of project	Objectives	Funder(s) and budget	Implementing agencies	Type of project	Sectors	Duration	Scale and location(s)
Climate Change, Food Security and Health	This project will develop coping strategies that balance environmental needs with farmers' health and food security concerns, in a context of changing climate patterns.	IDRC CA\$600,000	University of Botswana	Research	Agriculture; health	2010–2014	Okavango Delta
Climate Change Decision Support Simulation Tools	This project will develop decision support simulation tools that combine indigenous and traditional knowledge and formal knowledge on sustainable agricultural technologies. These tools will be used by low-income farmers.	African Union Research Grant Programme, through the 10th European Development Fund	Botswana Institute for Technology, Research and Innovation with the University of Mauritius, Durban University of Technology, South Africa, and Kenyatta University	Research; knowledge communication	Agriculture	Unknown	Regional
Climate for Development in Africa Programme	This project aims to increase climate resilience of Africa's population, addressing the need for improved climate information in Africa and strengthening the use of such information for decision-making. The Climate for Development in Africa Programme is an initiative of the African Union Commission, the United Nations Economic Commission for Africa and the African Development Bank.	European Union; Finland; Nordic Development Fund; Sweden; UKAID; USAID	African Climate Policy Centre	Research; capacity building; knowledge communication	Climate information	2012–2015	Regional



Resilience in the Limpopo River Basin	The program has three objectives: to reduce climate vulnerability by promoting the adoption of science-based adaptation strategies, to help conserve biodiversity and sustainably manage high-priority ecosystems in the Basin, and to build the capacity of stakeholders to sustainably manage water and biodiversity resources.	USAID US\$14.5 million	Chemonics	Research; capacity building; knowledge communication; policy formation and integration; Field implementation	Watershed management; governance	2012–2017	Regional  Botswana, South Africa, Mozambique, Zimbabwe
Southern Africa Region Environmental Program	This project will build capacity among a range of stakeholders to integrate climate information into policies and practices, with a focus on addressing threats to ecosystems and biodiversity, improving access to water supply and sanitation, and improving sustainable and climate resilient livelihood opportunities.	USAID US\$23 million	Chemonics; Permanent Okavango River Basin Water Commission	Capacity building; field implementation; knowledge communication; policy formation and integration	Freshwater supply; governance	2010–2015	Regional  Botswana, Namibia, Angola
Adaptation at Scale in Semi-Arid Regions	The project will enable proactive, longer-term approaches to CCA 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. 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	Multi-sectoral	2014–2019	Global  India, Ethiopia, Kenya, Uganda, Ghana, Mali, Botswana, Namibia, South Africa, Niger

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