CARIAA
Collaborative Adaptation Research Initiative in Africa and Asia

Review of Current and Planned Adaptation Action in Namibia

CARIAA Working Paper #12

Alec Crawford
Anika Terton

Crawford, A. and Terton, A. 2016. Review of current and planned adaptation action in Namibia. CARIAA Working Paper no. 12. International Development Research Centre, Ottawa, Canada and UK Aid, London, United Kingdom. Available online at: **www.idrc.ca/cariaa**.

ISSN: 2292-6798

This CARIAA working paper has been prepared by the International Institute for Sustainable Development (IISD).

About CARIAA Working Papers

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

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

Contact

Collaborative Adaptation Research Initiative in Africa and Asia
c/o International Development Research Centre
PO Box 8500, Ottawa, ON
Canada K1G 3H9
Tel: (+1) 613-236-6163; Email: cariaa@idrc.ca

Creative Commons License

Cover photos:

Top: © PANOS/Jean-Leo Dugast
Bottom: © PANOS/Abbie Trayler-Smith
Left: © Blane Harvey

IDRC | CRDI

International Development Research Centre
Centre de recherches pour le développement international

Canada

UKaid
from the British people

Abstract

Climate change presents a very real challenge to Namibia's continued development progress. The country is already home to a harsh environment dominated by desert and low levels of precipitation. Population growth, severe inequality, and development trends will interact with changing rainfall patterns, rising temperatures, increased rates of evapotranspiration, and rising sea levels to exacerbate water scarcity and other existing vulnerabilities. Despite these risks, Namibia is considered less vulnerable to the impacts of climate change than most of the countries of sub-Saharan Africa, which is more a function of its development status and sparse population than a reflection of its exposure to climate change or its policy environment. The country's climate vulnerability is closely tied to its aridity and high level of water scarcity. The government has identified six key sectors as particularly vulnerable: water and wetlands; agriculture; sea level rise, the coastal zone, and fisheries; tourism; health; and disaster risk management. The government has prioritized climate change action and has passed a national climate change policy; however, momentum on the subject is strongly tied to donor interest and funding. Adaptation programs and projects currently under way in Namibia, as well as adaptation networks and communities of practice, are limited. This report provides an overview of these issues. 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

Examen des mesures d'adaptation actuelles et prévues en Namibie

Les changements climatiques représentent un véritable obstacle au développement continu de la Namibie. Le pays présente déjà un environnement rude dominé par le désert et par de faibles taux de précipitations. À la croissance de la population, aux importantes inégalités et aux tendances en matière de développement s'ajoutent la modification des régimes pluviométriques, la hausse des températures, la hausse des taux d'évapotranspiration et la montée du niveau de la mer, ce qui exacerbe les pénuries d'eau et d'autres vulnérabilités existantes. Malgré ces risques, la Namibie est considérée comme moins vulnérable aux effets des changements climatiques que la plupart des pays d'Afrique subsaharienne, du fait de son stade de développement et de sa faible population plutôt que du fait de son exposition aux changements climatiques ou de ses politiques. La vulnérabilité climatique du pays est étroitement liée à son aridité et à une importante pénurie d'eau. Le gouvernement a déterminé six secteurs principaux comme étant particulièrement vulnérables : les bassins hydrographiques et les zones humides; l'agriculture; la montée du niveau de la mer; le littoral et les pêches; le tourisme; la santé; et la gestion des risques de catastrophe. Le gouvernement accorde la priorité aux mesures de réponse aux changements climatiques et a mis en œuvre une politique relative aux changements climatiques. Cependant, l'élan relativement à ce sujet est étroitement lié à l'intérêt et au financement des bailleurs de fonds. Les programmes et projets d'adaptation en cours en Namibie, ainsi que les réseaux d'adaptation et les communautés de pratique, sont limités. Ce rapport fournit un aperçu de ces enjeux. 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

ASSAR	Adaptation at Scale in Semi-Arid Regions
CARIAA	Collaborative Adaptation Research Initiative in Africa and Asia
CIA	Central Intelligence Agency
IDRC	International Development Research Centre
IIED	International Institute for Environment and Development
IPCC	Intergovernmental Panel on Climate Change
MDG	Millennium Development Goal
MET	Ministry of Environment and Tourism
NCCC	National Climate Change Committee
NCCP	National Climate Change Policy
NCCSAP	National Climate Change Strategy and Action Plan
ND-GAIN	Notre Dame's Global Adaptation Index
NDP	national development plan
OECD	Organisation for Economic Co-operation and Development
OPM	Office of the Prime Minister
SASSCAL	Southern African Science Service Centre for Climate Change and Adaptive Land Management
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change

About the authors

Alec Crawford

Associate, International Institute for Sustainable Development

Toronto, Canada

Alec Crawford is a researcher with the CARIAA-supported review of current and planned adaptation in the CARIAA program's countries of focus. His research examines the links among environmental change, natural resources, conflict, and peacebuilding in fragile states.

Contact: alec.crawford@iisd.ca

Anika Terton

Project Officer, International Institute for Sustainable Development

Winnipeg, Canada

Anika Terton is a researcher with the CARIAA-supported review of current and planned adaptation in the CARIAA program's countries of focus. She undertakes research in areas such as transitioning to the green economy, achieving the Sustainable Development Goals, and building climate resilience in the Canadian Prairies and internationally.

Contact: aterton@iisd.ca

Acknowledgements

The authors would like to thank Margaret N. Angula, from the University of Namibia and a researcher on the Adaptation at Scale in Semi-Arid Regions (ASSAR) project, for her valuable input on this report, and Jo-Ellen Parry for her invaluable guidance and advice in the preparation of this report.

Contents

Synopsis

Climate risks	• Rising temperatures • Uncertain changes in rainfall patterns • Sea level rise	**Key sources of vulnerability**	• Water scarcity, desert landscape • Severe inequality • High rates of drought and flooding	• Reliance on food imports for food security • Economic reliance on water-intensive mining activities • Energy security and low investment on renewable energy development

Vulnerable sectors	Illustrative potential impacts on vulnerable sector	Illustrative adaptation priority adaptation measures in each sector	Projects in sector[1]
Water and wetlands	• Surface water and groundwater scarcity • Decreased length of inundation of seasonally flooded wetlands • Reduced size and productivity of wetlands • Reduced annual river runoff and drainage	• Provide full support for integrated water resources management • Focus on reducing evaporation and improving the efficiency of water use • Improve water demand management, particularly at the local level and in the agricultural, industrial, mining, and tourism sectors • Monitor and control groundwater use more strictly	13%
Agriculture	• Fall in cereal outputs due to drought, flood • Broadened range of potential winter crops • Required increase in irrigation use • Change in fodder availability for livestock • Increase in climate-related animal diseases • Decreased food self-sufficiency	• Diversify crops to hedge against erratic rainfall and shorter seasons • Increase use of improved crop varieties; improve seed and fertilizer availability • Increase use of protected cultivation and livestock systems (e.g., greenhouses, net houses, improved tiling of crop fields) • Improve shared water resource management • Use livestock management strategies such as fall-back grazing areas and mixing small and large breeds in herds • Use crop modelling to inform decision-making	25%
Sea level rise, the coastal zone, and fisheries	• Disruption of port activities at Walvis Bay • Inundation of coastal areas • Increased rates of coastal erosion • Saltwater intrusion into coastal aquifers • Reduced protection from storm surges	• Introduce legislation to reduce property and infrastructure development in at-risk areas • Research and monitor sea level rise • Collaborate with the insurance market to guide investment in coastal areas	0%

[1] 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.

	• Changes to currents and upwellings	• Develop an early warning system • Rehabilitate wetland and estuary rehabilitation; replenish beaches and dunes • Build infrastructure to protect ports and certain roads; install sea walls, barriers, and barrages	
Tourism	• Changes in habitat, vegetation cover, and landscape characteristics • Biodiversity loss	• Promote sustainable tourism • Use community-based natural resource management as the basis for conservancies and tourism and adaptation; enhance community-based data collection and archiving	0%
Health	• Increase in vector and water-borne diseases (malaria, cholera) • Decline in quantity and quality of water • Malnutrition due to reduced crop yields • Poor sanitary conditions due to floods	• Enhance and further mainstream climate-related awareness • Strengthen the policies required to effectively address both slow-onset and catastrophic events (e.g., increase the patient to medical health ratio) • Develop health-centred adaptation strategies and climate-proof the public health system • Strengthened water and sanitation systems	0%
Disaster risk management	• Increased extreme climate events: droughts and floods	• Strengthen capacities for disaster risk preparedness, contingency planning, and risk reduction • Vulnerability and risk mapping; improve monitoring and documentation of extreme events	25%

Particularly vulnerable regions		**Particularly vulnerable groups**		**Status of climate governance (policies, institutions)**
• Caprivi Strip (flooding) • Southwest (drought)	• Walvis Bay (sea level rise)	• Rural population • Poor	• Women • Youth	• Climate change policy adopted; National Climate Change Strategy and Action Plan launched in October 2014

Introduction

Namibia lies in the southwest corner of Africa, bordered by Angola to the north, Zambia to the northeast, Botswana to the east and South Africa to the east and south (see Figure 1). To its west lies the Atlantic Ocean; in the past, dense fog throughout the year along this coast caused a number of shipwrecks and led to this area being dubbed the Skeleton Coast. Namibia is southern Africa's newest country; formally known as South West Africa, it achieved independence from South Africa in 1990. Prior to South African control, Namibia had been a German colony. It is a sparsely populated country, with just over 2 million inhabitants. About 15% of its citizens live it the capital city, Windhoek, which is found in the centre of the country. Since achieving independence, Namibia has experienced relative economic, political, and social stability.

Namibia is sub-Saharan Africa's driest country, dominated by the sands of the Kalahari and Namib deserts. Livelihoods and the economy are largely centred on agriculture, mining, the services sector, and tourism; visitors are increasingly drawn to the country's extensive wildlife and game parks, the coastal dunes of the Namib, and the shipwrecks of the Skeleton Coast. Environmental protection is of crucial importance to Namibia: it was the first country to enshrine environmental protection and sustainable natural resource use in its constitution.

While Namibians have long coped with extreme climatic conditions and water scarcity, climate change presents a significant challenge, as it will make living in an already harsh environment more difficult. Warming temperatures, increasingly variable rainfall, rising sea levels, and more frequent and intense weather events threaten to halt, or even reverse, the country's development progress. The government has identified key vulnerable sectors (water, agriculture, health, fisheries, tourism, and infrastructure) and has begun to respond to the threat, setting up appropriate institutional structures to respond to climate change and adopting a national climate change policy. More needs to be done, however, to fully respond to the challenge: climate change has to be better integrated across relevant sectors, including water, health, agriculture, and gender, and into national development plans.

This report provides a snapshot of current and planned efforts in Namibia to advance action on climate change adaptation. 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 17 countries of engagement, one of which is Namibia. Jointly funded by the UK Department for International Development and the International Development Research Centre (IDRC), CARIAA aims to help build the resilience of poor people to climate change in three hot spots in Africa and Asia: semi-arid areas, deltas in Africa and South Asia, and glacier- and snow-fed river basins in the Himalayas. To achieve this goal, CARIAA is supporting four consortia to conduct high-

calibre research and policy engagement activities that will inform national and subnational planning processes.

The report first outlines Namibia's current climate and how it is projected to change in the coming decades. Section 3 presents the socioeconomic and environmental factors that increase the vulnerability of Namibia and its people to climate change, describing the country's current development status and the potential implications of climate change for key sectors, groups, and regions. Section 4 gives an overview of the critical policies and plans shaping Namibia's efforts to address climate change adaptation at the national level. In order to assess the extent to which efforts to address the country's critical adaptation priorities are under way, Section 5 describes the scale, type, and focus of current and planned adaptation-focused programs and projects in Namibia, as well as the level of adaptation finance flowing into the country. 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 subnational levels in Namibia.

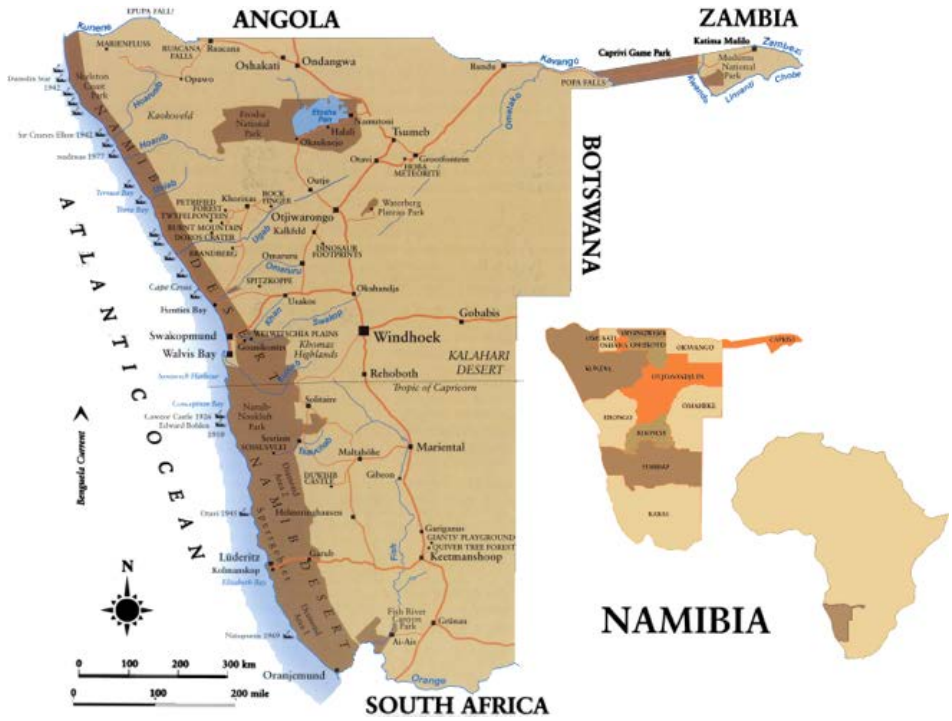


Figure 1 – Map of Namibia (Food and Agriculture Organization of the United Nations, 2002)

1. Current climate and projected changes

The geography of Namibia includes the Namib Desert, which extends along the western coast from Angola to South Africa. Moving inland, the terrain rises up through the Great

Escarpment to the country's central plateau. The Kalahari Desert covers the east of the country, while in the northeast Namibia extends eastward toward Zimbabwe in a thin, lush panhandle known as the Caprivi Strip. Namibia's climate is hot and dry, resulting in 92% of its land being defined as semi-arid, arid, or hyper-arid. It is, in fact, the driest country in sub-Saharan Africa (Ministry of Agriculture, Water and Rural Development, 2000), ranking just behind the Sahara Desert in terms of aridity (Ministry of Environment and Tourism [MET], 2010). Mean annual rainfall is less than 250 mm per year: 83% of this moisture evaporates, 14% goes to vegetation, 1% recharges groundwater, and 2% becomes runoff (MET, 2010). The northeast is the wettest part of the country, with mean annual rainfall of 700 mm, most of which falls during the austral summer months, between November and March. In the dry west and southwest of the country, mean annual rainfall is just 25 mm (MET, 2011). In the austral winter months, Namibia receives little to no rain (Daron, 2014). For the country's dry coastal regions, average monthly evapotranspiration is five times higher than rainfall, and precipitation from fog exceeds that from rain. Mean annual temperatures range from 16°C along the cooler southern coast to between 20°C and 22°C in the interior and the east and above 22°C in the north, with warmer days and cooler nights (MET, 2011). The highest temperatures are found in the Kalahari Desert, where they can reach over 40°C before significantly cooling in the night (Daron, 2014).

Temperature trends in Namibia are clear, having increased on average by 1°C to 1.2°C over the past 50 years, with greater increases in the north (MET, 2011). Similarly, the Intergovernmental Panel on Climate Change (IPCC) in its Fifth Assessment Report found that the southern Africa region has seen a decrease in the number of cold days and nights, and an increase in the number of warm days and nights (Christensen et al., 2013). Rainfall trends are less evident than temperature trends over the past 50 years, and there are large variations in the direction and magnitude of the changes observed across the region (Daron, 2014; MET, 2011). In Namibia, precipitation trends are particularly difficult to discern given the typically erratic nature of rainfall in the country: single extreme rainfall events can contribute a significant proportion of the annual rainfall for some regions (MET, 2011). While Daron notes evidence of an increase in rainfall in the austral summer months across much of the country, with a decrease in the border region with Botswana and Zambia, the Climate and Development Knowledge Network states that Namibia experienced a decrease in overall late summer rain in the second half of the 20th century (Climate and Development Knowledge Network, 2014; Daron, 2014). Overall, signs of systematic changes in rainfall patterns are weak, and multi-decadal variability remains the key feature of Namibia's climate.

Moving forward, temperatures projections for Namibia can be made with much greater confidence than for rainfall. Modelling by the IPCC for southern Africa suggests that temperatures could rise by 1.1°C by 2035 (ranging from 0.6°C to 1.6°C), 2.5°C by 2065 (from 1.7°C to 3.4°C), and 4.5°C by 2100 (from 3.3°C to 6.3°C) (Christensen et al., 2013, p.

14SM-36).[2] Central Namibia is expected to experience the largest temperature increase in the country moving forward, with the HadGem2-CCLM4 model projecting an increase in average annual temperatures of up to 4°C by the 2040s (CARIAA and Adaptation at Scale in Semi-Arid Regions [ASSAR], 2015). The coast is expected to experience less warming than the rest of the country (MET, 2011). An increase in temperatures will lead to higher evapotranspiration rates across the country, putting additional stress on already vulnerable systems (Daron, 2014).

Climate models disagree on the magnitude and direction of future changes in rainfall for many parts of Namibia: while some general circulation models project a wetting trend for a given part of the country, others suggest a drying trend (MET, 2011). Multi-decadal variability is likely to continue to be an influencing factor with regards to precipitation: there will be wet decades, and there will be dry decades (CARIAA and ASSAR, 2015). The government has documented an expectation of an increase in the frequency of floods and droughts, a rise in sea level of 30 cm, and more pronounced uncertainty in the climate that will be tougher to manage (MET, 2010).

2. Vulnerability to climate change

Namibia's vulnerability to climate change will be determined by the nature of the biophysical changes to which its population, economy and livelihoods are exposed, and by national and individual capacities to manage, recover from, and adapt to these changes. This section introduces and explores the economic, political, demographic, social, and environmental factors within Namibia that influence its vulnerability to climate change. It also highlights the vulnerability of key regions, groups, and economic sectors.

2.1 Current drivers of vulnerability

The most recent Human Development Index of the United Nations Development Programme (UNDP) categorizes Namibia as a country with medium human development (UNDP, 2014). Namibia ranks 127th out of 187 countries in the index, putting it behind only Botswana, South Africa, and Gabon in sub-Saharan Africa (see Table 1). It has made steady development progress over the past 10 years: life expectancy has increased from 45.3 years to 64.5 years, and HIV prevalence among adults has dropped from 21.3% to 13.3% (UNDP, 2004; 2014). Children spend on average 6.2 years in school, and gross national income per capita is US$9,185 (UNDP, 2014).[3] This development progress does hide one important barrier: Namibia's extremely high level of inequality—a legacy of apartheid rule prior to independence and heavy reliance on the capital-intensive extractives sector—is the third highest in the world (behind Seychelles and Comoros) (Central Bureau of Statistics, 2008; UNDP, 2014). Inequality stretches across gender lines as well: gross national income per

[2] 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.
[3] In 2011 US dollars, adjusted for purchasing power parity.

capita for men is US$11,196, while for women it is just US$7,288 (UNDP, 2014). Of all Namibians, 15.7% are categorized as living in severe poverty (UNDP, 2014).

Namibia is home to 2.3 million people. It is sparsely populated due to the high aridity of the country: the Namib Desert stretches along Namibia's western margins, while much of the rest of the country is arid. Most of the small population lives in the country's limited areas of semi-aridity. This population is young (median age of 21.8 years), is predominantly rural (60.5%), and is growing steadily at 1.9% per year (UNDP, 2014). A republic since independence from South Africa in 1990, the country was formally Marxist in ideology, though most of this thinking has since been abandoned (Central Intelligence Agency [CIA], 2015). Women constitute 47% of Namibia's members of parliament, a 23% increase in women's representation from the previous parliament (M. Angula, personal communication, March 2016). Both the prime minister and deputy prime minister are women. The country ranks 55th on Transparency International's Perceptions of Corruption Index, indicating that, while corruption is a concern, Namibia is doing much better than many of its sub-Saharan Africa neighbours (Transparency International, 2014).

According to the United Nations, Namibia's has made good progress toward achieving the Millennium Development Goals (MDGs) (United Nations Economic Commission for Africa et al., 2014). It was able to reduce poverty levels by 35% from 1993 to 2004, and has reduced hunger by 17% and undernutrition by 20% (MDG 1). The country's primary education enrolment rate is now 85%, and the primary education completion rate is over 80% (MDG 2). Namibia has maintained gender parity in primary, secondary, and tertiary schools since the 1990s, and at more than 40%, now has one of the highest rates of women in non-agricultural wage employment in Africa (MDG 3). It is nearing its target on reducing under-five mortality (MDG 4) and has a high level of births attended by skilled health professionals (over 81%; MDG 5). While it has made progress on reducing the incidence of malaria, it has regressed on the incidence, prevalence, and death rates of tuberculosis (MDG 6). Namibia has greatly expanded its protected areas, which now cover 43% of the country's territory (up from 11% in 1990). It has also substantially increased the rural population's access to safe drinking water, from 55% in 1990 to 87% in 2012 (MDG 7) (United Nations Economic Commission for Africa et al., 2014).

A number of economic factors contribute to Namibia's vulnerability to climate change, including its high levels of income inequality and the reliance of its rural population on climate-dependent livelihoods. The services sector dominates Namibia's economy: it is responsible for nearly 64% of GDP and employs 62% of the workforce (CIA, 2015). An important part of this sector is Namibia's growing tourism industry, which currently accounts for 15% of GDP (World Travel and Tourism Council, 2015). Namibia's economy is also heavily dependent on mining: extraction and processing of mineral resources accounts for 11.5% of GDP and half of all foreign exchange earnings (CIA, 2015). Despite this, the mining sector directly employs just 2% of the population. Key mineral resources include diamonds, copper, uranium, gold, silver, lead, tin, lithium, cadmium, tungsten, and zinc.

Namibia is a primary global source for gem-quality diamonds and is the world's fourth-largest producer of uranium.

About 58% of the population lives in rural areas where subsistence agriculture is the primary livelihood. Agricultural activities are limited by the country's scarce water resources and minimal arable land, which accounts for just 1% of the country's territory (World Bank, 2015). As such, agriculture accounts for just 6% of GDP and provides employment for just 16% of the Namibian labour force (CIA, 2015). The dearth of arable land means that livestock is the mainstay of the sector and that domestic food production cannot meet domestic demand. As such, the majority of the country's food is imported, with Namibia required to import 50% of its cereal requirements (MET, 2010). Forestry is not an important economic sector in terms of GDP contribution but is crucial for communities, who rely on forests for fuelwood, construction materials, and non-timber forest products (MET, 2010). Namibia's coast is also home to one of the most productive fishing grounds in the world, which contributes nearly 5% to the country's GDP (MET, 2011). Namibia is currently building up its domestic processing capacities and aquaculture industries (MET, 2010). Overall, the economy is growing at a healthy 4.5% per year, but—given its composition—is vulnerable to drought and commodity price fluctuations (World Bank, 2015).

Drought is common given Namibia's hot, dry climate and erratic rainfall. Localized water scarcity, desertification, and land degradation are all key environmental challenges (CIA, 2015). Namibia is not categorized as water scarce, due to the lush north and its small population. However, in the country's desert environments, groundwater is a key resource that is vulnerable to over-extraction, pollution, and contamination (MET, 2010; United Nations Statistics Division, 2011). Threats to the country's biodiversity include habitat destruction and uncontrolled development, forest clearing, overstocking, unsustainable harvesting of wild plants and animals, unequal resource distribution, fencing, and the fragmentation of protected areas (MET, 2010). Namibia was the first country in the world to incorporate the protection of the environment into its constitution: 43% of its land is now protected, including most of the Namib Desert coastal strip.

Table 1 – Key indicators of development progress for Namibia

Category	Indicator	Year	Value	Source
Human development	Human Development Index (score[d]/rank[d] out of 187 countries)	2013	127	UNDP (2014)
	Population in multi-dimensional poverty (%)	2013	47.5	
	Under-five mortality rate (per 1,000 live births)	2013	39	
	Adult literacy rate (15 years of age and above)	2013	76.5	

	Improved water source, rural (% of population with access)	2012	87	World Bank (2015)
	Improved sanitation facilities (% of population with access)	2012	32	
	Access to electricity (% of population)	2010	43.7	
Gender	Gender Inequality Index (value[e]/rank[d] out of 187 countries)	2013	0.450/87	UNDP (2014)
Demographics	Total population (in millions)	2013	2.3	UNDP (2014)
	Average annual population growth rate	2010	1.9	
	Population, urban (% of population)	2011	39.5	
Economic development	GDP (in current USD, millions)	2013	13,113	World Bank (2015)
	GDP growth (annual %) (average of period of 2010 to 2013)		5.1	
	Agricultural land (% of land area)	2012	47.1	
Governance	Corruption Perceptions Index (score[f]/rank[d] of 174 countries)	2014	49/55	Transparency International (2014)
	Fragile States Index (score out of 120[g]/status)	2015	70.8/Warning	Fund for Peace (2015)
	Expenditure on education, public (% of GDP)	2012	8.4	UNDP (2014)
	Expenditure on health (% of GDP)	2011	5.3	
Environment	Population living on degraded land (%)	2010	28.5	UNDP (2014)
	Change in forest area, 1990/2011	2013	-17.6	

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

2.2 Vulnerability of key sectors, groups and regions

Namibia's vulnerability to climate change is particularly acute due to its existing highly variable climate and the high reliance of local livelihoods and important economic sectors on climate-related natural resources. It is further enhanced by the difficulty of delivering services and infrastructure to a small population spread out over vast distances (MET, 2010). Each of these vulnerabilities is expected to be compounded by continued population growth and economic development. Taking into consideration these factors, Namibia's National Climate Change Policy (NCCP) (2010) and Second and Third National Communications (2011 and 2015) identify a number of specific sectors as being particularly vulnerable to the impacts of climate change: wetlands and water resources; agriculture; sea level rise, the coastal zone and fisheries; tourism; health; and disaster risk management (see Table 3).

In terms of regional differentiations in vulnerability, the Caprivi Strip—the panhandle extending toward Zimbabwe in the northeast of Namibia—is most exposed to flood risks as a result of its higher levels of precipitation and expected increases in summer rainfall (MET, 2011). This vulnerability will be further compounded by population growth; the north of the country is already more densely populated than other regions of the country. The dry southwest of the country (Karas and Hardap regions) is particularly vulnerable to drought (MET, 2011).

Walvis Bay—Namibia's third largest city, its main port and the centre, of the country's tourism industry—is identified as being highly vulnerable to sea level rise and storm surges, as much of the city lies at less than 2 metres above sea level (MET, 2011). It and other urban centres are experiencing considerable rural-urban migration, a trend that is expected to at least continue if not increase as rural livelihoods are strained by climate change impacts. This urban growth could overwhelm the capacity of local authorities to provide basic services (MET, 2011). Migration and population growth have also increased unplanned settlement in urban and peri-urban centres, and the NCCP highlights both areas as particularly vulnerable (MET, 2010).

In terms of social groups, the poor and rural populations of Namibia are considered most vulnerable to the impacts of climate change due to their reliance on climate-dependent livelihoods (MET, 2011). This population tends to be more concentrated in the north given that region's more favourable soils. Community-based organizations in rural areas are often weak or absent due to low population densities in these areas, further exacerbating vulnerability. Women are also identified as particularly vulnerable given existing gender inequalities in accessing productive resources and income. Female-headed households also rely to a greater extent than male-headed households on climate-dependent subsistence agriculture, and to a lesser extent on wages and salaries (MET, 2011). Those households across the country that are affected by HIV/AIDS are also considered more vulnerable, as their members often cannot work, which puts a strain on household income and financial resources (MET, 2011). Finally, undereducated youth are considered vulnerable due to their limited economic options.

Taking these and other factors into consideration, the University of Notre Dame ranks Namibia at 118th on its Global Adaptation Index (ND-GAIN), which measures levels of

vulnerability to climate change as well as the readiness of countries to respond to it.[4] According to the index, Namibia's vulnerability has increased in recent years; areas of particular concern include the country's high water dependency ratio, its limited dam capacity, and its dearth of paved roads (as a percentage of all roads). In terms of its readiness to respond to climate change, Namibia's score has been improving but remains low overall (ND-GAIN, 2015). The main areas of weakness in terms of readiness relate to the country's social readiness, specifically the country's existing levels of social inequality and its education system (ND-GAIN, 2015). Compared to other southern African countries, as indicated in Table 2, Namibia is assessed to be less vulnerable and more ready to respond than Angola and Zambia, but more vulnerable and less able to respond that Botswana and South Africa.

Table 2 – Comparison of ND-GAIN scores for Namibia and neighbouring countries

Country	Vulnerability*		Readiness**		Overall	
	World rank	Score	World rank	Score	World rank	Score
Namibia	133	0.518	99	0.444	118	46.3
Angola	140	0.547	169	0.292	160	37.2
Zambia	135	0.521	120	0.384	127	43.1
Botswana	119	0.491	34	0.639	64	57.4
South Africa	65	0.393	88	0.470	80	53.9

* Lower score indicates lower vulnerability. The vulnerability score is determined based on indicators of exposure, sensitivity, and adaptive capacity, taking into consideration indicators related to six life-supporting sectors: food, water, health, ecosystem service, human habitat, and infrastructure.
** Higher score indicates higher degree of preparedness. The readiness score takes into account measures of economic readiness, governance readiness, and social readiness to pursue adaptation actions.

Table 3 – Key vulnerable sectors in Namibia

Sector	Likely impacts of climate change
Water and wetlands	• Water scarcity due to increased variability of rainfall, temperature increases, prolonged and more severe droughts, and increased evapotranspiration • Reduced groundwater recharge and surface storage • Decreased length of inundation of seasonally flooded wetlands • Increased salt content in pans and pools • Reduced size and productivity of wetlands • Reduced annual runoff and perennial drainage in river systems • Drying out of shallower flood plains, disrupting agriculture; high dependence on Okavango flows for irrigation

[4] Please see the ND-GAIN profile for Namibia at ND-GAIN (2015).

	• Increased water use by people, animals, and plants • Rising domestic and industrial demand for water from population, mining, and economic growth
Agriculture	• Fall in cereal outputs due to drought and flooding • Broadened spectrum of potential winter crops due to warmer winters • Increased water demand • Required increase in irrigation and associated costs • Change in the availability of fodder for livestock • Increased climate-related animal diseases • Increased forest fires and resulting ecosystem changes • Decreased food self-sufficiency • Increased rural-urban migration • Increased poverty
Sea level rise, the coastal zone, and fisheries	• Extensive disruption of port activities at Walvis Bay • Inundation of low-lying coastal areas, impacting spawning grounds • Increasing rates of coastal erosion • Saltwater intrusion into coastal aquifers • Reduced protection from extreme storm and flood events • Loss of habitat for shorebirds and migratory birds • Changes to currents and upwellings that could impact fisheries
Tourism	• Habitat change, changes in landscape characteristics, and changes in vegetation cover • Biodiversity loss • Decreasing water availability • Increased severity and frequency of natural hazards such as heavy precipitation, storms, forest fires, and flooding • Coastal erosion and higher cost to maintain waterfronts • Increased insurance cost/loss of insurability, business interruption costs • Increase in vector-borne diseases
Health	• Increased prevalence of vector- and water-borne diseases (malaria, cholera) and re-emergence of previously eliminated diseases • Increased mental health problems due to loss of livelihoods and forced migration • Predicted decline in quantity and quality of drinking water • Malnutrition due to reduced crop yields and reduced livestock productivity • Poor sanitary conditions as a result of floods
Disaster risk management	• Increased extreme climate events, such as droughts and floods

Sources: MET (2010, 2011); Republic of Namibia (2015b).

3. Adaptation planning context

Namibia has made significant development progress in the years since declaring independence in 1990. This progress is increasingly extending toward the country's fight against climate change, with a national climate change policy having been put in place along with a supporting institutional framework (see Table 6). However, more limited progress has been made toward the goal of fully integrating the issue across all relevant economic sectors. This section examines the degree to which climate considerations have or have not been integrated into Namibia's existing and upcoming laws and policies, and into the country's institutional structures that have been established to support national responses to climate change.

Table 6 – National adaptation planning context in Namibia: Summary of progress as of June 2015

Indicator	Progress
Climate change recognized in country's guiding development vision/plan	Yes, in Vision 2030 as a key threat and in past NDPs, although to a lesser extent in the current plan
National-level coordinating entity for climate change established and active	Yes, National Climate Change Committee (NCCC) is in place
Climate change policy and/or law in place	Yes, the NCCP passed in 2010
Climate change strategy published	No
Climate change action plan published	Yes, the NCCSAP was approved by the cabinet in 2014
Adaptation plan published	Yes, the NCCSAP functions as the country's national adaptation plan
Climate change fund or adaptation fund operational	No
Climate change units established in key ministries	Yes, under the Multilateral Environmental Agreements Unit in the Ministry of Environment and Tourism
Climate change integrated into national sectoral policies	No

3.1 National-level development policy context

Vision 2030, a policy framework adopted in 2004, guides Namibia's national, long-term development (Office of the President, 2004). Climate change is included throughout the document, in sections on agriculture, disaster response strategies, marine resources,

forestry, and biodiversity. It is recognized as a key threat to sustainable development in Namibia. Preparing for the adverse impacts of climate change is listed as a key strategy for attaining sustainable development. However, while concrete activities, objectives, or goals have been identified for other areas of Vision 2030 (if largely aspirational in tone), none pertaining to climate change adaptation are included.

Vision 2030 will be achieved through the successful implementation of seven national development plans (NDPs). Namibia is currently implementing NDP4, which covers the period from 2012–13 to 2016–2017. Climate change does not appear in a meaningful way in NDP4, despite the fact that the climate-dependent sectors of tourism and agriculture are two of the country's four main strategic priorities for the five-year period (National Planning Commission, 2012). Climate change does, however, appear in prior NDPs: strengthening Namibia's meteorological services so that they can support the work of the National Climate Change Committee (NCCC) was a key component of NDP2 that was largely achieved by NDP3, while climate change is listed as a key threat to water resources, food, livelihoods, health, and development more generally in NDP3 (NPC, 2008). NDP3 calls for improvements to and mainstreaming of climate change adaptation, and for raising awareness of climate change and strengthening capacities to respond to it. It also calls for the drafting of a national climate change strategy and the naming of a designated national authority for climate change. A yearly budget for achieving these climate-related goals is included in the plan.

3.2 National-level climate policy context

The NCCP, adopted in 2010, initially guided recent action on climate change in Namibia at the national level. It was built on early consultations on the development of Namibia's National Climate Change Strategy and Action Plan (NCCSAP), which was only finalized after the National Climate Change Policy was adopted, and Namibia's First and Second National Communications to the United Nations Framework Convention on Climate Change (UNFCCC) (though published after the NCCP, much of the work for the Second National Communication was done concurrently with development of the NCCP) (MET, 2009). The NCCP explicitly states that it is designed to ensure that climate change "does not hinder the attainment of national development goals, Vision 2030 and beyond" (MET, 2010, p. 14). It also commits to helping to ensure that the government can fulfil its obligations under the constitution (1990), which highlights the need to develop and implement policies to maintain Namibia's ecosystems, ecological processes, and biodiversity for present and future generations. The NCCP recognizes that climate change will make upholding these pledges more difficult for the state and is designed to address this concern. The NCCP also sees climate change adaptation as a means of reducing poverty—the central objective of Vision 2030 (MET, 2010).

The NCCP provides a legal framework and overarching national strategy for the development, implementation, and monitoring and evaluation of climate change mitigation

and adaptation activities in Namibia. To succeed, the NCCP will require institutional structures that are adequately equipped and that are able to provide facilities and finances necessary to support climate change adaptation programs and activities (see Section 4.3 and MET, 2010). The guiding principles of the policy include mainstreaming climate change into policy, legal frameworks, and development planning; ensuring that actions are country driven and country specific; encouraging stakeholder participation in the policy's implementation; and promoting transparent planning and decision-making.

The NCCP has five guiding objectives:

1) To develop and implement appropriate strategies and actions that will lower the vulnerability of Namibians and various sectors to the impacts of climate change.

2) To integrate climate change effectively into existing policy, institutional and development frameworks in recognition of the cross-cutting nature of climate change.

3) To enhance capacities and synergies at local, regional and national levels and at individual, institutional and systemic levels to ensure successful implementation of climate change response activities.

4) To provide, through Government, secure and adequate funding resources for the effective adaptation and mitigation investments to climate change and associated activities (capacity building, awareness raising, etc.).

5) To facilitate climate proof development to reduce the magnitude and extent of impacts of climate change. (MET, 2010, pp. 25–26)

To facilitate implementation of the NCCP, Namibia has prepared an NCCSAP for 2013–2020 that was approved by the cabinet in November 2014. The NCCSAP outlines strategic aims with respect to adaptation, mitigation, and actions that cut across both topics, such as disaster risk reduction, capacity building, research, technology transfer, and training and institutional strengthening. Improving human and institutional capacity is described as a fundamental component of the overall strategy. With regards to adaptation, the NCCSAP outlines actions and implementation plans to meet vulnerabilities related to the following themes:

- Food security and a sustainable resource base, which includes agriculture, forestry, coastal zone management, fisheries and aquaculture, and biodiversity and ecosystems.
- Sustainable water resources, including integrated water management, watershed management, and transboundary cooperation.
- Human health and well-being, with a focus on the assessment of potential health impacts and strengthening of the health system.

- Infrastructure, looking specifically at needs related to the transport sector, tourism, coastal zones, and housing. (Republic of Namibia, 2015b)

Strategic aims have been identified under each theme and populated with specific actions, targets, time frames, a designated lead agency, and budget allocations to build Namibia's adaptive capacities.

The NCCSAP further recognizes the need to scale up domestic climate finance to successfully implement the plan. It also acknowledges that international climate finance will play an essential role in overcoming barriers and financial shortages, along with the necessity to understand and address Namibia's climate readiness needs (Republic of Namibia, 2013). At present, two national institutions have become accredited entities to directly access funding through multilateral climate funds for climate adaptation and resilience projects. The Desert Research Foundation of Namibia has been accredited as the Adaptation Fund implementation institution, while the Environment Investment Fund is accredited for the Green Climate Fund (M. Angula, personal communication, May 1, 2016).

Both the NCCP and NCCSAP identify key adaptation priorities (MET, 2011; Republic of Namibia, 2015b). These priorities are aligned with those sectors identified as being particularly vulnerable to climate change: water resources and wetlands; agriculture; sea level rise, the coastal zone, and fisheries; tourism; health; and disaster risk management (see Table 4).

Additionally, Namibia has prepared its Third National Communication, released in 2015, which builds on the work done and reported under the two previous national communications. The Government is also preparing its Intended Nationally Determined Contribution for submission to the UNFCCC.[5] There is no evidence of subnational climate change policies in place or being developed in Namibia.

The UNDP's Africa Adaptation Programme supported the introduction of a modelling and planning tool called Threshold 21 in Namibia that was adopted by the National Planning Commission. The tool takes users through the economic, social, and environmental impacts of climate change, and is being used to undertake analysis and inform policy. Professionals within various government ministries have been trained in the tool, reflecting a growing interest in further integrating climate change across government sectors (UNDP Africa Adaption Programme, n.d.).

[5] The Government of Namibia submitted its Intended Nationally Determined Contribution to the UNFCCC in September 2015. Its adaptation component reiterates the importance of adaptation for the country and its government, summarizes climate change trends and observed impacts, and outlines major adaptation initiatives that are already under way. Namibia's Intended Nationally Determined Contribution sets a long-term goal of ensuring resilience to climate change in its most vulnerable economic sectors by "improving technical capacity at the national and subnational levels," developing and implementing strategies that reduce the impact of extreme climate events, improving adaptation strategies in the agricultural sector, "improving ecosystem management, protection and conservation," further integrating climate adaptation into policies and practices, and "developing policies and programmes that accommodate and encourage new and diverse livelihood options while generating financial capital" (Republic of Namibia, 2015a, p. 14).

Table 4 – Priority adaptation actions by sector identified in Namibian policies	
Sector	**Adaptation priorities**
Water resources and wetlands	• Provide full support for integrated water resources management • Focus on reducing evaporation and improving the efficiency of water use • Coordinate use of surface and groundwater resources and artificially increase the recharge rate of groundwater aquifers to reduce evaporation • Improve water demand management, particularly at the local level, and in the agricultural, industrial, mining, and tourism sectors; expand stakeholder engagement • Monitor and control groundwater use more strictly
Agriculture	• Diversify crops to hedge against erratic rainfall and shorter seasons • Increase use of improved crop varieties • Prioritize seawater desalination • Protect all surface water and groundwater resources from pollution by regulating discharges • Increase seed and fertilizer availability • Increase use of protected cultivation and livestock systems (e.g., greenhouses, net houses) • Improve shared water resource management • Introduce drought mitigation measures • Use water only for irrigation of high-value crops • Use livestock management strategies, including fall-back grazing areas and mixing small and large stock herds of various breeds • Use crop modelling to inform decision-making • Implement crop germplasm conservation/evaluation and breeding • Improve and conserve indigenous livestock breeds
Sea level rise, the coastal zone and fisheries	• Create effective communication campaigns • Introduce legislation to reduce property and infrastructure development in environmentally sensitive areas and areas at risk of sea level rise • Research and monitor sea level rise • Undertake vulnerability mapping • Collaborate with the insurance market to guide investment in coastal areas • Develop an early warning system • Rehabilitate wetlands and estuaries • Replenish beaches and dunes • Raise infrastructure to protect ports and certain roads • Install sea walls, barriers, and barrages
Tourism	• Promote sustainable tourism • Implement conservancies, tourism, and adaptation programs based on community-based natural resource management

	• Promote community-based natural resource management data collection and archiving • Improve water management • Diversify livelihoods
Health	• Strengthen the capacity of health professionals in epidemic preparedness and response • Recruit and train community health workers to provide emergency first aid • Improve staff training on prevention and treatment of malnutrition • Enhance and further mainstream climate-related awareness • Improve access to timely and relevant information • Undertake scenario development and proactive planning to address both fast-onset and slow-onset climate-induced events • Strengthen the policies required to effectively address both slow-onset and catastrophic events • Develop health-centred adaptation strategies • Climate-proof the public health system • Strengthen water and sanitation systems
Disaster risk management	• Strengthen capacities for disaster risk preparedness, contingency planning, and risk reduction • Implement vulnerability and risk mapping • Improve information flow and communications between formal structures at the national, regional, and community levels • Support community-based adaptation practices • Improve monitoring and documentation of extreme events • Develop pro-poor disaster insurance schemes

Sources: MET (2011); Republic of Namibia (2015b).

3.3 Institutional structure for climate governance

At the highest level, the cabinet of Namibia is responsible for decisions about climate change policy in the country (see Figure 2). The Parliamentary Standing Committee on Natural Resources and Economics advises the cabinet in its decision-making, with the standing committee in turn being advised by the Office of the Prime Minister (OPM). Stakeholders report that the Parliamentary Standing Committee does have some members who are very committed to action on climate change, which is promising.

Guidance to the OPM on climate-related issues comes from both the Directorate of Disaster Risk Management and Namibia's Ministry of Environment and Tourism (MET). The MET coordinates all climate change action at the ministerial level in Namibia, and does so through the Climate Change Unit. It was also noted during the stakeholder consultations that while strengthening the role of the OPM on climate change was welcomed, some

tensions have emerged between it and the MET, as the MET wishes to retain its previous leadership role on the issue.

In the NCCP, the Climate Change Unit is envisioned as being directly supported by the formalized, multisectoral NCCC, which was established in 1998 and provides sector-specific and cross-sector implementation and coordination advice and guidance (MET, 2010). With the passing of the NCCP, a Subdivision for Climate Change was also established within the MET to directly assist in the planning, development, implementation, and coordination of climate change activities at the local, regional, and national levels. The government relies on existing local and regional structures to implement climate change action and strategy at those levels.

The Meteorological Services Division of the Ministry of Works and Transport carries out climatic monitoring, research, and assessment. It serves as the national Climate Analysis Unit, providing the Climate Change Unit, the MET, the NCCC, and all relevant line ministries with pertinent information (MET, 2010). Stakeholders believe that while the Meteorological Services Division does good work, it could be strengthened and should be brought to the table more often on climate change policy and strategy.

Overall, interview subjects reported that climate change had much more traction within the government's institutional structures when the well-financed Africa Adaptation Programme, an initiative of the UNDP and the Government of Japan, was under way. Unfortunately following the program's completion in 2012 the visibility of climate change in policy discussions and government action decreased, as did buy-in from the authorities. According to the project's stakeholders, a level of action on climate change will persist regardless of donor support. However, meaningful, strategic action on climate change adaptation is currently not happening.

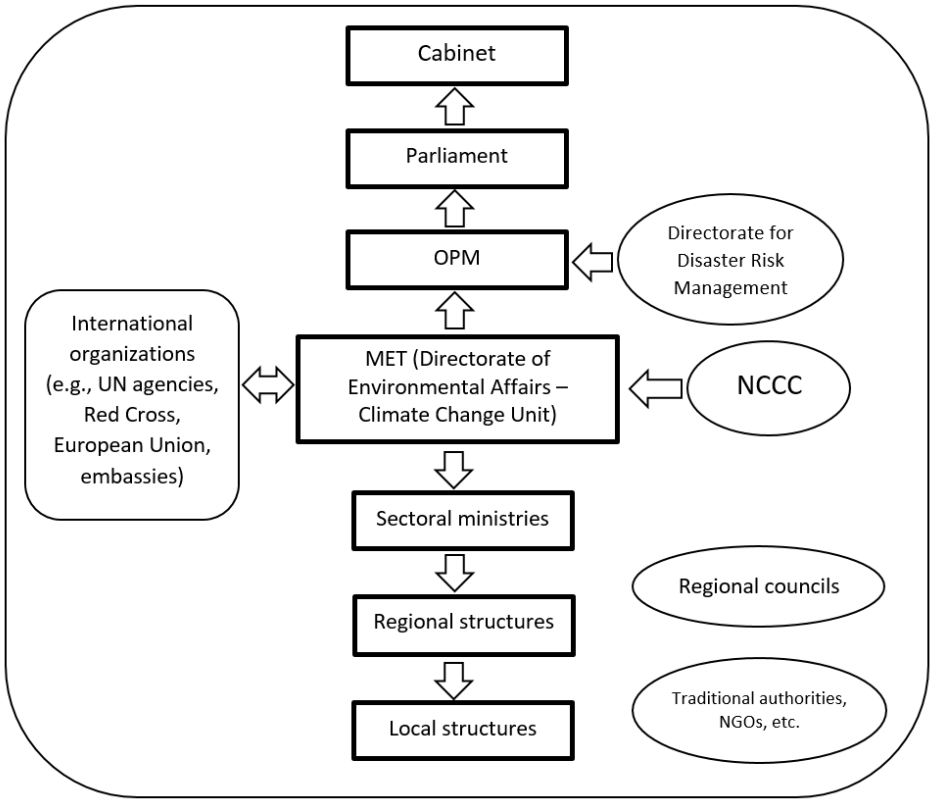


Figure 2 – Institutional structure for implementation of the NCCP (adapted from MET, 2010, p. 35)

3.4 National-level sectoral policies

Although one of the guiding principles of the NCCP is to ensure the mainstreaming of climate change into policies, frameworks, and development plans, climate adaptation has not yet been integrated into national-level sectoral policies in any meaningful way (see Table 5). The government recognizes that many of its sectoral policies were developed prior to climate change emerging as a key issue for the country, and as such, these policies must be revised to better integrate climate considerations (MET, 2010).

Table 5 – Integration of climate change into national sectoral strategies, polices and plans: An assessment of progress

Policies	Absent	Climate change mentioned as potential risk	Possible actions for reducing risk identified	Targets for specific adaptation measures identified
National Water Policy White Paper (2000)	✓			

Water Supply and Sanitation Policy (2008)	✓				
National Agricultural Policy (2015)		✓			
National Health Policy Framework (2010–2020)	✓				
National Malaria Policy (2005)	✓				
National Gender Policy (2010-2020)		✓			
National Policy for Disaster Risk Management (2009)		✓			
National Disaster Risk Management Plan (2011)		✓			

Climate change is not integrated into the National Water Policy White Paper (Ministry of Agriculture, Water and Rural Development, 2000), nor is it mentioned in the more recent Water Supply and Sanitation Policy (Ministry of Agriculture, Water and Forestry, 2008). While climatic factors, including high rates of evaporation, the recurrence of drought, and low and variable annual rainfall rates, are included in the 2000 policy as factors constraining the country's water resources, no mention is made of how these factors are expected to change or challenge the supply of water going forward in a future of increasing temperatures. Similarly, climate change is also not included in the water or sanitation objectives of the now-adopted 2008 policy. Perhaps reflective of the age of the document, there is similarly no mention of climate change in the National Agricultural Policy of 1995.[6]

The National Health Policy Framework (2010–2020) does not identify climate change as a key priority for public health (Ministry of Health and Social Services, 2010). Climate change is mentioned, briefly, as a contributing factor to disease outbreaks, particularly water- and vector-borne diseases related to flooding. That said, there is no mention in the policy of an expected increase in the incidence of flooding or extreme weather events, and no strategies outlined to address this challenge. While nutrition is also listed as a key priority, the policy does not refer to the links between climate change—in particular drought—and food insecurity, or the potential for malnutrition to increase in a future climate that is hotter and less predictable. Climate change is also omitted from the National Malaria Policy (Ministry of Health and Social Services, 2005), which does not acknowledge current or prospective changes in the distribution or prevalence of the disease due to changing climatic factors.

[6] The Government of Namibia released a new agriculture policy in December 2015. Climate change was identified as one of the reasons for the policy being updated (Ministry of Agriculture, Water and Forestry, 2015).

Climate change is included in the National Gender Policy (2010–2020), though only minimally. It is mentioned as an emerging issue, though in no great detail and with no information on how it directly or indirectly impacts the well-being of men and women. The environment is included as a policy program area, and within this area one of the listed strategies is to better involve women in the design, development, and implementation of policies and programs for climate change.

One exception is Namibia's National Policy for Disaster Risk Management (2009), which recognizes climate change and variability as factors increasing disaster vulnerability, and highlights that the government needs to play a role in strengthening capacities to reduce risks and to build community resilience to climate change. Climate change is referred to as a key hazard faced by the country, and its predicted effects are included in the policy. Specific adaptation measures are not included in the policy. Similarly, climate change and adaptation are referred to throughout the National Disaster Risk Management Plan (Directorate of Disaster Risk Management, 2011), though no specific adaptation actions are included in this document. The extensive inclusion of climate change in the policy and disaster risk management plan illustrates a dramatic change from the previous decade: climate change is not referred to in the National Drought Policy and Strategy (National Drought Task Force, 1997), despite its direct relevance.

4. Current and planned adaptation programs and projects

Namibia is very vulnerable to the impacts of climate change due to its geographic location, the variability of its climate, and various socioeconomic factors. Strategic adaptation measures, particularly in the vulnerable and economically important sectors of agriculture, tourism, and fisheries, are needed to help Namibia prepare for climate change. To provide a picture of the degree to which these required investments are being made today, this section gives an overview of programs and projects being implemented in Namibia that have a specific focus on supporting climate change adaptation. This includes those programs and projects that are planned, those that are under way, and those that have been completed recently. The section concludes with an analysis of the scale of adaptation finance flowing into the country.

4.1 Adaptation projects and programs

We identified adaptation programs and projects primarily using online resources, with an extensive review of the websites of UN agencies, multilateral development banks, bilateral development agencies, and international and national NGOs. The research focused on projects and programs that aim to support climate change adaptation, as reflected in their title, goals statement, and/or objective statement. We captured all relevant projects and programs in a database and classified them according to their type and area of focus. For a

detailed description of the methodology used in the review, please see Annex A. The review process revealed eight significant projects and programs that aim to support climate change adaptation in Namibia. Of the projects identified, four are being implemented at a national level, three at the regional level, and one at the global level. An overview of these adaptation projects and programs is presented in Table 6 and a full list is provided in Annex B.

Table 6 – Sector of focus of current adaptation projects and programs identified in Namibia

Sector of focus*	Priority sectors for adaptation	Number of projects*	Percentage of total projects**	Geographical characteristics	
Agriculture	✓	2	25%	National projects	4
Forestry		1	13%	Regional projects	3
Biodiversity protection		1	13%	Global projects	1
Ecosystem conservation		1	13%	Total	8
Freshwater supply	✓	1	13%		
Rural areas		1	13%		
Government		3	38%		
Climate information		3	38%		
Civil society		1	13%		
Disaster risk management	✓	2	25%		
Gender		1	13%		
Multisectoral or other		2	25%		

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

The projects and programs under way in Namibia are being directed toward supporting adaptation in the areas of agriculture, sustainable land management, government, climate information, forestry, and biodiversity. The projects tend to focus on capacity building, knowledge communication, field implementation, and policy formation and integration, with all nationally implemented projects supporting community-based adaptation. While

these areas have been recognized as important adaptation priorities through the NCCP, identified vulnerabilities related to water resources management, fisheries, infrastructure, and human health are not receiving targeted attention in current programming. Regions within Namibia that are a particular focus for adaptation projects are the northern parts of the country, including Kavango, Caprivi, Oshikoto, Oshana, Ohangwena, Omusati, and the northern part of Kunene Region.

At the national level, two of the four major projects (Scaling-Up Community Resilience to Climate Variability and Climate Change in Northern Namibia with a Special Focus on Women and Children, and Developing and Testing a Rangeland Production System with Livestock Farmers in Namibia) are aimed at adaptation in the agricultural sector, including improved production practices, food security, and livestock rearing. Both of these projects build the capacities of local communities and marginalized groups adversely affected by climate change, including rural farm communities, women, and children. A third identified national project focuses on biodiversity management, climate change, and environmental policy development. It promotes community-based natural resources management and ecosystem-based adaptation to climate change, and facilitates the integration of crosscutting environmental concepts such as biodiversity management, climate change adaptation, and the green economy (Deutsche Gesellschaft für Internationale Zusammenarbeit, 2015). Finally, the Environmental Awareness and Climate Change project aims to promote environmental awareness and empower stakeholders to participate in climate change responses (Hanns Seidel Foundation, 2015).

Namibia is also involved in three regional programs with climate change adaptation components. The first, the Southern Africa Regional Environmental Program, will as part of its objectives build the capacity of institutions in the three Okavango Basin countries (Angola, Botswana, and Namibia) and implement adaptation strategies to help communities in the region strengthen resilience to the local impacts of climate change (United States Agency for International Development, 2013). With a strong research focus, the Southern African Science Service Centre for Climate Change and Adaptive Land Management (SASSCAL) is supporting research initiatives and science-policy consultations through collaborations involving universities and government departments from Angola, Botswana, Namibia, South Africa, Zambia, and Germany (SASSCAL, n.d.). The third relevant program is the Climate for Development in Africa program, an initiative to increase the climate resilience of Africa's population through enhanced climate data and improved access to and stronger use of available climate information for decision-making processes.

In addition, Namibia is part of the global ASSAR project being undertaken as part of the CARIAA program. It aims to enable proactive, longer-term approaches to climate change adaptation in semi-arid regions in countries across Asia and Africa, drawing 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.

This review suggests that relatively limited adaptation-focused programming is currently under way or planned for implementation in Namibia, despite its high exposure to climate risks. This may be a function of the country's small population and its status as a country that has attained medium human development status, according to the most recent UNDP Human Development Report. However, high levels of income inequality mean that a significant portion of the population is highly vulnerable to climate impacts, and that further adaptation action is required to reduce these vulnerabilities and strengthen resilience.

4.2 Climate finance

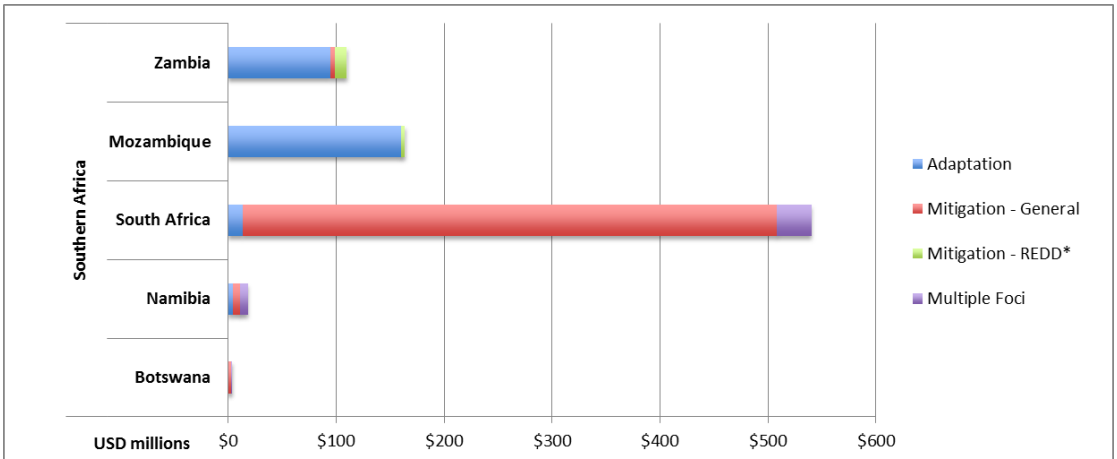
A report by the International Institute for Environment and Development (IIED) estimated that losses to the Namibian economy from climate change impacts could be up to 6% of GDP, or £100 million, over the next 20 years if no action is taken to adapt (IIED, 2007). Implementing the actions required to avoid these economic losses will require significant funding. The importance of resource identification, mobilization, and management to support the implementation of climate change activities is referenced in Namibia's NCCP. In fact, climate funding is a key objective of the policy: the government promises "to provide through Government, secure and adequate funding resources for the effective adaptation and mitigation investments to climate change and associated activities" (MET, 2010, p. 26). To provide a picture of the current status of funding support for adaptation in Namibia, this section gives an overview of the scale, sources, and orientation of current climate finance from domestic and international sources.

In terms of domestic financing for adaptation, despite its climate change policy objectives Namibia's government has no budget allocation associated with the country's NCCP, nor did it set aside funding for climate change programming. The NCCP envisions that funding will be mobilized from dedicated international climate funds, including the Adaptation Fund, Special Climate Change Fund, and the Green Climate Fund, as well as through multilateral and bilateral donors. There is, however, a need to better specify the likely costs associated with identified adaptation activities, and to develop a more detailed financing strategy.

At present, funding for climate change adaptation in Namibia comes primarily from international sources. According to the Climate Funds Update (2015), which tracks climate financing coming from designated bilateral and multilateral climate funds, as of May 2015, Namibia had received a total of US$18.2 million in climate finance since 2003. Notable multilateral sources of funding include the Global Environment Facility and the Special Climate Change Fund, with bilateral funding being limited to Germany's International Climate Initiative. However, of the nine projects identified in the Climate Funds Update as receiving financing since 2003, only two solely focus on climate change adaptation. Namibia received US$1.1 million for a project completed at the end of 2011 that sought to improve traditional crop and livestock farming practices by helping farmers adapt to climate change.

The country is currently receiving funding from the Special Climate Change Fund (US$3.2 million) to support the Scaling-Up Community Resilience to Climate Variability and Climate Change in Northern Namibia with a Special Focus on Women and Children project.

As illustrated in Figure 3, Namibia (along with Botswana) receives only a fraction of climate funding compared to other countries in southern Africa. By comparison, South Africa has received over US$540 million and Mozambique almost US$164 million in funding from dedicated climate funds since 2003. Funding for adaptation shows the same stark differences: Zambia and Mozambique together received almost US$255 million in funding for adaptation over the 2003 to 2015 period, compared to Namibia's US$4.3 million.



	Southern Africa				
	Botswana	Namibia	South Africa	Mozambique	Zambia
Adaptation	$0.0	$4.3	$13.6	$160.1	$94.7
Mitigation - General	$2.6	$6.6	$494.6	$0.0	$4.5
Mitigation - REDD*	$0.0	$0.0	$0.0	$3.6	$10.5
Multiple Foci	$1.0	$7.3	$32.6	$0.0	$0.0

*Reducing emissions from deforestation and forest degradation

Figure 3 – Comparison of approved funding from designated bilateral and multilateral climate funds in southern Africa since 2003 (based on Climate Funds Update, 2015)

An examination of the Organisation for Economic Co-operation and Development (OECD) Rio Markers, which reports on climate-related bilateral aid, reveals that Namibia received US$110.12 million for projects and programs with a principal or significant focus on climate change adaptation between 2010 and 2013 (see Figure 4). The German government has been the major contributor over the last three years, providing bilateral funding for climate change adaptation. However, as illustrated in Figure 4, the vast majority of funding has targeted activities that have adaptation as a significant, not principal, objective. A significant amount of the bilateral funding that prominently featured adaptation went into general environment protection, transportation and storage. Encouragingly, activities tagged as having adaptation as a principal objective made up one-third of total funding in 2013.

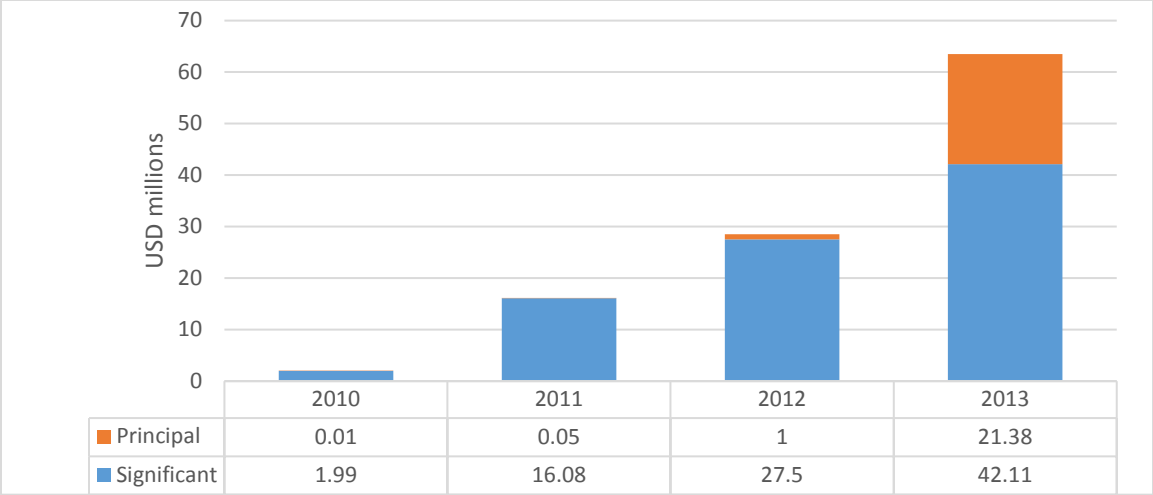


Figure 4 – Bilateral development aid in Namibia identified as having adaptation support as its principal or significant objective,[7] 2010 to 2013, constant 2012 prices (based on OECD, 2015)

5. Networks and communities of practice

Prominent national-level environmental NGOs include the Desert Research Foundation of Namibia, which is currently working on an awareness-raising project focused on climate change adaptation, and the Namibia Nature Foundation, which is working on projects that, while not directly focused on climate change adaptation, carry with them adaptation components and benefits (such as a current project on conservation agriculture). Creative Entrepreneurs Solutions is an NGO engaged in activities related to adaptation, improved stoves, and climate smart agriculture. Academic research on climate change is also carried out at the University of Namibia.

Networks and communities of practice working on climate change in general or climate change adaptation in particular remain limited in Namibia. Among the identified networks with a presence on the national and regional levels is the Namibia NGO Forum, an umbrella network of NGOs founded in 1991 that works toward creating and sustaining an enabling environment for NGOs, with an emphasis on democracy, poverty eradication, and human rights promotion. The network aims to facilitate the participation of civil society in policy development and to build the capacity of its NGO members to ensure effective delivery of development services to their constituents. In addition, the Namibia NGO Forum aims to provide an interactive platform for the sharing of experiences among its members, civil society, and international development agencies. It also promotes greater collaboration with other regional and international networks.

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

On the national level, the Namibian Youth Coalition on Climate Change is a network of youth groups, educational institutions, and governmental departments working on climate change. The coalition aims to be a medium in which young Namibians become change agents toward a resilient and carbon-responsible nation. The group was founded through the Africa Adaptation Programme in Namibia. As well, the Namibian Environmental Education Network links and promotes environmental education efforts throughout Namibia. It supports the development of existing and new environmental projects and programs, and initiates and coordinates environmental workshops, courses, seminars, and conferences. The network serves as a central access point for information on national environmental education, and encourages monitoring, evaluation, and research of environmental practices in Namibia.

On a regional scale, Namibia is a member of the Southern African Development Community and can draw from experiences and knowledge of its neighbouring countries in addressing climate change adaptation. One such initiative is the Programme for Climate Change Capacity Development initiated by the Southern African Regional Universities Association. The program specifically aims to build a network of higher education institutes in the region that will collaborate to enhance adaptive capacity and climate resilience. One of its initiatives, launched in June 2015, is the Southern African Regional Universities Association Curriculum Innovation Network, which is supporting the development of a shared master's-level curricula focused on interdisciplinary studies related to climate change and sustainable development. The University of Namibia is part of the consortium of regional universities engaged in this initiative.

OKACOM, the Permanent Okavango River Basin Commission, provides another platform for sharing knowledge and promoting transboundary collaboration on climate change adaptation. The organization coordinates actions among the three riparian countries of the Okavango River: Angola, Botswana, and Namibia.

6. Conclusions

Climate change presents a significant challenge to Namibia. While its stable government and status as a country of medium human development both help to reduce some of its vulnerability to climate impacts, the country's harsh environment, its variable climate and its population's reliance on climate-related livelihoods threaten Namibia's development progress in the absence of serious attempts to build adaptive capacity and resilience.

Climate models project that the country will be exposed to increasingly negative climate trends: higher temperatures, rising sea levels, an increase in flooding and drought, and more climate uncertainty. Without concerted action on climate change adaptation, the implications of increasing climate variability and higher evaporation rates could be dire in a context of existing (and extreme) water scarcity—threatening agriculture, livestock, tourism, and human health. At the same time, in Walvis Bay a rise in sea level and increased

storm surges could inundate low-lying coastal settlements and hamper activities at Namibia's main port for international trade.

Namibia's political and legislative bodies have begun to respond to the threats posed by climate change. The inclusion of climate change in national development policies, the passing of the NCCP, and the establishment of a national climate change committee indicate that the government takes the threat seriously. The Climate Change Unit, established under the MET, will be able to help with coordinating the Namibian response to climate change across all sectors and ministries. However, more needs to be done to integrate climate change into policies governing water, agriculture, gender, and health, given the impact that climate change is expected to have on each of these sectors. As existing policies are revised, it is imperative that they include climate change considerations and response strategies.

Namibia's Second and Third National Communication identify six key priority sectors and areas that are particularly vulnerable to climate change: water and wetlands; agriculture; sea level rise, the coastal zone, and fisheries; health; tourism; and disaster risk management. Specific adaptation activities are identified for each of the vulnerable sectors in the Second National Communication, in order to address climate vulnerabilities. In practice, however, a limited number of projects and programs that address these priority areas have been implemented or are under way in Namibia. No ongoing national projects focus on water issues, a surprising finding given the country's severe aridity; freshwater resources are included only as part of a larger regional project. The priority sectors of health; tourism; and sea level rise, the coastal zone, and fisheries are completely absent from current adaptation programming. The lack of action on adaptation programming in Namibia is reflected in the minimal amount of funding that it has received from bilateral donors and climate funds, particularly when compared to financing flowing into neighbouring South Africa, Mozambique, and Zambia. In order to fully address the country's vulnerability to climate change, further national adaptation projects and programs—particularly those focused on Namibia's identified priority sectors—will be required.

The limited presence of civil society organizations in Namibia further impedes the amount of climate change adaptation work happening on the ground. While environmental networks do exist, the extent to which they focus on climate change and have an influence on policy appears limited. Strengthening the role of these organizations in national climate change adaptation decision-making and programming would help to improve domestic capacities to address climate 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 agrology, botany, or meteorology) on the potential impacts of climate change (for example on changes in crop production, glacial melt rates, or typhoon patterns); long-term monitoring efforts (whether climatic or socioeconomic) needed to inform decision-making; stand-alone workshops, conferences, and training programs; and capacity building to support participation in processes related to the UNFCCC (such as training for negotiators, enabling activities to prepare reports).

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

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

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

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

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

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

A.2 Type of project being undertaken

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

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

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

A.3 Sector or area of focus

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Annex B: Projects and programs

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

Name of project	Objectives	Funder(s) and budget	Implementing agencies	Type of project	Sectors	Duration	Scale and location(s)
ASSAR	This project will enable proactive, longer-term approaches to climate change adaptation in semi-arid regions, while supporting the management of current risks. It draws on a number of disciplines to address the complex interactions among climate, biophysical, social, political, and economic dynamics. Research on each of these aspects will be integrated through transformative scenario planning, involving stakeholders throughout. The project will generate credible information that decision-makers and others can use to develop robust adaptation strategies.	UK Department for International Development; IDRC through the CARIAA program CAD$13.5 million	University of East Anglia; International START Secretariat; Oxfam; Indian Institute for Human Settlements; University of Cape Town, South Africa	Research; capacity building; knowledge communication	Multisectoral	2014–2019	Global Botswana, Ethiopia, Ghana, India, Kenya, Mali, Namibia, Niger, South Africa, Uganda
Biodiversity Management and Climate Change in Namibia	This project introduces policies, strategies, and practices relevant to biodiversity and climate in a coherent manner, thereby contributing to increasingly secure and diversified livelihoods for the local people who depend on natural resources.	German Federal Ministry for Economic Cooperation and Development	MET	Knowledge communication; policy formation and integration; community-based adaptation	Forestry; biodiversity protection; ecosystem conversation; government	2013–2016	National
Climate for Development in	This project aims to increase the climate resilience of Africa's	European Union through	African Climate Policy Centre	Research; capacity	Climate information	January 2012–	Regional

Africa (ClimDev) Programme	population, addressing the need for improved climate information in Africa and strengthening the use of such information for decision-making. ClimDev is an initiative of the African Union Commission, the United Nations Economic Commission for Africa, and the African Development Bank.	the Global Climate Change Alliance, Norway, Sweden, and the United Kingdom €8 million		building; knowledge communication		Decembe r 2015	Botswana, Burkina Faso, Ethiopia, Egypt, Ghana, Kenya, Mali, Namibia, Senegal, South Africa, Tanzania, Uganda
Developing and Testing a Rangeland Production Early Warning System with Livestock Farmers in Namibia	This project seeks to enhance the ability of all livestock farmers in Namibia to make rangeland management decisions based on timely and accurate information regarding the state and productivity of their rangelands, which will reduce their vulnerability to adverse climate change impacts such as more frequent and severe droughts.	European Union	Agri-Ecological Services in cooperation with Agra ProVision	Capacity building; knowledge communication; field implementation; community-based adaptation	Agriculture; disaster risk management; climate information	2015–unknown	National
Environmental Awareness and Climate Change Project	The project objectives are to: • Increase knowledge of and skills related to environmental issues. • Promote knowledge transfer in the environmental sector. • Promote social entrepreneurship in the environmental sector. • Support journalistic work in the environmental sector.	Hanns Seidel Foundation	Hanns Seidel Foundation Namibia; Desert Research Foundation Namibia	Capacity building; knowledge communication	Civil society	April 2015–2017	National

Scaling Up Community Resilience to Climate Variability and Climate Change in Northern Namibia, with a Special Focus on Women and Children	The goal of this project is to reduce vulnerability to the adverse impacts of climate change, including climate variability, at the local, national, regional, and global levels and to promote the transfer and adoption of adaptation technology. This is to be achieved by scaling up climate-resilient livelihoods, improving community-level flood and drought management, and mainstreaming climate change into agricultural strategy.	Special Climate Change Fund; Ministry of Agriculture, Water and Forestry; Ministry of Regional and Local Government and Housing and Rural Development; UNDP US$43.7 million	UNDP; MET; Ministry of Agriculture, Water and Forestry; regional councils; non-government entities; traditional authorities	Capacity building; field implementation; community-based adaptation	Agriculture; gender; rural areas	Endorsed 2015	National
Southern Africa Region Environmental Program	This project aims to 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.	United States Agency for International Development US$23 million	Chemonics; Permanent Okavango River Basin Water Commission	Capacity building; knowledge communication; policy formation and integration; field implementation	Freshwater supply; government	2010–2015	Regional Angola, Botswana, Namibia
SASSCAL	This multi-country initiative aims to support research initiatives and capacity building for application-oriented scientific research and science-policy consultations in southern Africa at the national and regional levels. Its mission is “to conduct problem-oriented research in the area of adaptation to climate and	German Federal Ministry of Education and Research	SASSCAL	Research; capacity building	Climate information; government; other: sustainable land use management	2010–unknown	Regional Angola, Botswana, Namibia, South Africa, Zambia

	change and sustainable land management and provide evidence-based advice for all decision-makers and stakeholders to improve the livelihoods of people in the region and to contribute to the creation of an African knowledge-based society" (SASSCAL, n.d.). The initiative engages a number of universities, research organizations, and government departments from the five participating southern African countries and Germany.						

8. References

Adaptation Partnership. (2015). Activities. Retrieved from http://www.adaptationpartnership.org/blog/activities

Collaborative Adaptation Research Initiative in Africa and Asia (CARIAA) and Adaptation at Scale in Semi-Arid Regions (ASSAR). (2015). Vulnerability and adaptation to climate change in the semi-arid regions of southern Africa. Ottawa: IDRC.

Central Bureau of Statistics. (2008). A review of poverty and inequality in Namibia. Windhoek: National Planning Commission.

Central Intelligence Agency (CIA). (2015). World factbook: Namibia. Retrieved from https://www.cia.gov/library/publications/the-world-factbook/geos/wa.html

Christensen, J.H., Krishna Kumar, K., Aldrian, E., An, S.-I., Cavalcanti, I.F.A. de Castro, M.,…Zhou, T. (2013). Cli¬mate phenomena and their relevance for future regional climate change supplementary material. In T.F. Stocker, D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung,…P.M. Midgley (Eds.), Climate change 2013: The physical science basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (Chapter 14). Cambridge University Press, UK: IPCC.

Climate and Development Knowledge Network. (2014). The IPCC's fifth assessment report: What's in it for Africa? London: Overseas Development Institute and Climate and Development Knowledge Network.

Climate Funds Update. (2015). The data. Retrieved from http://www.climatefundsupdate.org/data

Daron, J.D. (2014). Regional climate messages: Southern Africa. Scientific report from the CARIAA Adaptation at Scale in Semi-Arid Regions Project. Ottawa: CARIAA and Adaptation at Scale in Semi-Arid Regions.

Department for International Development. (2006). Social protection in poor countries. Social protection briefing note series, number 1. Retrieved from GSDRC website: http://www.gsdrc.org/docs/open/SP17.pdf

Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH. (2015). Biodiversity management and climate change. Retrieved from http://www.giz.de/en/worldwide/24529.html

Directorate of Disaster Risk Management. (2011). National disaster risk management plan. Windhoek: OPM.

Food and Agriculture Organization of the United Nations. (2002). Information on fisheries management in the Republic of Namibia. Retrieved from http://www.fao.org/fi/oldsite/FCP/en/nam/body.htm

Fund for Peace. (2015). Fragile states index 2015. Retrieved from http://library.fundforpeace.org/fsi

Hanns Seidel Foundation. (2015). Environmental awareness. Retrieved from http://www.hss.de/namibia/en/our-work-in-namibia/environmental-awareness.html

Intergovernmental Panel on Climate Change (IPCC). (2001). Annex B. Glossary of terms. In Climate change 2001: Impacts, adaptation and vulnerability. Retrieved from http://www.ipcc.ch/pdf/glossary/tar-ipcc-terms-en.pdf

International Institute for Environment and Development (IIED). (2007). The economic impact of climate change in Namibia: How climate change will affect the contribution of Namibia's natural resources to its economy. London: IIED. Retrieved from http://ageconsearch.umn.edu/bitstream/37922/2/15509IIED.pdf

Ministry of Agriculture, Water and Forestry. (2008). Water supply and sanitation policy. Windhoek: Government of Namibia.

Ministry of Agriculture, Water and Forestry. (2015). Official launch of the Namibia agriculture policy by Hon. John Mutorwa, MP, Minister of Agriculture, Water and Forestry, December 2015. [Speech]. Retrieved from http://www.mawf.gov.na/documents/37726/45469/Statement+by+Hon.+John+Mutorwa+on++the+luanchinf+of+the+NAP+18+Dec+2015.pdf/ff4b9136-4980-48ea-8f02-864ddd952ce1

Ministry of Agriculture, Water and Rural Development. (2000). National water policy white paper. Windhoek: Government of Namibia.

Ministry of Environment and Tourism (MET). (2009). Climate change strategy and action plan (proposed). Windhoek: Government of Namibia.

Ministry of Environment and Tourism (MET). (2010). National policy on climate change for Namibia. Windhoek: Government of Namibia. Retrieved from http://www.adaptation-undp.org/sites/default/files/downloads/namibia_nationalclimatechangepolicyfornamib.pdf

Ministry of Environment and Tourism (MET). (2011). Namibia second national communication to the United Nations Framework Convention on Climate Change. Windhoek: Government of Namibia.

Ministry of Health and Social Services. (2005). National malaria policy. Windhoek: Government of Namibia.

Ministry of Health and Social Services. (2010). National health policy framework: 2010–2020. Windhoek: Government of Namibia.

National Drought Task Force. (1997). National drought policy and strategy. Windhoek: Government of Namibia.

National Planning Commission. (2008). Third national development plan 2007/2008 – 2011/2012. Windhoek: Government of Namibia.

National Planning Commission. (2012). Namibia's fourth national development plan. Windhoek: Government of Namibia.

Notre Dame Global Adaptation Index (NG-GAIN). (2015). Namibia profile. Retrieved from http://index.gain.org/country/namibia

Office of the President. (2004). Namibia vision 2030: Policy framework for long-term national development. Windhoek: Government of Namibia.

Organisation for Economic Co-operation and Development (OECD). (2011). Handbook on the OECD-DAC climate markers. Retrieved from http://www.oecd.org/dac/stats/48785310.pdf

Organisation for Economic Co-operation and Development (OECD). (2015). Aid activities targeting global environmental objectives. Retrieved from http://stats.oecd.org/Index.aspx?DataSetCode=RIOMARKERS

Republic of Namibia. (2015a). Intended nationally determined contributions (INDC) of the Republic of Namibia to the United Nations Framework Convention on Climate Change. Retrieved from http://www4.unfccc.int/submissions/INDC/Published%20Documents/Namibia/1/INDC%20of%20Namibia%20Final%20pdf.pdf

Republic of Namibia. (2015b). Third national communication to the United Nations Framework Convention on Climate Change. Retrieved from https://www.weadapt.org/system/files_force/namnc3.pdf?download=1

Republic of Namibia. (2013). National climate change strategy and action plan 2013-2020. Republic of Namibia.

Southern African Science Service Centre for Climate Change and Adaptive Land Management (SASSCAL). (n.d.). Southern African Science Service Centre for Climate Change and Adaptive Land Management (SASSCAL) - a Regional Science Service Centre (RSSC) in Southern Africa. Retrieved from http://www.sasscal.org/index.php

Transparency International (2014). Corruption perceptions index 2014: Results. Retrieved from http://www.transparency.org/cpi2014/results

United Nations Development Programme (UNDP). (2004). Human development index 2004: Cultural liberty in today's diverse world. Retrieved from http://hdr.undp.org/sites/default/files/reports/265/hdr_2004_complete.pdf

United Nations Development Programme (UNDP). (2014). Human development index 2014: Sustaining human progress: Reducing vulnerabilities and building resilience. Retrieved from http://hdr.undp.org/en/2014-report

United Nations Development Programme (UNDP) Africa Adaptation Programme. (n.d.). Namibia profile. Retrieved from https://www.undp-aap.org/countries/namibia

United Nations Economic Commission for Africa, African Union, African Development Bank Group and the United Nations Development Programme. (2014). MDG report 2014: Assessing progress in Africa toward the Millennium Development Goals. United Nations Economic Commission for Africa: Addis Ababa.

United Nations Entity for Gender Equality and the Empowerment of Women. (n.d.). Gender mainstreaming: Concepts and definitions. Retrieved from http://www.un.org/womenwatch/osagi/conceptsandefinitions.htm

United Nations Environment Programme (UNEP). (2007). Glossary. In Global environment outlook 4. Retrieved from http://www.unep.org/geo/geo4/report/Glossary.pdf

United Nations International Strategy for Disaster Reduction. (2009). 2009 UNISDR terminology on disaster risk reduction. Retrieved from http://unisdr.org/files/7817_UNISDRTerminologyEnglish.pdf

United Nations Statistics Division. (2011). Environmental indicators: Inland water resources. Retrieved from http://unstats.un.org/unsd/environment/waterresources.htm

United States Agency for International Development. (2013). Southern Africa Regional Environmental Program (SAREP). Retrieved from https://www.usaid.gov/sites/default/files/documents/1860/SAREP%20Project%20Fact%20Sheet.pdf

World Bank. (2015). Databank: Indicators. Retrieved from http://data.worldbank.org/indicator

World Health Organization. (n.d.). Frequently asked questions. Retrieved from http://www.who.int/suggestions/faq/en/index.html

World Travel and Tourism Council. (2015). WTTC data gateway. Retrieved from http://www.wttc.org/datagateway/


IDRC | CRDI
International Development Research Centre
Centre de recherches pour le développement international

Canada


UKaid
from the British people


IISD
International Institute for
Sustainable Development