CARIAA
Collaborative Adaptation Research Initiative in Africa and Asia

Review of Current and Planned Adaptation Action in Tanzania

CARIAA Working Paper #14

Alec Crawford
Anika Terton

Crawford, A. and Terton, A. 2016. Review of current and planned adaptation action in Tanzania. CARIAA Working Paper no. 14. 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 Tanzania's continued development and relative prosperity. Rising temperatures, rising seas, and changes to where, when, and how much rain falls threaten to overwhelm the population's already low adaptive capacities and reverse the country's recent development progress. Central to the population's vulnerability is a widespread reliance on climate-dependent livelihoods, as well as high levels of poverty; both mean that climate change must be considered a high priority for the government. The government has identified a number of key sectors in need of adaptation action: water, coastal and marine environments, forestry, wildlife, agriculture, health, tourism, energy, industry, livestock, fisheries, infrastructure, human settlements, and land use. The state has made some headway on developing climate change strategies and action plans, and setting up the institutional structures that are required to meet the challenge of climate change. However, more needs to be done to implement these strategies and to integrate climate change into the policies of key relevant sectors, including water, health, agriculture, and disaster risk reduction. Encouragingly, there is a relatively high level of adaptation action currently underway in Tanzania. This report explores these issues in greater depth. It is one in a series of country reviews prepared to provide the Collaborative Adaptation Research Initiative in Africa and Asia (CARIAA) with a snapshot of adaptation action in its countries of engagement.

Résumé

Examen des mesures d'adaptation actuelles et prévues en Tanzanie

Les changements climatiques représentent un véritable obstacle au développement continu et à la relative prospérité de la Tanzanie. La hausse des températures, la montée du niveau de la mer et l'évolution des zones, des moments et du volume des précipitations menacent de réduire les capacités d'adaptation déjà faibles de la population et d'inverser la tendance de développement récente du pays. La grande dépendance des moyens de subsistance au climat est un aspect central de la vulnérabilité de la population, tout comme le niveau de pauvreté élevé. Ces deux éléments signifient que les changements climatiques doivent être considérés comme une priorité élevée par le gouvernement. Le gouvernement a déterminé plusieurs secteurs clés ayant besoin de mesures d'adaptation : les bassins hydrographiques, le littoral et l'environnement marin, la foresterie, la faune et la flore, l'agriculture, la santé, le tourisme, l'énergie, l'industrie, l'élevage, les pêches, les infrastructures, les établissements humains et l'utilisation des terres. L'État a fait des progrès en élaborant des stratégies et des plans d'action relatifs aux changements climatiques et en mettant en place des structures institutionnelles pour répondre aux défis posés par les changements climatiques. Cependant, davantage de mesures doivent être prises pour mettre en œuvre ces stratégies et intégrer les changements climatiques aux politiques relatives aux secteurs clés pertinents, notamment l'eau, la santé, l'agriculture et la réduction des risques de catastrophe. Fait encourageant, on constate un nombre relativement important de mesures d'adaptation en cours en Tanzanie. Ce rapport examine ces questions plus en détail. Cet examen fait partie d'une série d'examens des pays préparés dans le cadre de l'Initiative de recherche concertée sur l'adaptation en Afrique et en Asie qui donnent un aperçu des mesures d'adaptation dans les pays où elle est déployée.

Acronyms

CAN	Climate Action Network
ASSAR	Adaptation at Scale in Semi-Arid Regions
CARIAA	Collaborative Adaptation Research Initiative in Africa and Asia
CIA	Central Intelligence Agency
ClimDev	Climate for Development in Africa
DFID	Department for International Development (UK Government)
DoE	Division of Environment
DRC	Democratic Republic of Congo
GCAP	Global Climate Adaptation Partnership
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
GNI	gross national income
IDRC	International Development Research Centre
IPCC	Intergovernmental Panel on Climate Change
NAP	National Adaptation Plan
NAPA	National Adaptation Programme of Action
NCCS	National Climate Change Strategy
ND-GAIN	Notre Dame Global Adaptation Index
OECD	Organisation for Economic Co-operation and Development
PREPARED	Planning for Resilience in East Africa through Policy, Adaptation, Research and Economic Development
PRISE	Pathways to Resilience in Semi-Arid Economies
PRSP	Poverty Reduction Strategy Paper
TPC	Tanzania Planning Commission
TI	Transparency International

UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
USAID	United States Agency for International Development
VPO	Vice President's Office

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 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	**Key sources of vulnerability**	• Widespread reliance on climate-sensitive livelihood strategies • Poverty • Inadequate institutional arrangements • Lack of adequate financial resources	• Lack of sufficient human resources and technical capacities • Low awareness of climate change • Lack of adequate climate change information

Vulnerable sectors	**Illustrative potential impacts on vulnerable sector**	**Illustrative adaptation priority adaptation measures in each sector (from Second National Communication)**	**Projects in sector[1]**
Agriculture	• Decline in productivity and agro-diversity • Increased crop pests and disasters • Changes to the viability of different crops • Food shortages and food insecurity	• Identify suitable crops for new agro-ecological zones • Promote appropriate agricultural practices that increase resilience to climate change • Promote the use of appropriate technologies for production, processing, storage, and distribution	15%
Freshwater	• Decreased water flow triggered by droughts • Perennial rivers changing into seasonal rivers • Exacerbated degradation from pollution • Increased evapotranspiration	• Enhance protection and conservation of water catchments • Invest in and promote appropriate water management technologies • Invest in exploration and extraction of underground water resources • Improve water quality	25%
Human health	• Changes to distribution of diseases • Expansion of malarial zone to highland areas • Increased risk of respiratory diseases • Increased risk of food insecurity	• Enhance the capacity of public healthcare systems to respond to climate-related health risks • Improve disease surveillance and design of disease-control programs • Improve knowledge of climate change–related occupational health risks	15%

[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.

Coastal and marine environment	• Increased sea temperature and sea level rise could lead to coral bleaching and loss, mangrove degradation, coastal erosion, and saltwater intrusion into aquifers • Changing sea currents could impact fisheries	• Promote sustainable management of coastal and marine environments • Strengthen coastal and beach erosion systems • Promote the sustainable management of the coastal and marine environment • Promote livelihood diversification for coastal communities	15%
Energy	• Decline in generation capacity with the drying up of dams	• Promote and improve use of alternative energy sources • Promote use of and acquire efficient energy technologies	5%
Forestry	• Loss of forest biodiversity • Disappearance of wildlife habitats • Increased risk of bushfires • Ecosystem shift: from forests to grasslands	• Mainstream climate change into forest management practices • Promote the use of lesser-known tree species and use of non-timber materials • Promote alternative livelihoods for forest-dependent communities • Promote use of non-wood construction materials, improved energy efficiency, decentralization	5%
Biodiversity	• Changes to habitats and ecosystems • Water shortages a key threat to wildlife	• Promote wildlife management practices that increase resilience to climate change • Establish wildlife climate change–related monitoring and information management systems	10%
Tourism	• Reduced tourism • Destruction of coastal infrastructure • Coral bleaching impacting the diving sector	• Promote alternative tourist attractions • Restore degraded tourist sites • Sensitize and enhance adaptive tourism infrastructural development	5%
Industry	• Economic losses tied to dependence on agricultural inputs/raw materials, hydroelectric power	• Promote alternative energy sources and adoption of efficient technologies • Enhance occupational health in industries • Enhance resilience of the industrial sector to the changing climate	--
Livestock	• Reduced water and pastures • Increased vector-borne livestock disease • Changes to plant diversity	• Promote climate change–resilient livestock practices • Acquire appropriate technologies for livestock production systems	--
Fisheries	• Destruction of coral reefs • Negative impact on the Lake Victoria fishery	• Promote protection and conservation of aquatic ecosystems • Explore and promote alternative and diversified livelihoods for fishery communities	--

Infra-structure	• Flood damage to infrastructure • Risks of damage to coastal infrastructure	• Mainstream climate change into infrastructure design and development • Promote deployment and use of appropriate technology in infrastructure	--
Human settlements	• Exposure to extreme events, sea level rise • Threat of displacement, death	• Mainstream climate change issues into urban and rural planning • Promote use of appropriate building materials adaptive to climate change	10%

Particularly vulnerable regions	**Particularly vulnerable groups**	**Status of climate governance (policies, institutions)**
• Arid and semi-arid lands, Zanzibar, Lake Victoria	• Rural populations	• Good progress on adoption of climate change policies

Introduction

The United Republic of Tanzania (referred to herewith as Tanzania) is East Africa's largest country, both by size and population: it covers nearly 950,000 km2 and is home to almost 50 million people (Central Intelligence Agency [CIA], 2015). Tanzania was formed when, three years after Tanganyika achieved its independence from Great Britain in 1961, it united with the islands of the Zanzibar archipelago (including Unguja, Pemba, and Mafia). It is bordered to the north by Kenya and Uganda, to the west by Rwanda, Burundi, the Democratic Republic of Congo (DRC), and Zambia, and by Malawi and Mozambique to the south (see Figure 1). To the east lies its extensive 800 km coastline on the Indian Ocean. The city of Dodoma was made the capital in the mid-1970s, but Dar es Salaam remains the economic and administrative centre of the country.

Tanzania is home to the continent's highest mountain, Mount Kilimanjaro, and to its largest and deepest lakes (Victoria and Tanganyika, respectively). The country has more freshwater resources per capita than its East African neighbours (Food and Agriculture Organization of the United Nations, 2015). Tourists flock to the country every year to enjoy its beaches and world-famous protected ecosystems, including the Serengeti and the Ngorongoro Crater, and to witness the annual wildebeest migration, one of the natural world's great events.

Climate change presents a very real challenge to Tanzania. Rising temperatures, rising seas, and changes to where, when, and how much rain will fall threaten to overwhelm already low adaptive capacities and reverse recent development progress. Widespread reliance on climate-dependent livelihoods, as well as high levels of poverty, means that climate change must be considered a high priority for the government. And while the state has made some headway on developing climate change strategies and action plans, and setting up the institutional structures that are required to meet the challenge of climate change, more needs to be done to implement these strategies and to integrate climate change into the policies of key relevant sectors, including water, health, agriculture, and disaster risk reduction. Beyond the political sphere, there is, encouragingly, a relatively high level of adaptation action currently under way in Tanzania.

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

calibre research and policy engagement activities that will inform national and subnational planning processes in 17 countries, including Tanzania.

The report first outlines Tanzania's current climate and the changes to it that are projected to occur in the coming decades. Section 3 then presents the factors that increase the vulnerability of Tanzania 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. This is followed in Section 4 by an overview of the critical policies and plans shaping Tanzania's efforts to address climate change adaptation at the national and subnational levels. Section 5 describes the scale, type, and focus of current and planned adaptation-focused programs and projects in Tanzania as well as the level of adaptation finance flowing into the country, to assess the extent to which efforts to address the country's critical adaptation priorities are under way. 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, is provided in Section 6. The paper concludes with an assessment of the general status of adaptation planning at the national and subnational levels in Tanzania.

Figure 1 – Map of Tanzania (© Sémhur/Wikimedia Commons/CC-BY-SA-3.0)

1. Current climate and projected changes

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

1.1 Current climate

Tanzania has a diverse climate due to its latitude, its proximity to the warm Indian Ocean, its many inland lakes, its wide range of altitudes (from sea level to nearly 6,000 m), the migration of the Inter-Tropical Convergence Zone, and its location in relation to dominant atmospheric high and low pressure systems (Daron, 2014; Division of Environment (DoE), 2012a). Temperatures are typically high throughout the year: on the coast average temperatures range from 27°C to 29°C, while they range from 20°C to 30°C in the central, northern, and western parts of the country. Temperatures are highest between December and March and coolest between June and July; they can drop to 15°C in the highlands and mountains and can fall below freezing at high altitudes (DoE, 2012a). Rainfall varies more than temperature, both temporally and spatially. The country has two main rainy seasons: the long rains fall from March to May, and the short rains fall from September to November (CARIAA and Adaptation at Scale in Semi-Arid Regions [ASSAR], 2015). Most of the country receives less than 1,000 mm of rain per year: the central part of the country is the driest part of Tanzania, while the southeast and northwest are the wettest (DoE, 2012a). The country's temperature and rainfall vary on annual, decadal, and multi-decadal time scales (Daron, 2014).

1.2 Observed climate trends

Temperatures across East Africa have increased by 1.5°C to 2°C on average over the past 50 years (Daron, 2014). The Intergovernmental Panel on Climate Change (IPCC)'s Fifth Assessment Report reports a warming of the near-surface temperature and an increase in the frequency of extreme warm events for countries bordering the western Indian Ocean from 1961 to 2008 (Niang et al., 2014). Rainfall trends over the same time period are less evident; large variations in the direction and magnitude of rainfall changes in the region mean that trends are generally weak (Daron, 2014). From 1963 to 2012, the majority of Tanzania saw a decrease in rainfall exceeding 100 mm during the rainy season (March to May), with the change particularly pertinent in drier regions where absolute rainfall totals are lower (Daron, 2014). Rainfall variability in the arid and semi-arid zones of Tanzania and East Africa more generally has historically been high, and as such signals of systematic change are typically weak (Daron, 2014; DoE, 2012a). There is insufficient evidence to say anything about heat waves and heavy precipitation events; in general, an analysis of extreme events is very difficult for East Africa (Daron, 2014).

1.3 Climate projections

According to modelling completed for the IPCC in its Fifth Assessment Report using the Representative Concentration Pathway 8.5 scenario, temperatures in East Africa are expected to rise by 0.9°C by 2035 (ranging from 0.6°C to 1.5°C), 2.2°C by 2065 (from 1.6°C

to 3.2°C), and 4.0°C by 2100 (from 2.4°C to 5.6°C) (Christensen et al, 2013, p. 14SM-36).[2] Depending on the emissions scenario, other models put the mid-century temperature increase even higher, at up to 4°C by 2050 (Daron, 2014). The IPCC expects a wetter climate for East Africa, with more intense wet seasons and less severe droughts during the two rainy seasons. The IPCC also expects an increase in the number of extreme wet days by mid-century (Niang et al., 2014). Contrary to this, Tanzania's National Climate Change Strategy (NCCS) expects an overall decrease in rainfall, a later onset and earlier end to the rainy season, and a seasonal shift in rainfall patterns, which is consistent with nationally observed trends (DoE, 2012a). Projections for East Africa show both potential increases and decreases in rainfall, pointing to insufficient evidence to support statements suggesting a shift to drier or wetter conditions in the future at most locations (Daron, 2014). The decadal and multi-decadal variability in rainfall that has historically characterized the country's climate is more likely to dominate future changes in Tanzania's precipitation regime (Daron, 2014). Due to the uncertainty surrounding future rainfall patterns in Tanzania, the overall impact of climate change on water resources is unclear, though increasing temperatures combined with higher rates of evapotranspiration suggest additional stress on vulnerable systems (Daron, 2014).

2. Vulnerability to climate risks

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

2.1 Current drivers of vulnerability

According to the most recent Human Development Report by the United Nations Development Programme (UNDP), Tanzania is categorized as a country with a low level of human development (see Table 1). The country ranks 159 out of 187 countries on the Human Development Index, putting it on par with Comoros and Mauritania (UNDP, 2014). Tanzania's progress toward achievement of the Millennium Development Goals remains slow; approximately two-thirds of the population still suffers from multi-dimensional poverty and lives on less than US$1.25 per day, while a third of the population lives in conditions of severe poverty. That said, the country has made great strides in recent years in extending life expectancy at birth: in 2014, that figure was estimated to be 61.5 years, whereas 10 years earlier, Tanzanians were expected to live just 43.5 years (UNDP, 2004;

[2] These projections represent a 50% likelihood of occurrence, using 39 global models and against a baseline period of 1986 to 2005.

2014). Over the same 10-year period, the prevalence of HIV infection among the adult population (15 to 49 years old) dropped from 8.8% to 5.1% (UNDP, 2004; 2014). With respect to education, Tanzanian children are in school for an average of 5.1 years, which is below the global average but does exceed the mean number of years for children in sub-Saharan Africa.

Tanzania's population is nearly 50 million, making it the most populous country in East Africa (UNDP, 2014). The country's population is one of the fastest growing in the world, at 3% per year, a rate higher than the average for sub-Saharan Africa (UNDP, 2014). This high growth rate means that the population is young; the median age in Tanzania is just 17.5 years. Much of the population lives along the coast, in the northern and southern highlands where soils are fertile, and along the shore of Lake Victoria (UNDP-Adaptation Learning Mechanism, 2012). Most live outside of urban centres, with nearly three-quarters of Tanzanians living in rural settings (UNDP, 2014). That is, however, changing: in 2000, 22.3% of the Tanzanian population lived in cities, while by 2012 the figure had grown to 27.2% (UNDP, 2013).

Tanzania has a republic form of government. The head of state is President Jakaya Kikwete, who has been in power since 2005 and is now nearing the end of his second five-year term (elections are scheduled for November 2015).[3] Women hold 36% of seats in parliament, a rate approximately double that of the United States and 15% higher than the average for sub-Saharan Africa. Corruption is a problem in Tanzania and appears to be getting worse: the country ranks 119th out of 174 countries on Transparency International (TI)'s Corruption Perceptions Index, with a score that has worsened over the past two years (TI, 2014). High interest rates within the country reflect in part the high risk of fraud that accompanies doing business in Tanzania. While Tanzania itself is peaceful, instability in the East Africa region means that Tanzania continues to host significant populations of refugees, notably from Burundi and the DRC (CIA, 2015).

Tanzania's economy is the fastest growing in East Africa, with a current annual growth rate of 7.3% (World Bank, 2015). Gross national income (GNI) per capita is just US$1,702 (in 2011 dollars, adjusted for purchasing power parity), though there is a significant gap in income across gender lines: GNI per capita for women is $1,501, while for men it is $1,903. Employment is fragile, with 87.7% of all jobs considered vulnerable (UNDP, 2014). And despite legislation and international commitments protecting the rights of children, one in five continue to work (UNDP, 2014).[4] Agriculture is the dominant sector of the economy: it accounts for one-quarter of GDP and 85% of exports, and employs 80% of the workforce (CIA, 2015). The main crops produced are coffee, sisal, tea, cotton, cashew nuts, tobacco, cloves, corn, wheat, cassava, bananas, fruits, and vegetables. Livestock (cattle, sheep, and goats) are also an important part of the sector, with an estimated 3 million pastoralists

[3] Zanzibar is a semi-autonomous region within the United Republic, with its own president who governs matters internal to the islands.

[4] Children are here defined as being between 5 and 14 years of age.

active in Tanzania and 18.5 million head of cattle (CARIAA-ASSAR, 2015; CIA, 2015; DoE, 2012a). Nearly half of Tanzania's land is arable (45.9%) (World Bank, 2015).

Tanzania's recent high economic growth rates are often ascribed to growing gold production and tourism (CIA, 2015). Tourism represents a large (and growing) part of the national economy: the country's 14 national parks, 31 game reserves, and numerous mountains, beaches, and historical sites have enabled development of a tourism sector that accounts for 17.5% of Tanzania's GDP (DoE, 2012a). Beyond gold and wildlife, key natural resources include hydro power, tin, phosphates, iron ore, coal, gemstones, natural gas, and nickel (CIA, 2015). And while the industrial sector is largely focused on agricultural processing and mineral development, there are also enterprises devoted to salt, soda ash, cement, oil, refining, shoes, apparel, wood products, and fertilizer (CIA, 2015). Forestry also represents a significant portion of the national economy: Tanzania has among the highest levels of forest cover in East and southern Africa, and the sector formally contributes between 2% and 10% to the GDP (likely underestimated due to widespread informal use of forest products) (DoE, 2012a). Wood fuel is the most exploited source of energy; only 2% of the rural population is connected to the national grid, and biomass accounts for 90% of total energy consumption (DoE, 2012a).

Environmental conditions in Tanzania are influenced by its variable geography and topography, which ranges from a narrow 800 km coastal belt along the Indian Ocean to an extensive central plateau, where the altitude ranges from 1,000 m to 2,000 m above sea level (DoE, 2012a). This central plateau is fringed by highlands and mountains, including, on the country's northern border with Kenya, Mount Kilimanjaro. The Great Rift Valley traverses Tanzania: lakes Tanganyika, Nyasa (Malawi), and Rukwa fall in the western arm of the Rift, along Tanzania's western border, while the eastern arm cuts across the central part of the country, forming lakes Eyasi, Manyara, and Natron. The country's diverse topography translates into a number of different ecosystems: from the mangrove forests of the tropical coast, which receives more than 1,000 mm of rain per year, to the drier savannahs of the interior, which receive less than 600 mm, to the glaciers of Kilimanjaro, one of just three places on the continent with snow (Ministry of Water, 2002). These ecosystems host a wide variety of wildlife, the focal point of the country's important tourism sector. Current environmental concerns include soil degradation, deforestation, desertification, the destruction of coral reefs, drought, and the illegal hunting and trade in wildlife (particularly ivory) (CIA, 2015).

Table 1 – Key indicators of development progress for Tanzania

Category	Indicator	Year	Value	Source
Human development	Human Development Index (score[d]/rank[d] out of 187 countries)	2013	0.488/159	UNDP (2014)
	Population in multi-dimensional poverty (%)	2013	50.4	

	Under-five mortality rate (per 1,000 live births)	2012	54	
	Adult literacy rate (15 years of age and above)	2012	67.8[c]	
	Improved water source, rural (% of population with access)	2012	44	World Bank (2015)
	Improved sanitation facilities (% of population with access)	2012	12	
	Access to electricity (% of population)	2010	14.8	
Gender	Gender Inequality Index (value[e]/rank[d] out of 187 countries)	2013	.553/124	UNDP (2014)
Demographics	Total population (in millions)	2013	49.3[a]	UNDP (2014)
	Average annual population growth rate	2010	3.0%	
	Population, urban (% of population)	2011	27.6% [b]	
Economic development	GDP (in current USD, millions)	2013	43,646.7	World Bank (2015)
	GDP growth (annual %) (average of period of 2010 to 2013)		7.3%	
	Agricultural land (% of land area)	2012	45.9%	
Governance	Corruption Perceptions Index (score[f]/rank[d] of 174 countries)	2014	31/119	TI (2014)
	Fragile States Index (score[g] out of 120)	2014	80.8/ Very High Warning	Fund for Peace (2014)
	Expenditure on education, public (% of GDP)	2012	6.2%[c]	UNDP (2014)
	Expenditure on health (% of GDP)	2011	7.3%	
Environment	Population living on degraded land (%)	2010	25.0%	UNDP (2014)
	Change in forest area, 1990/2011	2013	-20.4%	

[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

According to the University of Notre Dame's Global Adaptation Index (ND-GAIN), which measures levels of vulnerability to climate change as well as the readiness of countries to respond to it, Tanzania is the 40th most vulnerable country of the 180 countries included in the index.[5] Vulnerability is assessed according to the following sectors: food, water, health, ecosystem services, human habitat, and infrastructure. According to the index, Tanzania's vulnerability has neither improved nor declined in recent years; areas of particular concern for Tanzania it notes include the country's declining agricultural capacity, the low number of medical staff in the country, and its low proportion of paved roads (as a percentage of all roads). As indicated in Table 2, Tanzania is less vulnerable than all of its neighbours, save Zambia. In terms of its readiness to respond to climate change, Tanzania's score has been improving, and is stronger than that of most of its neighbours, but remains low overall (ND-GAIN, 2015). The main areas of weakness in terms of readiness are the country's weak communications infrastructure and low levels of enrolment in tertiary education (ND-GAIN, 2015).

Table 2 – Comparison of Global Adaptation Index scores for Tanzania and neighbouring countries

Country	Vulnerability*		Readiness**		Overall	
	World rank	Score	World rank	Score	World rank	Score
Tanzania	141	0.493	125	0.370	135	43.8
Kenya	148	0.516	162	0.311	155	39.7
Uganda	166	0.554	147	0.335	159	39.1
Rwanda	168	0.563	95	0.455	131	44.6
Burundi	178	0.623	168	0.298	176	33.8
DRC	161	0.544	183	0.224	174	34.0
Zambia	136	0.475	120	0.384	126	45.4
Malawi	150	0.520	159	0.313	156	39.6
Mozambique	145	0.507	144	0.343	142	41.8

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

[5] Please see the ND-GAIN profile for Tanzania at ND-GAIN (2015).

Tanzania's NCCS (DoE, 2012a) identifies the country's key sectoral vulnerabilities, which are summarized in Table 3. While a number of sectors are identified, the main areas of vulnerability relate to agriculture and livestock, freshwater resources, human health, coastal areas, forestry, and tourism. The country's vulnerability is in large part tied to its high dependence on climate-sensitive livelihood activities (including agriculture and livestock, forestry, and fishing) and low adaptive capacities (DoE, 2012a). The non-climatic factors that influence vulnerability and are highlighted in the NCCS are poverty, inadequate institutional arrangements, a lack of adequate financial resources, a lack of sufficient human resources and technical capacities, low general awareness of climate change, and a lack of adequate climate change information (DoE, 2012a). The strategy recognizes climate change as a threat to the survival of the most vulnerable communities — though none are specifically identified — and as a barrier to the achievement of the Millennium Development Goals.

Table 3 – Key vulnerable sectors in Tanzania (DoE, 2012a)

Sector	Likely impacts of climate change
Agriculture	• General decline in productivity and changes in agro-diversity, tied to increasing unreliability of rainfall • Increase in crop pests and disasters • Reduced productivity in previously productive areas like the southern and northern highlands due to declining rainfall, frequent drought, and increasing spatial and temporal variability of rainfall • Changes to the viability of different crops that can be grown • Food shortages and food insecurity in semi-arid areas, tied to drought and floods • General shift in agro-ecological zones
Fresh water	• Increased droughts, triggering decrease in water flows in rivers and consequent shrinking of receiving lakes, creating problem for hydro dams and energy production • Transformation of perennial rivers into seasonal rivers • Loss of wetlands • Exacerbated degradation from pollution, over-abstraction, siltation, and damming and encroachment into catchment areas, impacting watershed and recharge areas • Increasing evapotranspiration could change pH levels in wetlands, impacting biodiversity
Human health	• Potential change in distribution of vector- and water-borne diseases • Expansion of malarial zone to highland areas that had traditionally been free from mosquitos • Increased risk of respiratory diseases and infections due to prolonged dry spells

	• Increased risk of food insecurity and malnutrition through decreased agricultural productivity
Coastal and marine environment	• Increase in sea surface temperature and sea level rise could lead to: o Growing incidence of coral bleaching, loss of reefs o Degradation of mangroves o Accelerated coastal erosion o Saltwater intrusion into freshwater wells and crop fields o Small islands submersion o Damage to coastal infrastructure (hotels, settlements) • Changing sea currents could impact fishing activities
Energy	• Declining generation capacity with the drying up of dams, leading to power cuts and blackouts
Forestry	• Loss of forest biodiversity • Disappearance of wildlife habitats • Increased risk of bush fires • Ecosystem shift: from forests to woodlands, woodlands to grasslands • Change to drier forests and ecosystems with rainfall changes
Biodiversity	• Changes to habitats and ecosystems will impact species distribution and survival • Water shortages a key threat to wildlife (particularly large mammals)
Tourism	• Reduced tourism linked to decreasing snow on Kilimanjaro, changes to wildlife productivity and biodiversity, falling water levels, incidence of infectious disease, frequency of wildfires, spread of insects or pests, and increased frequency of extreme events (tropical cyclones) • Destruction of coastal infrastructure (hotels) and loss of small islands to sea level rise • Coral bleaching, impacting the diving sector
Industry	• Economic losses tied to dependence on agricultural inputs/raw materials, hydroelectric power, and a stable water supply
Livestock	• Reduced water and pastures due to increasing length of the dry season • Increase in vector-borne livestock disease • Changes to plant diversity, with shift toward non-palatable and toxic plants • Increased risk of wildfires
Fisheries	• Destruction of coral reefs resulting in lost habitats for fish • Changing water levels, rising temperatures, increased incidence of water-borne diseases, increased eutrophication and decreased oxygen levels will have a negative impact on the Lake Victoria fishery
Infrastructure	• Flood damage to transport, communications, and buildings infrastructure • Risks of damage to coastal infrastructure from sea level rise

Human settlements	• Unplanned urban settlements exposed to extreme events, sea level rise • Threat of displacement, death

While Tanzania is not categorized as a water-scarce country, climate change does present a significant threat to the country's freshwater resources. Increased temperatures and changes to the duration and timing of seasonal rainfall could mean changes in river flows, particularly in the dry season (Climate Action Network Tanzania [CAN-Tanzania], n.d.-b). Sea level rise is expected to threaten groundwater resources near the coast with saltwater intrusion, while the continued melting of the Kilimanjaro ice cap, projected to be completely gone by 2025, will threaten associated rivers and the communities that depend on them (CAN-Tanzania, n.d.-b). The impacts will be far-reaching: beyond expected losses to agricultural productivity and implications for human health, reduced water flows are expected to threaten the country's capacity to generate hydroelectricity, further hindering development. By affecting wildlife, reduced water availability could also severely undermine the country's natural heritage and its tourism sector, a vital part of the national economy and a key source of livelihood for many Tanzanians.

Of further concern are potential hydrometeorological disasters. Drought and flooding are responsible for 70% of all natural disasters in Tanzania (DoE, 2012a). The country has experienced severe and recurring droughts in the past, with devastating impacts on the agriculture, water, and energy sectors; the central and northern zones are semi-arid and are already vulnerable, and that vulnerability is projected to increase with the rise in the frequency and magnitude of extreme climate events (DoE, 2012a). Rural communities with climate-dependent livelihoods will be particularly vulnerable; the drought of 2009 hit northern pastoralist communities particularly hard, as livestock died due to a lack of pasture and water and children were taken out of school to increase household income (DoE, 2012a).

With regard to human health, beyond threats to agricultural productivity and food security and a subsequent possible rise in malnutrition, the IPCC notes with very high agreement that the highland areas of East Africa could experience increased malaria epidemics (Niang et al., 2014).

Finally, coastal communities are also vulnerable to changes in sea level and sea surface temperature, which are expected to lead to coral bleaching, mangrove degradation, saltwater intrusion, coastal erosion, damages to coastal infrastructure, and the possible submersion of small islands (DoE, 2012a).

2.3 Vulnerable regions and groups

The NCCS identifies women and children as particularly vulnerable to the impacts of climate change, particularly those impacts related to water and health. The strategy also recognizes

that there is a particular need to build the capacities of marginalized groups, including women, to address climate-related disaster risks and to better involve them in adaptation planning, decision-making, and implementation.

Zanzibar is particularly vulnerable to climate change, a function of the fact that much of its economy and most of its livelihoods are tied to three climate-sensitive sectors: coastal resources, agriculture, and tourism (Global Climate Adaptation Partnership [GCAP], 2011b). The island has already experienced increasing rainfall variability, higher wind speeds, higher tides, and an increase in extreme events (GCAP, 2011b). For Lake Victoria, rising temperatures and increasingly variable rainfall could affect the survival of aquatic life, increasing the variability of fish catches; negative impacts on agriculture could also drive migration to the lake among those farmers seeking new alternative livelihoods (Johnson, 2009).

3. Adaptation planning context

After two decades of stagnant development progress, in the last 15 years Tanzania has made good progress on key development indicators. It has also begun the process of integrating climate risks and adaptation planning into its laws, policies, and strategies in a significant way (see Table 4): from the development of the National Adaptation Programme of Action (NAPA) in 2007, to the integration of climate change in its current five-year development plan and Poverty Reduction Strategy Paper (PRSP), to the adoption of an NCCS in 2012. The integration of climate change into related sectoral policies and legislation (water, gender, agriculture) remains minimal, but the government has published guidelines on how this can be done in practice. The degree to which climate considerations have or have not been integrated into existing and upcoming laws and policies, and the existing institutional structures that support national responses to climate change, will be the focus of this section.

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

Indicator	Progress
Climate change recognized in Tanzania's guiding development vision/plan	Recognized in the most recent five-year development plan, but not in Vision 2025
National-level coordinating entity for climate change established and active	Yes, the National Climate Change Committee, as well as its steering committee and technical committee
Climate change policy and/or law in place	Not present
Climate change strategy published	Yes, the NCCS was adopted in 2012
Climate change action plan published	Yes, the NAPA was published in 2007

Adaptation plan published	Tanzania has not yet submitted its *National Adaptation Plan* (NAP), but it is under development
Climate change fund or adaptation fund operational	Not present
Climate change units established in key ministries	Not present, but other ministries do sit on the National Climate Change Committee
Climate change integrated into national sectoral policies	Limited integration to date, although the government has developed guidelines to help ministries integrate climate change into their work and policies

3.1 National-level development policy context

Vision 2025, adopted in 1999, is Tanzania's guiding development policy. In it, the government presents its three principal development objectives: achieving quality and good life for all, enforcing good governance and rule of law, and building a strong and resilient economy that can withstand global competition. The vision was developed through participative processes and aims to achieve high-quality livelihoods; peace, stability, and unity; good governance; a well-educated society; and a competitive economy that produces sustainable growth and shared benefits (Tanzania Planning Commission [TPC], 1999). Climate change is not addressed in Vision 2025; in fact, there is very little mention of the environment or sustainable development more generally in the policy. To date, Vision 2025 has met with limited success, according to an independent review commissioned by the government in 2009 (TPC, 2011).

Vision 2025 is being implemented through a series of five-year plans, the latest of which covers the period 2011/2012 to 2015/2016. Encouragingly, climate change adaptation is featured prominently in the most recent plan (TPC, 2011). The plan, developed by the TPC in the Office of the President, identifies climate change adaptation as an urgent priority for the government to attain its development goals and ensure sustainable growth (TPC, 2011). It identifies climate change as a significant threat to the economy in general and the agricultural sector in particular; it notes that climate change, through increasing temperatures, decreasing rainfall, changing weather patterns, and various extreme climatic conditions, is projected to drastically affect the economy by reducing agricultural productivity, compromising soil quality, reducing energy supplies, and harming livelihoods, especially those "of marginalized and deprived sections of the society" (TPC, 2011). To address this threat, the plan calls for climate change to be integrated into existing development policies and for the establishment of a national framework on climate change to guide response measures. It also calls for the creation of the NCCS, which has since been developed, and a National Climate Fund. It sets goals for training a targeted number of government staff across selected ministries in climate change issues, and seeks to institute

participatory climate change adaptation measures at the catchment and water user–associated level. It also promotes climate-compatible agriculture (TPC, 2011). Climate change–related activities are budgeted and scheduled in the plan. The plan does not explicitly move the country away from an economy sensitive to climate change; agriculture, fisheries, forestry, and livestock are still considered key sectors for economic growth and job provision.

Climate change adaptation is also included in Tanzania's most recent PRSP. Goal 4 of the PRSP is listed as "ensuring food and nutrition security, environmental sustainability and climate change adaptation and mitigation" (Ministry of Finance and Economic Affairs, 2010). The papers' primary focus is better integrating climate change adaptation into agriculture to promote economic growth and ensure food security. Strategies include supporting research programs to improve and develop new technologies, quality seeds, pest control, and agronomic practices; integrating climate change projections into early warning systems and disaster risk management; introducing and adopting crop and livestock varieties well-suited to the adverse conditions brought about by climate change; and designing climate change–compatible, sustainable crop production and farming systems. The PRSP also highlights the need to respond to health impacts of climate change, particularly among children, and to raise national awareness on climate change (Ministry of Finance and Economic Affairs, 2010). Unfortunately, a progress report is not yet available for this PRSP, and therefore the government's progress toward meeting its climate change–related objectives is unclear.

3.2 National-level climate policy context

The Environmental Management Act (2004) provides the legal and institutional framework for sustainably managing the environment in Tanzania, as well as the basis for the country's implementation of international instruments on the environment. As such, it is the legal basis for addressing climate change in Tanzania.

In 2007, the country identified near-term actions to address priority adaptation needs in the NAPA. The NAPA provided a clear basis for identifying and implementing adaptation actions at both the sectoral and local levels (DoE, 2007). It identified five sectors as being particularly vulnerable to climate change: agriculture, water, energy, health, and forestry.[6] Existing and potential adaptation activities were identified for each sector, and the top ranked adaptation activities for each priority sector were increased irrigation to boost maize production (agriculture), alternative water storage programs and technologies for communities (water), alternative clean energy (energy), community awareness programs on preventable major health hazards (health), and afforestation programs in degraded lands using more adaptive and fast-growing tree species (forestry).

[6] The NAPA also identifies coastal and marine resources, wildlife, tourism, and industry as vulnerable.

As noted, Tanzania's most recent five-year development plan (2011 to 2016) called for the development of a coherent NCCS. In response to this directive and the growing concern over the negative impacts of climate change and climate variability on the country's social, economic, and physical environment, the NCCS was adopted in 2012. The NCCS aims to elevate adaptation within the national discourse and make it a high priority for the country. In particular, it aims to enhance the technical, institutional, and individual capacities within Tanzania to address the impacts of climate change. The NCCS's specific objectives are to:

a. Build the capacity of Tanzania to adapt to climate change impacts.
b. Enhance resilience of ecosystems to the challenges posed by climate change.
c. Enable accessibility and utilization of the available climate change opportunities through implementation.
d. Enhance participation in climate change mitigation activities that lead to sustainable development.
e. Enhance public awareness on climate change.
f. Enhance information management on climate change.
g. Put in place a better institutional arrangement to adequately address climate change.
h. Mobilize resources including finance to adequately address climate change. (DoE, 2012a)

The strategies presented in the NCCS build on and extend beyond those in the 2007 NAPA. The NCCS identifies short-, medium- and long-term priorities for adaptation actions to respond to existing and emerging climate threats (see Table 5). In addition to sector-specific priorities, the NCCS identifies cross-cutting adaptation and mitigation needs and strategies, including establishing and implementing awareness programs to sensitize the public on climate change impacts and adaptation and mitigation options; establishing adequate capacity for research and training institutions to address issues related to climate change; building sufficient capacities among marginalized groups, including women, to address climate change–related disaster risks; supporting the acquisition of appropriate technologies, including early warning and weather forecasting systems; and documenting and promoting indigenous responses to climate change (DoE, 2012a). It recognizes the need to build the capacity of all sectors and relevant institutions to address climate change adaptation (DoE, 2012a).

The NCCS recommends that a gender perspective be used in the development and implementation of adaptation strategies, in order to narrow the gender gap and reduce climate impacts on vulnerable groups. Part of this strategy will require generating disaggregated data on gender and vulnerable groups. It will also require the enhanced participation of women and vulnerable groups in planning, decision-making, and implementing climate change adaptation strategies, and the need to promote equity in

benefit sharing with regards to opportunities arising from climate change adaptation (DoE, 2012a).

The Vice President's Office (VPO) has developed a process and road map for the formulation of Tanzania's National Adaptation Plan (NAP) (VPO, 2013). This process began in January 2013 with the establishment of a NAP team to develop the plan and the appointment of a NAP focal point. The plans were to have been released in December 2014 following the completion of stakeholder consultations and assessments, but the NAP has not yet been published (UNDP-Adaptation Learning Mechanism, 2014). As of June 2015, Tanzania has not yet submitted its Intended Nationally Determined Contribution in advance of the UNFCCC Conference of the Parties meeting in Paris in December 2015. There is no evidence of separate sub-national policies or strategies on climate change.

Table 5 – Priority adaptation actions by sector identified in Tanzania's National Climate Change Strategy

Sector	Adaptation priorities
Water	• Enhance protection and conservation of water catchments • Invest in and promote appropriate water management technologies • Invest in exploration and extraction of underground water resources • Improve water quality
Coastal and marine environments	• Promote sustainable management of coastal and marine environments • Strengthen coastal and beach erosion systems • Promote sustainable management of coastal and marine environment • Promote livelihood diversification for coastal communities
Forestry	• Mainstream climate change into forest management practices • Promote use of lesser-known tree species • Promote alternative livelihoods for forest-dependent communities • Promote use of non-timber materials • Promote use of non-wood construction materials, improved energy efficiency, and decentralization of forestry management
Wildlife	• Promote wildlife management practices that increase resilience to climate change • Establish wildlife climate change–related monitoring and information management systems
Agriculture and food security	• Identify suitable crops for new agro-ecological zones • Promote appropriate agricultural practices that increase resilience to climate change • Promote use of appropriate technologies for production, processing, storage, and distribution
Human health	• Enhance capacity of public healthcare systems to respond to climate-related health risks

	• Improve disease surveillance and design of disease control programs • Improve knowledge of climate change–related occupational health risks
Tourism	• Promote alternative tourist attractions • Restore degraded tourist sites • Sensitize and enhance adaptive tourism infrastructural development
Energy	• Promote and improve use of alternative energy sources • Promote use and acquire efficient energy technologies in household, public, and industrial sectors
Industry	• Promote alternative energy sources • Promote adoption of efficient technologies • Enhance occupational health in industries • Enhance resilience of industrial sector to changing climate
Livestock	• Promote climate change–resilient livestock practices • Acquire appropriate technologies for livestock production systems
Fisheries	• Promote protection and conservation of aquatic ecosystems • Explore and promote alternative and diversified livelihoods for fishery communities • Promote environmentally friendly adaptation technologies in fish catching, processing, and storage
Infrastructure	• Mainstream climate change into infrastructure design and development • Promote deployment and use of appropriate technology in infrastructure design and development
Human settlements	• Mainstream climate change issues in urban and rural planning • Promote use of appropriate building materials adaptive to climate change • Promote acquisition and use of efficient technologies in household and public facilities • Promote sustainable availability of livelihoods and social services in both rural and urban areas
Land use	• Promote and enhance sustainable land-use planning at all levels • Mainstream climate change into land-use planning

3.3 Institutional structure for climate governance

Several governance bodies serve to enable coordinated action by the Tanzanian government on climate change. In particular, climate change policy, strategy, and action fall under the mandate of the DoE, found within the VPO.[7] The DoE serves as the national climate change focal point to the UN Framework Convention on Climate Change (UNFCCC).

[7] The DoE was originally established within the Ministry of Natural Resources and Tourism in 1991 but was transferred to the Office of the Vice President in 1995.

In this role, the VPO is responsible for coordinating, monitoring and evaluating the implementation of the NCCS. Specifically, the VPO undertakes to do the following:

i. Take measures to address climate change, particularly the impacts of climate change and related adaptation measures;

ii. Issue guidelines periodically to Ministries and any other institutions in order to address climate change and its impacts;

iii. Require Ministries and independent Government departments to put in place strategies and action plans to deal with climate change, and to advise schools and high learning institutions to include matters relating to climate change in their curriculum;

iv. Review and approve any measures undertaken to address climate change by any institution, firm, sector or individuals, foreign or local, including those relating to the use of land, water, forests or any other ecosystem to sequester greenhouse gases; and

v. Communicate national positions at the global level on how to address climate change in the context of the United Nations Framework Convention on Climate Change, and related Protocol(s). (DoE, 2012b)

The VPO is also responsible for preparing the NAP and Nationally Appropriate Mitigation Actions.

Cooperation among ministries and institutions is enabled through the National Climate Change Committee, a body made up of representatives from institutions relevant to climate change. The committee is chaired by the Director of Environment, and counts among its members the director of meteorology; director of the Centre for Energy, Environment, Science and Technology; director general of the National Environment Management Council; commissioner for energy; director of forestry; commissioner of agriculture and livestock development; director of fisheries; director of heavy industries; vice chancellor of the University of Dar es Salaam; and a representative from the Ministry of Foreign Affairs. The main functions of the National Climate Change Committee are to coordinate the development and implementation of the national climate strategy and climate change research, to develop a plan of action that identifies high-priority multidisciplinary tasks to be promoted within the national climate strategy, to act as the interface between the national climate strategy team and the government, and to maintain national and relevant international climate change information (inventory) at the National Climate Change Information Centre, located at the Tanzania Meteorological Agency (UNFCCC, n.d.-c).

Additionally, two national committees have been established to guide coordination and implementation of the NCCS: the National Climate Change Technical Committee and the National Climate Change Steering Committee. The Technical Committee provides technical advice to the national climate change focal point and is chaired by the director of

environment; the Steering Committee provides policy guidance to the national climate change focal point to ensure coordinated action and participation across sectors and institutions, and is chaired by the permanent secretary of the VPO.

Responsibility for implementing climate change action at the sectoral level falls to the relevant ministry, department, or agency, as per the NCCS. Each is responsible for preparing projects, programs, action plans, and budgets for strategic climate change interventions, with time frames, outcomes, and targets to be achieved. Once submitted, plans are integrated into the national budget (DoE, 2012a). The Tanzania Meteorological Agency, which is tasked with the generation and dissemination of climate information, forecasts, and warnings, is housed within the Ministry of Transport and is mandated to cooperate with other institutions on issues related to climate variability, climate change, and environment (Tanzania Meteorological Agency, n.d.). In addition, the Ministry of Finance establishes financial management guidelines and systems to ensure effective resource and financial mobilization on climate change, and the National Bureau of Statistics is in charge of keeping track of and updating records on climate change.

3.4 National-level sectoral policies

Effective adaptation efforts require the integration of climate change into existing development policies, as called for in Tanzania's current five-year plan. At present, the integration of climate change into relevant sectoral-level policies remains minimal (see Table 6), but there are encouraging signs that this will soon change.

The National Health Policy, developed by the Ministry of Health and adopted in 2003, does not mention climate change, and makes very little reference to the environment in general (Ministry of Health, 2003). Similarly, the National Strategy for Gender Development, developed by the Ministry of Community Development, Gender and Children in 2008, also makes no mention of climate change. The document does recognize that the environment and human development are highly interdependent and that environmental mismanagement will impair human development. It also recognizes the need to establish a gender balance in environmental management (Ministry of Community Development, Gender and Children, 2008).

In 2002, the Ministry of Water (then the Ministry of Water and Livestock Development) adopted the National Water Policy (2002). As with health and gender, there is no mention of climate change in the document. However, climate change is somewhat integrated into the National Water Strategy (2006–2015), released four years later: climate change is recognized as a driver of water scarcity, and climate change adaptation is noted as a key strategy for water-related disaster management (Ministry of Water and Irrigation, 2006).

Climate is mentioned, briefly, in the 2012 Tanzania Emergency Preparedness and Response Plan, but the plan makes no mention of adaptation as a means of reducing disaster risks (Disaster Management Department, 2012). Conversely, health and disaster risk

management are included in the NCCS, which calls for the mainstreaming of climate change into disaster risk management programs. It also stresses the importance of drawing on indigenous knowledge for climate change adaptation (DoE, 2012a).

In 2012, the DoE published guidelines for integrating climate change adaptation into national sectoral policies, plans, and programs (DoE, 2012b). The guidelines came out of the recognition that integration of climate change adaptation into sectoral policies, plans, and programs is crucial for effectively addressing the impacts of climate change in a more concerted manner. The sectors targeted in the guidelines are forestry, energy, fisheries, livestock, water, agriculture, land use, and health. The guidelines outline the following steps for integration: sectoral climate change situational analysis, institutional situation analysis, identification of potential interventions for integrating climate change adaptations within the sector, creation of a sectoral adaptation action plan, and monitoring and evaluation.

Since the release of this guidance, the government has adopted a new National Agricultural Policy (2013), a Climate Smart Agriculture Plan (2015–2018), and an Agricultural Climate Resilience Plan (2014–2019). Climate change is mentioned in the new policy and is recognized as a cause of environmental degradation. The new policy notes that irrigation is essential for increasing agricultural production and productivity in the face of climate change impacts. But climate change is not explicitly identified as a risk to the sector. The policy states that the government, in collaboration with other stakeholders, shall strive to improve adaptation measures to climate change effects and deal with all the risks involved. However, concrete suggestions for how this might be accomplished are not provided. Climate change was explicitly addressed in the two subsequent planning documents listed above: the case is made for climate action in the agricultural sector, priority resilience actions and key investments are identified, and an implementation strategy is outlined.

Table 6 – 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 identified for specific adaptation measures
National Agricultural Policy		✓	✓	✓
National Health Policy	✓			
National Gender Strategy	✓			
National Water Strategy		✓		
National Disaster Plan		✓		

4. Current and planned adaptation programs and projects

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

4.1 Adaptation projects and programs

We identified adaptation programs and projects in Tanzania primarily using online resources, with extensive reviews of the websites of UN agencies, multilateral development banks, bilateral development agencies, research organizations, and international 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 according to their type and area of focus. For detailed description of the methodology used in the review, please see Annex A. The review process revealed 20 significant adaptation projects that are currently being implemented or have recently been completed in Tanzania, the majority of which are being implemented solely within Tanzania. An overview of these adaptation projects and programs is presented in Table 7 and a full list is provided in Annex B.

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

Sector of focus*	Priority sectors for adaptation	Number of projects*	Percentage of total projects**	Geographical characteristics	
Agriculture	✓	3	15%	National projects	13
Forestry	✓	1	5%	Regional projects	4
Ecosystem conservation		2	10%	Global projects	3
Ecosystem restoration		1	5%	Total	20
Watershed management		1	5%		

Freshwater supply	✓	5	25%
Coastal zone management	✓	3	15%
Tourism	✓	1	5%
Insurance		1	5%
Energy	✓	1	5%
Urban areas		2	10%
Rural areas		2	10%
Government		7	35%
Civil society		1	5%
Climate information		4	20%
Disaster risk management	✓	4	20%
Human health	✓	3	15%
Multisectoral		1	5%

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

The adaptation projects and programs under way in Tanzania touch on a wide range of sectors, though the primary emphasis is on governance, disaster risk management, agriculture, human health, and freshwater supply. This generally aligns with the priority sectors identified by the government in the NCCS, though some priority sectors (fisheries, infrastructure) are not yet addressed through adaptation programs or projects. Most national projects focus on capacity-building and community-based adaptation measures, though there are several that include efforts to strengthen climate information and field implementation.

At the national level, capacity development projects are aimed at increasing the capabilities of institutions to manage climate change impacts through improved climate information, technical capacity, monitoring capabilities, and early warning systems. Projects with capacity building as a key element include the Global Climate Change Alliance's project on integrated approaches for climate change adaptation, the United Nations Environment Programme (UNEP)'s efforts to reduce livelihood and economic vulnerability in coastal regions, the government's project on building adaptive capacity in productive coastal zones, and the UNDP's efforts to strengthen climate change governance in Zanzibar (see Annex B). A central goal of these projects is to mainstream climate change adaptation into the implementation of national policies and development planning. In some cases, they aim to

build the capacity of local government actors, and support stakeholder consultations and the integration of climate change into local planning processes.

A number of projects aim to build capacity and support early adaptation actions for local communities and marginalized groups adversely affected by climate change impacts, including coastal and rural communities, women and children. For example, UNDP's Mainstreaming Climate Change Adaptation through Small Grants Programme provides support to approximately 10,000 people from 15 communities in the Longido, Iringa Rural and Bahi districts to help them cope with drought and climate-related water scarcity (UNDP, 2015). Two further projects funded by UK Aid and Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) (Supporting Water Sector Development in Tanzania and Building Urban Resilience to Climate Change in Tanzania) aim to make lasting improvements to management of water resources and to increase community resilience to water insecurity by increasing the population's access to clean drinking water and improved sanitation systems.

Relevant regional programs being implemented in Tanzania include the Global Framework for Climate Services Adaptation Programme in Africa, the DFID and IDRC-funded Pathways to Resilience in Semi-Arid Economies (PRISE) project, and the Planning for Resilience in East Africa through Policy, Adaptation, Research and Economic Development (PREPARED) program. The Global Framework for Climate Services, funded by the Norwegian government, seeks to guide decision-makers and public health authorities by providing targeted climate services, as well as helping these stakeholders obtain accessible and accurate climate service information, in order to strengthen resilience to climate change. The PRISE project aims to spur climate-resilient development by identifying economic threats and opportunities resulting from climate change in semi-arid regions. With funding from the United States Agency for International Development (USAID), the PREPARED program addresses the key climate challenges of East African countries, including increasing resiliency to climate change, managing transboundary freshwater, promoting biodiversity conservation, and improving access to drinking water supply and sanitation services. Tanzania is also one of 12 countries targeted by the Climate for Development in Africa (ClimDev) program, an initiative to improve climate information in Africa to strengthen and inform decision-making.

Tanzania is also involved in two global projects focused on adaptation in the health sector. It is one of four pilot countries included in the Building Adaptation to Climate Change in Health in Least Developed Countries through Resilient Water, Sanitation and Hygiene project, an initiative to reduce the risk of disease as a consequence of climate change. In addition, Tanzania is part of the Partnership for Advancing Human Development in Africa and Asia, funded by the Canadian Department for Foreign Affairs, Trade and Development. Among others, a central focus of the program is to improve the ability of civil society organizations to integrate climate change adaptation into their programming.

Regions within Tanzania that are a particular focus for adaptation projects include Tanzania's coastal region, the northern district of Longido, and the central and southern districts of Bahi and Iringa. Zanzibar and the Lake Victoria Basin are additional regions where adaptation projects are situated. Most priority sectors identified in the NCCS and the NAPA, including water, agriculture, and health, are being addressed, at least in part, by current adaptation projects, although some priority areas (forestry, livestock, tourism, and infrastructure) are either not addressed or are minimally addressed by adaptation projects. This is a significant gap, given the contribution of these sectors to the national economy and their vulnerability to climate change. The review also revealed that projects with an explicit gender focus are absent in the country.

4.2 Climate finance

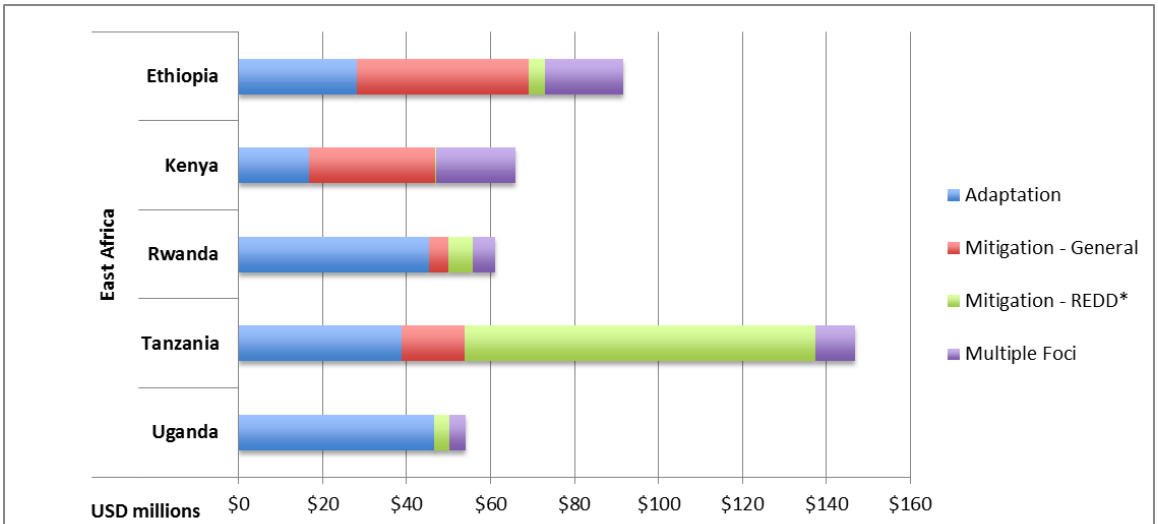
Addressing the challenge of climate change in Tanzania requires significant funding: according to the Global Climate Adaptation Partnership (GCAP), the estimated cost of building adaptive capacity and enhancing resilience against future climate change in Tanzania is between US$100 million and US$150 million per year, with an additional US$500 million per year required to address current climate risks (GCAP, 2011a). The net economic costs of climate change are expected to be 1% to 2% of GDP by 2030 (GCAP, 2011a). To help meet its climate financing needs, the government announced in its most recent five-year plan an intention to establish a National Climate Fund, based on successful examples from abroad (Brazil, China, Indonesia), to better access and manage global climate change finance; however, no date has been given by which this will be in place (DoE, 2012a).

Research and analysis of current adaptation projects and programs in Tanzania reveal that the government is using some of its own resources to support domestic adaptation efforts (Overseas Development Institute, 2013). While domestic contributions to adaptation funding are crucial, it is unlikely that they could adequately cover the cost of adaptation estimated by GCAP. To provide a picture of the current status of international funding support for adaptation in Tanzania, this section provides an overview of the scale, sources, and orientation of current climate finance flowing into the country.

Funding for climate change adaptation in Tanzania comes from a variety of sources, including international climate funds and bilateral and multilateral development assistance. According to the Climate Funds Update (ODI, 2015), which tracks climate financing through designated bilateral and multilateral climate funds, as of April 2015, Tanzania had received US$146.8 million in funding since 2003. Of this amount, US$38.7 million had been allocated to adaptation projects. Notable multilateral sources of funding include the Least Developed Country Fund, the Special Climate Change Fund, the Adaptation Fund, the UN-REDD Program, the Global Environmental Facility, and the Global Climate Change Alliance through the European Union. Additionally, Tanzania is receiving financing from bilateral funds, particularly the UK's International Climate Fund. The six adaptation-focused initiatives

tracked by the Climate Funds Update are aimed at developing core capacity to address adaptation to climate change in productive coastal zones, national adaptation planning, water resource management, and early warning-systems.

As illustrated in Figure 2, Tanzania has received more financing from designated climate change funds than its East African neighbours; it has received almost twice as much funding since 2003. However, much of this is funding for climate mitigation activities, particularly with respect to funding for REDD+ activities.



	East Africa				
	Uganda	Tanzania	Rwanda	Kenya	Ethiopia
Adaptation	$46.5	$38.7	$45.4	$16.8	$28.1
Mitigation - General	$0.0	$15.1	$4.5	$30.0	$41.1
Mitigation - REDD*	$3.8	$83.7	$5.8	$0.2	$3.8
Multiple Foci	$3.8	$9.3	$5.3	$18.9	$18.6

*Reducing emissions from deforestation and forest degradation

Figure 2 – Comparison of approved funding from designated bilateral and multilateral climate funds in East Africa since 2003 (based on Climate Funds Update, 2015)

In contrast, an examination of the Organisation for Economic Co-operation and Development (OECD) Rio Markers, which report on climate-related official development assistance from bilateral and multilateral sources, reveals that Tanzania received US$660.84 million for projects and programs with a principal or significant focus on climate change adaptation between 2010 and 2013. Funding came from a range of different donor countries, including Japan, Germany, France, and Finland. However, the vast majority of funding was for programs and projects in which adaptation was a significant, but not principal, part of the activity. Figure 3 shows that only US$75.42 million was dedicated to projects for which adaptation was the principle focus. Encouragingly, funding for adaptation-focused projects has been increasing over 2010–2013, suggesting that it is increasingly becoming a more important focus of development assistance in the country. Projects tagged as having a focus on adaptation were support activities in areas such as

water supply and sanitation, transportation and storage, agriculture, and general environment protection. Further analysis would be required to assess the contribution of these projects to climate change adaptation efforts in Tanzania, particularly those for which adaptation is a significant focus.

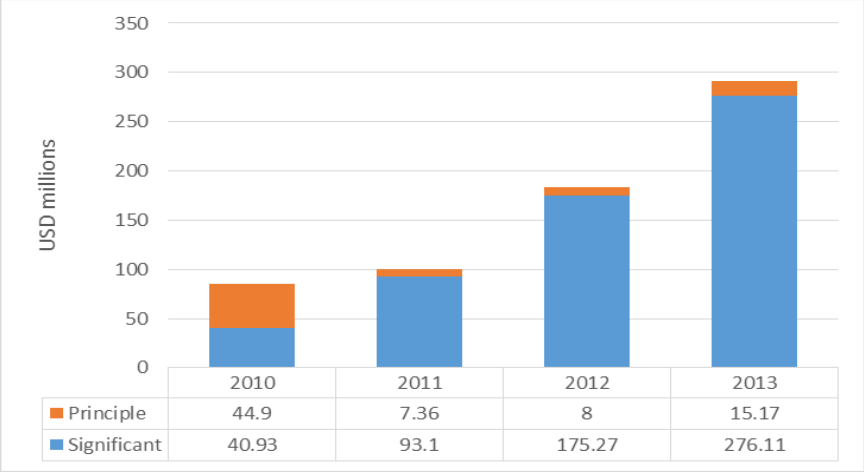


Figure 3 – Bilateral development aid identified as having as its principal or significant objective[8] support for adaptation in Tanzania, 2010 to 2013, constant 2012 prices (based on OECD, 2015)

5. Networks and communities of practice

As civil society organizations can play an active role in influencing adaptation planning and action, this section identifies the prominent knowledge-sharing networks established in Tanzania that are fostering capacity building, research, knowledge exchange, and advocacy around climate change. Of particular prominence is the Climate Action Network Tanzania (CAN-Tanzania), which was founded in 2011 and has more than 100 members consisting of different organizations from civil society, academia, and business. The network was established to promote and strengthen local Tanzanian institutions through increasing capacity, sharing information, and managing community-based projects, with a focus on climate change mitigation and adaptation, technology transfer, forest management, water resources, energy, and smart agriculture. The network has been critical in making the Tanzanian population, particular rural communities, more aware of climate change.[9]

Three additional national networks are worth mentioning. The Tanzanian Civil Society Forum on Climate Change is an association of civil society groups committed to working on

[8] [1] 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).

[9] Further information about CAN-Tanzania can be found at CAN-Tanzania (n.d.-a).

climate change. The Forum is composed of both development and environmental organizations, and its principal area of engagement is helping its members advocate for effective responses to climate change, information sharing, and capacity building. The Tanzania Coalition for Sustainable Development is one of three national chapters in the East Africa Sustainability Watch Network. The coalition is made up of a number of civil society organizations and is focused on helping Tanzanian communities improve their lives and livelihoods through the sustainable use of resources. A primary objective of the Tanzania Coalition for Sustainable Development is the achievement of the Millennium Development Goals, with particular focus on Goal 7: environmental sustainability. Finally, the Dodoma Environmental Network is a multidisciplinary organization made up of members with different professional backgrounds that focuses on environmental management. The network has been in place since 1995 and aims to sensitize, educate, and liaise with individuals, organizations, institutions, community groups, government institutions, and NGOs on the conservation of the environment and ensuring the sustainable management of natural resources of Tanzania. Climate change is one of its areas of interest.

Beyond networks and communities of practice, there are a number of key organizations working on climate change in Tanzania that should be highlighted. The Foundation for Energy, Climate and Environment is a Tanzanian NGO focusing on energy, climate change, and environmental issues. The Tanzania Natural Resource Forum focuses its climate change work on communications, awareness raising, and advocacy. CARE's Tanzanian office undertakes a variety of mitigation, adaptation, and advocacy activities, and launched the Poverty-Climate Change Initiative in July 2006. Oxfam's national office is implementing the Oxfam Global Climate Change Campaign, and is focused on helping vulnerable communities respond to drought and flood risks through a variety of strategies, including better flood defenses and drought-resistant farming techniques.

6. Conclusions

Tanzania's exposure to climate risks and its continued development challenges mean that the country is considerably vulnerable to climate change. While ostensibly less vulnerable than many of its neighbours in East, central, and southern Africa, due in part to its relatively high levels of freshwater resources, projections of higher temperatures, rising sea levels, and changes to the timing, duration, and scale of rainfall nonetheless threaten to halt or reverse the country's ongoing development progress. These climate trends will increasingly test the adaptive capacity of both the state and its population, and could threaten the country's agricultural, livestock, health, tourism, and forestry sectors, all central to the national economy and local livelihoods, and all heavily dependent on the climate. A failure to address these challenges could threaten the country's efforts to alleviate poverty and could even reverse the development gains of the past 15 years.

Climate change adaptation is seen as a national priority: the government has prepared a NAPA and an NCCS, has developed guidelines for integrating climate change into the

policies and plans of relevant sectors, has begun to establish the necessary institutional structures to address climate risks, and has integrated climate change into its most recent five-year national development plan. From a policy and governance perspective, however, more remains to be done. A climate change policy should be developed, and sectoral policies from relevant areas (water, agriculture and livestock, forestry, disaster risk management, gender, and health) should be updated to better respond to changing climate risks. Sectoral policies should also include detailed information on how these risks are to be addressed and how these actions will be financed. Dedicated personnel trained to address climate risks should also be placed inside each relevant ministry.

The country's NCCS identifies a number of priority areas for adaptation action, including freshwater resources, agriculture, health, coastal zones and forestry, as well as potential response strategies to meet the climate challenges faced by Tanzania. A considerable number of adaptation projects and programs are under way in Tanzania, including national, regional, and global initiatives, and many touch upon the high-priority areas identified in the NCCS (freshwater, health, coastal regions, forestry), in addition to governance. This is reflected in the amount of climate funding coming into the country; since 2003, almost US$40 million in support for adaptation has come to Tanzania through designated climate funds, and bilateral donors have given more than US$75 million to projects and programs in Tanzania in which adaptation plays a principal role.

Tanzania's existing vulnerabilities to climate change are rooted in its exposure to climate risks, its economic reliance on climate-dependent sectors, its low adaptive capacities, and its ongoing development challenges, including high levels of poverty. Addressing climate risks through adaptation will require good policies, strong institutions, significant funding, sufficient capacities, and the support of national, regional, and global partners. It will also require a move away from climate-sensitive sectors and livelihoods. While further progress is required in each of these areas, Tanzania is encouragingly moving in the right direction.

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 Tanzania are presented alphabetically in the table below.

Name of project	Objectives	Funder(s)	Implementing Agencies	Type of Project	Sector	Duration	Geographical scale
Building Adaptation to Climate Change in Health in Least Developed Countries through Resilient Water, Sanitation and Hygiene	The project will establish a clear framework for protecting health and reducing the risk of disease as a consequence of climate change in the four selected pilot projects. This will be achieved through transforming the way these countries integrate climate change into health programming, and will serve as the foundation to target risk reduction of climate-related disease and reduce the vulnerability of the poor in a wider set of low- and low-middle-income countries.	UK Aid through the International Climate Fund	World Health Organization	Policy formation and integration; field Implementation	Freshwater supply; human health	2013–2016	Global Bangladesh, Nepal, Ethiopia, Tanzania
Building Resilience to Climate Change through Improved Water Security in Tanzania	Improved resilience to water insecurity will have a positive impact on inclusive economic growth at the national level and will reduce the risks of falling back into poverty at the household level.	UK Aid		Capacity building	Freshwater supply	n/a–2020	National
Building the Capacity of Civil Society Organizations in Africa and Asia	The project aims to strengthen the effectiveness of civil society organizations to work with communities to adapt to climate change and ensure food security, to test innovative approaches that improve livelihood opportunities, and to support gender equality. Community-based organizations are often best placed to respond to basic needs and services in marginalized communities.	Canadian Department of Foreign Affairs, Trade and Development and the Aga Khan Foundation Canada through the Partnership for Advancing Human Development in Africa and Asia	Aga Khan Development Network agencies	Capacity building; knowledge communication	Civil society	June 2012–December 2017	Global Bangladesh, India, Pakistan, Tajikistan, Kenya, Tanzania, Uganda, Mali, Egypt, Afghanistan, Kyrgyzstan, Madagascar, Mozambique

Building Urban Resilience to Climate Change in Tanzania	Improved urban resilience will have a positive impact on urban development at the city level, and reduce shocks to vulnerable households at the community level.	UK Aid Africa Climate Change Challenge Fund	World Bank Group	Capacity building	Urban areas	2014–2019	National
Capacity Development for Coastal Zone Development and Implementation in Tanzania	This project aims to increase capacity for multistakeholder consultations and involvement in coastal adaptation planning.	Danish Ministry of Foreign Affairs	United Nations Office for Project Services; UNEP Denmark Technical University Partnership	Capacity building; knowledge communication	Coastal zone management; tourism; government	2014–2016	National
Developing Core Capacity to Address Adaptation to Climate Change in Productive Coastal Zones	This project will develop institutional capacities to manage climate change impacts through improved climate information, technical capacity, the establishment of demonstration projects to reduce vulnerability in key vulnerable areas, and learning.	Least Developed Countries Fund; Danish Ministry of Foreign Affairs; Norwegian Government; UNDP	UNEP; Ministry of Finance; DoE of the VPO	Capacity building; knowledge communication ; field implementation	Coastal zone management	2011–2015	National
Ecosystem-Based Adaptation for Rural Resilience	This project will strengthen climate resilience in rural communities of Tanzania by building adaptive capacities to implement ecosystem-based adaptation approaches and diversifying livelihoods.	Least Developed Countries Fund; UNEP; Tanzanian government	UNEP and Ministry of Agriculture and Food Security; Ministry of Water; DoE of the VPO; National Environment Management Council; Local Government Agencies	Capacity building; knowledge communication	Ecosystem conservation; ecosystem restoration; rural areas		National
ClimDev program	This project aims to increase the climate resilience of Africa's population, addressing the need for improved climate information in Africa and strengthening the use of 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.	European Union; Finland; Nordic Development Fund; Sweden; UK Aid; USAID	African Climate Policy Centre	Research; capacity building; knowledge communication	Climate information	January 2012–December 2015	Regional Ethiopia, Kenya, Tanzania, Uganda, Burkina Faso, Ghana, Mali, Senegal, Botswana,

							Namibia, South Africa, Egypt
Enhancing Adaptive Capacity through Sustainable Natural Resource Management	The overall objective of this project is to increase the capacity of vulnerable Tanzanian communities to adapt to the adverse effects of climate change and contribute to poverty reduction in rural areas. The project's specific objective is to enhance environmental sustainability and food security by strengthening the management of natural resources at the local level. In so doing, the project will seek to contribute to gender equality and good governance by actively promoting transparency and accountability.	European Union through the Global Climate Change Alliance	Ministry of Finance; DoE of the VPO	Assessment; capacity building; field implementation ; community-based adaptation	Agriculture; forestry; freshwater supply; energy; government	2014–2015	National
Strengthening Community Capacity for DRR Interventions in Drought Prone Regions Through Children	Enhancing community capacity to address adverse effects of climate change in drought prone areas in Lake zone and North Eastern zone.	Africa Caribbean Pacific-European Union Disaster Risk Reduction Program; UNICEF	Global Facility for Disaster Reduction and Recovery	Capacity building	Disaster risk management	August 2012–June 2015	National
The Global Framework for Climate Services Adaptation Programme in Africa	The goal of the program is to "increase the resilience of people most vulnerable to the impacts of weather and climate-related events through the development, implementation and evaluation of a joint programme of Climate Services in programme countries" (GFCS, 2015). The program is helping build integrated frameworks within countries and supporting existing initiatives in climate services, food security, nutrition and health, as well as disaster risk reduction.	Norwegian Ministry of Foreign Affairs	World Meteorological Organization (Lead); World Health Organization; World Food Programme; International Federation of Red Cross and Red Crescent Societies including Norwegian Red Cross and Red Cross/Red Crescent	Capacity building; knowledge communication ; policy formation and integration	Agriculture; disaster risk management; human health; climate information	2014–2016	Regional Tanzania, Malawi

			Climate Centre; CGIAR Research Program on Climate Change, Agriculture and Food Security; Centre for International Climate and Environmental Research–Oslo and the Chr. Michelsen Institute				
Implementation of Concrete Adaptation Measures to Reduce Vulnerability of Livelihoods and Economy of Coastal Communities in Tanzania	This project intends to lessen the negative impacts of sea level rise and changes in precipitation patterns in the Ilala and Temeke Districts of Dar es Salaam. The project aims to reduce the adverse impacts of sea level rise and floods on coastal infrastructures and settlements, rehabilitate coastal ecosystems to enhance ecological resistance to flooding, conduct a baseline study based on coastal vulnerability and an assessment of the economic viability and practical feasibility of adaptation measures, create and operate a climate change observatory for Tanzania; document lessons learned, build district-level administration capacity, and produce an Ecosystem-based Integrated Coastal Area Management Plan.	Adaptation Fund	UNEP and the VPO (DoE)	Assessment; capacity building; knowledge communication ; field implementation	Coastal zone management; urban areas; government	2012–2017	National
Mainstreaming Climate Change Adaptation through Small Grants Programmes	This project aims at supporting implementation of early adaptation actions for local communities that are adversely affected by climate change impacts in selected areas of Tanzania. The project also focus on demonstrating successful community-based climate change adaptation	UNDP; One UN and Small Grants Programme	UNDP; VPO; selected community-based organizations	Capacity building; community-based adaptation	Agriculture; disaster risk management; rural areas	2011–2015	National

	initiatives for people living in marginal areas.						
Mainstreaming Environment and Climate Change Adaptation in the Implementation of National Policies	The overarching aim of this project is to strengthen Tanzania's national capacity for climate change adaptation. The goal is to ensure that environment and climate change are mainstreamed in the most economically important and vulnerable sectors of the economy, leading to reduced poverty levels while maintaining environmental integrity.	UNDP; One UN	UNDP; VPO; Ministry of Finance; NEMC	Capacity building	Government	2012–2016	National
PRISE	This project aims to spur climate-resilient development in African and Asian semi-arid lands by identifying economic threats and opportunities resulting from climate change. The project will work with stakeholders in government, business, civil society, and regional economic organizations to research five areas: climate risk, institutional frameworks, regulatory frameworks, markets, natural capital, and human capital. Focusing on practical needs, the project will shed light on climate risks and opportunities, leading to better-informed policies and investments for climate resilience.	DFID and IDRC through CARIAA	Overseas Development Institute (UK); Innovation, Environnement, Développement Afrique (Senegal); Centre for Climate Change Studies, University of Dar es Salaam (Tanzania); Grantham Research Institute, London School of Economics (UK;) Sustainable Development Policy Institute (Pakistan)	Research; capacity building; knowledge communication ; policy formation and integration	Multisectoral	2014–2019	Global Pakistan, Tajikistan, Kenya, Tanzania, Burkina Faso, Senegal
PREPARED	This project aims to mainstream climate-resilient development planning and programming into the East African Community and its partner states' development agendas. The program addresses three key development challenges of the East African Community: i) increasing resiliency to climate change; ii) managing transboundary freshwater biodiversity	USAID; East Africa	East African Community Secretariat's Climate Change Coordination Unit; Lake Victoria Basin Commission; IGAD's Climate Prediction and Applications Centre; Regional	Capacity building; knowledge communication ; policy formation and integration	Ecosystem conservation; freshwater supply; human health	2012–2016	Regional Kenya, Tanzania, Uganda, Burundi, Rwanda

	conservation, and iii) improving access to drinking water supply and sanitation services. This will be done by strengthening regional climate change policy; accessing global climate change adaptation funds by accrediting the Secretariat as a Regional Implementing Agency; managing East Africa's biologically significant transboundary freshwater ecosystems; and facilitating sustainable water supply, sanitation, and wastewater treatment services in the Lake Victoria Basin.		Center for Mapping of Resources for Development; East African Community Partner States; Tetra Tech ARD				
Southwest Indian Ocean Risk Assessment and Financing Initiative	This initiative seeks to address high vulnerability of the Southwest Indian Ocean Island States to disaster losses from catastrophes such as cyclones, floods, earthquakes, and tsunamis. These threats are exacerbated by the effects of climate change, a growing population, and increased economic impacts.	ACP-EU Natural Disaster Risk Reduction Program	World Bank (Small Island Developing States; Ministries of Finance; National Disaster Risk Management Offices; insurance sector representatives; Indian Ocean Commission's ISLANDS Project; UN Office for Disaster Risk Reduction; French Development Agency	Research; assessment; policy formation and integration	Disaster risk management; insurance; climate information; government	2013–2016	Regional Tanzania, Comoros, Madagascar, Mauritius, Seychelles
Strengthening Climate Change Governance in Zanzibar	The aim of this project is to support the Zanzibar VPO in strengthening climate change governance for Zanzibar through capacity building and mainstreaming of adaptation actions in development plans. The project will strengthen the foundation for Zanzibar's government in addressing climate change challenges.	UNDP; One Fund	UNDP; VPO in Zanzibar	Capacity building; policy formation and integration	Government	2012–2015	National

Strengthening Climate Information and Early Warning Systems in Tanzania to Support Climate Resilient Development and Adaptation to Climate Change	This project aims to strengthen the weather, climate, and hydrological monitoring capabilities, early warning systems and available information for responding to extreme weather and planning adaptation to climate change in Tanzania.	Least Developed Countries Fund; Government of Tanzania; UNDP; Government of Finland	Tanzania Meteorological Agency; Prime Minister's Office, Disaster Management Department; Ministry of Water	Research; capacity building	Climate information	Approved 2013	National
Supporting Water Sector Development in Tanzania	Through this project, lasting improvements will be made to the institutional, legal, regulatory, and human resources frameworks of Tanzania's water sector, increasing the population's access to drinking water supplies and sanitation systems. The management of water resources will adapted to meet the challenges of climate change.	German Federal Ministry for Economic Development and Cooperation	GIZ; Ministry of Water	Capacity building; policy formation and integration	Watershed management; freshwater supply; government	2004–2016	National

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 East Africa. Ottawa, Canada: CARIAA and IDRC.

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

Christensen, J.H., Krishna Kumar, K., Aldrian, E., An, S.-I., Cavalcanti, I.F.A., de Castro, M.,…& Zhou, T. (2013). Climate phenomena and their relevance for future regional climate change. In: Climate change 2013: The physical science basis. Contribution of Working Group I to the fifth assessment report of the Intergovernmental Panel on Climate Change. Stocker, T.F., Qin, D., Plattner, G.-K., Tignor, M., Allen, S.K., Boschung, J., Nauels, A., Xia, Y., Bex V., and Midgley P.M. (Eds.). Cambridge, UK: Cambridge University Press.

Climate Action Network Tanzania (CAN-Tanzania). (n.d.-a). About us. Retrieved from http://www.tanzaniaclimateactionet.co.tz/about-us

Climate Action Network Tanzania (CAN-Tanzania). (n.d.-b). Climate change in Tanzania. Retrieved from http://www.tanzaniaclimateactionet.co.tz/climate-change-in-tanzania

Daron, J.D. (2014). Regional climate messages: East Africa. Ottawa: CARIAA and ASSAR.

Department for International Development (DFID). (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

Disaster Management Department. (2012) Tanzania emergency preparedness and response plan. Dar es Salaam, Tanzania: Prime Minister's Office, Government of Tanzania.

Division of Environment (DoE). (2007). United Republic of Tanzania: National adaptation programme of action. Dar es Salaam, Tanzania: Vice President's Office, Government of Tanzania.

Division of Environment (DoE). (2012a). National climate change strategy. Dar es Salaam, Tanzania: Vice President's Office, Government of Tanzania.

Division of Environment (DoE). (2012b). Guidelines for integrating climate change adaptation into national sectoral policies, plans and programmes of Tanzania. Dar es Salaam, Tanzania: Vice President's Office, Government of Tanzania.

Food and Agriculture Organization of the United Nations. (2015). Aquastat database. Retrieved from http://www.fao.org/nr/water/aquastat/main/index.stm

Fund for Peace (2014). Fragile states index 2014. Retrieved from http://ffp.statesindex.org/

Global Climate Adaptation Partnership (GCAP). (2011a). The economics of climate change in the United Republic of Tanzania. Report to Development Partners Group and the UK Department for International Development. Retrieved from http://economics-of-cc-in-tanzania.org/

Global Climate Adaptation Partnership (GCAP). (2011b). The economics of climate change in Zanzibar. Final summary report. Retrieved from http://www.economics-of-cc-in-zanzibar.org/

Global Framework for Climate Services. (2015). Climate Services Adaptation Programme in Africa - Building Resilience in Disaster Risk Management, Food Security and Health. Overview. Retrieved from: http://www.gfcs-climate.org/Norway_2

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

Johnson, J.L. (2009). Climate change and fishery sustainability in Lake Victoria. African Journal of Tropical Hydrobiology and Fisheries, 12, 31–36.

Ministry of Agriculture, Food Security and Cooperatives. (2013). National Agriculture Policy. Government of Tanzania: Dar es Salaam.

Ministry of Community Development, Gender and Children. (2008). National strategy for gender development. Dar es Salaam, Tanzania: Government of Tanzania.

Ministry of Finance and Economic Affairs. (2010). National strategy for growth and reduction of poverty II. Dar es Salaam: Government of Tanzania.

Ministry of Health. (2003). National health policy. Dar es Salaam, Tanzania: Government of Tanzania.

Ministry of Water. (2002). National water policy. Dar es Salaam, Tanzania: Government of Tanzania.

Ministry of Water and Irrigation. (2006). National water sector development strategy. Dar es Salaam, Tanzania: Government of Tanzania.

Niang, I., Ruppel, O.C., Abdrabo, M.A., Essel, A., Lennard, C., Padgham, J. & Urquhart, P. (2014). Africa. In: Climate change 2014: Impacts, adaptation, and vulnerability. Part B: Regional aspects. Contribution of working group II to the fifth assessment report of the

Intergovernmental Panel on Climate Change. Barros, V.R., C.B. Field, D.J. Dokken, M.D. Mastrandrea, K.J. Mach, T.E. Bilir, M. Chatterjee, K.L. Ebi, Y.O. Estrada, R.C. Genova, B. Girma, E.S. Kissel, A.N. Levy, S. MacCracken, P.R. Mastrandrea, and L.L. White (Eds.). (pp. 1199–1265). Cambridge, UK: Cambridge University Press.

Notre Dame Global Adaptation Index (ND-GAIN). (2015). Tanzania profile. Retrieved from http://index.gain.org/country/tanzania

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

Overseas Development Institute. (2013). Tanzania national climate change finance analysis. Retrieved from http://www.odi.org/sites/odi.org.uk/files/odi-assets/publications-opinion-files/8627.pdf

Oversees Development Institute (ODI) and Heinrich Böll Foundation North America. (2015). Climate Funds Update. Retrieved from: http://www.climatefundsupdate.org/

Tanzania Meteorological Agency. (n.d.). Tanzania Meteorological Agency. Retrieved from http://www.meteo.go.tz/about_us/index.php

Tanzania Planning Commission (TPC). (1999). The Tanzania development vision 2025. Dar es Salaam, Tanzania: Government of Tanzania.

Tanzania Planning Commission (TPC). (2011). The Tanzania five year development plan 2011/2012-2015/2016: Unleashing Tanzania's latent growth potentials. Retrieved from http://www.tzdpg.or.tz/fileadmin/documents/external/national_development_frameworks/FYDP-2012-02-02.pdf

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

United Nations Development Programme (UNDP). (2004). Human development report 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). (2013). Human development index 2013: The rise of the South: Human progress in a diverse world. Retrieved from http://hdr.undp.org/sites/default/files/reports/14/hdr2013_en_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)-Adaptation Learning Mechanism. (2012). United Republic of Tanzania. Retrieved from http://undp-alm.org/explore/eastern-africa/united-republic-tanzania

United Nations Development Programme (UNDP)-Adaptation Learning Mechanism. (2014). NAP-GSP countries. Retrieved from http://www.undp-alm.org/nap-gsp-countries

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 Framework Convention on Climate Change (UNFCCC). (n.d.-c). Tanzania and the United Nations Framework Convention on Climate Change. Retrieved from http://unfccc.int/resource/ccsites/tanzania/index.htm

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

Vice President's Office (VPO). (2013). Process and roadmap for formulating national adaptation plans for Tanzania. United Republic of Tanzania. Retrieved from https://unfccc.int/files/documentation/submissions_from_parties/application/pdf/tanzania_naps_rev.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

IDRC | CRDI

International Development Research Centre
Centre de recherches pour le développement international

Canada