Climate Adaptation and Protected Areas Initiative

Climate Risk Profile: Kavango-Zambezi Landscape

CAPA REPORT

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Project partners

IISD International Institute for Sustainable Development

Wildlife Conservation Society

WWF

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Climate Adaptation and Protected Areas (CAPA) Initiative

The Climate Adaptation and Protected Areas (CAPA) Initiative seeks to promote nature-based solutions (NbS) to strengthen climate resilience and protect biodiversity in and around protected areas and critical ecosystems. The CAPA Initiative, funded by Global Affairs Canada, will work with local communities, traditionally underrepresented groups, women's groups, and national and local authorities in Belize, Fiji, the Greater Virunga Landscape, and the Kavango–Zambezi Landscape to implement site-specific activities that respond to the risks, vulnerabilities, needs, and priorities of local communities and ecosystems, as identified through comprehensive assessments of the climate, gender, biodiversity, and conflict contexts. The CAPA Initiative is led by the International Institute for Sustainable Development (IISD), the Wildlife Conservation Society (WCS), and the World Wide Fund for Nature (WWF).

To learn more, visit https://www.iisd.org/capa.

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Written by Susan Sekirime, Enock Mwangilwa, and Daniel Abowe

Photo: Luke Katemba/IISD

CAPA Initiative Project Partners

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Abbreviations and Acronyms

CAPA	Climate Adaptation and Protected Areas
CORDEX	Coordinated Regional Climate Downscaling Experiment
GESI	gender equality and social inclusion
GWL	global warming level
IPCC	Intergovernmental Panel on Climate Change
KAZA	Kavango-Zambezi
NAP	national adaptation plan
NbS	nature-based solutions
TFCA	Transfrontier Conservation Area

1.0 About the Climate Risk Profile

The Climate Adaptation and Protected Areas (CAPA) Initiative seeks to promote natural solutions to strengthening climate resilience and protecting biodiversity in and around protected areas and critical ecosystems in Belize, Fiji, and the Greater Virunga and Kavango-Zambezi landscapes in Africa. Within this 3-year project, the International Institute for Sustainable Development (IISD), in collaboration with conservation partners at the Wildlife Conservation Society and the World Wide Fund for Nature, local communities, traditionally underrepresented groups such as women and Indigenous Peoples, and national and local authorities are designing and implementing nature-based solutions (NbS) for adaptation in and around protected areas and critical landscapes in the Global South, and working to better integrate climate risks into the management of these spaces. The project is being implemented with financial support from Global Affairs Canada.

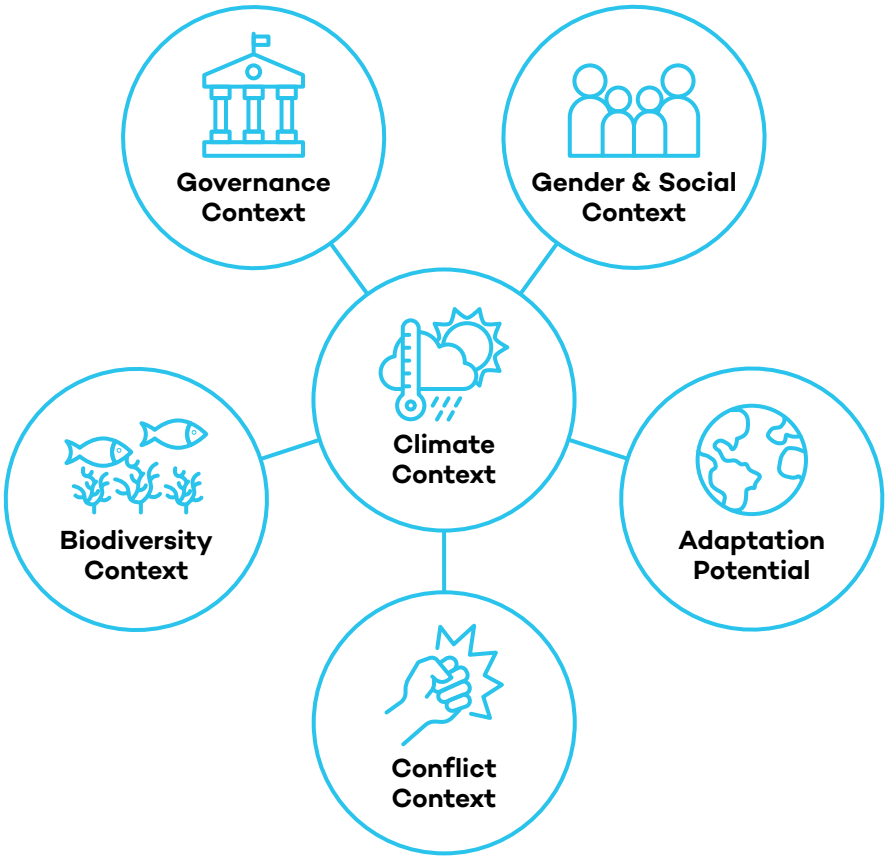
Box 1. What are NbS for adaptation?

NbS for adaptation are actions to protect, conserve, restore, sustainably use, and manage natural ecosystems to strengthen the resilience of communities and ecosystems to the impacts of climate change (adapted from UNEA, 2022). They involve assessing how climate change will affect ecosystems and people of all genders and social backgrounds and identifying how ecosystems can help to address these impacts on people.

As part of this project, the CAPA Initiative has developed a set of climate risk profiles for each of the four project sites to illustrate the impacts of climate change within and around select protected areas and critical ecosystems. They are based on comprehensive climate risk assessments that underpin the choices of NbS for climate adaptation alongside the design and implementation of gender equality and social inclusion (GESI) strategies for the four landscapes. The assessments furthermore rely on information collected from desk-based or secondary research and participatory engagement processes with communities. Each integrated assessment explored six thematic areas to provide a holistic understanding of the landscape (see Figure 1).

This profile is based on a comprehensive climate risk assessment conducted in 2024 by the CAPA Initiative in the Kavango-Zambezi Transfrontier Conservation Area (KAZA TFCA), specifically in Namibia, Zambia, and Zimbabwe. It provides an overview of the KAZA landscape's climate context alongside observed and projected climate change impacts based on observations from communities and climate data from the European Centre for Medium-Range Weather Forecasts' ERA5 atmospheric reanalysis (Hersbach et al., 2020), and climatic projections derived from the Intergovernmental Panel on Climate Change (IPCC) Working Group I Interactive Atlas (Gutiérrez et al., 2021) and the Coordinated Regional Climate Downscaling Experiment (CORDEX) regional climate model for Africa. The profile also recommends a set of NbS for adaptation actions and measures that promote gender-responsive and socially inclusive climate adaptation.

Figure 1. Six themes explored as part of the integrated climate risk assessment



Source: Jang et al., 2025.

1.1 The KAZA Landscape

Spanning approximately 520,000 km^2, the KAZA TFCA is the world's largest terrestrial transboundary conservation area. It connects five countries straddling the Okavango and Zambezi River basins: Angola, Botswana, Namibia, Zambia, and Zimbabwe. Over two-thirds of the TFCA (371,349 km^2) lies in recognized protected areas. To date, the landscape includes 20 national parks, 85 forest reserves, 22 conservancies, 11 sanctuaries, 103 wildlife management areas, and 11 game management areas (Southern African Development Community, 2011). The TFCA was formally established in 2011 to conserve and sustainably manage the region's shared natural and cultural heritage (Southern African Development Community, 2011).

The CAPA Initiative's comprehensive climate risk assessment was conducted in six sites across three countries in the KAZA landscape (see Figure 2). The protected areas within these districts are as follows: Bwabwata National Park in Zambezi district, Namibia; Mosi-oa-Tunya National Park in Livingstone district and Sioma Ngwezi National Park in Sesheke and Sioma districts, Zambia; and Chizarira National Park in Binga district and Victoria Falls National Park in Hwange district, Zimbabwe. Close to 3 million people live within the boundaries of the TFCA, with most inhabitants' livelihoods dependent on natural resource use and small-scale agriculture. The assessment gathered information from the following

communities located within or buffering the protected areas: Chetto in Zambezi district, Namibia; Makanda in Sesheke district, Mwanambao and Ngwezi in Sioma district, and Nsongwe in Livingstone district, Zambia; and Chitongo in Binga district and Chidobe and Sizinda in Hwange district, Zimbabwe.

KAZA ecosystems range from wood, scrub, and grassland to wetlands and agricultural land, providing refuge to a diverse array of endemic and migratory wildlife through key habitats and migration corridors. Considered to be an avian biodiversity hotspot (Ministry of Environment, Forestry and Tourism, 2020), the landscape is also home to endemic fish such as the tiger fish, the largest African savannah elephant population in the world, and a quarter of the global African wild dog population. Among its key conservation objectives, the TFCA aims to promote connectedness between the network of protected areas to restore wildlife dispersal pathways (Southern African Development Community, 2011).

Figure 2. A map of the KAZA TFCA boundary and CAPA Initiative sites in Namibia, Zambia, and Zimbabwe

Source: CAPA Initiative.

2.0 Climate Context in the KAZA Landscape

Climatic conditions vary throughout the KAZA landscape depending on local geographical and hydrological features, though the overall climate is defined as hot semi-arid. Mean annual air temperatures range from 16–26°C, and June and July tend to be the coolest months of the year following the end of the wet season, which lasts from November to April (Climate Change Knowledge Portal, 2026a, 2026b, 2026c).

2.1 Observed Climatic Changes

Historically, all three countries have suffered severe impacts from prolonged droughts, including a 107-month drought recorded in Livingstone, Zambia, from 1979 to 1987 (Food and Agricultural Organization of the United Nations, 2026). The landscape has continued to experience an intensifying cycle of droughts that often coincides with El Niño Southern Oscillation events. On May 22, 2024, the President of Namibia declared a national state of emergency in response to the country's worst drought in 100 years, following Zambia's driest agricultural season in more than 40 years (United Nations Office for the Coordination of Humanitarian Affairs [OCHA], 2024a, 2024b, 2026).

From 1980 to 2015, the KAZA landscape experienced an estimated 1.16°C rise in mean annual air temperature (Climate Change Knowledge Portal, 2026a, 2026b, 2026c). Across the landscape, rainfall has decreased and the timing of seasons has changed. Days have become increasingly hotter, coinciding with a rise in heat waves and a loss of water sources (WWF, 2021) that are further compounded by declining tree cover, with over 2,570 km^2 of tree cover lost from 2001 to 2019.

Based on ERA5 data and community observations, the following negative trends have been observed for the period 1980–2015:

Namibia

In Chetto (Bwabwata National Park), total annual rainfall has increased by 21 mm every decade, and mean and maximum air temperatures have risen by 0.06°C and 0.07°C per decade, respectively. Despite the increasing precipitation, droughts have intensified, with events recorded in 2014, 2015, 2019, and 2024 (WWF, 2022; OCHA, 2024a).

Zambia

In Livingstone (Mosi-oa-Tunya National Park), total annual rainfall has dropped by 59 mm per decade, and mean and maximum air temperatures have increased by 0.14°C and 0.13°C, respectively. Around Sioma Ngwezi National Park, rainfall declined by 38 mm and 43 mm per decade in Sesheke and Sioma, respectively. Both districts also saw a rise in mean and maximum air temperatures: 0.06°C and 0.06°C in Sesheke, and 0.08°C and 0.07°C in Sioma. Significant droughts were recorded in Sioma in 2015–2016, 2017–2018, 2019–2020,

and 2024–2026. Sesheke experienced a major drought in 2001 (Food and Agricultural Organization of the United Nations, 2026; OCHA, 2026).

Zimbabwe

In Chitongo (Chizarira National Park), total annual rainfall has risen by 47 mm per decade, alongside an increase in mean and maximum temperatures of 0.19°C and 0.22°C per decade, respectively. In Chidobe (Victoria Falls National Park), annual rainfall increased by 25 mm per decade, and mean and maximum air temperatures rose by 0.19°C and 0.24°C, respectively, every decade. Both communities experienced significant droughts in 2015–2016, 2018–2019, and 2023–2024 (OCHA, 2024b; United Nations Development Programme, 2012).

2.2 Future Climate Projections

With varying climatic conditions across the KAZA landscape, climate change will be experienced differently at different sites. The IPCC's representative concentration pathway 8.5 scenario forecasts that by 2050, the KAZA region will experience:

- a 4.6% decrease in annual precipitation, relative to historical data (1960–1990);
- drier conditions across all seasons, with the hot dry season lasting from August to October undergoing the most change (a 33% increase in dryness); and
- a 3°C increase in mean annual temperature.

The northeastern sections of the TFCA in Zambia and Zimbabwe are expected to become slightly wetter, while the northwestern section in Namibia is expected to become significantly drier. Furthermore, the western parts of the TFCA are expected to experience warmer temperatures than the rest of the landscape. Flood risk and associated vulnerability also vary across the region. An analysis of the landscape's protected areas showed that all protected areas within KAZA were vulnerable or highly vulnerable to climate change, and none were deemed resilient to climate change (WWF, 2021). Additionally, El Niño phases have been observed to couple with the climate more strongly in river catchments within the KAZA landscape, meaning the frequency of extreme weather events such as drought and flooding is expected to increase in these catchments over time.

Based on the IPCC's Interactive Atlas and CORDEX-Africa regional climate model, the following climatic changes are expected over the next century under four global warming level (GWL) scenarios, relative to a baseline period of 1985–2005. These projections are illustrated in Figure 3 and further detailed in Appendix A.

Namibia

Air temperatures in Bwabwata National Park are expected to rise steeply over the next century, accompanied by a significantly higher risk of heat waves, with an additional 163 days, or 45% of the year, predicted to exceed 35°C at 4°C of warming. Rainfall patterns will become more erratic, with annual precipitation projected to slightly decline at 1.5°C of warming, rise at 2°C of warming, and subsequently fall by over 10% at the 4°C GWL

scenario. The projected increase in extreme precipitation events, combined with reduced total rainfall and longer dry spells, will lead to unpredictable seasonal rainfall, intensifying droughts, and flooding risk.

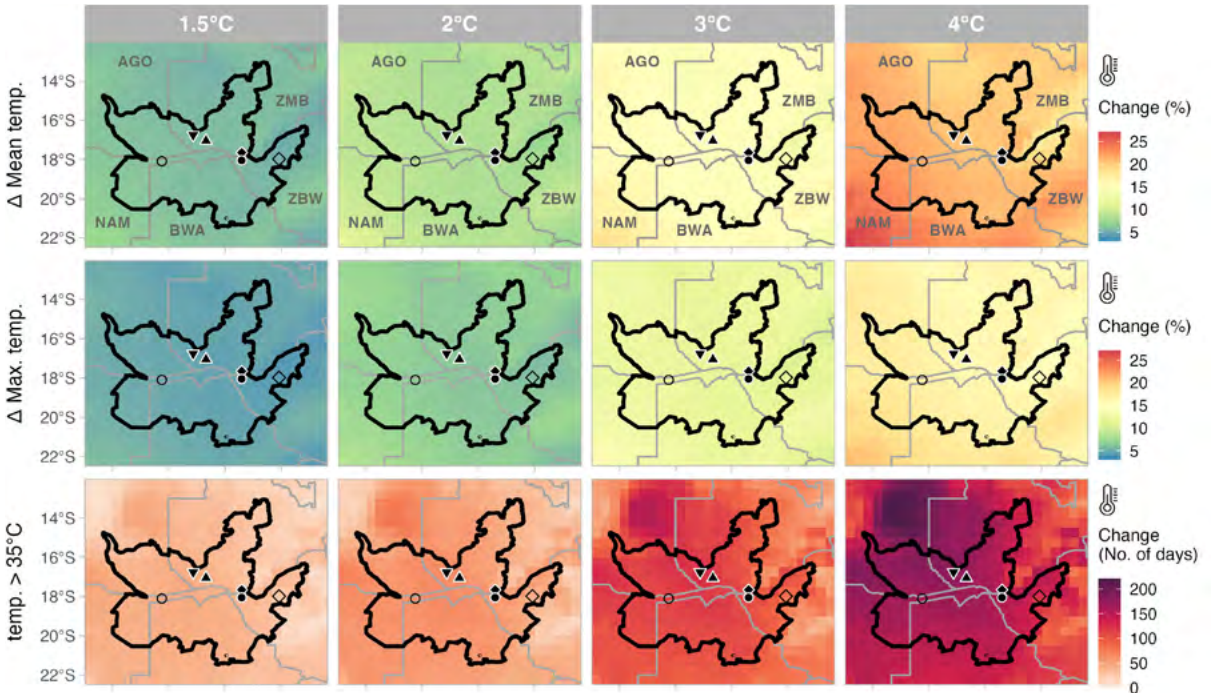
Zambia

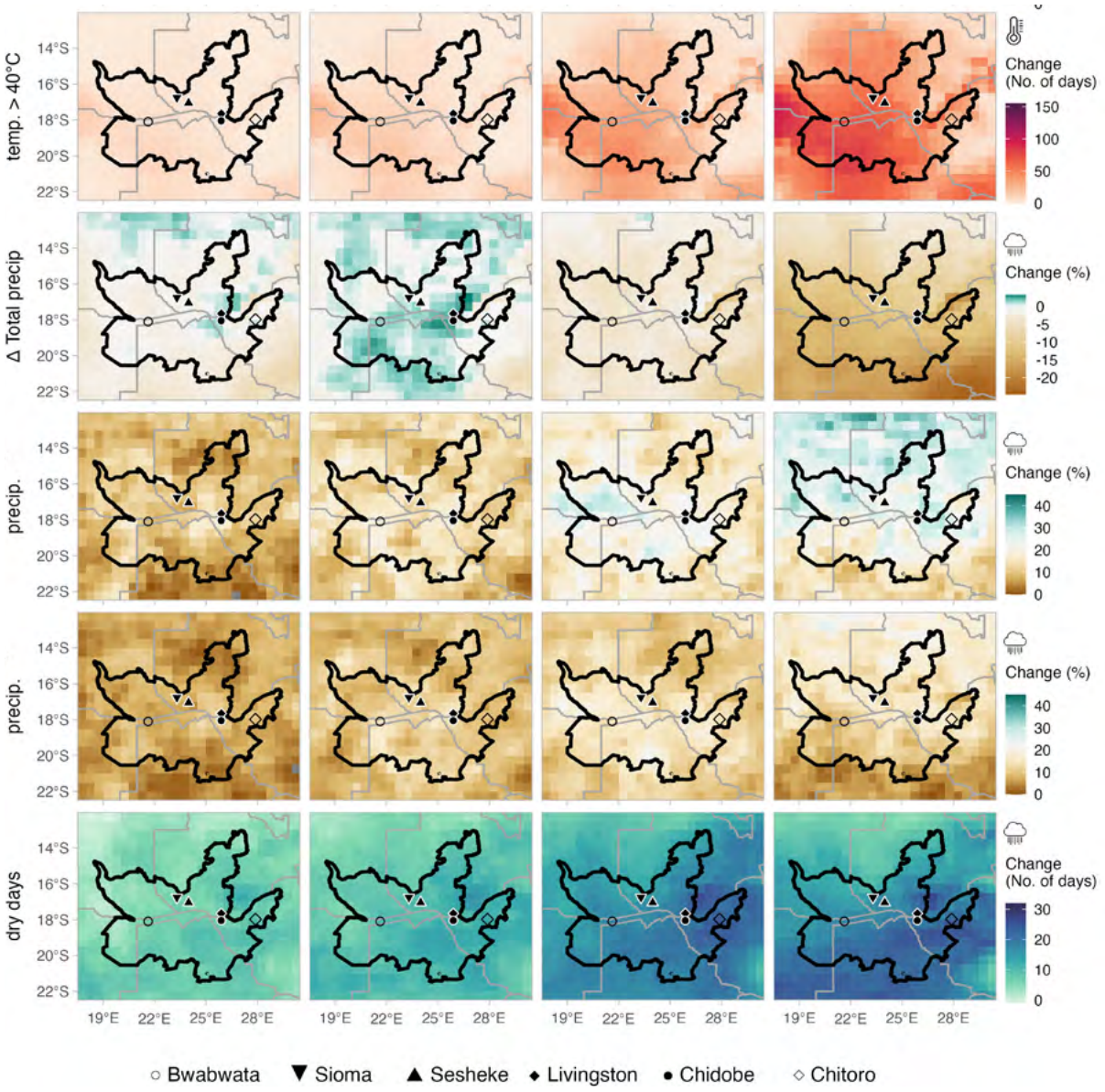
Livingstone, Sesheke, and Sioma are all expected to see a sharp rise in sustained heat waves, with mean air temperatures rising by over 20% at 4°C of warming. In line with this trend, the number of days exceeding 40°C is projected to increase significantly, causing severe heat stress for people and wildlife. Total annual rainfall for all three sites is projected to increase slightly at 2°C of warming, then decline sharply toward the end of the century. Conversely, extreme rainfall events will increase, as is the length of dry spells.

Zimbabwe

Air temperatures in both Chidobe and Chitongo are projected to rise significantly, alongside an exponential increase in heat waves and the duration of dry spells. Chidobe is expected to suffer more severe heat waves than Chitongo, with over 50 additional days surpassing 40°C at 4°C of warming, compared to 27 days in Chitongo. In Chidobe, total annual rainfall is expected to increase slightly under the 2°C GWL scenario, before falling by approximately 12% toward the end of the century. Rainfall events in Chidobe will also become more unpredictable. In Chitongo, total annual precipitation is projected to decline, while extreme rainfall events are expected to be stable at 2°C of warming, before rising sharply thereafter.

Figure 3. Projected climate change under four GWL scenarios (1.5°C, 2°C, 3°C, and 4°C) for CAPA Initiative sites in the KAZA landscape





Source: Giorgi et al., 2009; Gutiérrez et al., 2021.

Note: The eight projected climate parameters are: mean and maximum temperatures; days with maximum temperatures exceeding 35°C and 40°C (to project risk of potential heat waves); total precipitation; maximum 1- and 5-day precipitation (to project risk of flooding events); and consecutive dry days (to predict dryness and potential risk of drought).

3.0 Observed Climate Hazards and Risks in the KAZA Landscape

Communities and stakeholders in the KAZA landscape CAPA sites have identified significant climate change impacts and hazards across Namibia, Zambia, and Zimbabwe. These observations include increased temperatures, dry spells, heat waves, reduced rainfall, drought, flooding, climate variability, and strong winds. The implications of these changes are profound, affecting potable water availability, crop yields, livestock health, and overall food security. Table 1 outlines climate hazards observed in the region and their associated risks.

Box 2. Definitions

Climate hazard: Climate-related events or trends that may result in loss and damage to lives, health and well-being, livelihoods, infrastructure, ecosystems, and natural resources (IPCC, 2023). The onset of climate hazards can be slow (e.g., temperature rises) or rapid (e.g., storms).

Climate risk: The potential for climate change to create negative consequences for societies and ecosystems. This includes impacts on "lives, livelihoods, health and well-being, economic, social and cultural assets and investments, infrastructure, services … ecosystems, and species" (IPCC, 2023, p. 128).

Table 1. Climate hazards and associated risks in the KAZA landscape

Climate hazards	Climate risks	Namibia	Zambia	Zimbabwe
Increasing air temperatures	• Reduced availability of potable water during the dry season • Increased risk of heat stress and heat-related vector-borne diseases in humans and livestock	All sites	All sites	All sites
Dry spells	• Increased frequency and duration of dry spells • Reduced quality of crop yields and increased likelihood of mid-season crop failures • Reduced pasture availability for livestock		All sites	All sites

Climate hazards	Climate risks	Namibia	Zambia	Zimbabwe
Heat waves	• Increased heat stress on people and livestock • Reduced agricultural productivity • Increased occurrence and frequency of heat wave events			All sites
Reduced total rainfall	• Reduced availability of fodder for livestock • Reduced crop yields and associated increases in hunger and malnutrition • Changes in availability of potable water	All sites		All sites
Drought	• Increased intensity and duration of drought events • Reduced availability of fodder and pasture for livestock • Reduced crop yields with the risk of absolute crop failure and associated food insecurity and malnutrition • Changes in availability of potable water and of critical natural resources (e.g., devil's claw in Bwabwata National Park, Namibia, and Sesheke, Zambia)	All sites	All sites	All sites
Flooding	• Increased incidence of flooding • Damage to crops and soil erosion • Infrastructural damage to households and gardens near riverbanks, and associated economic losses and increased food insecurity	All sites	Nsongwe (Livingstone)	Binga and Hwange

Climate hazards	Climate risks	Namibia	Zambia	Zimbabwe
Climate variability	• Increased rainfall variability • Crop failures and limited pasture availability for livestock		All sites	All sites
Strong wind	• Damage to crops and vegetation • Increased occurrence of strong, destructive wind events		All sites	All sites

Source: Fieldwork data.

4.0 Climate Change Impacts on Ecosystems and Communities

4.1 Present and Projected Climate Change Impacts on Ecosystems

Climate change directly and indirectly impacts ecosystems and exacerbates biodiversity loss. Table 2 outlines the observed impacts of climate change on ecosystems and biodiversity at the CAPA sites in the KAZA landscape, which are expected to worsen over time.

Table 2. Current and projected climate change impacts on ecosystems

Impacts	Description	Namibia	Zambia	Zimbabwe
Increasing temperatures				
Invasive species expansion	Rising temperatures create conducive environments for invasive plant species to thrive in, which reduces the abundance of native plant species. Some of these are key food sources for wildlife, including elephants.	✓		
Wildfires	Higher temperatures increase dry biomass during the fire season, which intensifies damage to ecosystems and biodiversity.		✓	✓
Shifts in habitat suitability	Increasing temperatures in protected areas reduce habitat suitability for wildlife. In Chizarira National Park (Zimbabwe), this has led to animals moving out of the protected areas and into surrounding habitat. In Namibia, buffaloes' and spotted hyenas' ranges have moved closer to human settlements. Equally, this has resulted in a significant decline in elephant habitat, particularly in Livingstone (Zambia) and in Chidobe and Chitongo (Zimbabwe). This loss of habitat pushes elephants to move closer into human settlements, increasing incidences of crop raiding and infrastructure damage. Declines in hyena habitat suitability lead to increased livestock predation risk. In Chitongo (Zimbabwe), Sesheke and Sioma (Zambia), and Bwabwata (Namibia), habitat availability for hippopotamus is also decreasing. Conversely, Chacma baboons' habitat suitability is noted to increase with rising temperatures in Chitongo (Zimbabwe) and Livingstone (Zambia), which can lead to more crop raiding and property damage.	✓	✓	✓
Increased animal movement				✓
Key species habitat loss		✓	✓	✓
Human-wildlife conflict		✓	✓	✓
Expanding species ranges			✓	✓

Impacts	Description	Namibia	Zambia	Zimbabwe
Droughts				
Water scarcity	As water catchments' hydrological recharge reduces, the flow of perennial rivers declines and can cause river systems to subsequently dry up—as observed in the Nsongwe River (Zambia) and the Kwando and Okavango rivers (Namibia). This significantly affects aquatic biodiversity in these river systems. In Chitongo (Zimbabwe), communities observed changes in the wetland over time due to increased droughts affecting its hydrological recharge.	✓	✓	✓
Biodiversity loss		✓	✓	✓
Slowed ecosystem regeneration	Increased dry spells and droughts result in reduced food availability for wildlife, which increases pressure on vegetation regeneration rates. In Nsongwe (Zambia), this is characterized by observed declines in ecosystem integrity and natural resource availability. This decline in food and water availability in protected areas drives animals to search for food and water closer to communities and can ultimately exacerbate conditions for human-wildlife conflict. Communities have recorded baboons raiding food stores and hyenas attacking livestock. In the case of elephants, this results in more frequent incidences of damage to fields and gardens and crop destruction. In Bwabwata National Park (Namibia), elephants were observed damaging water tanks while searching for water. Across the landscape, drought-induced food insecurity contributes to increases in poaching.	✓	✓	✓
Reduced food availability for wildlife		✓	✓	✓
Human-wildlife conflict		✓	✓	✓
Reduced rainfall and rainfall variability				
Forest quality decline	With prolonged dry spells and declines in total precipitation, the diversity and richness of plant and animal species in the landscape's forests will continue declining, as recorded in Nsongwe (Zambia).	✓	✓	✓
Wetland deterioration	Changes in rainfall patterns lead to the drying up of water pans and result in wetland overuse, as observed in Chitongo (Zimbabwe).			✓
Flooding				
River siltation	An increase in climate-induced short and intense rainfall periods can result in increased runoff that washes away topsoil and deposits it into river systems.	✓	✓	✓
Aquatic habitat deterioration		✓	✓	✓

Source: Fieldwork data.

4.2 Present and Projected Climate Change Impacts on Communities and Livelihoods

Communities in the KAZA landscape have predominantly natural resource-dependent livelihoods that are vulnerable to the impacts of climate change. In Namibia, communities typically depend on concessions from tourism activities and on trading and harvesting devil's claw, an endemic plant. In Zambia and Zimbabwe, livelihoods are mainly supported by livestock, rain-fed agriculture, logging, and the collection of non-wood forest products.

Community members across the CAPA Initiative sites reported that drought, reduced rainfall, and increased warming have impacted their sources of income. Financial constraints stemming from declining agricultural productivity undermine households' ability to secure resources and products. Overall incomes are furthermore affected by crop losses that leave no surplus to be sold, as well as by decreases in wild fruit and vegetable availability and production (WWF, 2022). Livestock and crop values are also impacted, with vegetable and cattle prices falling due to declines in quality and weight loss, respectively. In Namibia, bans on devil's claw harvesting in light of decreasing abundance and unsustainable practices can dry up this income stream.

Vital water resources are affected by climate-induced drought, a lack of rainfall, and increased evapotranspiration. Throughout the KAZA landscape, communities have reduced access to potable water as droughts dry up springs, rivers, and boreholes, and they must endure longer distances and waiting times to collect potable water. Livestock and wildlife also face declines in water availability. In Namibia and Zambia, there has been an observed reduction in groundwater and river recharge, including for the Kwando, Okavango, and Nsongwe Rivers.

Heat waves and increased warming cause pressure on human health, leading to dehydration, respiratory diseases, and reduced productivity, as well as general discomfort. In Namibia and Zimbabwe, these higher temperatures have provided more conducive environments for vector breeding, which contributes to more frequent occurrences of diseases such as malaria.

Severe weather events such as extreme winds and heavy rains contribute to communities' vulnerability by damaging public and private infrastructure (e.g., roads, bridges, houses, schools, and health facilities), and drought exacerbates low attendance and dropouts from school due to hunger among school-going children. Changes in wind patterns, reduced rainfall, and prolonged droughts impact households' energy supplies by reducing the availability of firewood.

These impacts are ultimately felt beyond communities' boundaries, as droughts drive the forced migration of men toward urban areas in a bid to find work, usually leaving families behind. Most current impacts are expected to worsen as global warming increases. Table 3 details the specific impacts of climate change on the three main livelihood sectors in the KAZA landscape.

Table 3. Climate impacts on livelihoods

Climate hazards	Climate change impacts	Namibia	Zambia	Zimbabwe
Agriculture				
Drought Increased dry days Increasing temperatures	Decreases in agricultural productivity and crop yields, as well as crop failures during critical growth stages, strongly contribute to food insecurity.		✓	✓
	Reduced hydrological recharge leads to the Nsongwe River (Livingstone) drying up and reduces capacity for gardening and cultivating citrus fruits.		✓	
	A decline in aquatic habitat and fish stocks limits or halts fishing capacity, e.g., no fishing at Kasamampande (Zambia), thus affecting food supply.			✓
	Reduced availability of natural resources obtained from wild ecosystems, such as frogs and mopane worms, limits communities' diet and nutrition.	✓		
	Disruptions to the fruiting patterns of trees and wild plants reduce access to wild fruits and vegetables, such as monkey oranges and manketti nuts. The food available to communities is affected.	✓	✓	✓
Floods	Flooding destroys communities' crop fields and washes away topsoil, which leads to reduced soil fertility.	✓	✓	✓
Livestock				
Drought Prolonged dry spells	Increased dry spells and droughts reduce the availability of fodder and pasture for livestock to graze.	✓	✓	✓
Increased warming Pests	Increased warming creates more conducive environments for pests such as ticks, which spread diseases among livestock and result in higher cattle mortality rates.	✓	✓	✓
Human-wildlife conflict	Declining food availability in protected areas drives wildlife closer to human settlements, leading to increases in predator attacks on livestock by hyenas and lions, among others. This outward dispersal from protected areas increases incidences of human-wildlife conflict with other fauna such as elephants, crocodiles, and hippopotamuses.	✓	✓	✓

Climate hazards	Climate change impacts	Namibia	Zambia	Zimbabwe
Tourism				
Drought Reduced rainfall and increased variability Floods	Forced movement of wildlife away from protected areas in the search for food and water reduces tourist visits and drives the loss of tourism-related employment and income, such as tour guiding and selling of crafts.	✓	✓	✓

Source: Fieldwork data.

4.3 Present and Projected Climate Change Impacts on Different Genders and Underrepresented Groups

The negative impacts of climate change are experienced differently by men, women, and underrepresented groups such as people with disabilities, children, youth, and Indigenous Peoples, based on their gender and other social identity factors. Across the project sites in the KAZA landscape, women and underrepresented groups were found to be more vulnerable to the impacts of climate change. For example, extreme temperatures can provoke heat-related illnesses like heat stroke and exhaustion, which disproportionately affect children, the elderly, and pregnant people. Prolonged heat also worsens chronic health conditions, adversely impacting those with preexisting health issues.

Box 3. The intersection of conflict and climate change

When examining the impacts of climate change on communities and ecosystems, it is important to consider the relationship between climate change and conflict. Climate change can cause or exacerbate conflict, and existing conflict can increase the vulnerability of certain populations and ecosystems to climate change.

Human-wildlife conflict has been observed in the communities surrounding protected areas because of climate change exacerbating biodiversity loss and degrading key species' habitats. This has led to more frequent incidents where animals damage infrastructure—e.g., water tanks destroyed by elephants searching for water—crops, and livestock, as well as increases in diseases contracted at the livestock–wildlife interface (Kabali et al., 2015).

The impacts of climate change have also driven youth and men to engage in illegal alternative livelihood activities, such as charcoal production, illegal mining, illegal fishing, and poaching, among other activities.

The heightened vulnerability of women relative to men is attributed to a higher participation in and reliance on climate-sensitive sectors for their survival. These include household water management, harvesting ecosystem services, and crop farming. People with disabilities are also highly vulnerable because they experience challenges in accessing key livelihood assets such as water and forestry resources. Men are more affected by climate impacts on livestock and fishing. Other impacts on key aspects of residents' livelihoods, such as tourism and natural resource harvesting, were found to affect all genders in the communities. The assessed vulnerabilities of livelihoods to climate impacts across genders and underrepresented groups are as follows:

Water

In Bwabwata (Namibia), residents depend entirely on groundwater supplies that are highly vulnerable, in part due to the increasing complexities in the tapping and recharging of the water resources. In Zambia and Zimbabwe, the communities are supplied by both underground and surface water resources, including dams, perennial rivers, springs, and wetlands. These are susceptible to drying up due to rising temperatures, reduced rainfall, and more frequent droughts, and people with disabilities are particularly affected by water shortages. Women are typically more involved in household water management and water collection, and water shortages may cause them to spend more time reaching diminishing water sources that need to provision more households.

Ecosystem Services

Devil's claw is the main ecosystem resource harvested by communities in Namibia, and it is also collected in Sioma and Sesheke in Zambia. A lack of livelihood diversification options for women means they are usually more involved in this form of natural resource collection. In Zambian and Zimbabwean sites, residents source charcoal and logged timber, and Zimbabwean communities also harvest wild fruit. Shortages in these natural products negatively affect families. Women-headed households are often more severely affected by climate impacts, as they can lack the resources and financial safety nets that their male counterparts have.

Community Gardens

These are critical in providing additional food security to households that support main grain harvesting, chiefly through highly nutritious horticultural products. With increasing climate-induced water scarcity, however, community gardens have not thrived and can expose families to food insecurity. Alongside water shortages, this exposes women, who spend more time tending to these gardens, to higher vulnerability.

Crop Farming

This is the primary livelihood sector for households across the assessed communities in the KAZA landscape and is primarily rain-fed, which exposes this agricultural sector to increased risk of crop failure associated with climate change. In Namibia, crops grown are drought-resistant sorghum, mahangu, and cowpeas. These are also farmed in Zambia and Zimbabwe, where maize, groundnuts, and bambara nuts are cultivated as well. All genders are involved in

crop farming, and high female participation was reported, with women spending more time in the fields.

Tourism

All assessed communities in the KAZA landscape live in biodiverse-rich areas that attract tourism, which increases income streams and associated social benefits shared among families and communities. In Namibia and Zambia, both men and women benefit from conservation hunting concessions, but men are more invested in this sector due to their higher likelihood of employment (e.g., as game guards). This makes them less vulnerable to the failures of climate-sensitive livelihoods, such as agriculture.

Livestock

In both Zambian and Zimbabwean communities, livestock production is a key male-dominated livelihood sector, owing to cultural and societal constructs that afford men livestock and land ownership. Increasing drought and dry spells have reduced the availability of drinking water and grazing pastures, thereby increasing the vulnerability of men working in this sector.

Fishing

In Chidobe, Zimbabwe, fishing is primarily undertaken by men, as it is considered a man's role. Reduced water levels have affected fish populations and consequently diminished catches.

4.4 Underlying Drivers of Vulnerability

The integrated climate risk and vulnerability assessment in the KAZA landscape identified various underlying non-climatic drivers that increase communities' vulnerability to climate change while reducing their adaptive capacity. This capacity to cope with the impacts of climate change can either increase or decrease relative to the availability of physical, financial, and social assets. The identified underlying drivers of vulnerability include the following:

Discriminatory Cultural Norms and Gender Roles

Some traditional gender roles curtail women's access to resources and limit their decision-making power. Men also have privileges over land and livestock ownership, which can prevent women from taking part in activities requiring these resources. In Chetto, Namibia, the decision-making committee that plays a critical role in natural resources management, the Kyaramachan Association, includes only one woman out of 12 community representatives.

Limited Livelihood Diversification

The assessed communities have limited local opportunities for economic diversification, making their residents highly vulnerable to climate impacts and shocks affecting the climate-sensitive sectors that they rely on, including agriculture and natural resource extraction.

High Reliance on Natural Resource-Dependent Livelihoods

Crop farming, community gardening, and natural resource extraction highly involve women in communities throughout the KAZA landscape, causing them to be more directly affected by impacts on these climate-sensitive sectors.

Lack of Social Support

The absence of social and women-only groups limits women's access to support, knowledge sharing, and collective action. This is a significant issue in all assessed communities.

Overexploitation of Natural Resources

The overharvesting of resources like timber and wild fruits in response to crop shortages exacerbates environmental degradation. This can, in turn, reduce livelihood opportunities, especially when carried out through unsustainable practices such as poaching and illegal logging.

4.5 Vulnerability Ranking of Assessed Communities

Following the IPCC (2023) definition of vulnerability, the combination of exposure and sensitivity to climate shocks determines the potential overall impact of climate change. Thus, the difference between impact and adaptive capacity determines vulnerability.

According to the Notre Dame Global Adaptation Initiative's Country Index—which evaluates a country's current vulnerability to climate disruptions and its readiness for adaptation—Namibia, Zambia, and Zimbabwe are deemed highly vulnerable to climate change. The Country Index scales vulnerability from 0 to 1, with 0 being the least vulnerable and 1 being the most vulnerable. Respectively, Namibia, Zambia, and Zimbabwe have vulnerability scores of 0.45, 0.48, and 0.5, placing them within the top 75 most vulnerable nations worldwide (Notre Dame Global Adaptation Initiative, 2024). Rural populations in these countries are disproportionately affected due to their reliance on climate-sensitive livelihoods, high poverty levels, and limited adaptive capacity.

Vulnerability to climate impacts varies significantly within and between communities across the KAZA landscape. The loss of ecosystems and their services along with them has cascading and compounding impacts, especially on rural communities whose livelihoods are directly dependent on natural resources (IPCC, 2023). Factors such as exposure to hazards, access to resources, and demographic characteristics play a crucial role in determining social groups' particular vulnerabilities. For example, in Zambia and Zimbabwe, differences in access to land, poverty levels, and reliance on climate-sensitive resources significantly impact vulnerability. For Namibia's Chetto community, poverty, limited access to resources, and increased climate risks such as prolonged droughts contribute to heightened vulnerability.

The Notre Dame Global Adaptation Initiative's assessments of Namibia, Zambia, and Zimbabwe highlighted agricultural capacity, dam capacity, and lack of access to medical staff as the worst-scoring indicators of vulnerability. Zambia and Zimbabwe's worst-scoring indicators also include the projected change in cereal yields, reflecting the prevalence of (and dependence on) crop farming in both countries.

5.0 Recommendations for Climate Adaptation in the KAZA Landscape

5.1 Climate Adaptation Policy Context

The governments of Namibia, Zambia, and Zimbabwe have mainstreamed climate resilience across several national planning and strategic documents, as well as more targeted policies. There are notable similarities among documents across the countries, presenting an opportunity for cross-learning. These include the Vision 2030, nationally determined contributions, national adaptation plans, national climate change policies, environmental management acts, and national biodiversity strategies and action plans. Table 4 outlines some of the key documents in which climate adaptation work has been mainstreamed for each country.

The adaptation focus in all three countries' revised nationally determined contributions emphasizes enhancing resilience across critical sectors. Namibia prioritizes actions in agriculture, tourism, fisheries, and disaster risk management, focusing on community-based projects to enhance adaptive capacity and reduce climate change impacts. Zambia targets agriculture, water, forestry, energy, wildlife, infrastructure, and health to mitigate the impacts of extreme weather events and support its Vision 2030. Zimbabwe integrates adaptation measures into national development planning for water, health, agriculture, energy, infrastructure, and forestry to build disaster resilience and ensure sustainable development.

Additionally, the countries have developed comprehensive national adaptation plans to address their respective vulnerabilities to climate change. Among other sectors, Namibia's NAP, currently in progress and expected to be completed later in 2026, targets water and wetlands, agriculture, tourism, health, and disaster risk management, aiming to enhance adaptive capacity and reduce climate change impacts on these vital sectors. Zambia's NAP, completed in 2023, addresses agriculture, water, forestry, energy, wildlife, and infrastructure, among others, aiming to build resilience and support Vision 2030. Zimbabwe's NAP, completed in 2024, integrates climate change adaptation into all levels of development planning, targeting sectors such as water, health, agriculture, energy, infrastructure, and forestry to enhance disaster resilience.

Table 4. Key national strategies, plans, policies, and legislation in which climate change adaptation is mainstreamed

Namibia	Vision 2030 (2004)
	Environmental Management Act (2007)
	National Policy on Climate Change for Namibia (2010)
	Nationally Determined Contribution (2023)
	National Adaptation Plan (in progress)
	Third National Biodiversity Strategy and Action Plan 2026–2035 (2026)
	Sixth National Development Plan 2025/2026–2029/2030 (2025)
Zambia	Vision 2030 (2006)
	Environmental Management Act (2011)
	National Policy on Climate Change (2016)
	Nationally Determined Contribution (2025)
	National Adaptation Plan (2023)
	Third National Biodiversity Strategy and Action Plan 2025–2030 (2026)
	Eighth National Development Plan 2022–2026 (2023)
	Zambia's Climate Change Gender Action Plan (2018)
	National Green Growth Strategy (2024)
Zimbabwe	Vision 2030 (2018)
	Environmental Management Act (2002)
	National Climate Policy (2017)
	Nationally Determined Contribution (2025)
	National Adaptation Plan (2024)
	Third National Biodiversity Strategy and Action Plan 2026–2030 (2026)
	Second National Development Plan 2026–2030 (2025)
	National Climate Change Response Strategy (2014)

Source: Authors.

5.2 Recommended Nature-Based Solutions for Adaptation to Address Climate Change Impacts

As communities and ecosystems in the KAZA TFCA continue to face the impacts of climate change, implementing effective climate adaptation strategies is essential. To further enhance climate resilience, particularly in and around Bwabwata National Park in Namibia, Mosi-oa-Tunya National Park and Sioma Ngwezi National Park in Zambia, and Chizarira National Park and Victoria Falls National Park in Zimbabwe, this section presents additional adaptation options based on the CAPA Initiative's comprehensive climate risk assessment. These options focus on NbS for adaptation, which work with nature to adapt to a changing climate while also providing a range of socio-economic, health, and biodiversity co-benefits. These actions should be seen as part of a broader climate adaptation strategy and implemented alongside other adaptation and mitigation efforts to address climate change effectively.

While there is evidence of NbS for climate adaptation responses implemented in the communities within the KAZA landscape, it is important to recognize that most of these measures are spontaneous and, in some cases, are implemented to address societal challenges unrelated to climate change. The implementation of planned and structured NbS for climate adaptation responses therefore has the potential to increase resilience in communities and protected areas in the face of current and projected climate risks and impacts. Planned NbS would ensure proactive adaptation that addresses specific climate impacts and risks, compared to spontaneous responses that are always reactive measures.

Based on findings from the comprehensive climate risk assessment, the NbS for adaptation measures outlined in 5 were observed and co-identified in collaboration with local communities during the assessment process. These are recommended as interventions that can increase the resilience of communities and provide co-benefits to ecosystems across the KAZA landscape sites in Namibia, Zambia, and Zimbabwe, if implemented well.

Table 5. Observed and recommended NbS for climate adaptation for the KAZA landscape sites to increase the resilience of communities and ecosystems

Observed or recommended NbS for adaptation	Climate hazards and impacts addressed	Sites for implementation
Borehole rehabilitation strategy to support cluster gardens	Dry spells and drought, and associated impacts on food and water security	Bwabwata National Park, Namibia
Chilli fences as an alternative to electric fences and beekeeping, to ward off elephants	Human-elephant conflict, scarcity in forest resources (for beekeeping), and lack of economic diversification	Bwabwata National Park, Namibia
Sustainable harvesting and processing of non-timber forest products with market linkages (e.g., nuts, fruits, and devil's claw)	Drought and associated loss of income sources	Bwabwata National Park, Namibia

Observed or recommended NbS for adaptation	Climate hazards and impacts addressed	Sites for implementation
Restoring lagoons to improve water access for wildlife and desilting lagoons to promote water harvesting	Drought and reduced water availability, increased wildfires, heightened human-wildlife conflict, and associated impacts threatening biodiversity	Livingstone and Sesheke, Zambia
Beekeeping with market linkages and training	Increased temperatures, biodiversity loss, and lack of economic diversification	Sioma Ngwezi National Park, Zambia
Agroforestry with fruit trees and value addition for non-timber forest products (e.g., cashew nuts)	Soil erosion, drought, crop failures, and food insecurity	Sioma Ngwezi National Park, Zambia
Prescribed early burning	Drought, increased wildfires, and overexploitation of wetlands	Mosi-oa-Tunya National Park, Zambia
Restoring riverine buffers and promoting community-led agroforestry	Soil erosion from increased climate risks such as flash floods, biodiversity loss, and food insecurity	Nsongwe community, Zambia
Restoration and protection of wetlands and grazing lands	Drought, food and water scarcity	Zambian sites
Restocking protected areas with various wildlife species (e.g., impala, buffalo, zebra, and wildebeest)	Biodiversity loss and climate change-induced poaching	Sioma Ngwezi National Park, Zambia
Conflict resolution on harvesting of non-timber forest products (e.g., devil's claw and timber)	Droughts, dry spells, crop failures, and associated food insecurity	Ngwezi community in Sesheke, Zambia
Spring and catchment restoration, including fencing for livestock control and water access	Droughts and associated water and fodder scarcity	Chidobe community, Zimbabwe
Gully reclamation and dam desilting	Floods, increased storm events, and soil erosion, with associated river siltation and aquatic habitat degradation	Chidobe and Chitongo communities, Zimbabwe

Observed or recommended NbS for adaptation	Climate hazards and impacts addressed	Sites for implementation
Wetland restoration and rangeland management with fodder options suitable for dry conditions	Prolonged dry spells and associated drying up of wetlands, as well as drought-induced food and water scarcity	Victoria Falls National Park, Zimbabwe
Forest fire management	Increased dry spells and lack of rainfall, and associated increase in wildfires	Zimbabwean sites
Home gardens, including keyhole gardens	Droughts, dry spells (and associated water scarcity and food insecurity), and crop failures	Zambian and Zimbabwean sites

Source: Fieldwork data.

5.3 Recommended Measures to Advance Gender-Responsive and Socially Inclusive Adaptation

Box 4. A shift in the perception of women and underrepresented groups' roles

At the community level, a shift has been observed in the perceived value of contributions by women, youth, and people with disabilities to planning and implementation processes. While progress is slow, women have slightly more access to leadership positions, which other community members note affords them legitimacy. This varies depending on the resource being managed: in Chidobe, Zimbabwe, women are more frequently on Water Point Committees than other committees, owing to their traditional role as the primary social group fetching water.

Men can be advocates for cultural shifts and inclusive decision making in protected area and natural resources management (UNDP, 2026). Women possess unique and pertinent knowledge of both household and community needs (Chapman et al., 2026), the potential of which requires unlocking for more effective and equitable natural resource management.

Not everyone can participate equally in the design and implementation of climate adaptation strategies and initiatives, owing to varying levels of barriers that hinder participation. For example, women and youth at the community level are significantly underrepresented and often lack confidence in their abilities to influence climate and biodiversity-related planning and decision making due to limited knowledge on conservation and environmental issues.

To ensure that climate adaptation initiatives in the KAZA landscape are effective, inclusive, and sustainable, deliberate efforts must be made to adopt a gender-responsive and socially inclusive approach to their design and implementation. Such an approach can help facilitate the fair and equitable distribution of benefits and improve the adaptive capacity of communities. This section highlights key considerations for climate adaptation initiatives across the target communities in the KAZA landscape, drawing on lessons learned and insights from the integrated climate risk assessment.

Three key pillars to advance gender-responsive and socially inclusive adaptation were considered, which represent the CAPA Initiative's areas of focus for addressing gender and social barriers to promote GESI in NbS for adaptation outcomes among CAPA Initiative communities. The selection of these pillars is based on recent studies that revealed these areas to be the most salient to achieving equitable outcomes in NbS for adaptation (Caswell & Jang, 2024; Dazé & Terton, 2021). Table 6 outlines the main gaps identified for each key pillar, along with recommendations for the KAZA landscape.

Table 6. Recommended measures to advance gender-responsive and socially inclusive adaptation, categorized into three areas of focus

Gaps	Recommendations
Recognizing conservation and adaptation needs and capacities	
Lack of integrated, structured, and proactive NbS for climate adaptation in communities and protected areas that are gender responsive	**1.1:** Implement adaptation responses that address short-term livelihood needs, based on current vulnerabilities of women in communities, while promoting the implementation of long-term measures that address near-term climate risk (at 1.5°C GWL)[1] in project sites to increase communities' and biodiversity's resilience. For example, undertake mixed NbS, such as tree planting coupled with invasive species removal, while promoting immediate community gardens to address growing food challenges in communities.
Lack of key stakeholders and communities' technical capacity to implement NbS for climate adaptation	**1.2:** Build capacity for leadership and provide training opportunities for women and underrepresented groups to enhance their knowledge, skills, and access to resources that increase household and community-level resilience to current and future climate impacts.

[1] Many parts of Africa are expected to reach 1.5°C warming by the mid-2030s.

Gaps	Recommendations
Gender-equitable participation and influence in conservation and adaptation decision making	
Lack of or limited community-based, GESI-responsive structures that support the implementation of NbS for climate adaptation to foster climate resilience	**2.1:** Revive, where they exist, and/or create new community-based structures that promote women's participation in conservation and management decision making for climate adaptation, to stimulate participation and break down barriers that limit women's participation. Such structures include the creation of women-only groups (for sites that do not already have these structures) or strengthening existing ones by integrating NbS for climate adaptation and livelihoods. This should be supported by activities such as awareness raising in communities tailored to both men and women. Where women are in lower-level positions, facilitate their upward mobility in leadership. Where women already participate in and are present at meetings, work with local leaders to ensure they understand the importance of women's input, choices, needs, and goals and how these are linked to the success and sustainability of NbS to be implemented.
Lack of women's participation in key decision-making processes on conservation and natural resource management	**2.2:** Strengthen governance structures at community, local government, and protected area governance levels of women's participation in conservation and management of natural resources, through mentorship, capacity building, and reviewing existing management plans to make them GESI compliant. Where such governance structures do not exist, empower stakeholders in local government and communities that proposed community bylaws to incorporate GESI issues. Where they do, support the review and establishment of such bylaws, and ensure women and underrepresented groups have formal roles in NbS governance structures and resource management committees.[2]
	2.3: Deliberately target and include underrepresented groups in the implementation of NbS for climate adaptation, including by raising awareness of key stakeholders through training on why and how to incorporate these underrepresented groups. For example, protected area management authorities and local leadership can receive training on the importance of including underrepresented groups in conservation, and protected area and natural resource management.

[2] Note: these gaps provide an opportunity to develop and implement NbS-specific governance structures, especially at the community level, to complement existing governance structures such as forest management committees and village environment management committees.

Gaps	Recommendations
Closing institutional gender gaps in conservation and adaptation policies and practices	
Limited inclusion of women in institutional processes in conservation and protected area management	**3.1:** Develop GESI modules where key stakeholders, including protected area managers and authorities, work together with community-based organizations to produce gender inclusion strategies with pragmatic approaches to increase GESI in policy and practice. GESI plans must be translated into practice through collaboration with traditional leaders and communities to build support for changes in discriminatory gender norms, roles and decision-making practices, and to minimize resistance to change. This will help address gaps identified in the protected area management plans in the KAZA landscape.
	3.2: Deliberately and proactively include gender, equity, and the voices of underrepresented groups in national park management plans and strategies. Where provisions are already in place, collaborate with local government to raise their political will and commitment. For example: define set quotas or clear guidelines for representation of underrepresented groups in decision-making bodies and monitor compliance; and plan joint reviews of existing policies, capacity building for officials, and mechanisms to hold institutions accountable for ensuring women and marginalized groups are actively included in conservation and protected area management processes.
	3.3: Create gender operationalization frameworks that are sensitive to the gender dynamics, power relations and political conditions of different communities. These frameworks should enable interventions to be implemented in ways that are more likely to be accepted and encounter little resistance as they promote gender-responsive, equitable and inclusive approaches in predominantly patriarchal settings
Lack of monitoring and evaluation frameworks for tracking NbS for climate adaptation and women's participation	**3.4:** Establish a monitoring, evaluation, and learning framework with performance indicators to track progress on GESI, conflicts, and governance of the implemented activities to assess their effectiveness in addressing the key identified gaps.

Source: Authors.

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Appendix A. Future Climate Projections in the KAZA Landscape Under Four Global Warming Level Scenarios and Respective Timelines, Relative to 1985–2005 Baseline

Namibia

Global warming level	Temperature trends	Rainfall trends	Extreme rainfall events	Dryness (number of consecutive dry days)
Chetto (Bwabwata National Park)				
1.5°C	↑ + 6% mean temperature + 4.7% maximum temperature + 43 days >35°C + 8 days > 40°C	↓ – 1.8%	↑ + 8.6% maximum 1-day rain + 6% maximum 5-day rain	↑ + 7
2°C	↑ + 8.6% mean temperature + 6.6% maximum temperature + 61 days >35°C + 15 days > 40°C	↑ + 1.3%	↑ + 18% maximum 1-day rain + 15% maximum 5-day rain	↑ + 11
3°C	↑ + 15.1% mean temperature + 11.7% maximum temperature + 115 days >35°C + 40 days >40°C	↓ – 4.3%	↑ + 21.6% maximum 1-day rain + 15.3% maximum 5-day rain	↑ + 18.5
4°C	↑ + 21.5% mean temperature + 17% maximum temperature > 163 days >35°C + 71 days >40°C	↓ – 13.8%	↓ + 17.5% maximum 1-day rain + 9.5% maximum 5-day rain	↓ + 18

Zambia

Global warming level	Temperature trends	Rainfall trends	Extreme rainfall events	**Dryness** (number of consecutive dry days)
Livingstone (Mosi-oa-Tunya National Park)				
1.5°C	↑ + 5.7% mean temperature + 4.4% maximum temperature + 36 days >35°C + 3.3 days >40°C	↑ + 1.1%	↑ + 15.5% maximum 1-day rain + 13.5% maximum 5-day rain	↑ + 6.7
2°C	↑ + 8.2% mean temperature + 6.3% maximum temperature + 55.2 days >35°C + 6.5 days >40°C	↑ Slight rainfall increase + 2.2% rainfall	↑ + 16% maximum 1-day rain + 14.8% maximum 5-day rain	↑ + 11.9
3°C	↑ + 14.7% mean temperature + 11.4% maximum temperature + 104.8 days >35°C + 22 days >40°C	↓ – 2.9%	↑ + 21.1% maximum 1-day rain + 16.5% maximum 5-day rain	↑ + 20.9
4°C	↑ + 20.4% mean temperature + 16.1% maximum temperature + 153.5 days >35°C + 47.1 days >40°C	↓ – 10.7%	↑ + 21.2% maximum 1-day rain ↓ + 13.8% maximum 5-day rain	↓ + 19.5
Sioma (Sioma Ngwezi National Park)				
1.5°C	↑ + 5.8% mean temperature + 4.6% maximum temperature + 41.8 days >35°C + 4.1 days >40°C	↓ – 0.6%	↑ + 11.2% maximum 1-day rain + 9.8% maximum 5-day rain	↑ + 5.7

Global warming level	Temperature trends	Rainfall trends	Extreme rainfall events	Dryness (number of consecutive dry days)
2°C	↑ + 8.3% mean temperature + 6.4% maximum temperature + 63.2 days >35°C + 8.6 days >40°C	↑ + 0.5%	↑ + 13.2% maximum 1-day rain + 12.8% maximum 5-day rain	↑ + 9.3
3°C	↑ + 14.7% mean temperature + 11.5% maximum temperature + 120.4 days >35°C + 28.1 days >40°C	↓ – 3.2%	↑ + 18.4% maximum 1-day rain + 14.8% maximum 5-day rain	↑ + 13.2
4°C	↑ + 20.6% mean temperature + 16.4% maximum temperature + 175.5 days >35°C + 58.1 days >40°C	↓ – 10.8%	↑ + 21.1% maximum 1-day rain + 15.5% maximum 5-day rain	↑ + 14.8
Sesheke (Sioma Ngwezi National Park)				
1.5°C	↑ + 5.8% mean temperature + 4.5% maximum temperature + 43 days >35°C + 4.5 days >40°C	↓ – 0.4%	↑ + 6.7% maximum 1- and 5-day rain	↑ + 6.9
2°C	↑ + 8.2% mean temperature + 6.4% maximum temperature + 64.4 days >35°C + 9.4 days >40°C	↑ + 1.5%	↑ + 12.8% maximum 1-day rain + 11.9% maximum 5-day rain	↑ + 10.3

Global warming level	Temperature trends	Rainfall trends	Extreme rainfall events	Dryness (number of consecutive dry days)
3°C	↑ + 14.7% mean temperature + 11.5% maximum temperature + 120.6 days >35°C + 31.2 days >40°C	↓ – 2.4%	↑ + 19.9% maximum 1-day rain + 14.2% maximum 5-day rain	↑ + 17.6
4°C	↑ + 20.6% mean temperature + 16.3% maximum temperature + 172 days >35°C + 62 days >40°C	↓ – 10%	↑ + 22.3% maximum 1-day rain + 15% maximum 5-day rain	↓ + 17

Zimbabwe

Global warming level	Temperature trends	Rainfall trends	Extreme rainfall events	Dryness (number of consecutive dry days)
Chidobe (Victoria Falls National Park)				
1.5°C	↑ + 5.7% mean temperature + 4.4% maximum temperature + 37.3 days >35°C + 3.7 days >40°C	↑ + 1.3%	↑ + 16.9% maximum 1-day rain + 11.1% maximum 5-day rain	↑ + 7.8
2°C	↑ + 8.2% mean temperature + 6.2% maximum temperature + 56.9 days >35°C + 7.2 days >40°C	↑ + 2.6%	↑ + 16.8% maximum 1-day rain + 13.2% maximum 5-day rain	↑ + 12.7

Global warming level	Temperature trends	Rainfall trends	Extreme rainfall events	Dryness (number of consecutive dry days)
3°C	↑ + 14.6% mean temperature + 11.2% maximum temperature + 106.4 days >35°C + 23.4 days >40°C	↓ – 1.9%	↑ + 23.3% maximum 1-day rain + 16.7% maximum 5-day rain	↑ + 20.6
4°C	↑ + 20.5% mean temperature + 16.1% maximum temperature + 153.9 days >35°C + 50.1 days >40°C	↓ – 11.3%	↑ + 21.4% maximum 1-day rain + 13% maximum 5-day rain	↑ + 20.9
Chitongo (Chizarira National Park)				
1.5°C	↑ + 5.1% mean temperature + 4% maximum temperature + 27.2 days >35°C + 1.3 days >40°C	↓ – 0.1%	↑ + 12.2% maximum 1-day rain + 10.4% maximum 5-day rain	↑ + 8.9
2°C	↑ + 7.5% mean temperature + 5.8% maximum temperature + 43.8 days >35°C + 2.5 days >40°C	↓ – 0.3%	↓ + 10.4% maximum 1-day rain + 9.6% maximum 5-day rain	↑ + 12.4
3°C	↑ + 13.5% mean temperature + 10.6% maximum temperature + 86 days >35°C + 11.1 days >40°C	↓ – 4.4%	↑ + 19.7% maximum 1-day rain + 14.6% maximum 5-day rain	↑ + 23.3

Global warming level	**Temperature trends**	**Rainfall trends**	**Extreme rainfall events**	**Dryness** (number of consecutive dry days)
4°C	↑ + 19.1% mean temperature + 15% maximum temperature + 131.9 days >35°C + 26.9 days >40°C	↓ – 12%	↑ + 25.8% maximum 1-day rain + 16.7% maximum 5-day rain	↓ + 20.9

Source: Gutiérrez et al., 2021; Giorgi et al., 2009.

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