CLIMATE RISK COUNTRY PROFILE

ESWATINI

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Graphic Design: Circle Graphics, Inc., Reisterstown, MD.

ACKNOWLEDGEMENTS

This profile is part of a series of Climate Risk Country Profiles developed by the World Bank Group (WBG). The country profile synthesizes most relevant data and information on climate change, disaster risk reduction, and adaptation actions and policies at the country level. The country profile series are designed as a quick reference source for development practitioners to better integrate climate resilience in development planning and policy making. This effort is managed and led by Veronique Morin (Senior Climate Change Specialist, WBG) and Ana E. Bucher (Senior Climate Change Specialist, WBG).

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Climate and climate-related information is largely drawn from the Climate Change Knowledge Portal (CCKP), a WBG online platform with available global climate data and analysis based on the latest Intergovernmental Panel on Climate Change (IPCC) reports and datasets. The team is grateful for all comments and suggestions received from the sector, regional, and country development specialists, as well as climate research scientists and institutions for their advice and guidance on use of climate related datasets.

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FOREWORD

Climate change is a major risk to good development outcomes, and the World Bank Group is committed to playing an important role in helping countries integrate climate action into their core development agendas. The World Bank Group is committed to supporting client countries to invest in and build a low-carbon, climate-resilient future, helping them to be better prepared to adapt to current and future climate impacts.

The World Bank Group is investing in incorporating and systematically managing climate risks in development operations through its individual corporate commitments.

A key aspect of the World Bank Group's Action Plan on Adaptation and Resilience (2019) is to help countries shift from addressing adaptation as an incremental cost and isolated investment to systematically incorporating climate risks and opportunities at every phase of policy planning, investment design, implementation and evaluation of development outcomes. For all IDA and IBRD operations, climate and disaster risk screening is one of the mandatory corporate climate commitments. This is supported by the Bank Group's Climate and Disaster Risk Screening Tool which enables all Bank staff to assess short- and long-term climate and disaster risks in operations and national or sectoral planning processes. This screening tool draws up-to-date and relevant information from the World Bank's Climate Change Knowledge Portal, a comprehensive online 'one-stop shop' for global, regional, and country data related to climate change and development.

Recognizing the value of consistent, easy-to-use technical resources for client countries as well as to support respective internal climate risk assessment and adaptation planning processes, the World Bank Group's Climate Change Group has developed this content. Standardizing and pooling expertise facilitates the World Bank Group in conducting initial assessments of climate risks and opportunities across sectors within a country, within institutional portfolios across regions, and acts as a global resource for development practitioners.

For developing countries, the climate risk profiles are intended to serve as public goods to facilitate upstream country diagnostics, policy dialogue, and strategic planning by providing comprehensive overviews of trends and projected changes in key climate parameters, sector-specific implications, relevant policies and programs, adaptation priorities and opportunities for further actions.

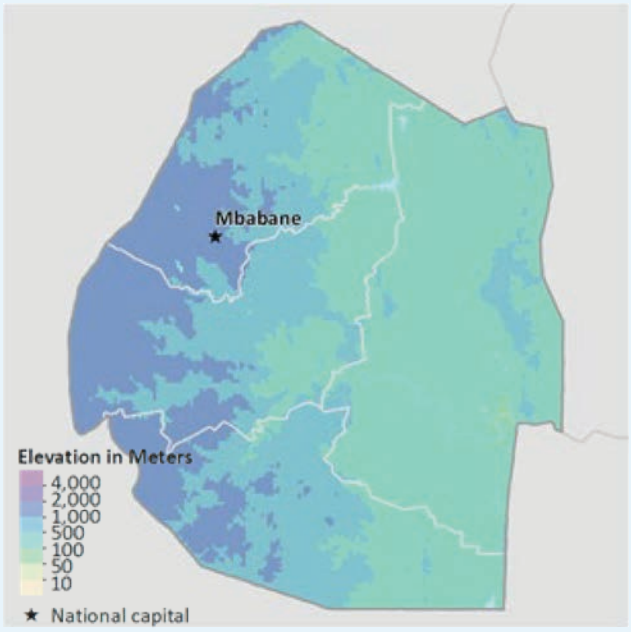
It is my hope that these efforts will spur deepening of long-term risk management in developing countries and our engagement in supporting climate change adaptation planning at operational levels.

Bernice Van Bronkhorst
Global Director
Climate Change Group (CCG)
The World Bank Group (WBG)

COUNTRY OVERVIEW

The Kingdom of eSwatini (formally Swaziland), herein referred to as eSwatini, is a landlocked, and mountainous country situated in the south eastern part of the African continent. eSwatini is the smallest country in the southern hemisphere with a total surface area of 17,360 square kilometers (km). It is landlocked with shared borders with South Africa and Mozambique in the east. eSwatini's general climate is characterized as subtropical with wet hot summers (about 75% of the annual rainfall in the period from October to March) and cold dry winters (April to September). The physiographic zones show clearly different climatic conditions, ranging from sub-humid and temperate in the Highveld to semi-arid and warm in the Lowveld.[1] There are four recognized ecosystems of eSwatini, 1) montane grasslands, 2) savanna-woodland mosaic, 3) forests, and 4) aquatic systems. The savanna-woodlands are the dominant ecosystem, covering the central and lower parts of the country, followed by the montane grasslands predominantly in the Highveld (**Figure 1**). Drylands are particularly vulnerable to the effects of climate change; hence adaptation is essential in dryland management. In eSwatini, drylands cover 944,000 hectares (ha) or 54% of the country and encompass all of the Lower Middleveld, Eastern and Western Lowveld, as well as parts of the Lubombo Range and Upper Middleveld. The driest zone in eSwatini is the moist semi-arid zone, found in the southern Lowveld. The intermediate dry sub-humid zone occurs mainly in the northern Lowveld. The most humid part of the Drylands covers the Lower Middleveld, most of the Lebombo and a small part of the Upper Middleveld.[2]

FIGURE 1. Elevation of eSwatini[3]



eSwatini has a population of 1.16 million people (2020), with an annual growth rate of 1.0%. The Gross Domestic Product (GDP) was $3.9 billion (2020), with annual growth rate of 2.2% in 2019 and –1.6% in 2020, peaking at 6.4% in 2013.[4] Approximately 24% of the population currently live in urban areas and this is projected to increase to 26.5% and 33.8% of the population by 2030 and 2050, respectively.[5] eSwatini is categorized as a lower middle-income country (**Table 1**). However, South Africa accounts for 90% of eSwatini imports and 80% of the country's national electricity is imported from South Africa. The eSwatini Lilangeni is pegged to the South African Rand.[6]

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1 eSwatini (2016). eSwatini's Third National Communication to the UNFCCC. Ministry of Tourism and Environmental Affairs. URL: https://unfccc.int/sites/default/files/resource/swgnc3.pdf
2 eSwatini (2012). Second National Communication to the UNFCCC. URL: https://unfccc.int/sites/default/files/resource/swgnc2.pdf
3 World Bank (2019). Internal Climate Migration Profile – eSwatini.
4 World Bank Data Bank (2021). World Development Indicators, eSwatini. URL: https://databank.worldbank.org/source/world-development-indicators
5 World Bank Data Bank (2021). Population estimates and projections, eSwatini. URL: https://databank.worldbank.org/source/population-estimates-and-projections
6 eSwatini (2012). Second National Communication. URL: https://unfccc.int/sites/default/files/resource/swgnc2.pdf

The country's major economic sectors are services accounting for 52.4% of GDP, and industry at 37.5%.[7] While the manufacturing sector has diversified since the 1980s, sugar remains the most important foreign exchange earner. Agriculture is the most important sector for the majority of eSwatini's population and national economic development. However, the sector's share of GDP decreased from over 30% at independence (1968) to 13% in 1989 and to 10% in 2009. Agricultural output forms the raw material base for approximately one third of value-added goods within the manufacturing sector and contributes substantially to national export earnings. Livestock production is also a major agricultural activity, with smallholder farmers owning about 77% of the total cattle population. The number of livestock has been declining in recent years due to droughts and overgrazing of rangelands resulting in less productivity, and to some extent also because of the population increases and thereby increasing demand for resources.[8] Agriculture forms the base of eSwatini's economy and diversification of economic activities is necessary if the country is to reduce its level of vulnerability to climate change as well as achieve its development goals.

TABLE 1. Data Snapshot: Key Development Indicators[9]

Indicator	
Life Expectancy at Birth, Total (Years) (2019)	60.2
Population Density (People per sq. km Land Area) (2018)	66.1
% of Population with Access to Electricity (2019)	77.2%
GDP per Capita (Current US$) (2020)	$3,415.50

The ND-GAIN Index[10] ranks 181 countries using a score which calculates a country's vulnerability to climate change and other global challenges as well as their readiness to improve resilience. This Index aims to help businesses and the public sector better identify vulnerability and readiness in order to better prioritize investment for more efficient responses to global challenges. Due to a combination of political, geographic, and social factors, eSwatini is recognized as highly vulnerable to climate change impacts, ranked 137 out of 181 countries in the 2020 ND-GAIN Index. The more vulnerable a country is the lower their score, while the more ready a country is to improve its resilience the higher it will be. Norway has the highest score and is ranked 1st. **Figure 2** is a time-series plot of the ND-GAIN Index showing eSwatini's progress since 2018.

The country's adaptation strategies to climate change have been identified in its Third National Communication (TNC) to the UNFCC (2016) and its Nationally Determined Contributions (NDC) submitted in 2016. eSwatini has identified four key sectors at risk to climate change which have been prioritized in adaptation strategies: agriculture, water, biodiversity and ecosystems, and health. Additionally, full implementation of eSwatini's climate change adaptation strategies are confident upon the continued strengthening of the country's technical capacities, technology enhancement and financial support received to invest in key adaptation programming.[11]

[7] World Bank (2021). World Bank Development Indicators. Data Bank: eSwatini. URL: http://databank.worldbank.org/data/reports.aspx?source=world-development-indicators&preview=on

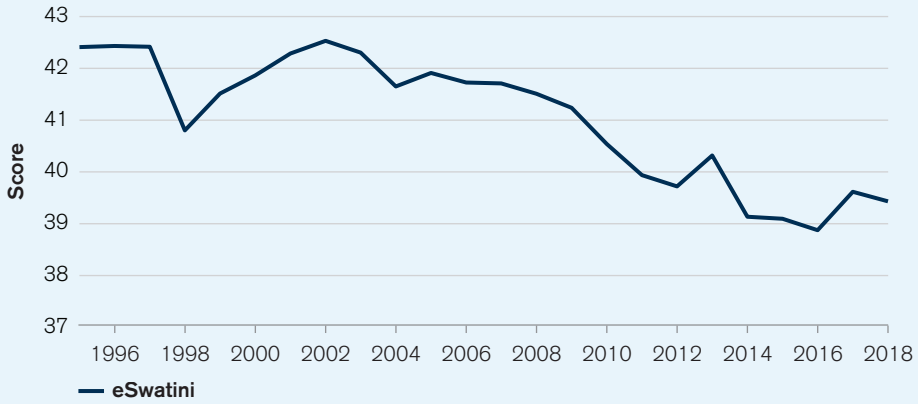
[8] eSwatini (2012). Second National Communication. URL: https://unfccc.int/sites/default/files/resource/swznc2.pdf

[9] World Bank (2021). DataBank – World Development Indicators. URL: https://databank.worldbank.org/source/world-development-indicators

[10] University of Notre Dame (2020). Notre Dame Global Adaptation Initiative. URL: https://gain.nd.edu/our-work/country-index/

[11] eSwatini (2016). Nationally Determined Contributions to the UNFCCC (NDC). URL: https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Eswatini%20First/Eswatini's%20INDC.pdf

FIGURE 2. ND-GAIN Index for eSwatini



eSwatini's TNC shows GHG emissions from all sectors (energy, industrial processes, agriculture, waste, and Land Use, Land Use Change and Forestry) projected to be 25.4 million tons of CO2 equivalent (CO_2e) and are expected to increase to 33.4 million tons of CO2e by the 2030. Stringent implementation of identified mitigation measures under energy and Land Use, Land Use Change and Forestry (LULUCF) is a possibility to gradually contribute to moving eSwatini from a carbon source to a carbon sink after 2030. Additional mitigation measures considered include strengthening and promoting renewable energy sources, establishing an efficient energy system under the energy sector. Under LULUCF, measures considered include reforestation, regeneration, and bio-electricity.[12]

Green, Inclusive and Resilient Recovery

The coronavirus disease (COVID-19) pandemic has led to unprecedented adverse social and economic impacts. Further, the pandemic has demonstrated the compounding impacts of adding yet another shock on top of the multiple challenges that vulnerable populations already face in day-to-day life, with the potential to create devastating health, social, economic and environmental crises that can leave a deep, long-lasting mark. However, as governments take urgent action and lay the foundations for their financial, economic, and social recovery, they have a unique opportunity to create economies that are more sustainable, inclusive and resilient. Short and long-term recovery efforts should prioritize investments that boost jobs and economic activity; have positive impacts on human, social and natural capital; protect biodiversity and ecosystems services; boost resilience; and advance the decarbonization of economies.

[12] eSwatini (2016). eSwatini's Third National Communication to the UNFCCC. Ministry of Tourism and Environmental Affairs. URL: https://unfccc.int/sites/default/files/resource/swgnc3.pdf

Climate Baseline

Overview

eSwatini lies at the transition lines of major climatic zones, being influenced by air masses from different origins, such as the equatorial convergence zone (summer rains), subtropical eastern continental moist maritime (onshore flow with occasional cyclones), dry continental tropical and marine west Mediterranean (winter rains, with rare snow). Thus, the country's agro-ecological zones result in differentiated climatic conditions across its diverse topography and ecosystems, ranging from sub-humid and temperate in the highvelds to semi-arid and warm in the lowvelds.[13] Mean annual rainfall ranges from approximately 1,500 millimeters (mm) in the northern Highveld to 500 mm in the southern lowland. The rainiest periods for the country tend to occur in November to February, overlapping with the typically hottest period annually.

According to the World Bank Group's Climate Change Knowledge Portal (CCKP),[14] (**Table 2**) the mean monthly temperature of the country has ranged between 15°C and 23.4°C. During the same time period, the mean monthly precipitation of the country varied from 11.9 mm in June to 143.3 mm in January, which resulted in an annual total average rainfall of 810.8 mm, for the latest climatology, 1991–2020 (**Figure 3**). **Figure 4** shows the spatial variation of the observed average annual precipitation and temperature across eSwatini.

TABLE 2. Data Snapshot: Summary Statistics

Climate Variables	1991–2020
Mean Annual Temperature (°C)	**20.7°C**
Mean Annual Precipitation (mm)	**810.8 mm**
Mean Maximum Annual Temperature (°C)	**27.0°C**
Mean Minimum Annual Temperature (°C)	**14.6°C**

[13] eSwatini (2016). eSwatini's Third National Communication to the UNFCCC. Ministry of Tourism and Environmental Affairs. URL: https://unfccc.int/sites/default/files/resource/sw3nc3.pdf

[14] WBG Climate Change Knowledge Portal (CCKP, 2021). eSwatini. URL: https://climateknowledgeportal.worldbank.org/country/eSwatini/climate-data-historical

FIGURE 3. Average Monthly Temperature andRainfall for eSwatini, 1991–2020[15]

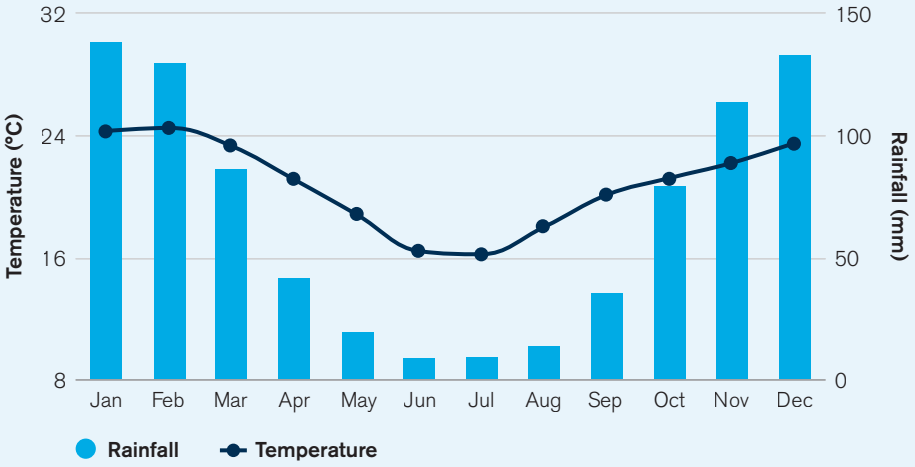
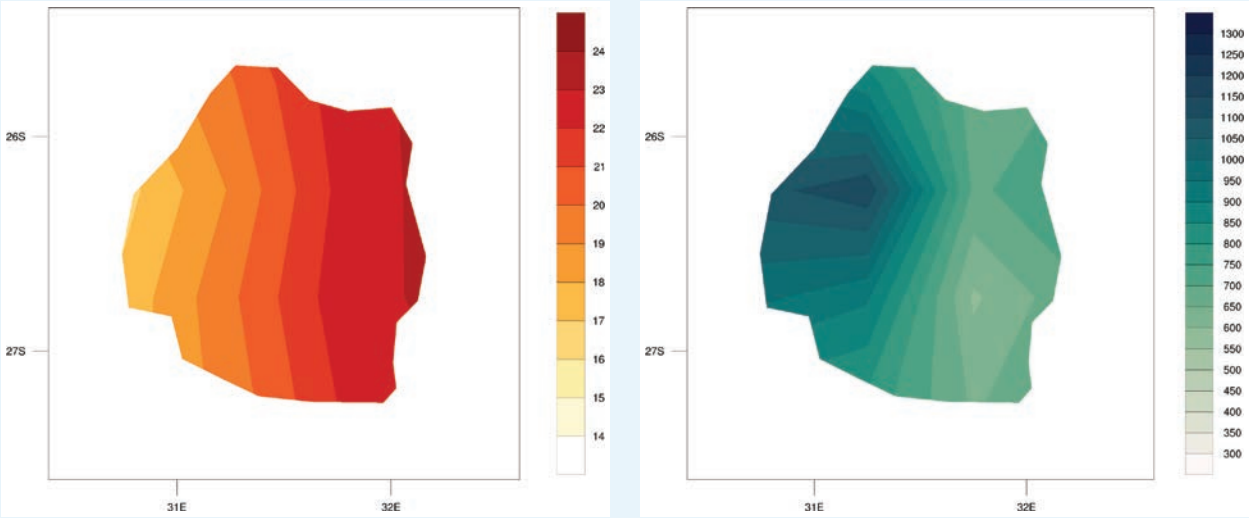


FIGURE 4. Mean Annual Temperature (°C) (left); Annual Precipitation (mm) (right) of eSwatini, 1991–2020[16]



[15] WBG Climate Change Knowledge Portal (CCKP, 2021). eSwatini. URL: https://climateknowledgeportal.worldbank.org/country/eSwatini/climate-data-historical

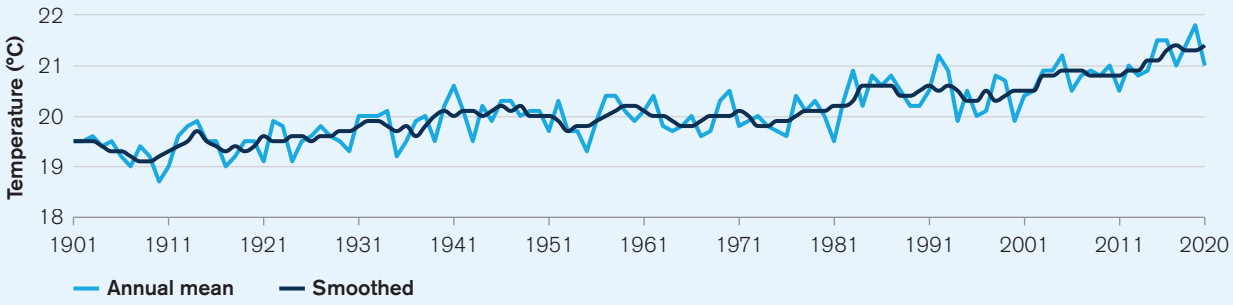
[16] WBG Climate Change Knowledge Portal (CCKP, 2021). eSwatini, Historical Climate. URL: https://climateknowledgeportal.worldbank.org/country/eSwatini/climate-data-historical

Key Trends

Temperature

Daily maximum and minimum temperatures from 1961 and 2010 show patterns of consistent temperature extremes with warming over most of the country in the last decade (**Figure 5**). Minimum temperatures have been found to have increased more rapidly compared to maximum temperatures.[17] The 1990s and 2000s were found to be warmer, as compared to the 1970s and 1980s. In the 1970s, temperatures rarely exceeded 34°C in the Lowveld, which is the hottest region in the country. In the past two decades, the frequency of very hot days, exceeding 34°C, increased. In general, the frequency of cold nights (and frost where it occurs) has decreased whilst the frequency of hot nights has increased. Highest increases in the number of hot nights occurred at Mbabane, where the frequency increased by 27% between 1960 and 2004 during the winter season. This show that the recent decades have experienced upward trends in annual mean, maximum and minimum temperature across the different regions in the country with the most significant warming occurring between 2000 and 2010.[18]

FIGURE 5. Observed Temperature for eSwatini, 1901–2020[19]



[17] European Commission (2018). 2018 – Drought and Water Crisis in Southern Africa. JRC Technical Reports. URL: https://publications.europa.eu/en/publication-detail/-/publication/629ccc90-58b8-11e8-ab41-01aa75ed71a1/language-en

[18] eSwatini (2016). eSwatini's Third National Communication to the UNFCCC. Ministry of Tourism and Environmental Affairs. URL: https://unfccc.int/sites/default/files/resource/sw3nc3.pdf

[19] WB Climate Change Knowledge Portal (CCKP, 2021). eSwatini URL: https://climateknowledgeportal.worldbank.org/country/eSwatini/climate-data-historical

Precipitation

Precipitation varies considerably from year to year, which either may lead to periods of flash flooding or drought. Drought is an inherent feature of the current semi-arid climate in eSwatini. Rainfall trends in the country points towards a decrease in the number of rainy days, which has an implication on the intensity of rainfall events and dry spell duration.[20] Apart from changes in total or mean summer rainfall, certain intra-seasonal characteristics of seasonal rainfall such as onset, duration, dry spell frequencies, and rainfall intensity as well as delay of rainfall onset has changed over the country. From available rainfall records from 1970 –2010 indicate an increase in inter-annual rainfall variability in the post 1970 periods with an increase on average of dry spell length.[21]

Climate Future

Overview

The main data source for the World Bank Group's Climate Change Knowledge Portal (CCKP) is the CMIP5 (Coupled Model Inter-comparison Project Phase5) data ensemble, which builds the database for the global climate change projections presented in the Fifth Assessment Report (AR5) of the Intergovernmental Panel on Climate Change (IPCC). Four Representative Concentration Pathways (i.e. RCP2.6, RCP4.5, RCP6.0, and RCP8.5) were selected and defined by their total radiative forcing (cumulative measure of GHG emissions from all sources) pathway and level by 2100. The RCP2.6 for example represents a very strong mitigation scenario, whereas the RCP8.5 assumes business-as-usual scenario. For more information, please refer to the RCP Database. For simplification, these scenarios are referred to as a low (RCP2.6); a medium (RCP4.5) and a high (RCP8.5) emission scenario in this profile. **Table 3** provides CMIP5 projections for essential climate variables under high emission scenario (RCP8.5) over 4 different time horizons. **Figure 6** presents the multi-model (CMIP5) ensemble of 32 Global Circulation Models (GCMs) showing the projected changes in annual precipitation and temperature for the periods 2040–2059 and 2080–2099.

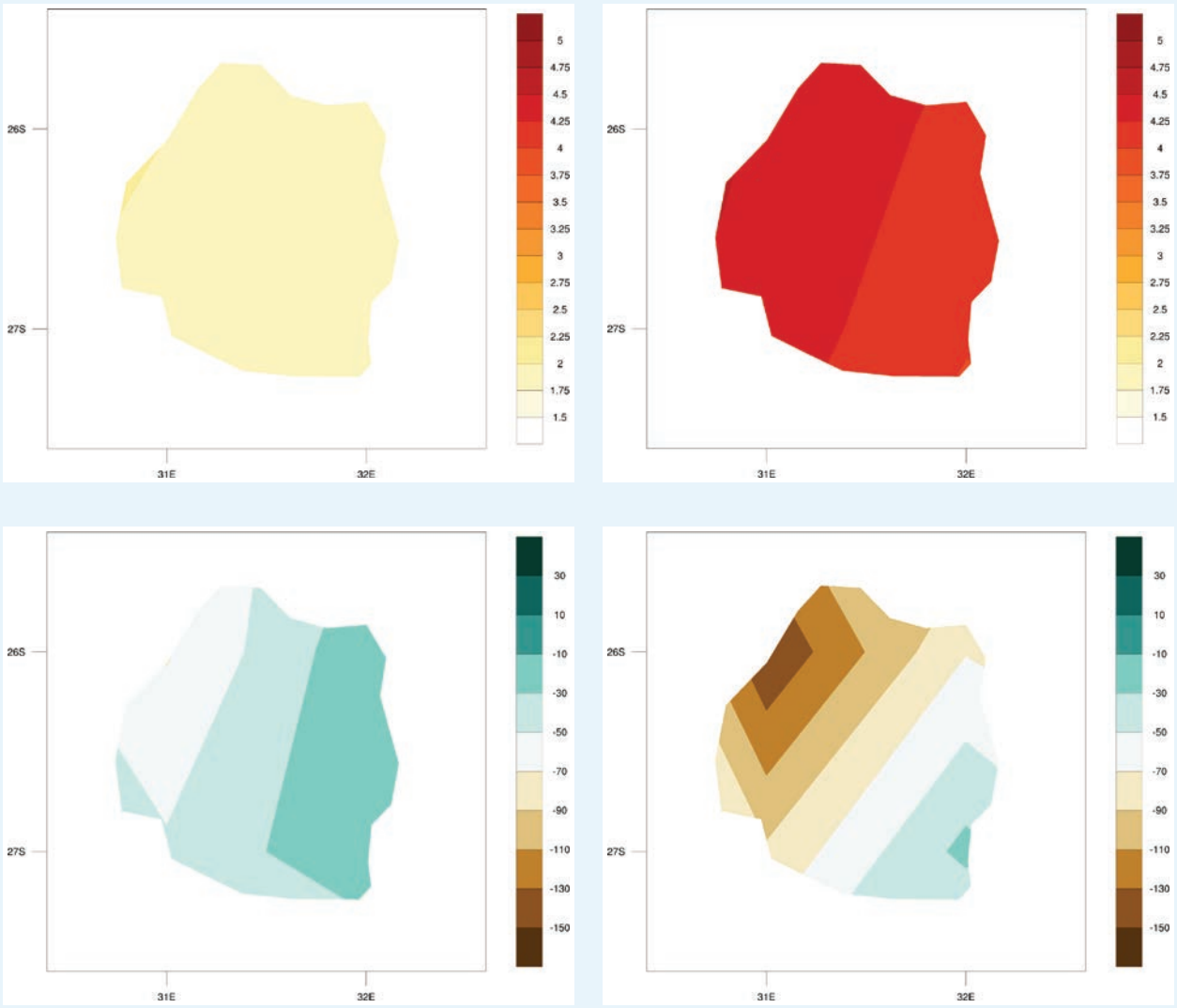
TABLE 3. Data Snapshot: CMIP5 Ensemble Projections

CMIP5 Ensemble Projection	2020–2039	2040–2059	2060–2079	2080–2099
Annual Temperature Anomaly (°C)	**+.51 to +1.48** (0.97)	**+1.23 to +2.40** (1.75)	**+2.17 to +3.73** (2.79)	**+3.04 to +5.15** (3.82)
Annual Precipitation Anomaly (mm)	**–26.03 to +27.56** (0.29)	**–30.45 to +27.75** (–1.96)	**–32.11 to +31.08** (–0.06)	**–37.25 to +32.71** (–1.13)

Note: The table shows CMIP5 ensemble projection under RCP8.5. Bold value is the range (10th–90th Percentile) and values in parentheses show the median (or 50th Percentile).

[20] UNDP (2018). Climate Change Adaptation – eSwatini. URL: http://www.adaptation-undp.org/explore/southern-africa/eSwatini
[21] eSwatini (2016). eSwatini's Third National Communication to the UNFCCC. Ministry of Tourism and Environmental Affairs. URL: https://unfccc.int/sites/default/files/resource/swgnc3.pdf

FIGURE 6. CMIP5 Ensemble Projected Change (32 GCMs) in Annual Temperature (top) and Precipitation (bottom) by 2040–2059 (left) and by 2080–2099 (right), Relative to 1986–2005 Baseline under RCP8.5[22]



[22] WBG Climate Change Knowledge Portal (CCKP, 2021). eSwatini Projected Future Climate. URL: https://climateknowledgeportal.worldbank.org/country/eSwatini/climate-data-projections

Key Trends

Temperature

In eSwatini, both minimum and maximum temperatures are projected to increase through the 2090s and temperature is expected to rise by as much as 1.9°C by the 2050s, under an RCP8.5 scenario. Hot Days are expected to rise by as many as 24.4 days by the 2050s. Temperature is expected to increase year-round, with peaks felt in the hottest period of October to December, under RCP8.5.[23] Projections also indicate a decrease in cold days and nights, which is expected to have harmful impacts on eSwatini's agriculture and livestock productivity.[24]

Across all emission scenarios, temperature increase for eSwatini are projected throughout the end of the century. As seen in the graph below, under a high-emission scenario, average temperatures are expected to increase rapidly by mid-century (**Figure 7**). An increase is also expected for the change in the number of summer days (Tmax >25°C), and the change in number of days across the seasonal cycle is also seen in the graphs below. As shown below in **Figure 8**, increases in the number of days over 25°C, calculated at national scale aggregation, are expected to remain largely the same. However, some areas, such as the Highveld are expected to experiences greater changes in temperature increases. Increased heat and extreme heat conditions will result in significant implications for human and animal health, agriculture, and ecosystems.

FIGURE 7. Projected Average Temperature for eSwatini (Reference Period, 1986–2005)[25]

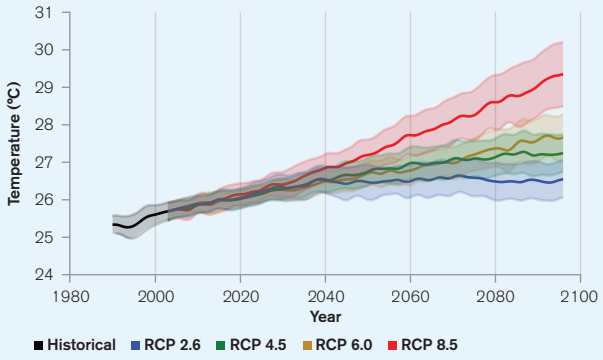
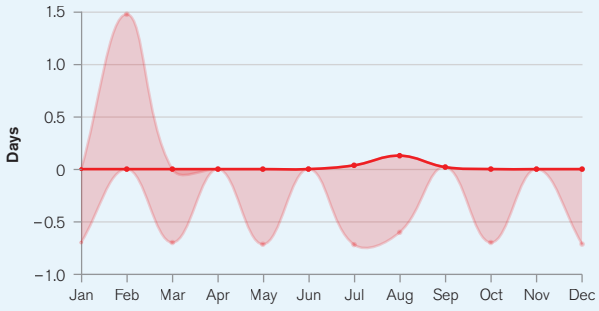


FIGURE 8. Projected Change in Summer Days (Tmax >25°C) (RCP8.5, Reference Period, 1986–2005)[26]



[23] eSwatini (2016). eSwatini's Third National Communication to the UNFCCC. Ministry of Tourism and Environmental Affairs. URL: https://unfccc.int/sites/default/files/resource/swznc3.pdf

[24] Matondo J.I. (2020) Assessing Runoff Changes in Major Catchments in Swaziland Due to Climate Change. In: Matondo J., Alemaw B., Sandwidi W. (eds) Climate Variability and Change in Africa. Sustainable Development Goals Series. Springer, Cham. https://doi.org/10.1007/978-3-030-31543-6_5

[25] WBG Climate Change Knowledge Portal (CCKP, 2021). eSwatini Agriculture Dashboard. URL: https://climatedata.worldbank.org/CRMePortal/web/agriculture/crops-and-land-management?country=SWZ&period=2080-2099

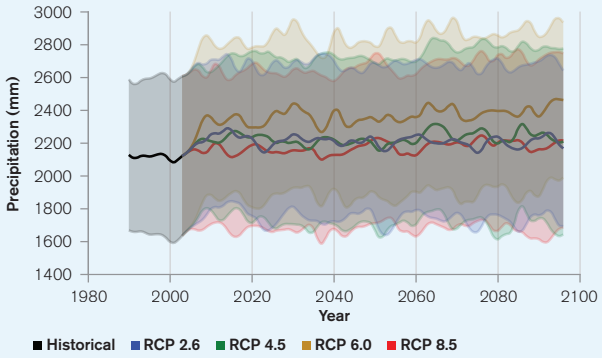
[26] WBG Climate Change Knowledge Portal (CCKP, 2021). eSwatini Climate Data – Projections. URL: https://climatedata.worldbank.org/CRMePortal/web/agriculture/crops-and-land-management?country=SWZ&period=2080-2099

Precipitation

Precipitation projections for eSwatini are highly variable, with a high degree of uncertainty in rainfall projections. However, available projections suggest increased aridity and a higher occurrence in the number and frequency of dry spells over the summer season, October to February. Decreases in frost days are expected for the Highveld region.[27] Changes in rainfall patterns are expected and this will alter streamflow and downstream catchment intakes. Runoff changes range from –17.4% to 26.6%; –31.2% to 18.1%; –40.3% to 27.7%; and –40.8% to 34.9% in the Komati, Mbuluzi, Usutu and Ngwavuma catchments, respectively. The median of the runoff change is negative for the majority of months in three catchments (Usutu, Mbuluzi and Ngwavuma) excluding the Komati catchment.[28]

As seen in **Table 3**, increases in precipitation are expected through the 2030s, with increasingly significant decrease expected throughout the rest of the century, under the high emissions scenario, RCP8.5. Given the projected increasing trend of temperatures and slight decreases in variable rainfall, eSwatini's agricultural and water sectors are projected to be the most impacted and most at risk. Likewise, the expected changes in decreased rainfall increases probability of drought for much of Southern African sub-region. **Figure 9** shows the projected trends for nationally aggregated annual precipitation for the different emission scenarios through the end of the century. Projections indicate a slight increase across each emission scenario. Water routing and storage and other management options, are often very different if the precipitation input comes as many weak or a series of heavy rainfall events.

FIGURE 9. Projected Annual Average Precipitation for eSwatini (Reference Period, 1986–2005)[29]



[27] eSwatini (2016). eSwatini's Third National Communication to the UNFCCC. Ministry of Tourism and Environmental Affairs. URL: https://unfccc.int/sites/default/files/resource/swgnc3.pdf

[28] Matondo J.I. (2020) Assessing Runoff Changes in Major Catchments in Swaziland Due to Climate Change. In: Matondo J., Alemaw B., Sandwidi W. (eds) Climate Variability and Change in Africa. Sustainable Development Goals Series. Springer, Cham. https://doi.org/10.1007/978-3-030-31543-6_5

[29] WBG Climate Change Knowledge Portal (CCKP, 2021). eSwatini Water Dashboard. URL: https://climateknowledgeportal.worldbank.org/country/eSwatini/climate-sector-water

Overview

eSwatini is at high risk of natural hazards, which are expected to primarily affect the agricultural sector, through seasonal flooding and periods of drought. The country experiences natural hazards, such as violent storms and persistence drought, which is further exacerbating the country's existing challenges of food insecurity, ability to attain development goals. Climate change and variability are evident in eSwatini in many forms, including hydrological disasters (droughts and storms), changes in rainfall regimes, including heavy rainfall events and extreme weather conditions. The country has recently been impacted by large variations in rainfall as well as recurring drought events. This is expected to have an increasingly adverse effect of agricultural production and particularly smallholder farmers and communities. Land degradation and resulting erosion is further exacerbated by heavy rains; increasing vulnerability for the more than 70% of the population that is reliant upon the agricultural sector.[30] Decreased precipitation and periods of drought are also expected to adversely impact the country, specifically its agricultural and livestock sectors. Drought risk is of particular concern.[31]

Data from the Emergency Event Database: EM-Dat,[32] presented in **Table 4**, shows the country has endured various natural hazards, including droughts, epidemic diseases, floods, storms and forest fires.

TABLE 4. Natural Disasters in eSwatini, 1900–2020

Natural Hazard 1900–2020	Subtype	Events Count	Total Deaths	Total Affected	Total Damage ('000 USD)
Drought	Drought	7	500	2,354,000	1,739
Epidemic	Bacterial Disease	2	62	3,677	0
	Parasitic Disease	1	80	0	0
Flood	Flash Flood	1	11	400	0
	Riverine Flood	2	0	274,500	50
Storm	Tropical cyclone	1	53	632,500	54,152
Wildfire	Forest fire	1	2	1500	0

[30] eSwatini (2016). eSwatini's Third National Communication to the UNFCCC. Ministry of Tourism and Environmental Affairs. URL: https://unfccc.int/sites/default/files/resource/swznc3.pdf

[31] Matondo J.I. (2020) Assessing Runoff Changes in Major Catchments in Swaziland Due to Climate Change. In: Matondo J., Alemaw B., Sandwidi W. (eds) Climate Variability and Change in Africa. Sustainable Development Goals Series. Springer, Cham. https://doi.org/10.1007/978-3-030-31543-6_5

[32] EM-DAT: The Emergency Events Database – Universite catholique de Louvain (UCL) – CRED, D. Guha-Sapir, Brussels, Belgium. URL: http://emdat.be/emdat_db/

Key Trends

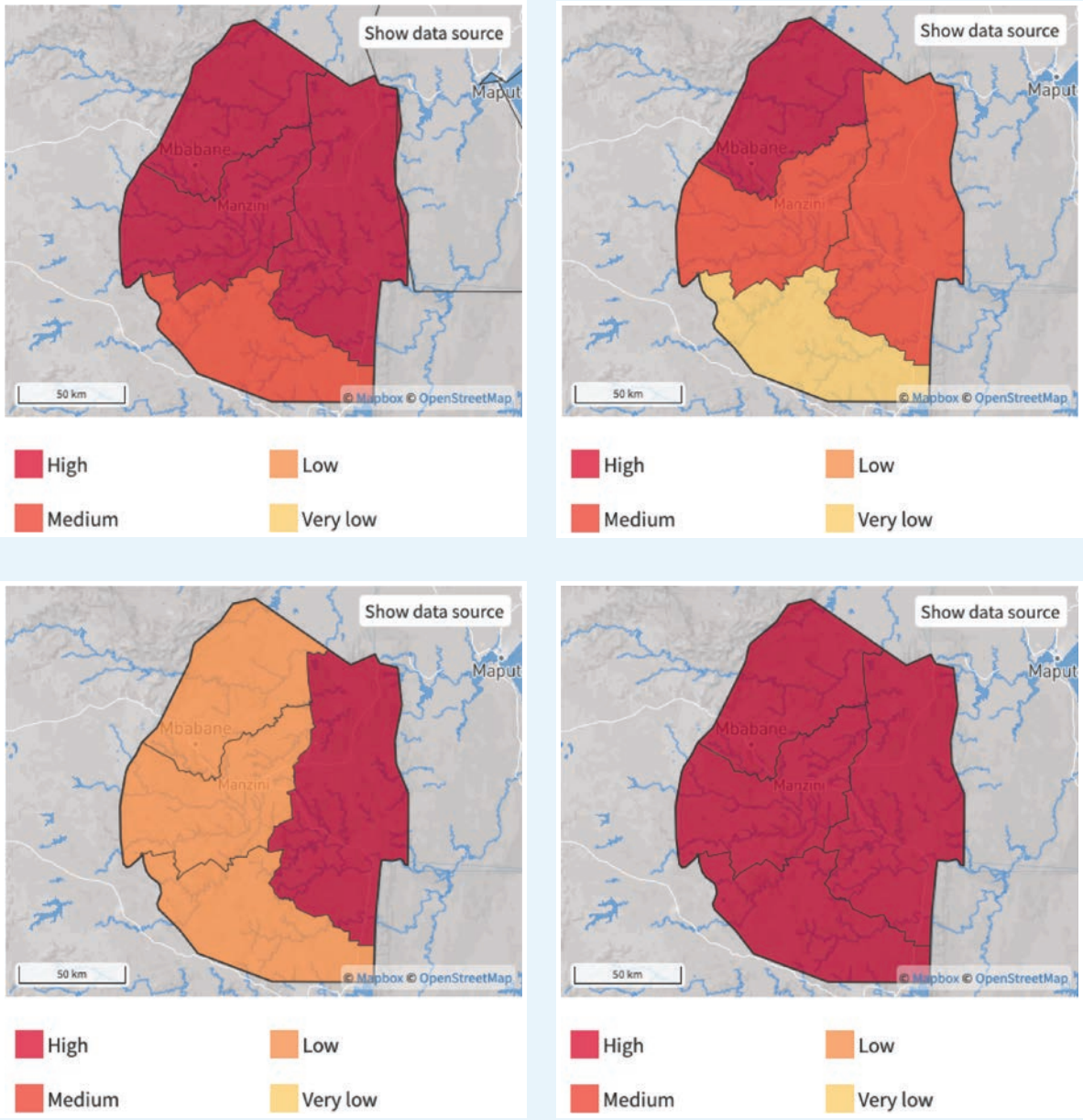
Climate change is expected to increase risks and severity of natural disasters in eSwatini, as well as across the southern Africa region, through more intense temperatures as well as rainfall patterns, prolonged heat waves, and water scarcity. The country is disposed to natural disasters which disrupt seasonal patterns. Impacts are expected to be through the occurrence and scale of disasters, such as flooding, heavy rainfall as well as heat waves and extended dry periods, and their associated impacts. eSwatini already experiences intense, recurring drought resulting in disaster situations. However, despite the recurrence of drought, both its influence on rural subsistence communities' support systems and the related resilience capabilities remain poorly understood; more research is necessary. Due to poor coping capacities and limited livelihood opportunities, each drought incidence provides opportunity to increase disaster resilience if appropriate investment is undertaken.[33]

eSwatini is also already at high risk to river as well as urban flooding and wildfire. These risk factors will impact project design, construction and infrastructure development and also have potential population health ramifications. Deforestation, watershed degradation, urbanization and settlements into flood and landslide-prone areas has exacerbated eSwatini's risks of flooding. Heavy rainfall events are likely to trigger riverine and flash floods. Heavy rainfall and flash floods are common in the country's hill areas and Highveld, which can trigger landslides or mudslides. Additionally, water stress during the traditional dry periods (October to February) may be further exacerbated with competing demands between household consumption and agriculture. Increased heat will further strain existing water resources, increase evapotranspiration and impacts from changing rainfall patterns.[34] **Figure 10** shows different risks from river flooding, urban flooding, landslides, and wildfires.

[33] Kamara, J., Agho, K. and Renzaho, A. (2019). Understadning disaster resilience in communities affectes by recurrent drought in Lesotho and Swaziland – a qualitative study. PLOS ONE. DOI: https://doi.org/10.1371/journal.pone.0212994

[34] Ministry of Environment (2018). Third National Communication under the United Nations Framework Convention on Climate Change. URL: https://unfccc.int/sites/default/files/resource/swznc3.pdf

FIGURE 10. Risk of River Flood (upper left); Risk of Urban Flood (upper right); Risk of Landslides (lower left); Risk of Wildfires (lower right)[35]



[35] ThinkHazard! (2020). eSwatini. URL: https://thinkhazard.org/en/report/235-swaziland

Implications for DRM

eSwatini released its national progress report on the implementation of the Hyogo Framework for Action (2013–2015), which aimed to augment the country's Disaster Management Act (2006) and its National Disaster Preparedness and Response Plan.[36] The country's disaster risk management (DRM) aims to improve its recognition of the country's changing disaster profile, specifically in response to changing weather patterns and long-term climate changes. National contingency planning aims to support community resilience to common natural disasters, such as floods, and infectious diseases, such as cholera, but also to improve preparedness and resilience to natural hazards throughout the environment, health agriculture, water, and forestry sectors.[37] Specifically in response to the country's drought risk, eSwatini, with donor support, is working to implement a drought monitor and early warning system, produce drought vulnerability profiles and related costs for drought-prone areas, design drought contingency plans and establish risk financing measures to support communities most affected by drought.[38]

CLIMATE CHANGE IMPACTS TO KEY SECTORS

Climate change in eSwatini is expected to lead to overall warming and increased aridity, with a greater frequency and intensity of droughts as well as floods. Negative impacts will be felt on the agricultural and water sector and are expected to be considerable. Yields of staple food crops such as maize, sorghum and beans are likely to decrease, thereby threatening national food security. Surface flows in rivers and streams are likely to have greater variation, with lower base-flows in the dry season, potentially resulting in water shortages for domestic, industrial and agricultural use. Additionally, groundwater reserves, which are an important source of water for many rural communities, may be reduced as a result of increased rainfall intensity and concomitant increases in surface runoff.[39]

Variable precipitation patterns, droughts, desertification, higher temperatures and increased storm intensities have already affected the country's key economic sectors.[40] Consequences of severe, recent droughts for the country have resulted in ¼ of the population being vulnerably and currently acknowledged as food and water insecure, with many households still reliant on welfare and social safety nets. The regions with the highest prevalence of food insecurity are Lubombo and Shiswelweni, the areas most affected by the drought. These negative impacts of climate change will be further exacerbated by baseline conditions of widespread poverty (63% of the population), high unemployment (40%), a high prevalence of HIV (26% of adults), and widespread land degradation as a result of deforestation, alien plant invasions and overstocking of livestock.[41]

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[36] eSwatini (2006). Disaster Management Act. URL: https://www.ifrc.org/docs/idrl/815EN.pdf

[37] National Disaster Management Agency – eSwatini (2015). National progress report on the implementation of the Hyogo Framework for Action (2013–2015) – Interim Report. URL: https://www.preventionweb.net/files/42827_SWZ_NationalHFAprogress_2013-15.pdf

[38] GFDRR (2020). ACP-EU Natural Disaster Risk Reduction Program. eSwatini Drought Preparedness. URL: https://www.gfdrr.org/en/eswatini-drought-preparedness

[39] Matondo J.I. (2020) Assessing Runoff Changes in Major Catchments in Swaziland Due to Climate Change. In: Matondo J., Alemaw B., Sandwidi W. (eds) Climate Variability and Change in Africa. Sustainable Development Goals Series. Springer, Cham. https://doi.org/10.1007/978-3-030-31543-6_5

[40] European Commission (2018). 2018 – Drought and Water Crisis in Southern Africa. JRC Technical Reports. URL: https://publications.europa.eu/en/publication-detail/-/publication/629ccc90-58b8-11e8-ab41-01aa75ed71a1/language-en

[41] UNDP (2018). Climate Change Adaptation, eSwatini. Adapting Water Resource Management in Swaziland to Manage Expected Climate Change. URL: http://adaptation-undp.org/projects/sccf-swaziland

Gender

An increasing body of research has shown that climate-related disasters have impacted human populations in many areas including agricultural production, food security, water management and public health. The level of impacts and coping strategies of populations depends heavily on their socio-economic status, socio-cultural norms, access to resources, poverty as well as gender. Research has also provided more evidence that the effects are not gender neutral, as women and children are among the highest risk groups. Key factors that account for the differences between women's and men's vulnerability to climate change risks include: gender-based differences in time use; access to assets and credit, treatment by formal institutions, which can constrain women's opportunities, limited access to policy discussions and decision making, and a lack of sex-disaggregated data for policy change.[42]

Agriculture

Overview

The agricultural sector contributes nearly 11% of the country's GDP yet occupies 75% of crop land. Additionally, over 70% of the country's rural population is dependent upon subsistence agriculture.[43] Currently the sector is being negatively impacted by variable precipitation patterns, droughts, higher temperatures and increased storm intensities. Climate change is expected to affect crop production regardless of crop type or agro-ecological zone. Planting cycles of key crops, maize, beans, sorghum may be altered for changing rain patterns. Dairy animals are expected to perform better in the Highveld and wet Middleveld particularly during the winter months. However, agricultural activity has been declining in eSwatini over the last two decades. This is due in no small part to the country recently being hit with a series of droughts. Over 70% of the country's total population (just over a million) rely on subsistence farming, and under current conditions, many survive on only one dollar per day. According to FAO's most recent hunger figures, one in three people in eSwatini is undernourished.[44]

Climate Change Impacts

Annual precipitation is one of the most fundamental climatic conditions for rain-fed agriculture and livestock productivity. The projected decrease may determine if certain crops or farm practices remain viable, and if reduced water availability might require a shift to more drought resistant crops or if farmers are required to shift investments into irrigation. Changes in precipitation provides a critical background to understand which other factors can become important, such as the temporal gaps between individual rainfall episodes, the availability of water during critical times of the seasonal cycle, or the intensity of individual rainfall events. As temperatures rise, local trends

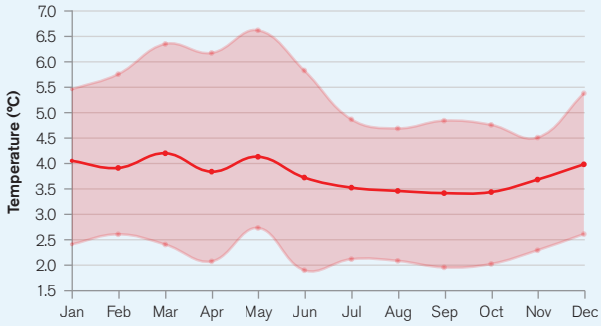
[42] World Bank Group (2016). Gender Equality, Poverty Reduction, and Inclusive Growth. URL: http://documents1.worldbank.org/curated/en/820851467992505410/pdf/102114-REVISED-PUBLIC-WBG-Gender-Strategy.pdf

[43] GAIN (2016). eSwatini Agricultural Economic Fact Sheet. URL: https://apps.fas.usda.gov/newgainapi/api/reportdownloadreportbyfilename?filename=Swaziland%20Agricultural%20Economic%20Fact%20Sheet_Pretoria_Swaziland_11-16-2016.pdf

[44] FAO (2020). eSwatini looks to a revitalized agriculture sector. URL: http://www.fao.org/in-action/swaziland-looks-to-a-revitalized-agriculture-sector/en/

in daily maximum temperatures may offer insights on these upper thresholds for specific crops, translating these potentially into changing yields (**Figure 11)**.

FIGURE 11. Projected Average Daily Max Temperature for eSwatini (RCP8.5, Reference Period, 1986–2005)[45]



Adaptation Options

Adaptation for eSwatini's agriculture sector requires an increase in the contribution of agriculture to economic development, including food security and exports. A reduction in overall poverty can make poorer, farming households more resilient to anticipated climatic changes. Specific identified activities include: conservation tillage, crop diversification, greenhouse farming, hydroponics, livestock selective breeding, micro irrigation and organic farming. Crop production may also include shifting planting periods, growing of drought tolerant crops, and raising suitable crops in appropriate regions. Adaptation in livestock production may include raising dairy cattle mainly in the Highveld and wet Middleveld which is typically cooler.[46] eSwatini has also committed to invest in agricultural development opportunities to reduce the country's food insecurity. These actions could include conservation tillage, crop diversification, green house farming, hydroponics and selective livestock breeding, among others.[47]

Water

Overview

Primary water sources in eSwatini are surface waters (rivers, reservoirs), ground water and atmospheric moisture. An expected 40% of the country's river flows will be impacted by climate change. The seven-river catchment or drainage systems in eSwatini are the Komati, Lomati, Mbuluzi, Usutu, Ngwavuma, Pongola and Lubombo. Several of these rivers rise in South Africa and all flow eventually to Mozambique. Water is relatively scare for the country and irrigation uses approximately 95% of surface water resources; irrigation is most common in the Lowveld, which is a drier part of the country and more susceptible to drought. Late onset of the rainfall season, the shortened rain periods and severe dry spells during the critical crop growth stages are expected to increase potential for crop failure. The industrial forestry sector is also using large amounts of water, however directly derived from rain and substantially reducing runoff.[48]

[45] WBG Climate Change Knowledge Portal (CCKP, 2021). eSwatini Agriculture Dashboard. URL: https://climateknowledgeportal.worldbank.org/country/eSwatini/climate-sector-agriculture

[46] FAO (2020). Swaziland looks to a revitalized agriculture sector. URL: http://www.fao.org/in-action/swaziland-looks-to-a-revitalized-agriculture-sector/en/

[47] eSwatini (2016). Nationally Determined Contributions. URL: https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Eswatini%20First/Eswatini's%20INDC.pdf

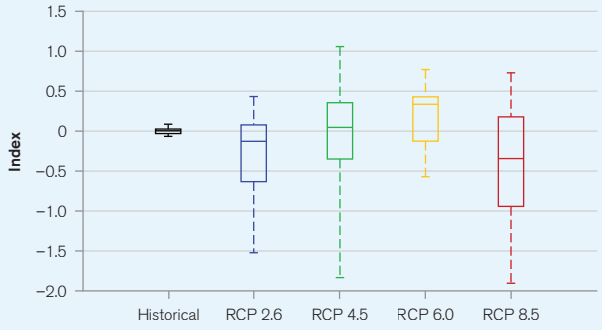
[48] Matondo J.I. (2020) Assessing Runoff Changes in Major Catchments in Swaziland Due to Climate Change. In: Matondo J., Alemaw B., Sandwidi W. (eds) Climate Variability and Change in Africa. Sustainable Development Goals Series. Springer, Cham. https://doi.org/10.1007/978-3-030-31543-6_5

Climate Change Impacts

Decrease in precipitation is expected to have negative consequences for eSwatini's riverways and catchments. This is expected to be particularly pronounced in Usuthu, Mbuluzi and Ngwavuma catchments. eSwatini's grasslands are also likely to be impacted by climate change and decreasing water availability. It is anticipated that adverse impacts due to water scarcity in the country's grasslands will impact both vegetation, biodiversity and people's livelihoods.[49] A projected riskier agricultural production environment, as is projected through increased temperatures will result in greater cropland evapotranspiration, offsetting projected marginal increases in precipitation and resulting in a more arid production environment that is more reliant on already stressed and deficient water resources. Reduced precipitation and increasing heat trends for much of the country's agricultural areas are also expected to be impacted by increasing number of consecutive dry days. Increased dry days, or days without any agriculturally meaningful rainfall (>0.1 mm/day) is highly impactful for rainfed agriculture and directly impacts soil moisture and crop growth. The trend towards more consecutive dry days and higher temperatures will increase evaporation and add stress to limited water resources, affecting irrigation and other water use

As rainfall and evaporation rates change in eSwatini, so will rates of surface water infiltration and groundwater recharge. These changes can further reduce the reliability of unimproved groundwater sources and surface water sources during droughts or prolonged dry period. These can increase strain on pumping mechanisms, leading to breakdowns if maintenance is neglected. The projected Standardized Precipitation Evapotranspiration Index (SPEI) is a drought index, which represents the measure of the given water deficit in a specific location, accounting for contributions of temperature-dependent evapotranspiration and providing insight into increasing or decreasing pressure on water resources. Negative values for SPEI represent dry conditions, with values below –2 indicating severe drought conditions, likewise positive values indicate increased wet conditions. This is an important understanding for the water sector in regards to quantity and quality of supply for human consumption and agriculture use as well as for the energy sector as reductions in water availability impacts river flow and the hydropower generating capabilities. As seen in **Figure 12**, eSwatini, at a nationally aggregated scale is expected to experience a decrease in rainfall and as seen by the graph, increased aridity for the country.

FIGURE 12. Projected Annual SPEI Drought Index in eSwatini (Reference Period, 1986–2005)[50]



[49] eSwatini (2016). eSwatini's Third National Communication to the UNFCCC. Ministry of Tourism and Environmental Affairs. URL: https://unfccc.int/sites/default/files/resource/swgnc3.pdf

[50] WBG Climate Change Knowledge Portal (CCKP, 2021). eSwatini Water Sector Dashboard. URL: https://climatedata.worldbank.org/CRMePortal/web/water/land-use-/-watershed-management?country=SWZ&period=2080-2099

Adaptation Options

According to the country's Nationally Determined Contributions, eSwatini has multiple adaptation options for its water sector. These begin with the alignment and update of the country's climate change policy with the National Water Policy and Water Act (2003). Additional opportunity exists for the development and implementation of water pricing structures to encourage efficient water use as well as reduce consumption throughout the value chain; however, this may create additional burdens for poorer households. Capacity needs to be strengthened for the development and implementation of effective early warning systems and disaster preparedness and responds. Integrated water resource management systems need to be put in place across all sectors, including land use and the environment.[51] Additional, the country has committed to actions including artificial groundwater recharge, integrated river basin management, leakage detection systems, scaled use and access for rainwater harvesting mechanisms, sand damns, solar pumps for borehole water pumping, and water recycling and reuse.[52]

Health

Overview and Climate Change

Increasing temperatures and changing precipitation patterns will affect the basic requirements for maintaining a healthy population, ensuring clean air and water, and sufficient food. Catastrophic weather events, variation in weather systems that affect food and water supplies, ecosystem changes all pose health risks. Within eSwatini, these risks also may result in increased deaths due to heat waves, and natural hazards, such as floods, vector-borne diseases such as malaria and other existing and emerging infectious diseases. Given the country's high prevalence of HIV/AIDS, these households are also expected to be particularly vulnerable.[53]

eSwatini is projected to experience record high temperatures. Increased night temperatures can result in decreased opportunity for natural cooling. Increased health threats can be projected and monitored through the frequency of tropical nights (>20°C). Tropical Nights (**Figure 13**) represents the projected increase in tropical nights across different emission scenarios (CMIP5 ensemble). Increased nighttime temperatures are projected to be minimally increased, except for the sharp increase expected under the high emission scenario. The Warm Spell Duration Index (**Figure 14)** shows the cumulative nature of a sequence of multiple days with high temperatures, which can raise the impact on the human body and lead to health issues in broad segments of the population. As seen, the warm spells are projected to rapidly increase across all emission scenarios by mid-century.

[51] eSwatini (2016). eSwatini's Third National Communication to the UNFCCC. Ministry of Tourism and Environmental Affairs. URL: https://unfccc.int/sites/default/files/resource/swgnc3.pdf

[52] eSwatini (2016). Nationally Determined Contributions. URL: https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Eswatini%20First/Eswatini's%20INDC.pdf

[53] eSwatini (2016). eSwatini's Third National Communication to the UNFCCC. Ministry of Tourism and Environmental Affairs. URL: https://unfccc.int/sites/default/files/resource/swgnc3.pdf

FIGURE 13. Projected Number of Tropical Nights (Tmin >20°C) (Reference Period, 1986–2005)[54]

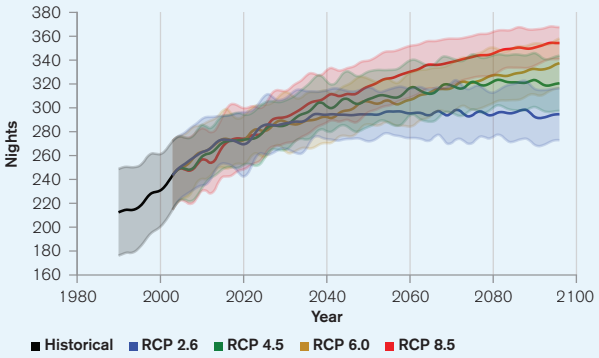
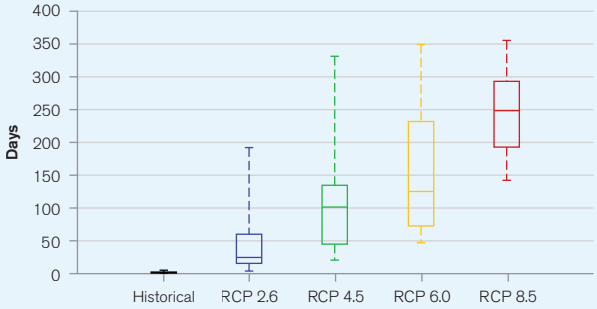


FIGURE 14. Projected Warm Spell Duration Index in eSwatini for the Period 2040 to 2059 (Reference Period, 1986–2005)[55]



Adaptation Options

eSwatini has yet to develop and/or implement a health adaptation strategy for climate change. However, several adaptation options can be to increase the awareness and understanding of health system personnel to the relationship between climate change and variability and health impacts. There has been no specific training of the personnel in regard to adaptation to climate change and mitigating its negative health impacts. Increases in training and capacity can improve the level of knowledge and skills to prevent diseases connected with climatic factors, however this knowledge remains relatively limited among the general population. eSwatini has committed to improve monitoring and surveillance systems that are not conducted at the right geographical and temporal scale that would allow observations of trends and make advance forecasts to direct interventions against climate sensitive diseases.[56] Increased investment, coupled with a targeted climate-health-adaptation research agenda, can support the identification and analysis of trends and develop indicators to improve health sector capacity to react.

Energy

Overview and Climate Change Impacts

eSwatini imports approximately 80% of its energy from South Africa's energy Supply commission (ESKOM). However, agricultural and forest-based biomass is used almost exclusively to power industrial processes in the sugarcane producing and timber producing sectors. The majority of rural households use firewood as their main energy source (contributing to environmental pollution as well as harmful health impacts such as indoor air pollution). The majority

[54] WBG Climate Change Knowledge Portal (CCKP, 2021). eSwatini Health Sector. URL: https://climateknowledgeportal.worldbank.org/country/eSwatini/climate-sector-health

[55] WBG Climate Change Knowledge Portal (CCKP, 2021). eSwatini Health Sector. URL: https://climateknowledgeportal.worldbank.org/country/eSwatini/climate-sector-health

[56] eSwatini (2016). Nationally Determined Contributions. URL: https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Eswatini%20First/Eswatini's%20INDC.pdf

of coal and electricity are used by industrial consumers, companies, town, and urban households. Bagasse, a waste product of the sugar industry in eSwatini is used by the industry for electricity and steam generation.[57]

The two main renewable sources of energy in eSwatini are biomass and hydroelectric power. Biomass fuels are available from the sugar and forestry industries whilst fuelwood is harvested from forests often by rural communities dependent upon it for their cooking and lightening energy needs. Expected climate change impacts are likely to adversely impact the energy generating sector through reduced water availability, and increasingly challenge agriculture producing environments. Additionally, the country has a high-rate of deforestation, presenting further, future stress for household biomass consumption for energy.[58] The majority of eSwatini's population are reliant upon biomass and the country's ecosystems for survival, with climate change impacts presenting increasing hardships for the country's poor.[59]

Adaptation Options

The country's relatively large sugar cane industry is believed to present attractive mitigation opportunities for ethanol generation. Additional adaptation options include switching to solar powered lighting and increasing hydropower generation. The Energy Department in the Ministry of Natural Resources and Energy has initiated a program to promote the efficient use of energy which will have an effect on reducing emission from energy from the current baseline condition. However, the greatest limitation remains eSwatini's importation of 80% of its energy from South Africa. This is predominantly thermal and hydropower generation requires a Southern African Power Pool (SAPP) baseline which is also predominantly thermal-based. The government has also committed to protecting the country's biodiversity and ecosystems sector through the restoration of ecological infrastructure and improved natural resource management programs.[60]

ADAPTATION

Institutional Framework for Adaptation

The institutionalization of climate change issues and processes is mandated to the eSwatini Meteorological Services under the Ministry of Tourism and Environmental Affairs, which also houses the National UNFCCC Focal Point. The department works closely with the eSwatini Environmental Authority in screening and approving possible projects. Within the Department of Meteorology, a range of key specialists covering a range of climate change related expertise was initially assembled to investigate and prepare advisory information to the Government of eSwatini.

[57] eSwatini (2016). eSwatini's Third National Communication to the UNFCCC. Ministry of Tourism and Environmental Affairs. URL: https://unfccc.int/sites/default/files/resource/swgnc3.pdf

[58] eSwatini (2016). eSwatini's Third National Communication to the UNFCCC. Ministry of Tourism and Environmental Affairs. URL: https://unfccc.int/sites/default/files/resource/swgnc3.pdf

[59] eSwatini (2016). Nationally Determined Contributions. URL: https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Eswatini%20First/Eswatini's%20INDC.pdf

[60] eSwatini (2016). Nationally Determined Contributions. URL: https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Eswatini%20First/Eswatini's%20INDC.pdf

These technical working groups have prepared the GHG inventory, assessment of the country's vulnerability and adaptation situation, and the mitigation assessment. Each of these working groups contributed to comprise the country's First and Second National Communications. Technical and logistical support is provided by the Department of Meteorology and financial support from the Government and the United Nations Development Program, as well as the United Nations Environment Program.[61]

Policy Framework for Adaptation

eSwatini submitted its Third National Communication to the UNFCCC in 2016 and its Nationally Determined Contributions in 2016. The country's Ministry of Tourism and Environmental Affairs established an ad hoc multi-sectoral National Climate Change Committee (NCCC) comprising of various government ministries. The NCCC is responsible for developing and coordinating adaptation programs and projects. This committee also conducts education and public awareness campaigns on climate change and is currently working to guide the establishment of a technical board comprising of representatives from NGOs and the private sector. The Department of Meteorology is the Designated National Authority (DNA) for the Clean Development Mechanism (CDM). Additional partnerships include, the University of eSwatini, the eSwatini Water and Agricultural Development Enterprise, the eSwatini Water Services Corporation, and the eSwatini Electricity Company.

Since the publication of its First National Communication (2002), eSwatini has undertaken a number of activities that can broadly be presented as the first steps towards addressing the needs of climatic change and these include:

- establish a National Climate Change Committee to strengthen climate change mainstreaming in the country,
- formulate a National Bio-fuel Strategy and Action Plan which is aimed at identifying entry points for bio-ethanol usage, and
- conduct research on drought tolerant food crops in collaboration with university partnerships, regional seed companies and research institutions.

eSwatini aims to develop a National Adaptation Plan (NAP) by the early 2020s, with three primary objectives:

1) Identify the level of climate risk for the country given the economic, social and environmental constraints of the country.
2) Reduce vulnerability to anticipated climate trends and build adaptive capacity and resilience. This can be achieved thought integrated water resource management, climate smart agriculture, early warning mechanisms, disaster risk management and emergency preparedness and sustainable land management.
3) Facilitate the integration of climate change adaptation into relevant new and existing policies and programs and activities, orientated towards the country's development agenda.[62]

[61] eSwatini (2016). eSwatini's Third National Communication to the UNFCCC. Ministry of Tourism and Environmental Affairs. URL: https://unfccc.int/sites/default/files/resource/swgnc3.pdf

[62] eSwatini (2016). eSwatini's Third National Communication to the UNFCCC. Ministry of Tourism and Environmental Affairs. URL: https://unfccc.int/sites/default/files/resource/swgnc3.pdf

National Frameworks and Plans

- Third National Communication to the UNFCCC (2016)
- Nationally Determined Contributions (2016)
- National Sustainable Energy for All, Country Action Plan (2014)
- Energy Efficiency and Conservation Policy (2009)
- Disaster Management Act (2006)
- Comprehensive Agricultural Sector Policy (2005)
- National Food Security Policy for ESwatini (2005)
- National Biodiversity Conservation and Management Policy (Final 2001)

Recommendations

Research Gaps

- Improve science-based understanding of the nature and magnitude of physical and biophysical climate change impacts for eSwatini and the southern Africa region
- Improve understanding of key vulnerabilities to climate change for eSwatini, including the anticipated development impact, cost and necessary adaptation needs
- Widen the participation of the public, scientific institutions, women and local communities in planning and management, taking into account approaches and methods of gender equity
- Improve understanding of models and use of estimate values for national conditions
- Insufficient well trained and skilled people on climate change

Data and Information Gaps

- Improve collection of observational data through the additional of weather stations and hydro-meteorological instrumentation
- Establish early warning systems for dangerous hydrometeorological phenomena and climate risk management
- Build-up knowledge, skills and technologies for improving water use efficiency in agriculture, specifically to increase awareness of long-term groundwater risks
- Improve awareness and access to information about climate change for all groups of population
- The National Meteorology Department should produce simplified versions of seasonal weather forecast reports for farmers
- Agricultural extension officers advising farmers on crop and livestock production should be sensitized to and trained in climate change issues, as well as in interpreting seasonal weather reports
- Correct the lack of a climate change data and information collection framework and data base management system

Institutional Gaps

- Climate change should be addressed and streamlined in national agendas
- The government should upscale the construction of small dams, especially in the Lowveld area, which is more vulnerable to climate change. Communities could use the water captured to produce crops and vegetables to improve their livelihoods

- Institutions should develop capabilities for a more defined cost of inaction as well as key actions across water resources, energy, agriculture, forestry, transport, and health sectors to provide compelling economic arguments and a broad-brush "road map" and the next steps for climate-smart actions
- Need for implementation of cross-sectoral climate-smart solutions at national and subnational levels
- Implement regional-scale cooperation among countries in Southern Africa and to emphasize the benefits of collaboration and institution building in the region
- Establish a National Steering Committee on Climate Change to ensure the integration of low-carbon, climate-resilient considerations into development planning by providing overall guidance, political support, and leadership, ensuring adequate resource allocation and monitoring the results related to the national efforts to address and adapt to climate change
- Establish or use an existing mechanism for a Regional Southern African Steering Committee on Climate Change. The committee's main responsibilities would be to provide overall guidance, political support, and leadership and to serve as a platform for continuous coordination of regional efforts to address and adapt to climate change

CLIMATE RISK COUNTRY PROFILE

ESWATINI

WORLD BANK GROUP