



**CVF
V20**



CVM3 Regional Workshop: Southern Africa

Brent Cloete

21 February 2023 | Online | 13:00 – 14:30



**GLOBAL
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ADAPTATION**



FINRES



Introduction

Context

- Climate impacts are being seen, felt, and measured today
- **Current 1.1°C** above pre-industrial levels → **already impacting** health and development outcomes, threatening cities and rural settlements, and disrupting economies
- Further climate change is inevitable
- Developmental challenges mean Africa lacks resilience to cope with climate change
- Adapting beyond 1.5°C global temperature increase will be struggle

Climate Vulnerability Monitor 3 (CVM3)

Research Consortium

Global Center on Adaptation (GCA) and the Climate Vulnerable Forum (CVF) and the Vulnerable Group of Twenty (V20): Research Consortium Lead

- Overall Coordination
- Editorial Leadership for the CVM3 Report

Biophysical and Socio-economic Impact Analysis

Scientific Consortium

- Climate Analytics, Lead
- Global Data Lab
- Mercator Climate Change Institute
- Climate Media Factory

Human Health Impact Analysis

- The Lancet Countdown

Macro-economic Impact Analysis

- Finres

Temperature
Daily maximum near-surface air temperature
Daily minimum near-surface air temperature
Daily mean near-surface air temperature
Water
Precipitation (rainfall+snowfall)
Snowfall
Surface runoff
Discharge
Maximum daily discharge
Minimum daily discharge
Drought Index
Extreme precipitation
Wind
Horizontal wind speed
Agriculture
Total soil moisture content
Maize yields
Rice yields (first growing period)
Rice yields (second growing period)
Soy yields
Winter wheat yields
Spring wheat yields (summer wheat)

Heat and Health
Exposure of vulnerable populations to heatwaves
Heat and physical activity
Loss of labor productivity
Heat-related mortality
Wildfires
Exposure to very high or extremely high wildfire risk
Infectious Diseases
Dengue
Vibrio
Malaria
Heat and Food Security
Crop yield potential
Heat and food insecurity

GDP Per Capita Growth
Inflation
Interest Rates

CLIMATE VULNERABILITY MONITOR 3



Photo credit: Aleksander Bolbot

Biophysical Data Explorer

[Start](#)



Photo credit: Africa Studio

Health Data Explorer

[Start](#)

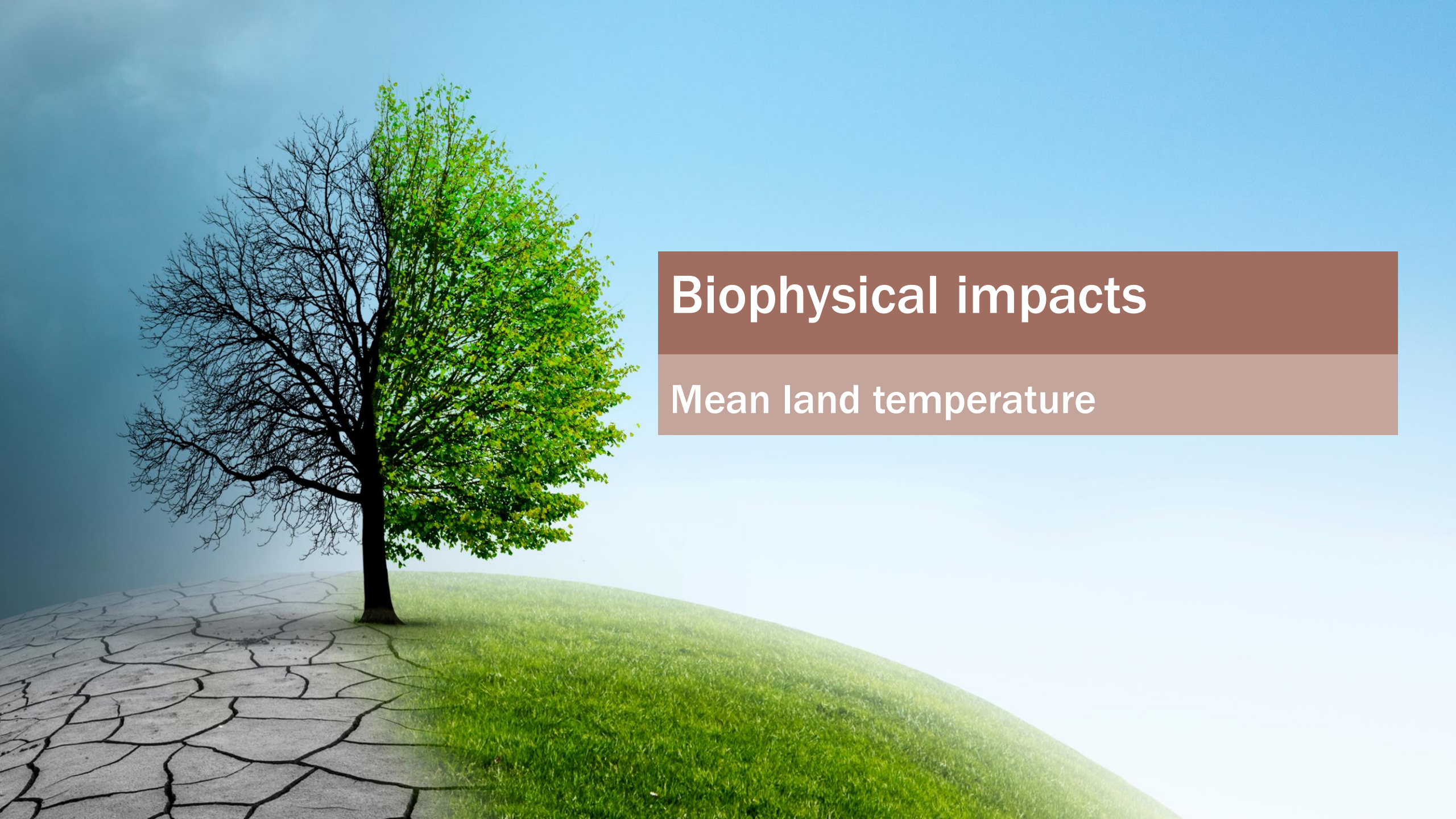


Photo credit: Gina Sanders

Economics Data Explorer

[Start](#)

<https://www.v-20.org/climatevulnerabilitymonitor>

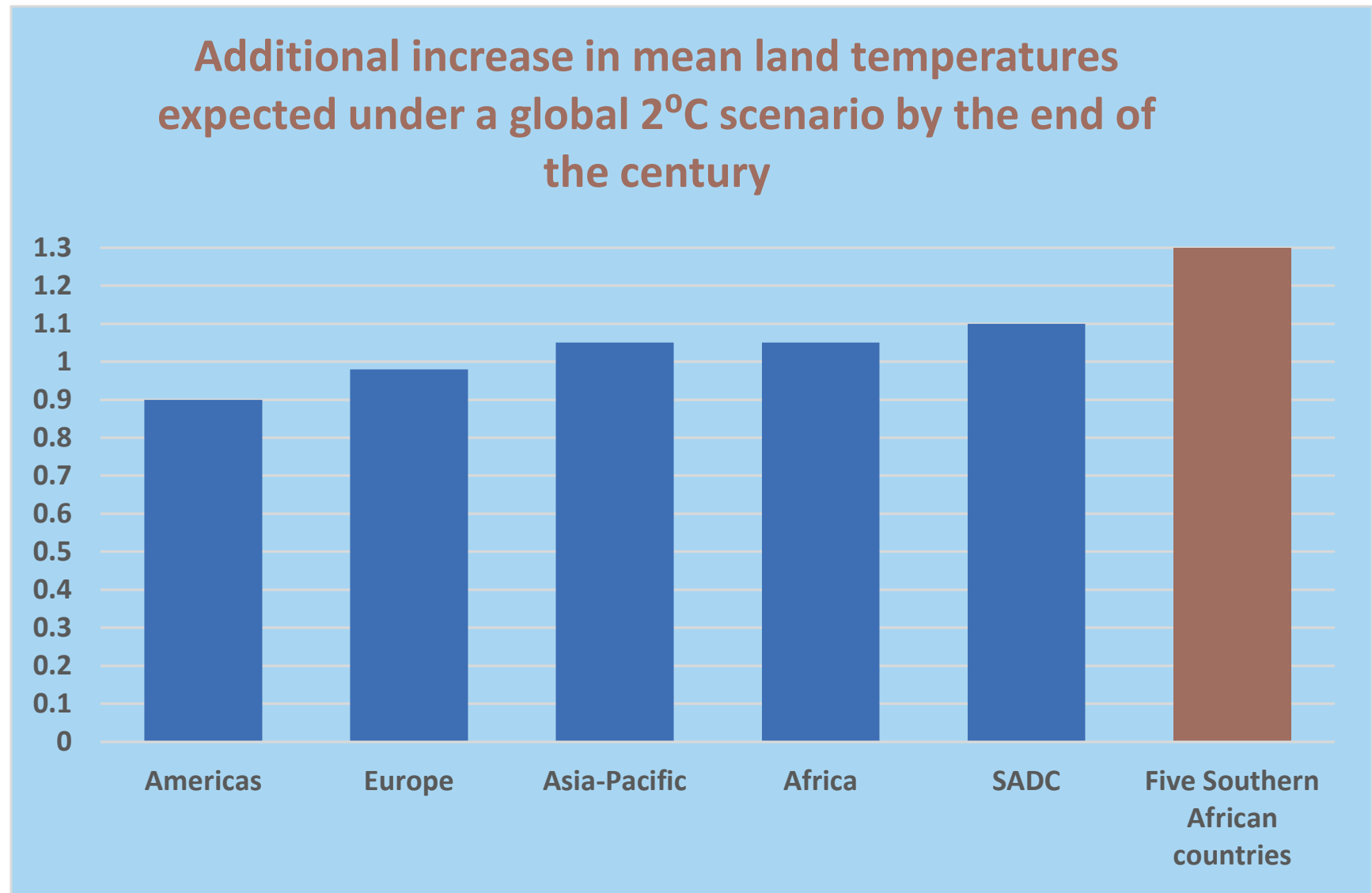


Biophysical impacts

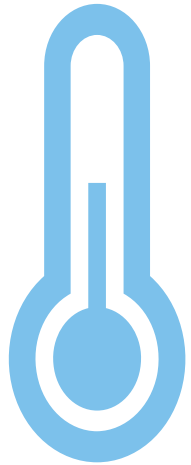
Mean land temperature

- Southern Africa expected to warm faster than global average

- Under a global 3.6°C scenario, average temperatures in Southern Africa will increase by an **additional 4.2°C**



Droughts and extreme precipitation



2°C



- 10.6 additional severe drought events every 20 years by 2090 (broadly similar to rest of SADC)



- Risk of extreme precipitation events also increases (3.1% versus 9.3% in rest of SADC)
- Highest regional increase in extreme precipitation risk is in Botswana (5.3%).

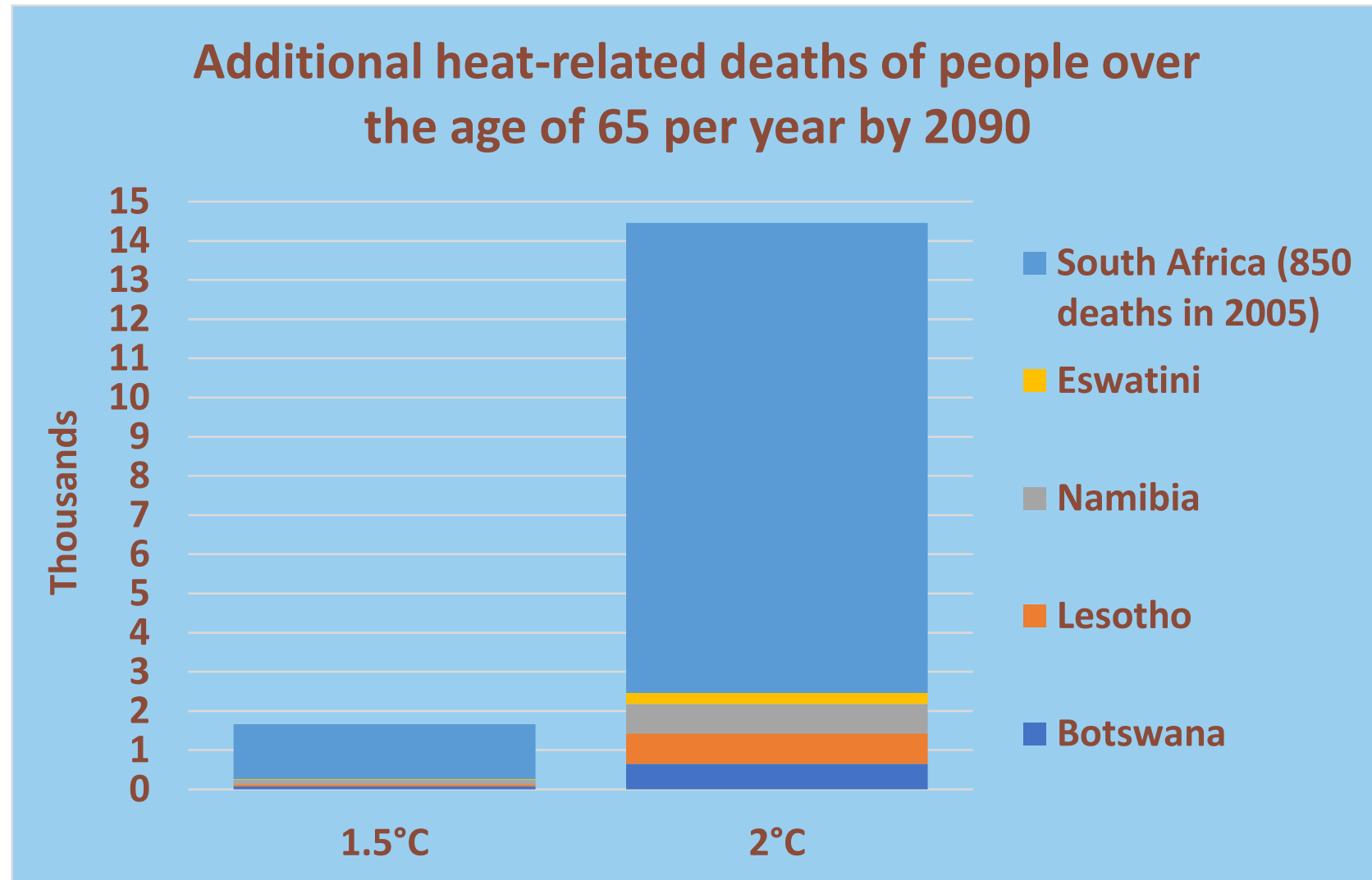


Health and wellbeing

Heat exposure

Heat-related deaths and productivity

- 2°C: by 2090 4.3% of the hours worked outdoors with no protection from the sun will be lost in Southern Africa



Wildfire

- **2°C**: By 2090 each person in Southern African is exposed to **11.14** additional days with very high or extremely high wildfire danger (falls to **6.71 days at 1.5°C**)
- **2°C**: Max increase in Botswana (**26.38** additional days)

Infectious diseases

- Prevalence of Malaria is only marginally impacted under 2°C and 3.6°C scenarios (apart from in Lesotho under the latter)
- Significant increase in prevalence of dengue fever everywhere apart from Lesotho (mosquito-borne disease responsible for high disease burden globally)
- Dengue in South Africa: 1.5°C causes basic reproduction number (R) to increase from below 1 currently (0.89) to 1.17 by 2030 – meaning that outbreak could continue to spread unless measures are implemented to contain it

Food insecurity

- Wheat yields are significantly impacted by climate change, and the impact increases with global temperatures

Average global temp increase	winter wheat yield			spring wheat yield			Soy yield		
	1.5°C	2°C	3.6°C	1.5°C	2°C	3.6°C	1.5°C	2°C	3.6°C
Botswana	-4.3%	-4.8%	-18.0%	-3.8%	-6.5%	-17.6%	1.2%	1.3%	-3.7%
Lesotho	-1.0%	-2.8%	-8.9%	2.3%	1.1%	5.3%	12.0%	11.6%	13.0%
Namibia	-2.1%	-2.5%	-7.3%	-0.2%	-0.6%	-4.7%	2.8%	2.3%	-1.1%
Eswatini	-4.3%	-11.5%	-29.9%	-0.3%	-2.2%	-0.1%	5.0%	5.2%	5.4%
South Africa	-1.1%	-2.6%	-11.1%	0.5%	-0.7%	0.3%	4.2%	3.9%	4.9%
Average	-2.6%	-4.8%	-15.0%	-0.3%	-1.8%	-3.4%	5.0%	4.8%	3.7%

Food insecurity (2)

Average global temp increase	Temperature-driven 20-year mean change in the time it takes for maize to reach maturity by 2090 (number of days)		
	1.5°C	2°C	3.6°C
Botswana	-8.00	-10.00	-34.00
Lesotho	-34.00	-44.00	-76.00
Namibia	-9.00	-13.00	-38.00
Eswatini	-10.00	-15.00	-42.00
South Africa	-21.00	-27.00	-61.00
Average	-16.40	-21.80	-50.20

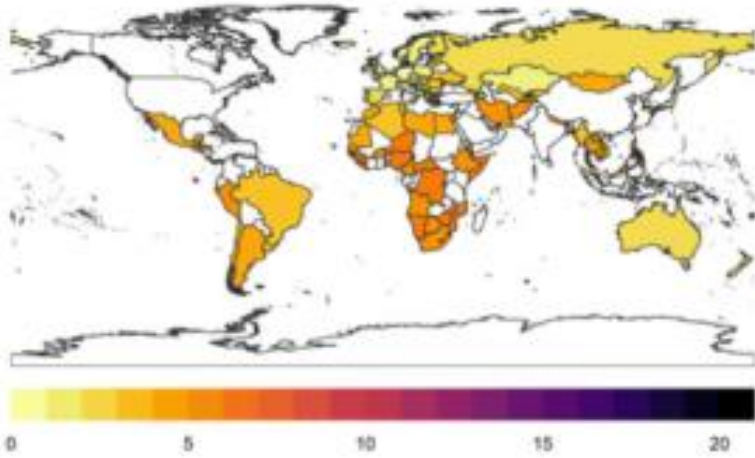
- 3.6°C: Lesotho is country **globally where maize crop maturity is most severely impacted** (followed by South Africa)

Food insecurity (3)

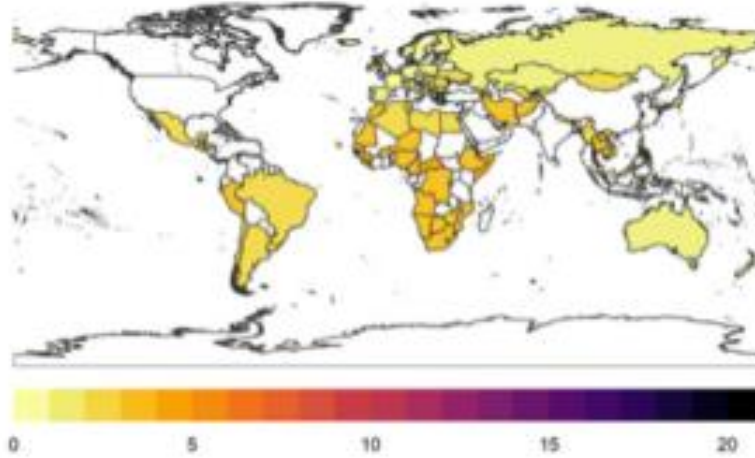
- Heatwaves and droughts also increase food insecurity via reduced yields, lower agricultural and non-agricultural labour productivity (crop production and incomes fall) → upward pressure on food prices and disruptions to supply chains

Average global temp increase	Change in moderate-severe food insecurity due to change in the number of heatwave days by 2090 [%-points]		
	1.5°C	2°C	3.6°C
Botswana	5.90	3.20	18.30
Lesotho	6.60	3.70	19.70
Namibia	6.00	3.30	18.90
Eswatini	5.80	3.20	18.10
South Africa	5.40	3.00	17.30
Average	5.94	3.28	18.46

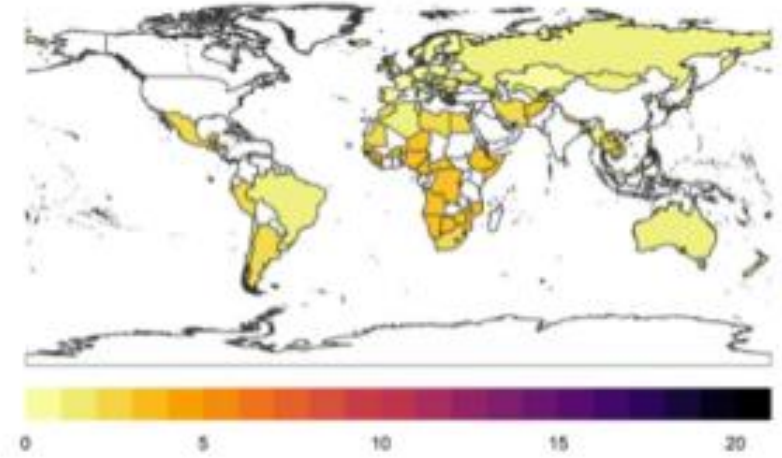
SSP1-RCP2.6 (2021 - 2040)



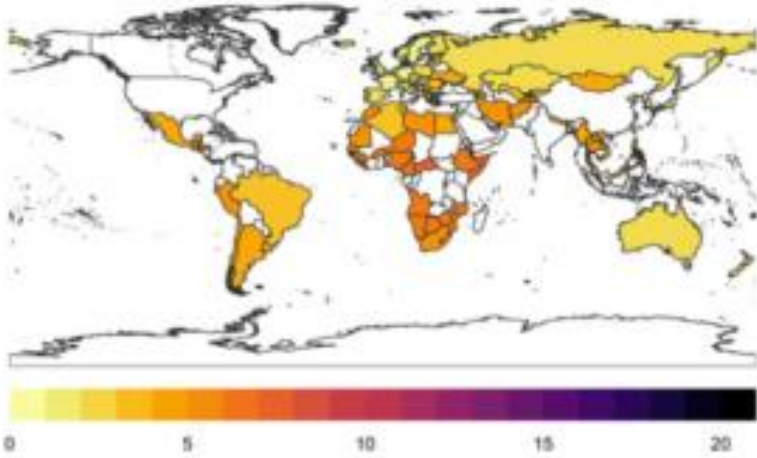
SSP1-RCP2.6 (2041 - 2060)



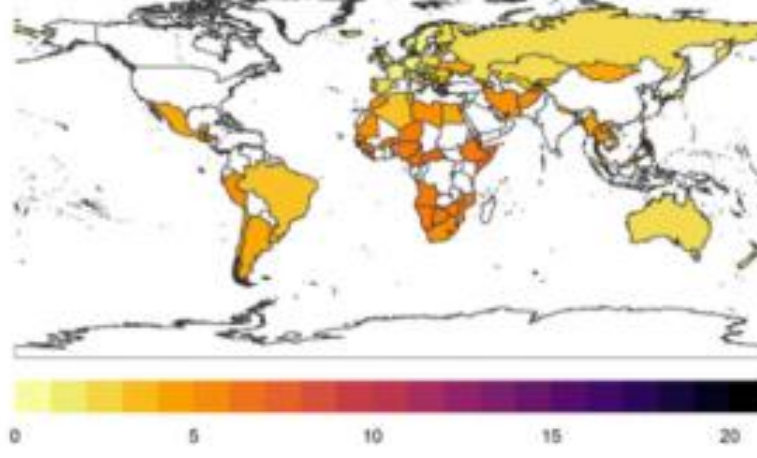
SSP1-RCP2.6 (2081 - 2100)



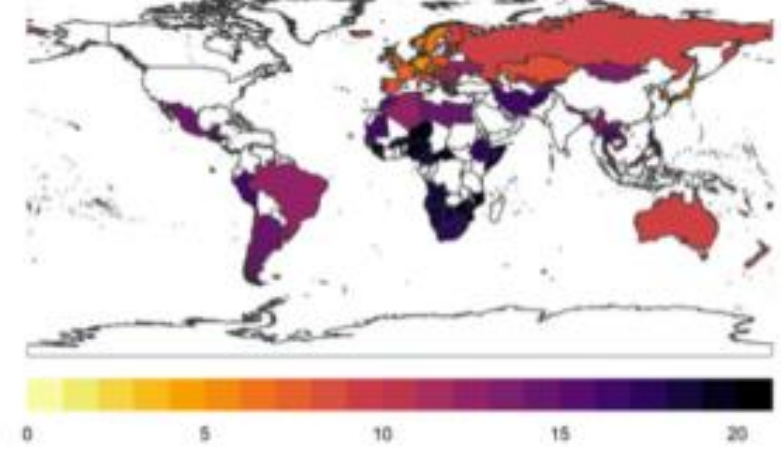
SSP3-RCP7.0 (2021 - 2040)



SSP3-RCP7.0 (2021 - 2040)



SSP3-RCP7.0 (2081 - 2100)



Change in moderate to severe food insecurity linked to heatwave days relative to 1995-2014 baseline



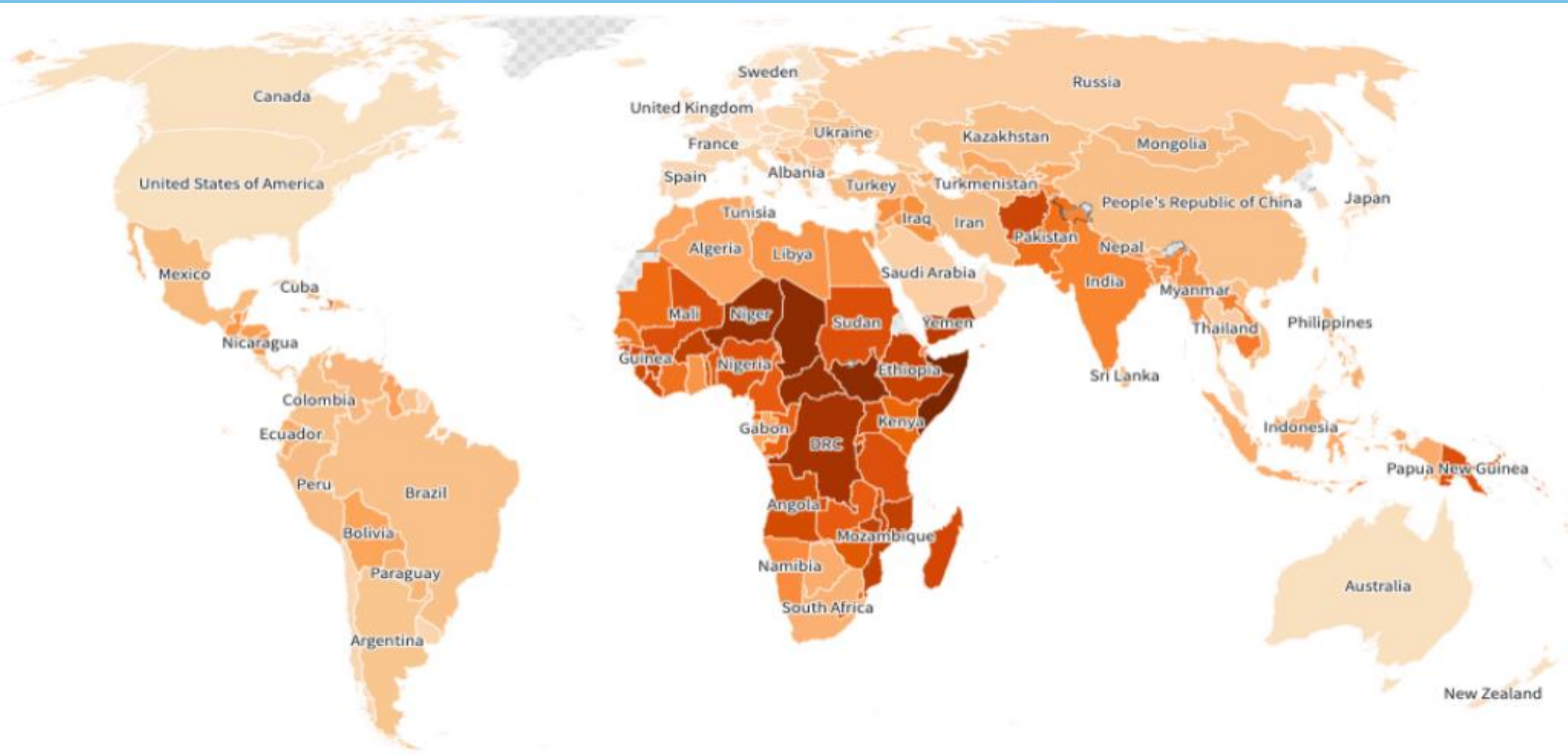
Climate risk and vulnerability

Continent-wide perspective

Climate risk and vulnerability

Global Data Lab (GDL) Vulnerability Index considers the vulnerability of countries to climate change impacts. Index scale runs from 0 to 100, with 0 indicating the lowest and 100 the highest vulnerability.

The IPCC *Sixth Assessment Report* defines **vulnerability** as “the **propensity or predisposition to be adversely affected**. Vulnerability encompasses ... **sensitivity or susceptibility to harm** and lack of **capacity to cope and adapt**”.



Relative climate risk and vulnerability

Possible impacts

- Climate-attributable displacement and migration not modelled as part of CVM3
- BUT - **marked difference in vulnerability** between three largest economies in Southern Africa and rest of Sub-Saharan means that significant migration is likely in response to climate disruption and natural disasters
- **Potential of immigration to create social instability in unequal and low growth environment** already visible in South Africa



Macroeconomic impacts

GDP

Changes in GDP growth

	Average reduction in GDP per capita growth per year (%) by 2090	
Average global temp increase	<2°C	3°C
Botswana	-2.50	-10.6
Lesotho	-1.20	-5.9
Namibia	-1.30	-7.8
Eswatini	-3.20	-11.9
South Africa	-3.40	-13.5
Average	-2.32	-9.94

GDP caveats

- Estimates based on **climate impacts within countries**
- In reality, and particularly under an extreme climate change scenario, offshore impacts on export markets, supply chains or international commodity markets will impact on in-country economic growth
- Significant real and financial linkages between economies in the region facilitated by membership of the Southern Africa Customs Union (SACU) and currency pegs
- **Impact of climate change on economic growth in region probably underestimated**

Close real and financial linkages will lead to the transmission of climate-related economic shocks between countries within region

Inflation and interest rates

- Climate change is expected to lead to increase in inflation of 0.58 %-points in region by 2090 if global temperature rise is contained to 2°C (and 1.94 %-points if not)
- This is relatively low compared to expected impacts elsewhere
- Combined with GDP impacts → increase in interest rates of 19 (2°C) or 60 (3.6°C) basis points by 2090

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Inflation and interest rates caveats

- Modelled impacts driven purely by **acute in-country climate impacts**
- Chronic in-country impacts could place upward pressure on inflation and interest rates
 - e.g. persistent deterioration in food security, or increased climate-related migration
- Food insecurity will drive up inflation and imports of food will negatively impact current account and place upward pressure on interest rates
- **Impacts on inflation and interest rates probably underestimated**

Integrated supply chains and capital markets mean higher climate-induced inflation and interest rates abroad are likely to be transmitted to region

A conceptual image featuring a tree on a cracked, stone-paved path that leads to a lush green field. The tree's left side is bare, while its right side is full of vibrant green leaves, symbolizing a transition or a gap in knowledge. The background is a clear blue sky.

Knowledge gaps

African context

- **Significantly less country-specific research** into physical climate impacts and adaptation strategies in Africa than elsewhere
- Adaptation research focuses heavily on **economic sectors** while neglecting **environment, health and infrastructure**
- **Behavioural and cultural responses and ecosystems-based adaptation approaches are favoured**, and less attention is paid to **institutional and technological or infrastructural responses**
- **Lack of information may be restricting scope of activities** and limiting uptake of available concessional adaptation finance

Recommendations for policymakers

4. A **just low carbon transition is critical** to manage climate-driven migration by supporting sustainable development and increasing social cohesion
5. Increased funding for **country- and Southern African-specific** climate and adaptation **research** required
6. Multilateral and bilateral development assistance and regional development finance institutions NB to support climate response given **positive cross-country externalities** and **pressing domestic socioeconomic and development challenges** within the region



Recommendations

Recommendations for policymakers

1. Exposure to extreme temperatures highlights importance of **climate-resilient urban (re)design**
 - E.g. better insulation of buildings, more green spaces and cost effective solutions like cool roofing and cool pavements
2. **Health systems should be strengthened** and surveillance, early warning, and response systems put in place to deal with evolving health threats
3. **Policies that increase both availability and affordability of food** can combat food insecurity
 - E.g. expanding social safety nets, supporting climate smart agriculture and resilient food systems, strengthening regional food value chains and using competition policy to moderate food prices



Conclusion

Conclusion

- CVM3 analysis shows climate risks in Southern Africa are **real, significant and present**
- Differential impacts of climate change illustrates **value of intra- and inter-regional approaches**
- Areas to **prioritise** are clear
- **CVM3 data explorer** provides powerful and easy-to-use tool to support design of interventions to increase regional resilience and to assess relative benefits of interventions in different areas



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Thank You!

<https://econrsa.org/publications/climate-vulnerability-of-southern-africa/>

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