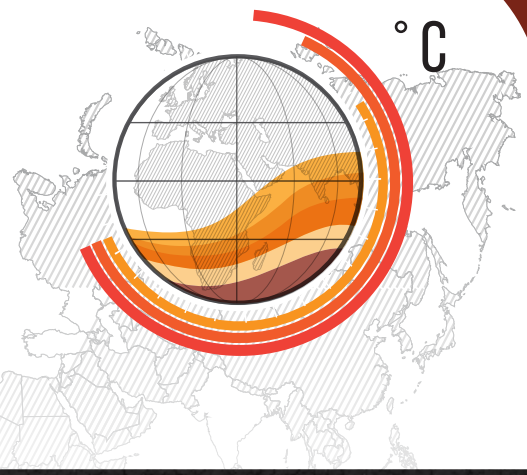
WHAT GLOBAL WARMING OF 1.5°C AND HIGHER MEANS FOR NAMIBIA



The Paris Agreement has a goal of limiting global warming well below 2°C, ideally 1.5°C. Understanding the local-level impacts of these global temperature targets is crucial for informing climate change adaptation needs and actions. To date, mitigation pledges by nations fall far short of what is needed, with the world on track to warm by 3.2°C by the end of the century[1].

For Namibia, local warming and drying will be greater than the global average. So, even a 1.5°C increase in global temperature will have severe local impacts, negatively affecting water supply, agriculture, health, and other vulnerable sectors. The 1.5°C threshold could be breached within the next decade, and the 2°C threshold the decade after[2]. This means there is an urgent need to accelerate Namibia's adaptation responses.

LOCAL IMPACTS IN NAMIBIA

		GLOBAL WARMING ABOVE PRE-INDUSTRIAL LEVELS			
		1.5°C	2°C	2.5°C	3°C
Projected climate changes[3]					
CLIMATE	Mean temperature (°C)	▲ 2	▲ 2.7	▲ 3.3	▲ 4
	Heat waves (days)	▲ 50	▲ 78	▲ 114	▲ 148
	Annual rainfall	▼ 4%	▼ 7%	▼ 11%	▼ 14%
	Heavy rainfall (days)	▼ 1	▼ 1	▼ 2	▼ 2
	Dry days	▲ 12	▲ 17	▲ 22	▲ 27
Estimated impacts[4]					
WATER	Evapotranspiration rates[5]	▲ 10%	▲ 14%[6]	▲ 17%[6]	▲ 20%[6]
	Surface runoff[7]	▼ 19%[6]	▼ 30%[6]	▼ 40%[6]	▼ 50%[6]
	Groundwater recharge rates[8]	▼ 33%[6]	▼ 49%[6]	▼ 66%[6]	▼ 82%[6]
AGRICULTURE	Cereal crops[5] (productivity)	▼ 5%[6]	▼ 10%	▼ 15%[6]	▼ 20%
	Livestock[5] (productivity)	▼ 5%	▼ 20%	▼ 35%	▼ 50%
HEALTH	Malaria[9] (months of risk)	▼ 23%[6]	▼ 34%[6]	▼ 44%	▼ 56%[6]
	Heat stress[10] (number of days of exposure)	▲ 21	▲ 41	▲ 41	▲ 188
BIODIVERSITY	Desert encroachment[5]	▲ 11%[6]	▲ 18%[6]	▲ 18%	▲ 43%
	Species loss[11]	▲ 30%[6]	▲ 40%	▲ 50%	▲ 60%

[1] Climate Action Tracker. https://climateactiontracker.org/global/cat-thermometer.
[2] Nkemelang, T. et al. 2018. Determining what global warming of 1.5°C and higher means for the semi-arid regions of Botswana, Namibia, Ghana, Mali, Kenya and Ethiopia: A description of ASSAR's methods of analysis. https://bit.ly/2yHbWPf.
[3] Based on climate modelling by T. Nkemelang. University of Cape Town, South Africa.
[4] Based on data analysis by R. Bouwer. University of Cape Town, South Africa.
[5] Reid, H., Sahlén, L., Stage, J. and MacGregor, J. 2008. Climate change impacts on Namibia's natural resources and economy. *Climate Policy*. https://doi.org/10.3763/cpol.2008.0521.
[6] Extrapolated assuming a linear progression with no threshold being reached.
[7] Arnell, N.W., Hudson, D.A. and Jones, R.G. 2003. Climate change scenarios from a regional climate model: Estimating change in runoff in southern Africa. *Journal of Geophysical Research: Atmospheres*. https://doi.org/10.1029/2002JD002782.
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[11] Midgley, G., Hughes, G., Thuiller, W., Drew, G. & Foden, W. 2005. Assessment of potential climate change impacts on Namibia's floristic diversity, ecosystem structure and function.Climate Change Research Group: South African National Biodiversity Institute. Cape Town.

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Adaptation at Scale in Semi-Arid Regions

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IMPACTS OF GLOBAL WARMING THRESHOLDS ON NAMIBIA'S CLIMATIC ZONES

	HYPER ARID				ARID SOUTH				ARID NORTH				SEMI-ARID SOUTH				SEMI-ARID NORTH				NAMIBIA OVERALL			
	1.5°C	2°C	2.5°C	3°C	1.5°C	2°C	2.5°C	3°C	1.5°C	2°C	2.5°C	3°C	1.5°C	2°C	2.5°C	3°C	1.5°C	2°C	2.5°C	3°C	1.5°C	2°C	2.5°C	3°C
Annual rainfall (%)	-6	-9	-12	-16	-7	-9	-16	-18	-4	-6	-9	-13	-3	-8	-8	-12	-4	-6	-9	-12	-4	-7	-11	-14
Duration of dry spells (days)	+ 10	+ 17	+ 18	+ 25	+ 12	+ 18	+ 22	+ 28	+ 13	+ 17	+ 21	+ 28	+ 12	+ 17	+ 22	+ 30	+ 13	+ 17	+ 21	+ 28	+ 12	+ 17	+ 22	+ 27
Duration of wet spells (days)	0	0	-1	-1	0	-1	-1	-1	0	-1	-1	-1	-1	-1	-2	-1	-1	-1	-2	-2	-1	-1	-1	-1
Heavy rainfall days (>10mm/day)	0	0	0	0	0	-1	-1	-1	0	-1	-1	-2	-1	-2	-2	-2	-1	-2	-3	-4	-1	-1	-2	-2
Extreme heavy rainfall days (>20mm/day)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Amount of rain in heavy rainfall events (%)	0	-2	-5	-7	+1	+2	-4	-7	+5	+5	+5	+1	+2	+3	+1	0	+5	+1	+3	+8	+6	+5	+1	+1
Amount of rain in extremely heavy rainfall events (%)	+15	+12	+8	+3	+11	+11	+3	-4	+19	+21	+22	+12	+13	+19	+17	+12	+14	+14	+25	+26	+15	+13	+18	+21
Amount of rain in highest rainfall day (%)	0	-2	-3	-2	0	0	-2	-4	+2	+4	+3	+4	+4	+4	+5	+4	+5	+5	+5	+6	+3	+3	+3	+2
Amount of rain in highest five consecutive rainfall days (%)	0	-5	-5	-4	+1	-2	-3	-5	+2	+2	+4	+3	+2	+1	+2	+2	+2	+2	+2	+4	+3	+1	+2	+1
Temperature change (°C)	+1.6	+2.2	+2.7	+3.2	+1.9	+2.6	+3.2	+3.8	+2.0	+2.7	+3.4	+4.0	+2.1	+2.9	+3.5	+4.2	+2.1	+2.8	+3.5	+4.1	+2.0	+2.7	+3.3	+4.0
Number of hot days (>90th percentile)	+73	+105	+139	+171	+73	+103	+134	+159	+85	+124	+157	+189	+86	+125	+164	+201	+89	+128	+168	+205	+81	+118	+153	+184
Number of hot nights (>90th percentile)	+77	+111	+147	+183	+63	+91	+124	+150	+78	+111	+150	+183	+86	+125	+165	+198	+95	+136	+179	+216	+75	+111	+150	+183
Number of cold days (<10th percentile)	-40	-45	-49	-51	-31	-37	-40	-43	-30	-36	-39	-42	-30	-35	-39	-41	-30	-35	-39	-41	-33	-37	-41	-43
Number of cold nights (<10th percentile)	-49	-54	-57	-59	-40	-45	-49	-52	-41	-45	-48	-50	-42	-46	-49	-50	-42	-46	-49	-51	-41	-46	-49	-51
Duration of heat waves (days)	+38	+65	+95	+126	+34	+61	+89	+117	+53	+84	+123	+160	+59	+92	+134	+174	+59	+96	+146	+180	+50	+78	+114	+148