# WHAT GLOBAL WARMING OF 1.5°C AND HIGHER MEANS FOR KENYA

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 Kenya, local warming will be greater than the global average, with significant impacts for the already-warm climate. Even a 1.5°C increase in global temperature will severely affect agriculture, health, and other vulnerable sectors. Under an increasing emissions trajectory, the 1.5°C threshold could be breached within the next decade, and the 2°C threshold the decade after[2]. As impacts on climate extremes and vulnerable sectors will worsen with each half degree increment, and compromise Kenya's development agenda, there is an urgent need to accelerate the country's adaptation responses.

°C

LOCAL IMPACTS IN KENYA
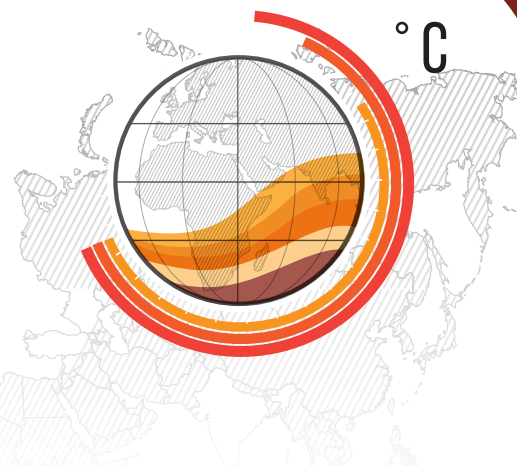
GLOBAL WARMING ABOVE PRE-INDUSTRIAL LEVELS

Projected climate changes[3]		Local Impact	1.5°C	vs	2°C	vs	2.5°C	vs	3°C
	CLIMATE	Mean temperature (°C)	▲ 1.7		▲ 2.2		▲ 2.8		▲ 3.3
		Heat waves (days)	▲ 92		▲ 155		▲ 201		▲ 226
		Annual rainfall	▲ 5%		▲ 8%		▲ 11%		▲ 12%
		Heavy rainfall (days)	▲ 1		▲ 2		▲ 2		▲ 3
		Percentage of total rainfall falling within heavy downpours[4]	21%		23%		24%		25%

Estimated impacts[5]		Local Impact	1.5°C	vs	2°C	vs	2.5°C	vs	3°C
	WATER	Lake Victoria Basin[6] (runoff)	▲ 46%		▲ 50%[7]		▲ 88%		▲ 91%[7]
		Country-wide streamflow[8]					▲ 50%		
	AGRICULTURE	Wheat and groundnuts[9] (yield)	▼ 14%[7]		▼ 24%[7]		▼ 34%[7]		▼ 43%[7]
		Maize[10] (yield)	▲ 4%		▲ 7%		▲ 7%		▲ 7%
	LIVESTOCK	Small livestock farms[11] (income)	▼ 6%[7]		▼ 9%[7]		▼ 13%		▼ 17%[7]
		Large livestock farms[11] (income)	▼ 11%[7]		▼ 19%[7]		▼ 26%		▼ 35%[7]
	HEALTH	Child malnutrition[9] (increased prevalence linked to climate change)	▲ 2%		▲ 2.5%[7]		▲ 3%		▲ 3.5%[7]
		Malaria[12] (months of risk)	▲ 32%[7]		▲ 47%[7]		▲ 70%		▲ 78%[7]
		Diarrheal death linked to climate change[13] (% of all diarrheal deaths)	9%		10%[7]		12%[7]		13%

[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] As an indicator of flood risk.
[5] Based on data analysis by R. Bouwer. University of Cape Town, South Africa. Empty blocks indicate a lack of available information.
[6] Githui, F., Gitau, W., Mutua, F., and Bauwens, W. 2009. Climate change impact on SWAT simulated streamflow in western Kenya. *International Journal of Climatology*. https://doi.org/10.1002/joc.1828.
[7] Extrapolated assuming a linear progression with no threshold being reached.
[8] Schewe, J. et al. 2014. Multimodel assessment of water scarcity under climate change. *Proceedings of the National Academy of Sciences*. https://doi.org/10.1073/pnas.1222460110.
[9] Herrero, M. et al 2010. Climate variability and climate change and their impacts on Kenya's agricultural sector. Nairobi, Kenya. ILRI. https://cgspace.cgiar.org/bitstream/handle/10568/3840/climateVariability.pdf?sequence=8.
[10] Climate Analytics. 2018. RegioCrop tool. https://climateanalytics.org/tools/
[11] Mendelsohn, R. and Seo, S.N. 2007. *The impact of climate change on livestock management in Africa: a structural Ricardian analysis*. The World Bank. http://hdl.handle.net/10986/7463.
[12] Tanser, F.C., Sharp, B. and le Sueur, D. 2003. Potential effect of climate change on malaria transmission in Africa. *The Lancet*. https://doi.org/10.1016/S0140-6736(03)14898-2.
[13] World Health Organisation. 2016. *Climate and Health Country Profile - 2015 Kenya*. WHO. http://apps.who.int/iris/bitstream/handle/10665/246133/WHO-FWC-PHE-EPE-15.23-eng.pdf;sequence=1

ASSAR
Adaptation at Scale in Semi-Arid Regions

UKaid from the British people

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IMPACTS OF GLOBAL WARMING THRESHOLDS ON KENYA'S CLIMATIC ZONES

	ARID NORTH EAST				ARID NORTH WEST				SEMI-ARID NORTH				SEMI-ARID NORTH EAST				SEMI-ARID SOUTH				HUMID: MOUNTAINS				HUMID: COAST				KENYA 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	1.5°C	2°C	2.5°C	3°C	1.5°C	2°C	2.5°C	3°C
Annual rainfall (%)	+6	+10	+12	+15	+9	+18	+21	+24	+10	+12	+16	+16	+7	+12	+14	+17	+4	+6	+8	+8	+6	+6	+9	+10	+1	+1	+2	+1	+5	+8	+11	+12
Duration of dry spells (days)	+2	+1	0	+2	-4	-5	-6	-7	+2	+2	+2	+5	-3	-2	-3	-4	-3	-4	-5	-6	-2	-2	-1	-2	+3	+4	+4	+5	0	-1	0	0
Duration of wet spells (days)	+1	+1	+1	0	0	0	+1	+1	0	0	+1	+1	+1	+1	+1	+1	0	0	0	-1	+1	+1	0	0	0	-1	-1	-1	0	+1	+1	+1
Heavy rainfall days (>10mm/day)	+1	+2	+2	+3	+1	+2	+3	+3	+2	+1	+2	+3	+2	+2	+3	+4	+1	+1	+2	+2	+2	+2	+3	+3	+1	+1	+1	+1	+1	+2	+2	+3
Extreme heavy rainfall days (>20mm/day)	0	0	+1	+1	+1	+1	+1	+1	0	+1	+1	+1	+1	+1	+1	+1	0	+1	+1	+1	+1	+1	+2	+2	0	0	0	0	+1	+1	+1	+1
Amount of rain in heavy rainfall events (%)	+28	+38	+48	+54	+43	+53	+60	+79	+18	+27	+39	+44	+26	+41	+45	+66	+31	+34	+50	+57	+32	+42	+55	+66	+13	+17	+24	+25	+25	+38	+49	+59
Amount of rain in extremely heavy rainfall events (%)	+36	+51	+64	+92	+54	+76	+92	+121	+44	+61	+61	+83	+58	+66	+91	+117	+30	+43	+69	+72	+32	+35	+51	+138	+25	+31	+47	+52	+47	+64	+83	+96
Amount of rain in highest rainfall day (%)	+8	+14	+16	+17	+12	+16	+16	+19	+10	+12	+14	+16	+12	+13	+18	+19	+6	+10	+16	+16	+11	+15	+18	+25	+6	+10	+13	+14	+9	+11	+16	+17
Amount of rain in highest five consecutive rainfall days (%)	+8	+11	+14	+18	+9	+13	+18	+18	+7	+10	+14	+17	+7	+11	+13	+15	+8	+12	+14	+15	+9	+12	+14	+18	+5	+7	+11	+10	+7	+10	+12	+16
Temperature change (°C)	+1.7	+2.2	+2.7	+3.3	+1.7	+2.4	+2.9	+3.5	+1.7	+2.3	+2.9	+3.4	+1.7	+2.3	+3.0	+3.5	+1.6	+2.1	+2.6	+3.2	+1.7	+2.2	+2.8	+3.3	+1.5	+2.0	+2.8	+3.4	+1.7	+2.2	+2.8	+3.3
Number of hot days (>90th percentile)	+156	+208	+233	+248	+132	+173	+205	+222	+146	+204	+232	+250	+128	+172	+203	+221	+129	+176	+211	+235	+106	+147	+182	+208	+149	+201	+237	+264	+133	+181	+208	+227
Number of hot nights (>90th percentile)	+150	+212	+276	+306	+127	+189	+243	+279	+127	+186	+248	+285	+125	+191	+244	+281	+156	+216	+271	+308	+125	+186	+237	+272	+194	+261	+299	+326	+136	+204	+261	+294
Number of cold days (<10th percentile)	-36	-39	-43	-45	-28	-34	-37	-38	-31	-35	-38	-40	-30	-33	-38	-40	-37	-41	-45	-47	-32	-36	-38	-40	-51	-55	-56	-57	-34	-38	-41	-43
Number of cold nights (<10th percentile)	-63	-65	-66	-66	-55	-57	-60	-62	-58	-60	-61	-61	-60	-62	-64	-65	-64	-66	-68	-68	-58	-61	-62	-63	-72	-74	-77	-78	-63	-65	-66	-66
Duration of heat waves (days)	+112	+182	+236	+253	+96	+145	+184	+212	+92	+153	+207	+235	+90	+141	+185	+215	+85	+147	+198	+227	+68	+115	+153	+188	+111	+109	+225	+257	+92	+155	+201	+226