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FACT SHEET

Climate Change Information Fact Sheet ZIMBABWE

Definitions
Ensemble: A collection of model simulations characterizing a climate prediction or projection. [IPCC AR5]
Representative Concentration Pathway (RCP): Scenarios that include time series of emissions and concentrations of the full suite of greenhouse gases and aerosols and chemically active gases, as well as land use/land cover. RCPs usually refer to the portion of the concentration pathway extending up to 2100, for which Integrated Assessment Models produced corresponding emission scenarios. [IPCC AR5]
RCP8.5: Generally, high emissions. One high pathway for which radiative forcing reaches >8.5 W m^{-2} by 2100 and continues to rise for some amount of time. [IPCC AR5]
RCP4.5: Generally, moderate emissions. One of two intermediate stabilization pathways in which radiative forcing is stabilized at approximately 4.5 W m^{-2} after 2100. [IPCC AR5]

CLIMATE IMPACTS AND VULNERABILITIES

TEMPERATURE

Current (based on historical climate conditions and recent trends, generally over the past few decades)
Mean annual temperature has increased by ~0.01 to 0.02°C/year over the time period 1950-2002, with medium statistical confidence [CW]. According to the Zimbabwe Meteorological Service, daily minimum temperatures have risen by approximately 2.6°C over the last century while daily maximum temperatures have risen by 2°C during the same period; while the number of cold days have decreased, and hot days increased [IIED]. An increase in hot days and nights, and a decrease in cold days and cold nights in recent decades is consistent with the general warming trend [IPCC AR5].

Future: 2030 (generally 2020-2049)
The mean annual temperature in the country is projected to increase by 0.46°C,1.04°C, and 1.83°C for the 10th, 50th, and 90th percentiles for the RCP4.5 model ensemble runs. Similarly, the 10th, 50th, and 90th percentiles for the RCP8.5 ensemble project increases of 0.62°C, 1.25°C, and 1.83°C. For the RCP4.5 and RCP8.5 median model ensemble, maximum temperatures are projected to increase by 1.08°C and 1.31°C, and minimum temperatures by 0.99°C and 1.18°C [CCKP].

Future: 2050 (generally 2040-2059)
The mean annual temperature in the country is projected to increase by 0.95°C,1.68°C, and 2.66°C for the 10th, 50th, and 90th percentiles for the RCP4.5 model ensemble runs. Similarly, the 10th, 50th, and 90th percentiles for the RCP8.5 ensemble project increases of 1.43°C, 2.17°C, and 3.13°C [CCKP]. At midcentury, for the RCP4.5 and RCP8.5 median model ensembles minimum temperatures are projected to increase by 1.55°C to 1.98°C, and maximum temperatures by 1.8°C to 2.27°C. The greatest increases are projected for the months June through

September [CCKP]. Increases in mean annual temperature over all land areas in Africa are very likely in the mid- and late 21st-century periods for RCP2.6 and RCP8.5 [IPCC AR5]. For projected temperature extremes, there is high confidence that heat waves and warm spell durations will increase, suggesting an increased persistence of hot days toward the end of the century [IPCC AR5].

PRECIPITATION AND FLOODING

Current (based on historical climate conditions and recent trends, generally over the past few decades)
Reductions in average annual rainfall from 1950-2002, have low statistical confidence [CW]. IPCC AR5 notes modest observed reductions in annual rainfall in Zimbabwe. The last 30 years have shown a trend towards heavy rainfall and drought occurring back to back in the same season [SARUA]. The frequency and length of dry spells during the rainy season have increased while the frequency of rainy days has declined. There is low to medium confidence in historical extreme temperature and heavy rainfall trends over most of Africa in part due to lack of data and conflicting information [IPCC SREX].

Future: 2030 (generally 2020-2049)
The median ensemble runs for RCP4.5 and 8.5 indicate an average annual rainfall reduction of -0.1 mm/day, and 0 mm/day, by the middle of the 2030s. [USGS] By 2030, the RCP4.5 10th percentile (-44%), median (-4%), and 90th percentile (41%) ensembles for mean annual precipitation indicate high uncertainty in the direction and amount of change across the models, although more model agreement indicating a reduction in rainfall. These results are similar to RCP8.5 (-52%, -7%, and 34%). [CCKP]

Future: 2050 (generally 2040-2059)
By 2050, the RCP4.5 10th percentile (-52%), median (-9%), and 90th percentile (34%) ensembles for mean annual precipitation indicate high uncertainty in the direction and amount of change across the models. These results are similar to RCP8.5 (-57 %, -11%, and 32%). Though there is some model agreement indicating annual rainfall will be reduced. [CCKP] Under A2 and B2 emission scenarios, mean annual rainfall is predicted to decrease in all catchments, except for Manyame [WB]. There is a proportionately greater decline in runoff than in precipitation; this multiplier effect on runoff means that even small declines in rainfall can have significant impacts on runoff [WB]. Future precipitation projections show changes in the scale of the rainfall probability distribution, indicating that extremes of both signs may become more frequent in the future [IPCC AR5 citing Kay and Washington, 2008]. There is low confidence in projected increases of heavy precipitation [IPCC SREX].

DROUGHT

Current (based on historical climate conditions and recent trends, generally over the past few decades)
The timing and amount of rainfall received are becoming increasingly uncertain, with the last 30 years having shown a trend towards reduced rainfall or heavy rainfall and drought occurring back to back in the same season [IIED]. Shifts in the onset of rains, increases in the proportion of low rainfall years, and increases in the frequency and intensity of mid-season dry-spells have been observed [IIED citing Unganai, 2009]. The frequency and length of dry spells during the rainy season have increased while the frequency of rainy days has declined [SARUA]. Drought has increased in frequency and intensity [IIED citing Mutasa, 2008]. Groundwater recharge rates are not generally known although some estimates have been made [WB].

Future: 2030 (generally 2020-2049)
The tendency towards rainfall reductions, and temperature increases by 2030, may exacerbate existing trends towards increasing frequency and intensity of droughts.

Future: 2050 (generally 2040-2059)
Future precipitation projections show changes in the scale of the rainfall probability distribution, indicating that extremes of both signs (floods and droughts) may become more frequent in the future [IPCC AR5 citing Kay and Washington, 2008]. The southwestern regions in Africa are projected to be at a high risk to severe droughts during the 21st century and beyond [IPCC AR5]. Groundwater recharge is projected to decline based on one model analysis [WB]. Projections from the CCKP 'Zimbabwe basin' indicate reductions in annual groundwater

baseflow for the median ensemble of A2 and B1 scenarios at midcentury. Soil moisture is projected to decrease by mid-century for all river basins under the A2 and B1 scenarios [CCKP]. Annual runoff is projected to decline [WB] by mid-century for most basins for one model; the CCKP indicates reductions in mean annual runoff for median ensemble. Median model RCP4.5 and 8.5 ensembles indicate reductions in rainfall in the rainy season (October through March) [CCKP].

WINDS AND OTHER STORMS

Current (based on historical climate conditions and recent trends, generally over the past few decades)
Tropical cyclones have increased in frequency and intensity [IIED citing Mutasa, 2008]. Tropical cyclones are believed to have increased in frequency and intensity although this has not been verified statistically [WB].

Future: 2030 (generally 2020-2049)
Estimates are highly uncertain and information is not readily available. Consider future winds and storms based on the most extreme past experience.

Future: 2050 (generally 2040-2059)
Large uncertainties surround projected changes in tropical cyclone landfall from the southwest Indian Ocean that have resulted in intense floods during the 20th century [IPCC AR5].

Climate information sources	CCKP = World Bank Climate Change Knowledge Portal
	CW = Climate Wizard
	IIED = Brown et al., 2012. Climate Change Impacts, Vulnerability, and Adaptation in Zimbabwe. IIED Climate Change Working Paper Series
	IPCC AR5 = Niang et al., 2014. WGII Ch22 Africa
	IPCC SREX = IPCC, 2012. Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation
	SARUA = Lotz-Sisitka and Urquhart, 2014. Climate Change Counts Mapping Study: Zimbabwe Country Report. Southern African Regional Universities Association (SARUA)
	USGS = Alder, J.R. and Hostetler, S.W., 2013. CMIP5 Global Climate Change Viewer. US Geological Survey.
	WB = Davis and Hirji, 2014. Climate Change and Water Resources Planning, Development and Management in Zimbabwe: An Issues Paper. World Bank