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FACT SHEET

Climate Change Information Fact Sheet SENEGAL

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)
Temperatures increase from the coast toward the west of Senegal in most seasons, except for the rainy season (July-September), when the south is cooler than the north [UNDP]. In the hottest season, April - June, the hottest regions have average temperatures of up to 35°C, while the cooler coastal regions are 25°C to 28°C. In the cooler seasons (October through December and January through March) average temperatures can be below 25°C at the coast and up to 30°C in the west. Inter-annual variability in temperature in this region of western Africa is caused by the El Niño Southern Oscillation. In La Niña years, temperatures tend to be cooler than average throughout the year. Mean annual temperature has increased by 0.9°C since 1960 at an average rate of 0.2°C per decade. The rate of increase is most rapid October to December, at 0.29°C per decade. Available data indicates that the average number of "hot" nights (the hottest 10% of nights annually) increased by 27 per year (an additional 7.3% of nights) between 1960 and 2003.

Future: 2030 (generally 2020-2049)
The mean annual temperature in the country is projected to increase by 0.53°C, 0.96°C, and 1.52°C by 2030 for the 10th, 50th, and 90th percentiles for the RCP4.5 model ensemble runs [CCKP]. These results are similar to the RCP8.5 10th, 50th, and 90th percentile model ensembles (1.52°C, 1.11°C, 1.66°C). Maximum temperatures are projected to increase by 1.0°C to 1.10°C, and minimum temperatures by 0.92°C and 1.05°C for the RCP4.5 and RCP8.5 median model ensemble. Simple linear interpolation of projections indicate that annually, "hot" days will occur on 14–29% of days by the 2030s [UNDP].

Future: 2050 (generally 2040-2059)
The Sahel and tropical West Africa were identified as hotspots of climate change for both RCP4.5 and RCP8.5

pathways and unprecedented climates are projected to occur earliest (late 2030s to early 2040s) in these regions [IPCC]. The mean annual temperature in the country is projected to increase by 0.87°C, 1.4°C, and 2.27°C for the 10th, 50th, and 90th percentiles for the RCP4.5 model ensemble runs [CCKP]. Similarly, the 10th, 50th, and 90th percentiles for the RCP8.5 ensemble project increases of 1.17°C, 1.9°C, and 2.83°C. The projected rate of warming is faster in the interior regions of Senegal than in those areas closer to the coast [UNDP]. All projections indicate substantial increases in the frequency of days and nights that are considered "hot" in current climate. Annually, projections indicate that "hot" days will occur on 22–46% of days by the 2060s [UNDP].

PRECIPITATION AND FLOODING

Current (based on historical climate conditions and recent trends, generally over the past few decades)
The wet season is from July to September, with an average annual rainfall of 782 mm [CCKP]. There is a strong north-south gradient in total rainfall, decreasing from about 1,000 mm/year in the south to about 200 mm/year in the north [WFP]. The rainy season is controlled by the movement of the Inter-Tropical Conversion Zone, which causes large variability from one year to the next and from one decade to the next [UNDP]. Sahelian rainfall is characterized by high variability from year to year and decade to decade, which can make long-term trends difficult to identify. El Niño events are associated with drier conditions in the Sahel. Statistically significant decreases of around 10 to 15 mm/decade have been observed in the southern regions of Senegal in the wet season between 1960 and 2006. Some unusually high rainfalls have occurred in the dry season (January-March) in recent years (2000–2006), but this has not been part of a consistent trend. There are insufficient daily rainfall observations available from which to determine changes in extreme indices of daily rainfall. Floods in the country are the result of river overflows (particularly in the Gambia and Senegal rivers due to heavy rains), a combination of heavy rains and insufficient drainage infrastructure (in Kaolack and Dakar, especially), and storm surges leading to saltwater intrusion into agricultural lands (particularly in the Saloum Delta) [CCKP]. In recent years, floods appear to have become more frequent in association with the increased frequency of heavy rainfall events and development.

Future: 2030 (generally 2020-2049)
Projections of mean annual rainfall averaged over the country from different models in the ensemble project a wide range of changes in precipitation for Senegal, but tend toward decreases, particularly in June through August [CCKP]. The median ensemble runs for RCP4.5 and 8.5 indicate an average annual rainfall change of 0 mm/day by the middle of the 2030s [USGS].

Future: 2050 (generally 2040-2059)
Model simulations of precipitation changes for the Sahelian and Guinea coast regions of Africa do not agree on future changes, and most models fail to reproduce realistic year to year and decade to decade rainfall variability in the Sahel in 20th-century simulations [UNDP]. Current understanding of the processes causing tropical rainfall is insufficient to allow a prediction of the direction of change with any certainty. Projections of mean annual rainfall averaged over the country from different models in the median ensemble suggest a wide range of changes in precipitation for Senegal but tend toward decreases, particularly in the wet season months July through September. The proportion of total annual rainfall that falls in heavy events tends toward increases in the ensemble projections. Seasonally, this varies between tendencies to decrease in January through March and April through June and to increase in July through September and October through December. The range of projections from different models in the ensemble, however, includes both increases and decreases in all seasons. The largest magnitude one- and five-day rainfall projections all tend toward increases in July through September and October through December. The range of changes in projections from the model ensemble covers both increases and decreases in most seasons. In sum, changes are consistent in the direction of erratic rainfall, with higher rainfall in heavy rainfall events potentially leading to higher flood risk [WFP].

DROUGHT

Current (based on historical climate conditions and recent trends, generally over the past few decades)
Droughts are a frequent occurrence in Senegal, including the notable Sahelian drought (between the late 1960s

and the mid-1980s) and more recent events in 2000, 2002, and 2011 [WFP]. The most recent historical record suggests no discernible trend in drought frequency.

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

Future: 2050 (generally 2040-2059)
Projected rates of warming are faster in the interior regions of Senegal, compared to the coastal areas [WFP]. This could result in higher drought magnitudes. Projected fewer rainfall events overall may lead to higher frequency of dry spells.

SEA LEVEL RISE AND STORM SURGE

Current (based on historical climate conditions and recent trends, generally over the past few decades)
Sea level changes and increased intensity of storm surges are known to lead to coastal erosion, which poses a major threat to the population and economy of Senegal [CCKP]. Sea level rise has resulted in coastal retreat of about 1 to 2 meters annually in Senegal. Further evidence highlights that salinization has increased as a result of drought and sea level rise [WFP].

Future: 2030 (generally 2020-2049)
Global sea level could rise by up to 0.4 meter by 2030 (from a reference time period of 1971-2010) [IPCC WG1AR5, Ch. 13].

Future: 2050 (generally 2040-2059)
Sea level rise is exacerbated by the country's geology and threatens 74% of households living in coastal areas. Sea level could rise by up to 1 meter by the end of the century, which would put at least 110,000 people, mostly in southern Senegal in the Cape Verde region, at risk of coastal flooding [CCKP]. Sea level rise could result in further deterioration of soil quality and erosion along the sandy coastlines [WFP].

WINDS AND OTHER STORMS

Information about winds and other storms in Senegal is not readily available.

Climate information sources	CCKP = World Bank Climate Change Knowledge Portal
	CW = Climate Wizard
	IPCC = IPCC WG II, 2014. Climate Change 2014: Impacts, Adaptation, and Vulnerability. Chapter 22 (Africa); IPCC WG1AR5, Ch. 13: IPCC Working Group 1, Assessment Report 5, Chapter 13: Sea Level Change
	UNDP = McSweeney, C., M. New, and G. Lizcano, 2012. UNDP Climate Change Country Profiles: Senegal
	USGS = Alder, J.R. and Hostetler, S.W., 2013. CMIP5 Global Climate Change Viewer. US Geological Survey.
	WFP = World Food Programme, 2013. Climate risk and food security in Senegal: Analysis of climate impacts on food security and livelihoods. National Agency for Civil Aviation and Meteorology of Senegal (ANACIM), WFP's Office for Climate Change, Environment and Disaster Risk Reduction, WFP's Food Security Analysis Service, Columbia University's International Research Institute for Climate and Society (IRI) and the WFP Country Office in Senegal