



Climate Change Information Fact Sheet

SRI LANKA

<i>Definitions</i>
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 $>8.5 \text{ W m}^{-2}$ 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)

Little or no seasonal annual variation of temperature is experienced in Sri Lanka, with mean annual temperature in coastal areas ranging from 26.0°C to 28.0°C. At higher altitudes, above 1500 m, temperature ranges between 15°C and 19°C. Sri Lanka has a strong hourly variation in the mean temperatures throughout the year. Over the period 1961-1990, there was a general increasing temperature trend by 0.16°C per decade, with the highest increase of minimum temperature around 2.0°C at Nuwara Eliya [GFDRR]. Sri Lanka’s 100-year warming trend from 1896 to 1996 is 0.003 °C per year [IPCC 2001], while it is 0.025°C per year for the 10-year period 1987-1996, indicating a faster warming trend in more recent years. Scientists attribute this warming trend seen throughout the country to both the enhanced greenhouse (global) effect as well as the local heat island effect caused by rapid urbanization [IWMI].

Future: 2030 (generally 2020-2049)

The mean annual temperature in the country is projected to increase by 0.47°C, 0.69°C, and 1.08°C by 2030 for the 10th, 50th, and 90th percentiles for the RCP4.5 model ensemble runs, and by 0.56°C, 0.80°C, and 1.12°C for the RCP8.5 10th, 50th, and 90th percentile model ensembles, respectively. Maximum temperatures are projected to increase by 0.68°C to 0.78°C, and minimum temperatures by 0.69°C and 0.80°C for the RCP4.5 and RCP8.5 median model ensemble [CCKP].

Future: 2050 (generally 2040-2059)

The mean annual temperature in the country is projected to increase by 0.77°C, 1.06°C, and 1.64°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 1.13°C, 1.41°C, and 2.04°C [CCKP].

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PRECIPITATION AND FLOODING

Current (based on historical climate conditions and recent trends, generally over the past few decades)

Sri Lanka's climate varies over time and space, due in part to the country's topography. The average annual rainfall in Sri Lanka varies from less than 1000 mm in the semi-arid area of the north-west and south-east of the island to above 5000 mm on the south-western slopes of the central hills. The country has four major rainfall seasons: 1) The south-west monsoon (SWM) period (May to September) accounts for up to 55% of the annual precipitation and often exceeds 3000 mm of rain; 2) the inter-monsoon period (IM1) (October to November) follows the south-west monsoon and contributes over 500 mm of rain in many places; 3) the north-east monsoon (NEM) period (December to February) contributes about 200 mm to 1200 mm of rain; 4) the inter-monsoon period (IM2) (March to April) follows the north-east monsoon. Over 1961-1990, there was a decreasing trend in rainfall pattern in most of the island with the exception of the northeast. Mean annual precipitation decreased by 144 mm (7%) compared to the period 1931-1960 [GFDRR]. There is a wide disparity in the magnitude of changes that have taken place in different rainfall seasons and different spatial locations. Although no significant changes in rainfall amount have been observed during the SWM and IM2, rainfall in the NEM and IM1 has reduced, with NEM showing increased variability [IWMI]. Historical records from 1974-2004 indicate that floods are increasing. The SWM periods cause severe flooding in the western and south-western provinces; the NEMs cause flooding in the eastern, northern, and north-central provinces. In the past 30 years, floods have affected more than 10 million people. Increased rainfall intensity and forest cover reduction have led to increases in landslides [GFDRR].

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 Sri Lanka, but tend toward increases. By 2030, the RCP4.5 10th percentile (-25%), median (3.8%), and 90th percentile (31%) 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 (-22%, 3.1%, and 38%) [CCKP]. The median ensemble runs for RCP4.5 and 8.5 indicate an average annual rainfall change of 0.1 mm/day by the middle of the 2030s (>90% models in agreement) [USGS].

Future: 2050 (generally 2040-2059)

Projections of mean annual rainfall averaged over the country from different models in the ensemble project a wide range of changes in precipitation for Sri Lanka, but tend toward increases. Rainfall projections for Sri Lanka within this century appear to be confusing and sometimes contradictory both spatially and temporally [IWMI]. The RCP4.5 10th percentile (-22%), median (8.8%), and 90th percentile (46%) ensembles for mean annual precipitation in Sri Lanka indicate high uncertainty in the direction and amount of change across the models. These results are similar to RCP8.5 (-28%, 10%, and 48%) [CCKP]. Projections of future rainfall are less reliable for island nations. What is clear, however, is that climate variability and extreme events across Sri Lanka will increase in the future [GFDRR].

DROUGHT

Current (based on historical climate conditions and recent trends, generally over the past few decades)

Historical records from 1974- 2004 indicate that droughts are increasing. A large part of the island is drought-prone from February to April and, if there is a subsidiary drought in the normal rainy season from May to June, drought can extend into September. In the past 30 years, droughts have affected more than 6 million people. El Niño can result in warmer and drier than average conditions [GFDRR]. In the country as a whole, the number of consecutive dry days increased while the number of consecutive wet days reduced. Recent analysis of the spatial pattern of rainfall also indicates an expansion of the dry zone. Four districts stand out in terms of drought vulnerability: Moneragala, Nuwara Eliya, Anuradhapura and Polonnaruwa, which are generally subject to frequent droughts [IWMI].

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)

Increased frequency and intensity of droughts are projected [GFDRR]. Increasing temperature has reduced crop growth in the past, and higher temperatures may exacerbate this, as well as increasing evaporation (in turn increasing water stress) [PA].

SEA LEVEL RISE AND STORM SURGE

Current (based on historical climate conditions and recent trends, generally over the past few decades)

Sea level rise, storm surges, and coastal erosion are greatest in the west, south-west, and southern coastal belt where about 50% of Sri Lanka's population lives [GFDRR]. The current rate of sea level rise in coastal areas of Asia is reported to be 1-3 mm/year which is marginally higher than the global average. Evidence also suggests an accelerated rate of sea level rise in Asia over the period 1993-2003 (3.1 mm/year) compared to that over the twentieth century as a whole (1.7 to 2.4 mm/year). However, the specific rate of rise in seas immediately surrounding Sri Lanka is not known [IWMI].

Future: 2030 (generally 2020-2049)

A linear interpolation of end of century global sea level estimations indicates that sea level could rise by 0.13 meters [RCP4.5] up to 0.4 meters [RCP 8.5] by 2030 (from a reference time period of 1971-2010) [IPCC WG1AR5, Ch. 13].

Future: 2050 (generally 2040-2059)

A linear interpolation of end of century global sea level estimations indicates that sea level could rise by 0.20 meters [RCP4.5] up to 0.58 meters [RCP 8.5] by 2050 (from a reference time period of 1971-2010) [IPCC WG1AR5, Ch. 13]. Inundation is estimated to be in the range of 41 square kilometers (km²) for a rise of 0.3 meters (m) and 91.25 km² for a rise of 1 m for lowlands along the southwest coast. [IWMI] Sea level rise could lead to inundation and displacement of low lying coastal areas and wetlands, coastal erosion and degradation of shorelines, salinization of estuaries and freshwater aquifers, and changes to and migration of coastal eco-systems and habitats.

WINDS AND OTHER STORMS

Current (based on historical climate conditions and recent trends, generally over the past few decades)

Cyclones often affect the northern region of the country, especially in the months of November and December. Historically their severity has been moderate [GFDRR].

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)

An increase of 10-20% in tropical cyclone intensities (for a rise in sea surface temperature of 2-4 °C relative to current threshold temperature), amplification of storm surge heights (due to stronger winds), with increase in sea surface temperatures and low pressures associated with tropical storms, could contribute to enhanced risk of coastal disasters [IWMI].

Climate information sources	CCKP = World Bank Climate Change Knowledge Portal
	CW = Climate Wizard
	GFDRR = GFDRR. 2011. Vulnerability, Risk Reduction, and Adaptation to Climate Change: Sri Lanka.
	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
	IWMI = Eriyagama, N., Smakhtin, V., Chandrapala, L., Fernando, K. 2010. Impacts of Climate Change on Water Resources and Agriculture in Sri Lanka: A Review and

	Preliminary Vulnerability Mapping. Colombo, Sri Lanka: International Water Management Institute. (IWMI Research Report 135).
	PA = Practical Action. 2012. Promoting adaptation to climate change in Sri Lanka: A briefing for government advisors and development practitioners.
	USGS = Alder, J.R. and Hostetler, S.W., 2013. CMIP5 Global Climate Change Viewer. US Geological Survey.