WEATHERING RISK

# SRI LANKA

# Climate Impact Profile

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adelphi RESEARCH

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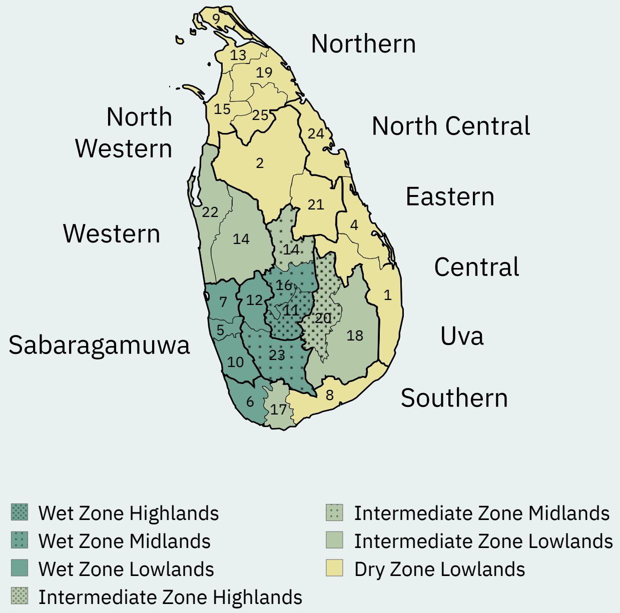
# Summary for policymakers

Sri Lanka is particularly vulnerable to the impacts of climate change. This profile provides an overview of climate trends for short-term (2020–39) and medium-term (2040–59) time periods in Sri Lanka under both the higher-emission SSP3-7.0 and lower-emission SSP1-2.6 scenarios, and their impacts across different sectors. Sri Lanka has a hot tropical climate with little annual variation in temperature, except further inland and at higher altitudes. The country experiences two wind-driven seasonal changes (monsoons) and two transitional periods (intermonsoons) each year, which result in high regional and temporal variability in precipitation. Over the last 50 years, mean temperature and annual average precipitation nationwide have been increasing.




## Climate Trends

### Temperature

Under the SSP3-7.0 scenario, mean temperature rises nationwide by a best estimate of 0.55°C (0.31°C to 0.84°C possible) in the short term and 1.07°C (0.76°C to 1.64°C possible) in the medium term. Under the SSP3-7.0 scenario, Heat Index days above 35°C in the representative province of North Central (Dry Zone) increase by roughly 1.5 months per year (0.5 to 2.5 months possible) in the short term and four months per year (2.5 to six months possible) in the medium term. Tropical nights – with minimum temperatures above 26°C, which can prolong daytime heat stress – are expected to increase nationwide by roughly 1.5 months per year (one to three months possible) in the short term and three months per year (two to 4.5 months possible) by mid-century under SSP3-7.0.

### Precipitation

Under the SSP1-2.6 scenario, average annual precipitation increases nationally by a best estimate of +80.88 mm (-53.50 mm to +257.64 mm possible) over the medium term and, under SSP3-7.0, increases by a best estimate of +31.02 mm (-104.32 mm to +190.62 mm possible). In Wet and Intermediate Zone provinces, precipitation deficits over the course of the Yala agricultural season (March to September) occur with higher model agreement under the SSP3-7.0 scenario. Net precipitation amounts over the Yala season on average indicate that existing water scarcity risks may continue in Dry Zone lowlands under the SSP3-7.0 scenario. On the other hand, the October to February agricultural season faces increasing precipitation across all three climate zones by mid-century. The best-estimate frequency of the average largest five-day precipitation events at 25-year, 50-year and 100-year intervals is projected to more than double in Wet Zone provinces by mid-century.

## Projected Sectoral Impacts

### Human Health
Many climate-related health risks, including heat stress and vector-borne diseases, are projected to worsen over the short to medium term. Extreme conditions will raise mortality and morbidity risks in the short term for particular demographic groups, especially outdoor labourers, older people, pregnant women, children and people with pre-existing health conditions across northern and eastern areas. Increased temperatures, monsoon rainfall and relative humidity correspond with more favourable conditions for disease vectors such as mosquitoes. In the medium term, the Wet Zone faces increased risks related to dengue and leptospirosis, while the Dry Zone experiences increased risks related to leishmaniasis.

### Floods and Droughts
Sri Lanka faces both high flood risks and severe water scarcity due to uneven regional and seasonal precipitation, which are expected to intensify under both the SSP3-7.0 and SSP1-2.6 scenarios. High flood risks threaten settlements, critical infrastructure and agriculture. Sri Lanka will maintain medium to high levels of water stress through mid-century (SSP3-7.0). Water shortages disproportionately impact women, reduce income generation, and affect household health and sanitation. Droughts during the March to September agricultural season will continue to occur in the Dry Zone and lowland Intermediate Zone, while droughts during the October to February agricultural season will continue to occur in the northwestern and southeastern Dry Zone.

### Food and Agriculture
Changing temperature and precipitation patterns pose high risks to food security, especially for rural and low-income agricultural labourers in the Dry Zone. Expected temperature increases will affect liveable conditions for cattle, dairy animals, poultry, swine and agriculture. Under the Middle-of-the-Road scenario with rising population and rapid GDP growth by mid-century, net food demand is projected to increase along with overall crop yields, and imports of wheat and other cereal grains. Meanwhile, under the SSP3-7.0 scenario, slower projected economic growth, greater population increase and lower annual precipitation nationally will increase the need for key food imports. Higher temperatures will also lead to changes in the sea surface temperature, ocean acidification and sea level rise, threatening habitats and breeding grounds for fish.

### Human Displacement
Worsening climate-related impacts can threaten households previously uprooted by generalised violence and conflict (including during the civil war), which often possess weakened social networks and livelihood opportunities. This can increase demand and overwhelm basic health services and specialised care, including psychological support. Sri Lanka continues to experience internal displacement due to frequent flood events (including significant lasting impacts from the 2004 Indian Ocean tsunami. Increasing precipitation intensity poses nationwide risks across seasons.

### Critical Infrastructure and Economy
Economic activity and infrastructure networks face significant risks from flooding and sea level rise, and from the effects of water stress and extreme heat on energy costs. Sri Lanka is highly vulnerable to GDP loss from precipitation-driven flooding and extreme heat (both 100% likelihood), as well as severe storms (87%) and water stress (79%) (SSP3-7.0). Inundation from sea level rise poses a high risk to the Colombo-Galle transit corridor, which is important for trade, tourism and service sector activities, with economic activity in coastal areas contributing 45% of GDP. Flooding, water stress, landslide exposure and extreme heat pose particular risks to the forestry and agricultural sectors (15.6% of GDP), and hydropower-generated electricity (c. 40% of GDP nationally).

### Ecosystems
Sri Lanka is a biodiversity hotspot, with forests covering approximately 30% of the country's land area across diverse temperature, precipitation and soil regimes. These forests provide critical ecosystem services, helping to manage runoff and erosion, thus reducing flood and landslide risks. Species limited to higher elevations face a greater risk of extinction due to changing climate conditions, especially under the SSP3-7.0 scenario. Meanwhile, monsoon rainforest in the Dry Zone may expand under SSP3-7.0's expected climate conditions. Major risks to

biodiversity and ecosystems vary by region, and include the potential for lowland forest and scrubland to expand throughout the Dry Zone, as well as the increasing vulnerability of already threatened species, wetlands and inland fisheries.

### Coastal Zone

Sri Lanka's roughly 1,700 km-long coastline, home to 40% of the country's population and a large proportion of economic activity, faces multifold climate impacts. By mid-century, most of the country's major coastal cities face moderately high exposure risks as a result of 23 cm best-estimate sea level rise for Colombo (Western Province). While seemingly small, sea level rise amplifies coastal flooding and storm surge from extreme storm events, worsened by non-climate drivers such as poor drainage and coastal development pressures. Major impacts include high exposure to coastal settlement, transportation infrastructure and paddy agriculture. Increasing sea surface temperatures alter the locations suitable for fish stock breeding and habitation, threatening livelihoods reliant on deep sea fishing. Degradation and destruction of naturally protective reef, mangrove and wetland habitats ultimately raise coastal exposure to storm surge, sea level rise, and associated risks of erosion and saltwater intrusion.

# Country Overview

Sri Lanka – a teardrop-shaped island country located between 6°N and 10°N latitude in the Indian Ocean – covers an area of 65,525 $km^2$, roughly the size of Ireland. The country is subdivided into nine provinces and 25 districts (see **Figure 1**). Hilly lowland plains (< 300 m above sea level) and a sandy coastal fringe (< 30 m above sea level) comprise three-quarters of the country's territory, while the rugged interior of the Central Highlands (> 2,000 m above sea level) comprises the remaining quarter.[1] Mountains and mountain plateaus significantly influence the island's Wet, Intermediate, and Dry climatic zones, discussed in the next section.

As of 2023, Sri Lanka was home to more than 22 million people, though the country's annual population growth rate (-0.6%) has been declining over the last few years due to outmigration and changes in birth and death rates.[2] Most of the population (> 80%) lives outside of urban areas, such as the capital city Colombo's metropolitan region in Western Province. Based on factors such as life expectancy, education and gross national income, Sri Lanka maintains high human development and medium gender development equality, which has improved since the 1990s (see **Table 1**).[3] However, despite relatively high levels of educational attainment and health care provision, women especially in rural areas experience lower labour force participation due to gendered inequalities in household obligations, among other factors.[4] Ethnic divisions between the majority Sinhalese, and minority Tamil and Muslim (Moor) communities concentrated in the Northern and Eastern provinces persist, despite the end of the country's civil war (1983–2009). Four phases of conflict – rooted in British colonial rule, and post-1948 independence-era political and economic grievances – began following a series of escalating confrontations between successive nationalist (Sinhalese) ruling regimes and the armed separatist group Liberation Tigers of Tamil Eelam.[5] The final and most intense phase of conflict (2007–09) under President Mahinda Rajapaksa employed guerrilla tactics that resulted in approximately 100,000 casualties, displaced at least 870,000 persons, and caused widespread physical, economic and social devastation in Northern and Eastern provinces by the end of the civil war.[6, I] Though the extent of poverty and inequality in Sri Lanka nationwide remains lower than much of South Asia (see **Table 1**), other metrics – such as the proportion of population living below the national poverty line (14.3% in 2019) – reflect higher poverty rates than the threshold of $2.15 per day.[7] In particular, this applies to rural areas, which lack sufficient access to services such as safe drinking water.

I Wartime casualty and displacement statistics remain contested. The estimate of 870,000 mostly encompasses temporarily or repeatedly displaced people within Sri Lanka by the end of 2009. However, other estimates place this number at over one million. Additionally, 12,000 people still remain under protracted displacement from the civil war and ethno-religiously fuelled Easter 2019 bombings as of 2023. See Human Displacement section.

Sri Lanka's GDP topped $84.4 billion in 2023, equivalent to the economy of Panama, while the country's GDP per capita of $3,828 is characteristic of a lower middle-income country.[8] While dominated by services such as trade and tourism, agriculture accounts for approximately 25% of the labour force. However, GDP growth remains volatile due to the country's loan default and economic crisis in 2022, which stemmed from structural and policy issues, and external disturbances.[9, II] The Fragile States Index reflects these conditions, ranking Sri Lanka 30 out of 179 countries globally, according to social cohesion, economic, political and cross-cutting indicators of fragility.[10] Meanwhile, the ND-GAIN Index recognises Sri Lanka's comparatively higher adaptive capacity in spite of high exposure to climate-related hazards and high annual disaster losses.[11]

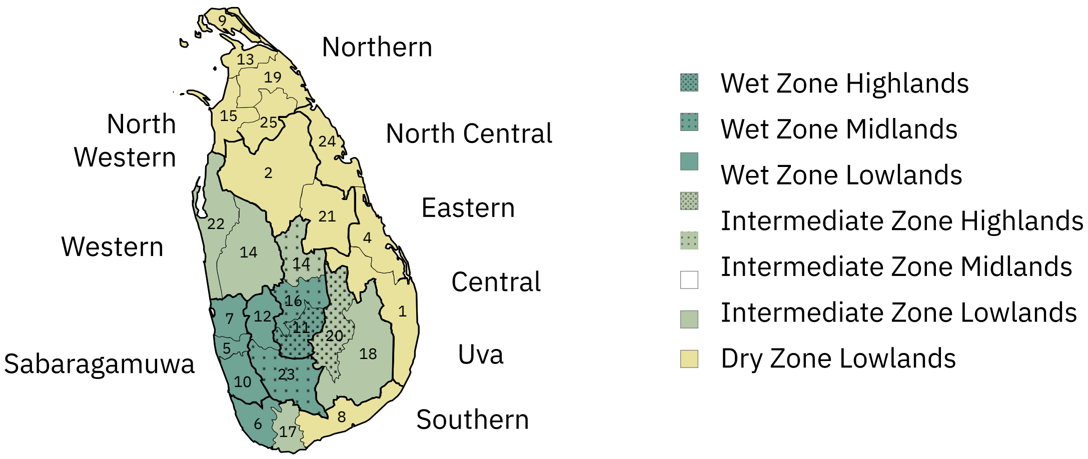



**Figure 1:** Map of Sri Lanka's Provinces and Districts with Dominant Topo-Climatic Zones.[12]

| Human Development Index (HDI) | GDP per Capita | % Population Living on <$2.15 per Day | Gini Coefficient | % Population Undernourished | ND-GAIN Vulnerability[13] Index |
|---|---|---|---|---|---|
| **78** (tied) out of 193 (2022)<br>*High Human Development* | **145** out of 214 (2023)<br>$3,828.00 | **75** (tied) out of 168 (2019)<br>1.0%<br>*(2017 Purchasing Power Parity)* | **101** out of 168 (2019)<br>37.7<br>*(0=Most Equal, 100=Most Unequal)* | **83** (tied) out of 171[14] (2021)<br>5.0% | **104** out of 185 (2021)<br>*Lower Middle Vulnerability and Adaptation Readiness* |

**Table 1:** Representative Fragility Indicator Rankings.[15, III]

II Most recently, after mass protests overthrew President Gotabaya Rajapaksa in 2022, the country peacefully elected President Anura Kumara Dissanayake in September 2024 under an anti-corruption and economic reform agenda.

III World Bank 2024: DataBank – World Development Indicators. From: https://data.worldbank.org/

# Observed Climate

## Temperature Conditions

**Most of Sri Lanka maintains hot tropical temperatures with little annual variation, except further inland and at higher altitudes.** Between 1991 and 2020,[16] Sri Lanka's national average mean temperature was 27.25ºC. The warmest monthly mean temperature occurred in May (28.40ºC), with temperatures ranging from a minimum of 24.83ºC to a maximum of 32ºC. The coolest monthly mean occurred in January (25.66ºC), with temperatures ranging from a minimum of 21.92ºC to a maximum of 29.45ºC. Daily temperature ranges across the diverse topography at provincial levels (lowlands < 300 m, midlands 300–900 m and highlands > 900 m above sea level) registered only moderate variations (see **Figure 1)**. The warmest annual mean temperature (28.53ºC) and monthly mean temperature (30.19ºC in May) occurred in lowland Northern Province. At higher subtropical elevations approaching 1,000 m above sea level, mean annual temperature decreased to 25.69ºC in Sabaragamuwa and mean monthly temperature to 24.64ºC in the coolest month of January. Central Province contains the highest elevations characteristic of a temperate climate, with the coolest annual mean temperature of 24.63ºC, monthly mean temperature of 23.13ºC and monthly minimum temperature of 18.62ºC during January. **Across the island, monthly maximum and minimum temperatures correspond with seasonal changes in wind-driven monsoon conditions** (see below).

## Precipitation Conditions

**Several key factors drive Sri Lanka's observed precipitation patterns, including changes in elevation, four monsoon seasons and the El Niño-Southern Oscillation, which result in high regional and temporal variability.** Sri Lanka received 1,740.27 mm of precipitation annually between 1991 and 2020 at the national level. However, annual precipitation regimes differ regionally, with the Wet Zone receiving more than 2,500 mm, the Intermediate Zone receiving 1,750–2,500 mm and the Dry Zone receiving less than 1,750 mm (see **Figure 1**).[17] Wet Zone provinces receive precipitation year-round in the form of two distinct wet and dry monsoon seasons.[18] **Figure 2a**, which charts monthly precipitation averages over the last 30 years in Western Province, clearly portrays these two monsoon and intermonsoon seasons (discussed in more detail below).

In contrast, the Dry Zone, and especially Eastern and Northern provinces (see **Figure 2b**), exhibit just one distinct wet and dry season, with the latter extending three to six months long on average.[19] Provinces in between and particularly in the Intermediate Zone, such as Uva Province (see **Figure 2c**), contain a dry season of up to three months, but portray mixed precipitation profiles that lack such defined patterns over time.

**Two noticeable wind-driven seasonal changes (monsoons) and two transitional periods between monsoon seasons characterise Sri Lanka's climate as follows:[20]**
- First Intermonsoon period: March to April, wettest in Wet Zone
- Southwest Monsoon season: May to September, wettest in Wet Zone
- Second Intermonsoon period: October to November, wettest annually nationwide
- Northeast Monsoon season: December to February, wettest in the north and east of the country

The First Intermonsoon period occurs between March and April (coloured green in **Figure 2**), and results in greater precipitation across western-facing slopes of the island's southwest Wet Zone. The Intertropical Convergence Zone, a global band of low-pressure precipitation that migrates seasonally based on the overhead angle of solar radiation, shifts northward during this period and enhances thunderstorm activity driven by daily heat, a sea breeze and topographic uplift that characterise the season.[21] Western Province (**Figure 2a**) and to a lesser extent mountainous Uva Province (**Figure 2c**) display precipitation peaks during this period. However, in Dry Zone provinces such as Northern Province (**Figure 2b**), the First Intermonsoon season accounts for a smaller percentage of annual rainfall.

The Southwest Monsoon season from May to September (coloured dark blue in **Figure 2**) features moist prevailing westerly, south-westerly winds and significant precipitation on western-facing slopes in the Wet Zone. A moisture-depleted downhill *Kachchan* or *Yal-Hulang* wind then forms a rain shadow on eastern-facing slopes in the Intermediate Zone during this period.[22] Though prevailing winds weaken in July and August, and generate drier "monsoon break" conditions in the Wet Zone (see **Figure 2a**),[23] these provinces receive more than 40% of their annual precipitation during this season. The pre-monsoon tropical cyclone season (April to June) also contributes, on average, to these totals.[24] The highest monthly rainfall of 312.16 mm during May occurred in Western Province. Intermediate Zone provinces (e.g., Uva Province) receive less than 30% of their annual precipitation over the Southwest Monsoon season and Dry Zone provinces receive less than 20%, with the lowest monthly rainfall of 10.55 mm occurring in Northern Province during June.

The Second Intermonsoon period between October and November (coloured light blue in **Figure 2**) produces the highest volumes of precipitation (> 300 mm in November) across the island's three zones. Over the course of the Second Intermonsoon, the Intertropical Convergence Zone shifts southward and tropical cyclones tend to form in the Bay of Bengal as part of Sri Lanka's post-monsoon season (October to December).[25] The largest monthly precipitation total of 355.24 mm occurred in November in Eastern Province in the Dry Zone, with nearly half of annual precipitation occurring in Dry Zone provinces such as Northern Province during this season.

The Northeast Monsoon season, characterised by prevailing northeasterly winds, extends from December to February (coloured orange in **Figure 2**). Northeast Monsoon winds, especially cool dry winds from the Indian landmass in January, do not generate as much moisture as the Southwest Monsoon winds. However, north and east-facing slopes receive a greater proportion of precipitation during this season, largely due to tropical depressions and cyclones that occur interannually, most often in December.[26] Dry and Intermediate Zone provinces such as Northern and Uva provinces receive roughly twice the percentage of annual rainfall during the Northeast Monsoon season than Wet Zone provinces.

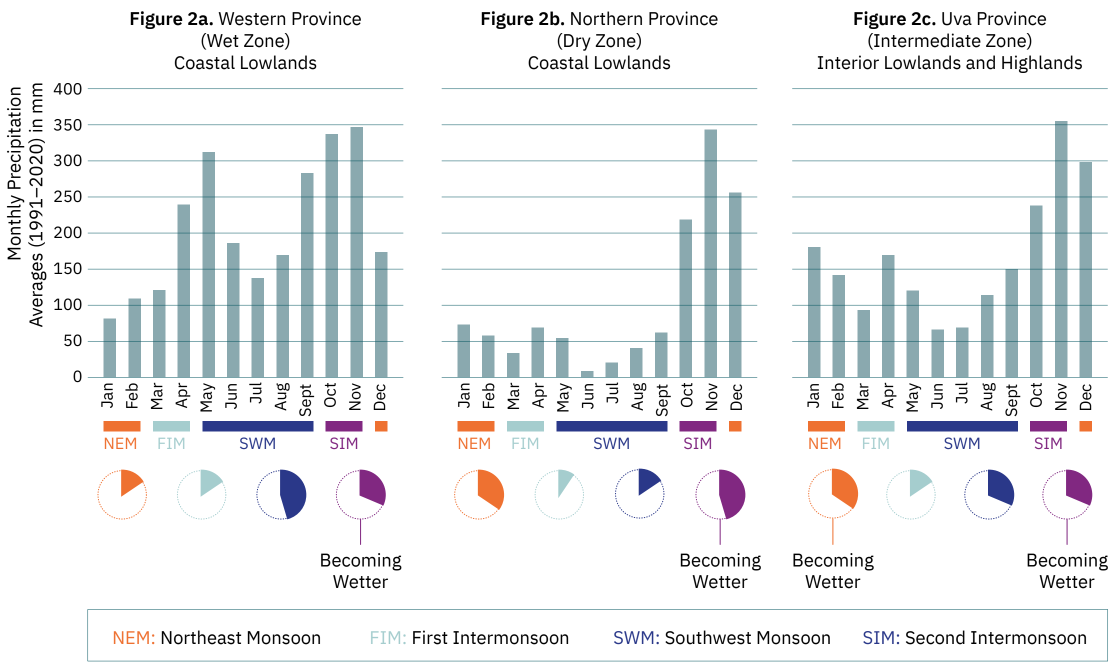



**Figure 2: Monthly Precipitation Averages (1991–2020) across Monsoon Seasons in Western Province (top left, 2a), Northern Province (top centre, 2b) and Uva Province (top right, 2c).**[27] Pie charts indicate rough percentage of annual precipitation per season. Note, Uva Province's y-axis possesses a lower cap than Western and Northern provinces. Arrows signify increasing seasonal trends > 20 mm per decade observed (1971–2020) across the three representative provinces.

# Temperature and Precipitation Trends

**Observed temperature and precipitation records over the last 50 years (1971–2020) indicate significantly warmer and wetter trends, with regional and temporal patterns.[28]** Over this period, the mean temperature rose by 0.13°C per decade and the minimum temperature rose by 0.17°C per decade nationally.[29] The largest minimal temperature increase occurred in Wet Zone provinces during summer months (Southwest Monsoon season), with a 0.22°C per decade increase in Western Province and a similar trend for mean temperature. Uva Province in the Intermediate Zone experienced the lowest minimum temperature increase annually and during summer months (both 0.12°C per decade), and decreasing maximum temperatures during summer months (-0.15°C per decade). Nationally, tropical nights with a minimum temperature threshold greater than 20°C significantly increased by 3.78 nights per decade, while humid daytime temperatures with maximum temperatures on the Heat Index greater than 35°C significantly increased by 2.69 days per decade.

Nationally, precipitation significantly increased by 72.47 mm per decade over the last 50-year period and maximum consecutive dry days decreased by 0.98 days per decade. The greatest annual precipitation increases occurred in high-elevation Central Province (80.61 mm per decade), while a relatively lower increase occurred in the northern lowlands (57.85 mm increase per decade in North Central Province). Precipitation increased the most during autumn months (Second Intermonsoon season) on west-facing slopes in the Wet Zone (59.52 mm per decade in Sabaragamuwa). Precipitation increased most during winter months (Northeast Monsoon season) in east-facing Uva Province (21.76 mm per decade), but elsewhere increased the least (< 5 mm per decade) across many lowland provinces during winter (Northeast Monsoon) and summer (Southwest Monsoon) months.

Interannually, Sri Lanka experiences above and below-average precipitation conditions associated with El Niño-Southern Oscillation events. During El Niño phases where below-average sea surface temperatures and precipitation volumes occur in the West Pacific, precipitation tends to increase in Sri Lanka during the Second Intermonsoon season and decrease during the Northeast Monsoon season.[30] During La Niña years, the pattern reverses with stronger seasonal effects.[31] These conditions create major cross-sectoral impacts (see Floods and Droughts section).

**HOW TO INTERPRET FUTURE CLIMATE SCENARIOS**

A scenario describes a trajectory of future conditions based on key assumptions. It serves as an important tool for both climate scientists and social scientists to understand and plan for the effects of complex, unpredictable, human-non-human interactions across various timeframes. The Intergovernmental Panel on Climate Change's (IPCC's) *Sixth Assessment Report* draws upon a handful of hypothetical future scenarios (Shared Socioeconomic Pathways or SSPs) simulated by a large collection of computer models to gain insight into future societal and climate conditions. These scenarios possess a range of socioeconomic (e.g., population, economic development, technological, and governance) assumptions and associated emissions trajectories.

The Climate Impact Profiles prioritise analysis of (1) the SSP3-7.0 scenario, as it explores the effects of high-adaptation challenges under a pessimistic warming scenario and regional conflicts; and (2) the SSP1-2.6 scenario, as it explores the effects of low-adaptation challenges under an optimistic warming scenario and greater international collaboration. Where possible, analysis notes deviations compared to other scenarios in the short and medium-term.

Uncertainty in projections is indicated with the symbol throughout the profile. Additional details are specified in the corresponding text. See section on 'How to Interpret Uncertainty in Climate Change Projections' in the Supplementary Methodology for more details on the relationship between model scenarios and probability.

# Projected Climate

The following projected conditions explore future effects of a lower-emission SSP1-2.6 scenario and higher-emission SSP3-7.0 scenario, referencing additional climate scenarios when appropriate, across short-term (2020–39) and medium-term (2040–59) outlooks. Best estimates refer to median (50th percentile) multi-model ensemble projections, while possible estimates in parentheses denote 10th percentile and 90th percentile ranges. Readers should note that these probability distributions reflect the *level of agreement across participating models under a given scenario*, but do not possess the full scope of prerequisite information to determinatively express statistical likelihood of future conditions. As a result, purple text and icons (described in the info boxes above) guide appropriate interpretation for decision-makers. For further details regarding climate scenarios, data sources, presentation and uncertainty, see adelphi's Supplemental Information.

## Temperature

**Sri Lanka faces more extreme temperature conditions throughout the Dry and Intermediate zones under both SSP3-7.0 and SSP1-2.6 scenarios starting in the short term, with greater scenario uncertainty and relatively high consensus regarding the magnitude (though not the direction of temperature trends) among models over the medium term.[32] Under the SSP3-7.0 scenario, the mean temperature nationwide increases uniformly** by a best estimate of 0.55°C (at least 0.31°C, up to 0.84°C possible) in the short term and 1.07°C (at least 0.76°C, up to 1.64°C possible) in the medium term. **This rate of warming roughly matches the SSP1-2.6 scenario over the short term, but outpaces it over the medium term** (see **Figure 3**), as the lower-emission scenario rises by a mean temperature best estimate of 0.87°C (at least 0.51°C, up to 1.23°C possible). By mid-century, the highest monthly increase of 1.21°C (at least 0.89°C, up to 1.66°C possible) under SSP3-7.0 occurs at the beginning of the Southwest Monsoon season in June and lowest monthly increase of 0.97°C (at least 0.53°C, up to 1.51°C possible) occurs at the end of the Southwest Monsoon season in September. In comparison, the highest monthly increase of 1.01°C (at least 0.53°C, up to 1.39°C possible) under SSP1-2.6 occurs in May and lowest monthly increase of 0.73°C (at least 0.36°C, up to 1.13°C possible) occurs in September.

**Projected maximum and minimum temperature increases generally mirror the rates of mean temperature increases under each scenario.** However, increases in the lowest single-day minimum temperature exhibit even larger differences regionally during spring and autumn months over the medium term. Under the SSP3-7.0 scenario during autumn months by mid-century, the best-estimate projected lowest single-day minimum increases 0.98°C (at least 0°C, up to 1.96°C possible) in Southern Province and 1.60°C (at least 0.52°C, up to 2.80°C possible) in North Western Province. The best-estimate projected lowest single-day minimum under the SSP1-2.6 scenario displays a similar pattern during autumn months by mid-century, increasing 0.88°C (at least 0°C, up to 1.45°C possible) in Southern Province and 1.30°C (at least 0.13°C, up to 1.91°C possible) in North Western Province.

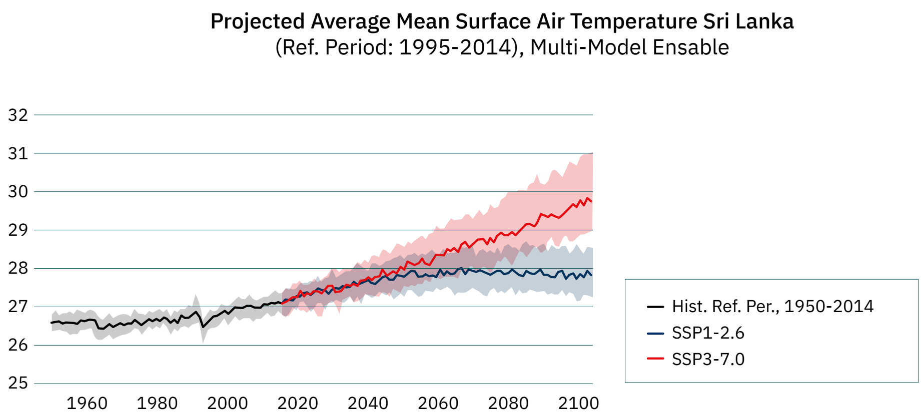



**Figure 3: Projected Average Mean Temperature in Sri Lanka (Degrees Celsius) under SSP1-2.6 and SSP3-7.0 Scenarios (Reference Period: 1995–2014).** Note how both scenario trajectories increase above the overlain historical reference period but diverge during the 2040–59 period.

**Daytime temperatures combined with humidity, represented by the Heat Index, endanger human health particularly above 35°C and increase most in the Dry Zone. Figure 4a** illustrates how the greatest increases occur during summer months in the representative province of North Central (Dry Zone). **Under the SSP3-7.0 scenario, Heat Index days greater than 35°C increase** in the province by a best estimate of 49 days annually (at least 22 days, up to 83 days possible) in the short term and 114 days annually (at least 73 days, up to 175 days possible) in the medium term. This increase of **roughly 1.5 months (at least half a month, up to 2.5 months possible) in the short term and four months (at least 2.5 months, up to six months possible) in the medium term represents a drastic shift in hot, humid daytime conditions in the near future unlike conditions previously experienced**, with greater scenario uncertainty and overall relatively high consensus among models. For comparison, annual Heat Index days greater than 35°C under the SSP1-2.6 scenario rise by a still drastic 86 days (at least 38 days, up to 140 days possible) over the medium term. Large increases in Heat Index days greater than 35°C also occur in the Intermediate Zone, but to a lesser extent and with seasonal variations. For example, Heat Index days in North Western Province increase by a best estimate of 27 days (at least 15 days, up to 48 days possible) annually in the short term and 55 days (at least 20 days, up to 95 days possible) in the medium term under SSP1-2.6. The SSP3-7.0 scenario projects a larger best estimate of 78 days (at least 46 days, up to 141 days possible) over the medium term, mostly during spring months (pre-monsoon season). Under SSP1-2.6, best-estimate Heat Index days in the Wet Zone and most populated urban areas of Western Province rise by 32 days with a wide probability range (at least eight days, up to 62 days possible) annually in the medium term and an even greater 50 days (at least 22 days, up to 97 days possible) under SSP3-7.0.

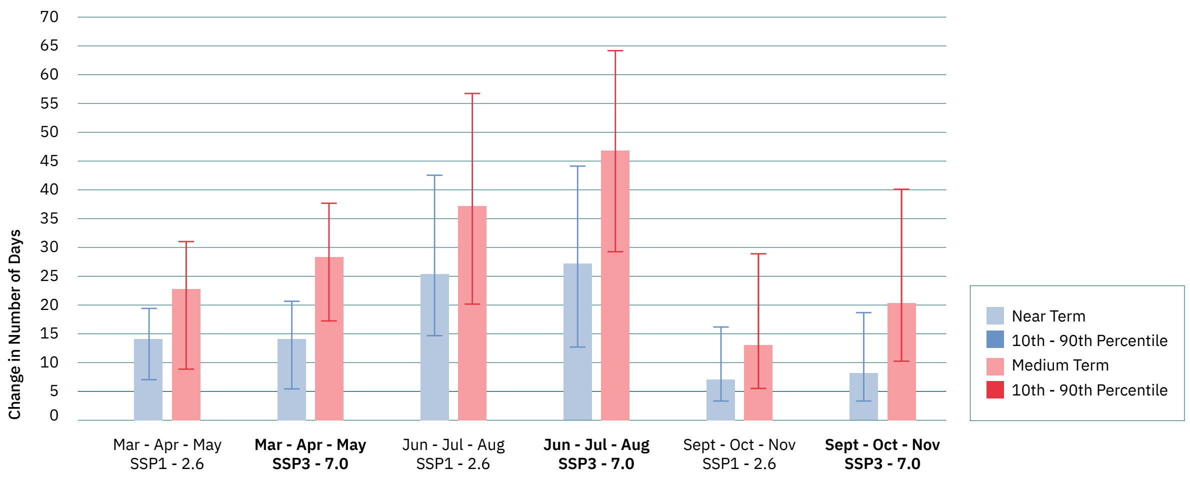



**Figure 4a: Projected Change in Heat Index Days > 35°C by Season in North Central Province over the Short Term (2020–39) and Medium Term (2040–59) under SSP1-2.6 and SSP3-7.0 Scenarios.** Probability range of 10th and 90th percentiles for short-term (blue) and medium-term (red) periods under both scenarios represented by error bars. Note increases in Heat Index days from short to medium term under both scenarios.

**Tropical nights with minimum temperatures greater than 26°C, which can prolong daytime heat stress, especially over extended time periods, notably increase in the short term across the Dry Zone and all coastal provinces, particularly during the Southwest Monsoon season.** However, scenario uncertainty increases with time, though there is relatively high consensus among participating models. The largest increases occur in North Central Province under the SSP3-7.0 scenario (see **Figure 4b**). In the short term, nights with such warm minimum temperatures increase annually by a best estimate of 48 days (at least 24 days, up to 84 days possible) and 95 days (at least 60 days, up to 141 days possible) in the medium term. In other words, the expected annual increase of roughly 1.5 months (at least one month, up to three months possible) over the short term and three months (at least two months, up to 4.5 months possible) by mid-century radically expands the frequency that one would experience warm nighttime minimums. The expected change under the SSP1-2.6 scenario expands less, though still by a significant amount, as tropical nights above 26°C increase by a best estimate of 74 days or 2.5 months (at least 36 days or one month, up to 112 days or 3.5 months possible) in the medium term.

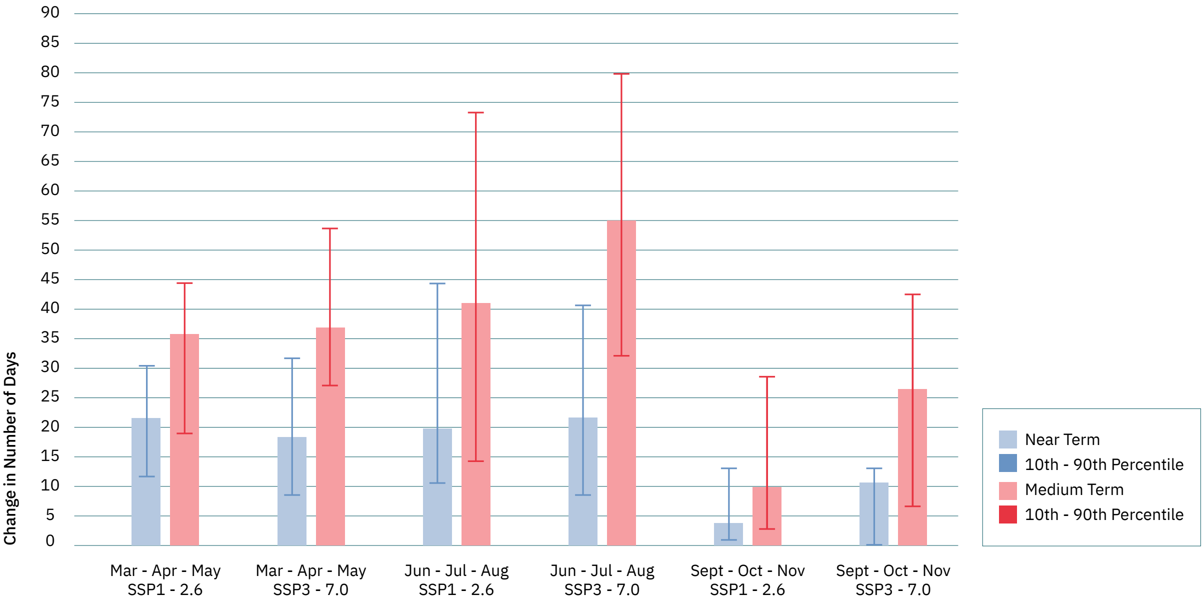
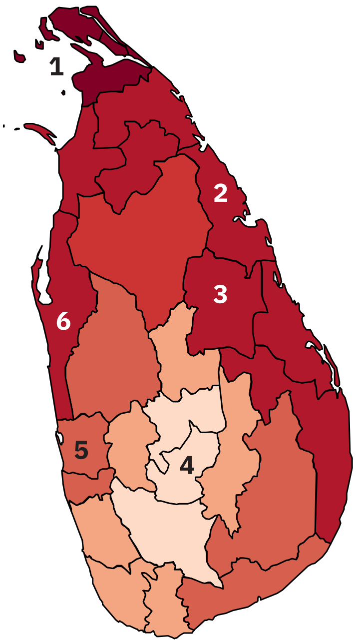



**Figure 4b: Projected Change in Tropical Nights > 26°C by Season in North Central Province over the Short Term (2020–39) and Medium Term (2040–59) under SSP1-2.6 and SSP3-7.0 Scenarios.** Probability range of 10th and 90th percentiles for short-term (blue) and medium-term (red) periods under both scenarios represented by error bars. Note increases in tropical nights from short to medium term under both scenarios.

**Figure 5** maps the combined effects of hot and humid daytime temperatures, and warmer nighttime temperatures across the island by district. **The greatest combined heat risks exist during the pre-monsoon season (April to June) throughout the Dry and Intermediate zones, resulting in serious health implications** (see Human Health section). More extreme heat risk conditions begin in Jaffna and Kilinochchi (Northern Province) in the short term, and expand throughout Northern and Eastern provinces by mid-century. Under the SSP3-7.0 scenario, high heat risk conditions also extend throughout North Central and North Western provinces, Colombo (Western Province), and southern Dry Zone regions (Uva and Southern provinces) over this period. Notably, the SSP1-2.6 scenario projects this same pattern and intensity by mid-century, except in southern Dry Zone regions. In the short term, high heat risk due to warm tropical nights exist in Intermediate Zone provinces and southwest lowland Wet Zone provinces, while moderate heat risks prevail in highland Central and Sabaragamuwa provinces.




- Extreme Heat Index and Nighttime Minimum Risks by 2020-2039
- Extreme Heat Index and Nighttime Minimum Risks by 2040-2059
- Extreme Heat Index and High Nighttime Minimum Risks by 2040-2059
- High Heat Index and High Nighttime Minimum Risks by 2040-2059
- High Nighttime Minimum Risks by 2020-2039
- Moderate Nighttime Minimum Risks by 2020-2039

1. Highest heat risk exposure in Jaffna and Kilinochchi (**Northern Province**) in the short term
2. **Northern and Eastern provinces** experience highest annual increases in Heat Index days above 35°C and during summer months (Southwest Monsoon season) in the short term
3. **North Central and all coastal provinces except Western Province** experience large increases in tropical nights above 26°C in the short term during Southwest Monsoon season
4. **Central Province** experiences large annual increases in summer days above 25°C by mid-century, and **Central and Sabaragamuwa provinces** experience large annual increases in tropical nights above 20°C in the short term
5. Large population exposed to heat risk in Colombo and Gampaha (**Western Province**)
6. **North Western and North Central provinces** experience large increases in Heat Index days above 35°C during spring months (pre-monsoon season) by mid-century

**Figure 5: Heat Risk by District under SSP3-7.0 Scenario in the Short Term (2020–39) and Medium Term (2040–59).** Extreme, high and moderate risk levels were determined based on whether a district's projected conditions exceeded any of the following heat metrics, in ascending order of moderate, high and extreme risk: daily maximum (35°C, 40°C, 45°C), nighttime minimum (23°C, 26°C, 29°C) and Heat Index (37°C, 39°C, 41°C). Heat risk patterns displayed remain largely similar under the SSP1-2.6 scenario.

While highland areas do not face equivalent heat intensities, they do encounter significant shifts in daytime conditions. In Central Province, the number of summer days with maximum temperatures greater than 25°C under the SSP3-7.0 scenario increases annually in the medium term by a best estimate of 32 days (at least 21 days, up to 47 days possible), especially during winter months. A roughly comparable increase and probability range occurs under the SSP1-2.6 scenario over the same time period. In addition, the number of tropical nights with a minimum temperature greater than 20°C increases during the Northeast Monsoon season. Under SSP3-7.0 in Central Province, the annual number of tropical nights at this temperature threshold increases by a best estimate of 32 days (at least 17 days, up to 48 days possible) in the short term and 58 days (at least 38 days, up to 82 days possible) in the medium term. However, the number of annual tropical nights above 20°C under SSP1-2.6 increases by a slightly lower best estimate of 46 days (at least 25 days, up to 66 days possible) in the medium term.

## Precipitation

**By mid-century, projected precipitation amounts show a slight increase nationally under the higher-emission SSP3-7.0 scenario and a substantial increase under the lower-emission SSP1-2.6 scenario. Both scenarios exhibit greater model agreement during the Southwest Monsoon season, but display complex patterns. Under SSP3-7.0, average annual precipitation increases** by a best estimate of +31.02 mm (-104.32 mm to +190.62 mm possible) **in the medium term nationally, roughly the same increase that occurs in the short term.**[33] Western Province in the Wet Zone experiences the largest annual best-estimate increase in the medium term of +87.14 mm (-126.63 mm to +373.99 mm possible), while Northern Province in the Dry Zone experiences the smallest increase of +3.40 mm (-76.31 mm to +159.75 mm possible). **Under SSP1-2.6, average annual precipitation increases by** a best estimate of +80.88 mm (-53.50 mm to +257.64 mm possible) in the medium term, **more than double that of the SSP3-7.0 scenario,** with the largest subnational increase of +126.76 mm (-48.31 mm to +511.62 mm possible) in Western Province and the smallest (but still sizable) increase of +61.66 mm (-62.96 mm to +219.82 mm possible) in Eastern Province. By the end of the century, **both scenarios generally project increased precipitation during the**

**Southwest Monsoon season and Second Intermonsoon period, while the Northeast Monsoon season and First Intermonsoon period show either decreases or increases with less model agreement. However, in the short to medium term, clear directional trends remain difficult to determine** due to, among other things, model uncertainty and inherent variability.[34,IV] While it is essential to plan for uncertainty in the face of wide probability ranges, examining spatial and temporal patterns with higher relative model agreement offers useful insights for policymakers and practitioners to prepare for future climate impacts.

**Greater model agreement exists for precipitation trends across all provinces during the First Intermonsoon period, especially in the south, and during the Southwest Monsoon season by mid-century. The largest best-estimate, monthly precipitation decrease** of -14.12% (-42.24% to +11.68% possible) **occurs in March under SSP3-7.0.** This pattern and timing could reflect a future deviation in the track of the Intertropical Convergence Zone.[35] **The largest best-estimate, monthly precipitation increase** of +22.45% (-1.99% to +65.44% possible) **occurs in September. This could portend an earlier onset of the post-monsoon period. Similar changes in seasonal precipitation patterns occur under other scenarios**.[36] **However,** the SSP1-2.6 and SSP2-4.5 scenarios do **not** display the same median precipitation decreases as SSP3-7.0 **during the Northeast Monsoon season**. For example, compared to the -13.06% precipitation decrease (-31.55% to +31.66% possible) in January by mid-century under SSP3-7.0, a slight increase of +1.50% (-21.34% to +31.61% possible) occurs under SSP1-2.6. Scenario projections for the Northeast Monsoon season trend in the direction of their mid-century January medians by the end of the century. However, higher uncertainty during this season may reflect the dynamic role of interannual precipitation events.

**In Wet Zone provinces, precipitation deficits over the course of the *Yala* agricultural season (March to September)[37,V] maintain higher model agreement under the SSP3-7.0 scenario**, especially in Sabaragamuwa Province (see **Table 2**). For example, in the short term, precipitation decreases on average during spring months by a best estimate of -20.00 mm (-107.96 mm to +57.39 mm possible), and then insufficiently increases during summer months by a best estimate of +15.23 mm (-52.32 mm to +134.61 mm possible). In the medium term, precipitation decreases during spring months by a best estimate of -54.30 mm (-135.45 mm to +44.90 mm possible), and then insufficiently increases during summer months by a best estimate of +24.96 mm (-29.39 mm to +154.05 mm possible). The substantial net precipitation reductions throughout the season in Sabaragamuwa Province may indicate future shifts in the Southwest Monsoon's trajectory. However, they also align with some findings suggesting that precipitation will decrease at higher elevations compared to lowland areas (e.g., Western Province) in the Wet Zone.[38] In comparison, while net precipitation over the *Yala* season increases under the SSP1-2.6 scenario over the short to medium term, only summertime precipitation increases maintained higher model agreement.

**In Intermediate Zone provinces, precipitation deficits over the course of the *Yala* season occur with greater model agreement under the SSP3-7.0 scenario than the SSP1-2.6 scenario.** For example, by mid-century in Uva Province, precipitation decreases during spring months by a best estimate of -25.19 mm (-54.66 mm to +16.32 mm possible), and then insufficiently increases during summer months by a best estimate of +14.21 mm (-10.21 mm to +68.83 mm possible). Note that, while net precipitation decreases in mountainous Uva and Central provinces (see **Table 2**) maintain higher model agreement in the medium term under this scenario, the trend for lowland North Western Province possesses lower model agreement.

IV One challenge involves localised effects of evaporation due to projected increases in temperature. This means that Sri Lanka's marginal precipitation increase may not result in actual runoff due to the higher rates of evaporation caused by hotter conditions. Additionally, since interannual extreme precipitation events tied to El Niño-Southern Oscillation heavily influence Sri Lanka's long-term precipitation average, a small average precipitation increase may instead reflect an increase in precipitation intensity during extreme events or their increasing frequency. Besides the many localised and global factors influencing future precipitation, provincial and even smaller district-level units of analysis may possess topographic and climatic diversity that result in potentially diverging trends combined into a larger unit of analysis.

V Calendar dates vary slightly by region and crop type.

In Dry Zone provinces, precipitation deficits occur over the course of the *Yala* season under the SSP3-7.0 scenario, though only mid-century summer months maintain higher levels of model agreement. For example, in Eastern Province in the medium term, precipitation decreases during spring months by a best estimate of -16.23 mm (-42.43 mm to +16.96 mm possible) and then insufficiently increases during summer months by a best estimate of +12.64 mm (-10.30 mm to +59.59 mm possible). The relatively stable average **net precipitation over the *Yala* season suggests that existing water scarcity risks in Dry Zone lowlands may persist under SSP3-7.0, though model consensus is lacking for SSP1-2.6** (see Floods and Droughts section). **Compared to the *Yala* season, the *Maha* agricultural season (October to February) may face increases across Sri Lanka's three climate zones. However, both scenarios maintain higher model agreement only during autumn months by mid-century**.

| | SSP3-7.0, 2020–39 | | | SSP3-7.0, 2040–59 | | |
|---|---|---|---|---|---|---|
| **Province** | **Spring** | **Summer** | **Net** | **Spring** | **Summer** | **Net** |
| **Southern** (Wet, Intermediate, Dry Zone Lowland) | -12.54 (-61.20, +32.92) | **+13.16** (-36.92, +107.37) | +0.62 | **-28.33** (-75.11, +26.44) | **+18.67** (-24.35, +104.48) | **-9.66** |
| **Western** (Wet Zone Lowland) | -16.03 (-83.02, +51.12) | +13.44 (-69.70, +174.46) | -2.59 | -30.97 (-99.29, +55.25) | **+33.92** (-45.09, +183.93) | +2.95 |
| **Sabaragamuwa** (Wet and Intermediate Zone Highland) | -20.00 (-107.96, +57.39) | +15.23 (-52.32, +134.61) | -4.77 | **-54.30** (-135.45, +44.90) | **+24.96** (-29.39, +154.05) | **-29.34** |
| **Uva** (Intermediate and Dry Zone, Lowland and Highland) | -12.61 (-48.21, +23.16) | **+11.06** (-16.81, +51.37) | -1.55 | **-25.19** (-54.66, +16.32) | **+14.21** (-10.21, +68.83) | **-10.98** |
| **Central** (Wet and Intermediate Zone Highland) | -15.95 (-66.51, +37.32) | +11.15 (-27.08, +69.26) | -4.80 | **-34.38** (-84.61, +29.45) | **+15.07** (-18.09, +93.17) | **-19.31** |
| **North Western** (Intermediate and Dry Zone Lowland) | -12.57 (-49.30, +31.02) | +11.37 (-31.77, +79.19) | -1.20 | -24.19 (-68.10, +34.07) | **+20.62** (-28.86, +89.71) | -3.57 |
| **North Central** (Dry Zone Lowland) | -10.28 (-35.71, +19.72) | **+10.62** (-12.82, +34.71) | +0.34 | -15.86 (-47.79, +22.38) | **+9.64** (-10.35, +44.66) | -6.22 |
| **Northern** (Dry Zone Lowland) | -7.67 (-31.87, +18.28) | +11.67 (-13.40, +34.47) | +4.00 | -13.83 (-42.60, +24.47) | **+8.41** (-11.75, +42.47) | -5.42 |
| **Eastern** (Dry Zone Lowland) | -7.58 (-36.78, +19.04) | **+9.38** (-14.04, +45.38) | +1.80 | -16.23 (-42.43, +16.96) | **+12.64** (-10.30, +59.59) | -3.59 |

(Table 2 continued on page 17)

| Province | SSP3-7.0, 2020–39 | | | SSP3-7.0, 2040–59 | | |
|---|---|---|---|---|---|---|
| | Spring | Summer | Net | Spring | Summer | Net |
| **Southern** (Wet, Intermediate, Dry Zone Lowland) | -10.75 (-51.43, +33.75) | +16.17 (-27.28, +72.89) | +5.42 | -4.46 (-61.24, +55.73) | **+33.89** (-10.13, +117.34) | +29.43 |
| **Western** (Wet Zone Lowland) | -11.81 (-78.03, +55.03) | +28.06 (-49.27, +140.33) | +16.25 | -0.02 (-83.75, +82.26) | **+59.67** (-43.06, +216.02) | +59.65 |
| **Sabaragamuwa** (Wet and Intermediate Zone Highland) | -19.50 (-93.81, +62.70) | **+23.57** (-33.41, +107.82) | +4.07 | -15.48 (-91.19, +89.75) | **+49.06** (-26.29, +161.44) | +33.58 |
| **Uva** (Intermediate and Dry Zone, Lowland and Highland) | -9.14 (-36.91, +33.40) | +12.76 (-12.97, +34.76) | +3.62 | -9.76 (-35.10, +41.77) | **+20.08** (-5.68, +50.26) | +10.32 |
| **Central** (Wet and Intermediate Zone Highland) | -11.47 (-61.74, +46.13) | **+11.20** (-16.23, +52.51) | -0.27 | -13.57 (-60.80, +62.37) | **+28.15** (-15.89, +78.09) | +14.58 |
| **North Western** (Intermediate and Dry Zone Lowland) | -10.44 (-57.41, +39.78) | **+9.81** (-16.96, +53.44) | -0.63 | -2.21 (-58.25, +55.29) | **+30.17** (-23.05, +84.95) | +27.96 |
| **North Central** (Dry Zone Lowland) | -5.73 (-40.50, +29.33) | **+9.92** (-7.85, +27.53) | +4.19 | -6.36 (-40.62, +43.40) | **+15.41** (-5.02, +33.51) | +9.05 |
| **Northern** (Dry Zone Lowland) | -7.31 (-33.17, +22.14) | **+10.61** (-5.50, +32.76) | +3.30 | -3.69 (-33.27, +38.59) | **+15.91** (-6.30, +37.41) | +12.22 |
| **Eastern** (Dry Zone Lowland) | -4.43 (-31.65, +30.43) | +11.90 (-11.54, +32.61) | +7.47 | -5.78 (-33.44, +33.62) | **+17.01** (-4.50, +39.62) | +11.23 |

**Table 2. Projected Average Precipitation Change (mm) across Provinces during *Yala* Season under the SSP3-7.0 Scenario (top) and SSP1-2.6 Scenario (bottom) in the Short Term (2020–39) and Medium Term (2040–59).** Net precipitation represents the best estimate (50th percentile) of projected precipitation changes during spring (March to May) and summer (June to August) months. Greater model agreement on precipitation surpluses are shaded blue, with the best estimate bolded (90th percentile exceeding three times the absolute value of the 10th percentile). Precipitation deficits with greater model agreement are indicated in red (10th percentile exceeding three times the absolute value of the 90th percentile). Net precipitation values with greatest projected model agreement for both spring and summer months are outlined in red. Note, net deficits under SSP3-7.0 show greater model agreement than net surpluses under SSP1-2.6.

**Precipitation intensity** (measured by the average largest monthly precipitation amount over a five-day period) **increases with higher model agreement in the medium term across Wet Zone lowlands during summer months under the SSP3-7.0 and SSP1-2.6 scenarios, but varies by region and scenario on average annually.** In the medium term, median precipitation at this intensity increases everywhere during the summer months (Southwest Monsoon season). For example, under the SSP3-7.0 scenario in Western Province over spring months by mid-century, average largest five-day precipitation increases by a best estimate of +17.06 mm (-61.30 mm to +132.82 mm possible) and during summer months +20.92 mm (-47.05 mm to +88.01 mm possible). Under the SSP1-2.6 scenario by mid-century, average largest five-day precipitation increases in Western Province by +24.43 mm (-56.48 mm to +97.31 mm possible) during spring months and +27.66 mm (-40.60 mm to +86.19 mm possible) during summer months. While increases in precipitation intensity may contribute to future shifts in total precipitation, **model uncertainty and inherent variability in the short to medium term limit projections of extreme precipitation magnitude and timing.** By mid-century, **the frequency of the average largest five-day precipitation events at 25-year, 50-year and 100-year intervals is projected to more than double for Wet Zone provinces by mid-century, though agreement between models is not high**. Only by 2060–89 does the future 25-year return period of average five-day precipitation events shorten to a best estimate of 11.10 years (5.13 years to 33.42 years possible) under the SSP3-7.0 scenario and 10.33 years (4.44 years to 29.09 years possible) under the highest-emission SSP5-8.5 scenario. By this point after mid-century, precipitation events that currently recur every 25 years would occur every 10–11 years.

# Projected Sectoral Impacts

The following sections outline projected climate impacts by sector considering the temperature and precipitation indicators described above, sector-specific metrics further detailed in adelphi's Supplemental Information and interdisciplinary research findings – particularly as part of the national government's periodic submissions to the UN Framework Convention on Climate Change.[39]

## Human Health

**Many of Sri Lanka's climate-related health risks, including heat stress and vector-borne diseases, are projected to worsen in the short to medium term.[40]** Extreme daytime temperature and humidity conditions (Heat Index > 35°C) increase the most during the pre-monsoon season (April to June). Likewise, warm nighttime minimums (Tropical Nights > 26°C), which prevent body temperature from adequately cooling down for restful sleep, increase across most lowland and coastal areas during the intermonsoon periods in the short and medium term. The combination of high daytime temperature and humidity, and warmer nighttime minimums become most severe during the First Intermonsoon period under both the SSP1-2.6 and SSP3-7.0 scenarios. **All identified extreme heat conditions raise mortality and morbidity risks in the short term for particular demographic groups, especially outdoor labourers, older people, pregnant women, children and people with pre-existing health conditions across Sri Lanka's northern and eastern areas (see Figure 5**). **These heat risk trends experience relatively greater model agreement,** and contribute to decreased living standards in Northern and North Western provinces by mid-century under the SSP3-7.0 scenario without further adaptation.[41, VI] Heat-related illness, including dehydration and heat stroke, notably affect the large population of outdoor agricultural workers in North Central Province and urban poor in the Colombo metropolitan area (Western Province), directly impacting economic livelihoods (see Critical Infrastructure and Economy section).[42, VII]

**Increased temperatures, monsoon rainfall and relative humidity correspond with more favourable conditions for disease vectors, such as mosquitoes.** However, more frequent, severe and extensive outbreaks often result from complex interactions with other environmental factors, such as solid waste and drainage. This profile highlights three vector-borne diseases with outsized risks due to future climate conditions: dengue, leptospirosis and leishmaniasis (see **Figure 6**). **The Wet Zone faces increased risks related to dengue and leptospirosis in the medium term, while the Dry Zone faces increased risks related to leishmaniasis.** However, in the short term, all regions remain subject to precipitation patterns with inherent variability. Scholars note important links between food and waterborne illnesses, such as dysentery in the Intermediate Zone, associated with flood and drought conditions (see Food and Agriculture section for details on malnutrition),[43] as well as the potentially bi-directional relationship between disease and conflict in the Sri Lankan context.[44, VIII]

Since the 1990s, epidemics of **dengue fever**, the main mosquito-borne disease on the island with flu-like symptoms, began occurring more frequently after seasonal monsoon onsets. Large epidemics infected an estimated 35,000 people and caused 350 casualties in 2009, and infected more than 180,000 people causing 440 casualties in 2017, especially in Western Province during the Southwest Monsoon season.[45] Research suggests local dengue transmission correlates with high humidity and number of wet days, not necessarily extreme amounts of rainfall that can flush

VI Heat risk severity worsens considerably more than other scenarios (and thus introduces scenario uncertainty) only under SSP5-8.5 by mid-century.

VII Heat risk severity worsens considerably more than other scenarios (and thus introduces scenario uncertainty) only under SSP5-8.5 by mid-century.

VIII For example, a malaria epidemic in northeastern Sri Lanka near the beginning of the civil war (1986–87) resulted in roughly 600,000 cases. Conflict can detrimentally extend the spread of malaria by limiting access to preventative measures and health care services, as well as driving people to travel along irregular routes. However, during the 1990s, the risk of outbreak affecting both warring parties and their motivation to demonstrate political legitimacy in part led to constructive efforts to jointly combat malaria, which was officially eradicated in 2016. In the short to medium term, according to the national government's Third Climate Change Communication, all areas outside of major cities face a moderate risk of reintroduction.

out insects.[46] Under the SSP3-7.0 and SSP1-2.6 scenarios, increased precipitation (mm) projected during the Southwest Monsoon season in the short to medium term raises the overall risk of dengue transmission in Wet and Intermediate Zone provinces. The national government also identifies a high risk of dengue in urban areas such as Jaffna (Northern Province) during the Northeast Monsoon season, which despite greater future precipitation uncertainty, possess other risk factors such as large solid waste volumes that contribute to mosquito breeding.[47]

**Leptospirosis**, a bacterial infection often spread by rodents, tends to occur year-round in areas of unplanned urban development with close proximity to wild and domesticated animals.[48] Since 2008, the disease spread to new locations, particularly in the Wet and Intermediate zones. Between 2008 and 2010, leptospirosis outbreaks in Sri Lanka resulted in an estimated 15,000 cases and 400 casualties.[49] One study found that disease spikes correlated with the number of wet days, moist soil and lowland areas of the Wet and Intermediate zones, as well as land clearing and ploughing for seasonal crop cultivation in March and September.[50] Therefore, under the SSP3-7.0 and SSP1-2.6 scenarios, increased precipitation (mm) projected in the short to medium term during the Southwest Monsoon season raises the transmission risk in rural lowlands for the peak month of September (*Maha* cultivation season). However, the national government projects elevated risks also in urban and suburban areas of the Wet and Intermediate zones.[51]

**Leishmaniasis**, a parasitic infection transmitted by sand flies with the potential to cause symptoms such as fever and skin lesions, poses a growing risk in the Dry Zone, with more than 1,000 cases annually nationwide.[52] Research has found that irrigated land and water bodies in lowland areas contribute to vector breeding, and transmission on warm and humid, not rainy, days.[53] In addition, infection risk increases as a result of activities such as collecting firewood, and travelling through forested areas of northern and northeastern districts previously impacted by conflict.[54] Recent outbreaks peaked in northern and eastern Dry Zone provinces during the Southwest Monsoon season, and in southern Dry Zone provinces during the Second Intermonsoon period.[55] While future climate indicators under the SSP1-2.6 scenario do not worsen transmission conditions in the short to medium term across the Dry Zone during these seasons as much as under the SSP3-7.0 scenario, lower projected rainfall (mm) during the First Intermonsoon period could shift the timing of most favourable outbreak conditions.

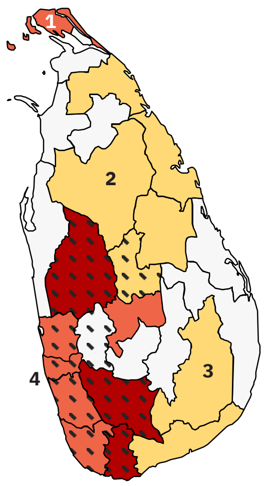



**Figure 6: Projected Exposure to Vector-Borne Disease by District.**[56] Map combines exposure levels of three diseases in the medium term (2040–59) considering projected climate trends of the SSP1-2.6 and SSP3-7.0 scenarios.

## Floods and Droughts

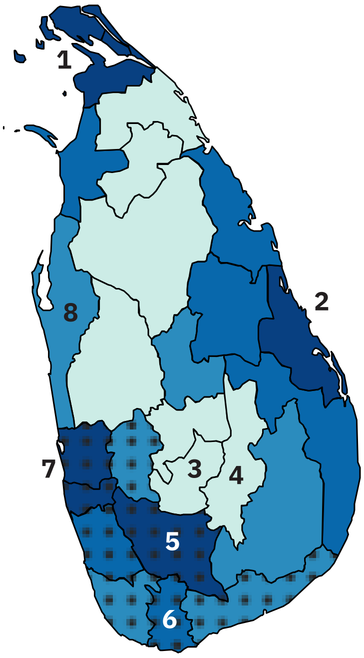
**Sri Lanka not only faces high flood risks, but also severe water scarcity at the same time due to uneven regional and seasonal precipitation patterns (see Projected Precipitation section for levels of uncertainty in purple associated with linked indicators for meteorological floods and droughts).**

Floods and droughts impacted an estimated 15 million people in Sri Lanka between 2008 and 2018.[57] During the 2016/17 El Niño, as one vivid example, the worst drought in 40 years hit the Dry Zone particularly hard, while major pre-monsoon floods and landslides in the Wet Zone displaced half a million people and resulted in at least USD 1 billion in damage.[58] **Floods occur most often during the pre-monsoon and post-monsoon periods, but may differ in their causes.** Heavy precipitation, combined with paved urban surfaces and poor drainage, directly lead to flooding in urban areas such as metropolitan Colombo. In turn, this can further enhance localised rainfall intensity.[59] Flooding particularly impacts unplanned settlements on marginal land in the capital region, where 40% of the country's poor live.[60] Urban poor without toilets or own piped water sources often require hospitalisation after flooding because of exposure to contamination.[61]

**Tropical cyclones deliver** extreme rainfall **in Sri Lanka interannually, affecting Eastern, Northern, and North Central provinces with west-northwest tracks in the post-monsoon period**.[62] **However, the greatest intensity and damage tends to occur during the pre-monsoon period, mostly impacting the Wet Zone** with northward tracks in the pre-monsoon season.[63] Cyclone Roanu in 2016 occurred during this timeframe, resulting in widespread flooding that caused over USD 600 million in damage, especially in metropolitan Colombo.[64] Cyclones impacting Sri Lanka from the Bay of Bengal occur with greater frequency during La Niña years, though researchers currently debate whether tropical cyclone frequency in the North Indian Ocean will increase in the future.[65]

Landslide risk increases with intense rainfall events, exacerbated by factors such as land clearance, substandard urban development and poor drainage, especially along slopes.[66] For example, heavy rainfall during the Southwest Monsoon season in May 2017 triggered 35 landslides in Ratnapura (Sabaragamuwa Province), Kalutara (Western Province) and Matara (Southern Province), which led to more than 100 casualties, and damaged houses, critical infrastructure and plantation agriculture.[67] **Roughly 20% of Sri Lanka's land surface – mainly in the Central Highlands, and slopes in the Wet and Intermediate zones – is at a risk of landslides,[68] which most frequently occur during and immediately after the Second Intermonsoon period, and the beginning of the Southwest Monsoon season**.[69] The highest landslide exposure risks occur in Nuwara Eliya (Central Province) and Badulla (Uva Province).[70]

**Figure 7** displays flood exposure risks, including flood-induced landslides, riverine floods and areas of increased projected rainfall intensities.[71] **Sri Lanka faces a high riverine flood risk** (> 1% of the population affected annually on average),[72] **which threatens settlements, critical infrastructure and agriculture.** While extreme rainfall (i.e., the average largest five-day precipiration) may increase annually in the short term under the SSP1-2.6 scenario, and in the short to medium term with some degree of model uncertainty and projection variability in the Central Highlands under the SSP3-7.0 scenario, flooding may also occur in Dry Zone lowlands, where water channelled from the Wet Zone can cause waterlogging.[73] More than 100 river basin systems drain from the Central Highlands to the coast, but only a few watersheds expand beyond 2,500 km². These include the Kelani and Kalu rivers in the Wet Zone, and the 335 km-long Mahaweli River, which flows northward through the Dry Zone and irrigates crops throughout the region,[74] amid incidents of flooding.[75]




- High Flood Exposure Risk
- More Certain Precip Increases
- Moderate Flood Exposure Risk
- More Certain Precip Increases
- Low Flood Exposure Risk
- More Certain Precip Increases
- Minimal Flood Exposure Risk

1. **Northern Province:** High risk for Jaffna and Kilinochchi settlements, Kilinochchi transport network, and paddy agriculture
2. **Eastern Province:** High risk for Batticaloa settlements and paddy agriculture, and drinking water in Gal River Basin (Ampara)
3. **Central Province:** High flood-induced landslide risk in Nuwara Eliya
4. **Uva Province:** High flood-induced landslide risk in Badulla
5. **Sabaragamuwa Province:** High risk for Ratnapura settlements, transport network, drinking water and plantation agriculture
6. **Southern Province:** High risk to drinking water in Nilwala and Walawe river basins
7. **Western Province:** High risk to Colombo-Gampaha settlements and transport network, Gampaha plantation agriculture, and drinking water in Kelani and Kalu river basins
8. **North Western Province:** High risk to settlements and drinking water in Puttalam
9. **North Central Province:** High risk to Polonnaruwa paddy and plantation agriculture

**Figure 7: Flood Exposure Risk and Projected Medium-Term (2040–59) Extreme (Average Largest Five-Day) Precipitation Increase by District under the SSP3-7.0 Scenario.**[76] Based on reports of people affected between 1974 and 2008. Map combines relative exposure levels of settlements, transportation infrastructure, drinking water, and paddy and plantation agriculture. Landslide exposure risk based on reports of people affected over the same timeframe also noted.

**Under the SSP3-7.0 scenario, Sri Lanka maintains medium to high levels of water stress through mid-century,** with high levels of water stress and seasonal variability projected for Jaffna (Northern Province).[77, IX] **Water shortages frequently impact Sri Lanka, despite its high annual precipitation volumes,** and extensive network of over 200 major and 12,000 minor irrigation reservoirs, principally intended for channelling water from the Wet Zone to cropland in the Dry Zone.[78] In addition to meteorological droughts and hydrological droughts, agricultural and ecological droughts (see Food and Agriculture, as well as Ecosystems sections), climate-related conditions may strain existing infrastructure and water management activity (see Critical Infrastructure and Economy section), resulting in socioeconomic droughts. **Droughts during the *Yala* agricultural season occur in the Dry Zone and lowland Intermediate Zone** due to weaker First Intermonsoon and Southwest Monsoon rainfall, along with high rates of evaporation.[79] **Droughts during the *Maha* agricultural season often strike the northwestern and southeastern Dry Zone** due to their distance from the effects of the Northeast Monsoon (see Food and Agriculture section for further discussion of drought characteristics). Over the last few decades, competition and conflicts among farmers for water has increased, in addition to regional tensions over water for cropland irrigation versus hydropower.[80] Water shortages disproportionately impact women, who are traditionally expected to supply households with water, sometimes from long distances. This reduces time for income-generating activities, and impacts household health and sanitation if water quality is poor.[81] While groundwater often supplies domestic and drinking water needs, saltwater intrusion and pollution threatens many coastal and riparian aquifers (see **Figure 7**).[82]

IX Projected levels of water stress under the SSP1-2.6 scenario by mid-century across Sri Lanka – except for Jaffna – reach low to medium levels.

## Food and Agriculture

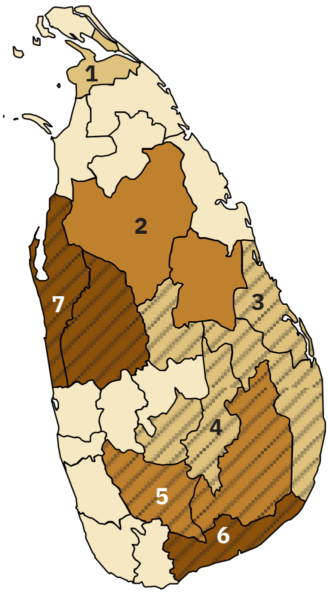
**Changing temperature and precipitation patterns pose high risks to food security, especially for particular demographic groups in the Dry Zone.** Expected temperature increases with relatively high consensus among participating models in the Dry and Intermediate zones will affect liveable conditions for cattle and dairy animals, poultry, and swine.[83] Temperatures avoce 35°C, even for short periods, can affect rice paddy flowering, while warmer nighttime temperatures (> 26°C) negatively affect subsistence vegetables harvests.[84] Agricultural plantations for tea, coconut and rubber, and minor export crops including spices such as cinnamon and pepper remain sensitive to higher temperatures and extreme conditions, as well as flood and drought conditions.[85] Likewise, changes in sea surface temperature, ocean acidification and sea level rise threaten fish habitats and breeding grounds (see Coastal Zone section). Fishing provides a large majority of Sri Lanka's animal protein sourced from coastal, freshwater and aquaculture sectors.[86] In addition, increased risk of drought threatens brackish estuaries and lagoons along the coast, especially in Northern and North Western provinces.[87]

Sri Lanka's most important staple crop, rice, provides the main livelihood for the country's rural population, occupies extensive tracts of irrigated land and serves as the main source of dietary energy in addition to wheat.[88] Rice paddy cultivation has increased significantly over the last several decades in concert with an expansion in irrigation. The Dry Zone now produces more than three quarters of Sri Lanka's rice mostly during the *Maha* season, comprising more than 6,000 hectares or twice as much as cultivated land during the *Yala* season.[89] Nearly half of national yields originate from North Central Province, Ampara (Eastern Province) and Kurunegala (North Western Province). **Figure 8** illustrates areas of high-projected drought risk and seasonal precipitation deficits (mm) in Sri Lanka. Districts with high poverty rates and dependence on agriculture include Puttalam (North Western Province), Anuradhapura (North Central Province) and Monaragala (Uva Province).[90] **During the *Maha* season, decreasing Northeast Monsoon rainfall (greater model agreement under the SSP3-7.0 scenario in the short to medium term) will increase drought risk in North Western Province, risking rainfed rice paddy cultivation or tracts drawing from minor irrigation reservoirs**.[91, X] **Rice production over the minor (*Yala*) season tends to decrease during El Niño years and over the major season (*Maha*) during La Niña years.[92]** Climatic changes that result in reduced water availability, and affect irrigation and crop yields risk triggering internal migration of rural labourers to other sectors such as construction or transportation.[93]

Malnutrition (4.40% of the population at risk) already affects a large low-income population in urban Western Province, dependent on variable food prices and rainfed rural subsistence paddy farmers such as in lowland Uva Province.[94] **Since 2014, the total prevalence of moderate or severe food insecurity has doubled, reaching 11.4% in 2023, reflecting economic disruptions caused by the COVID-19 pandemic, the country's 2022 economic crisis and the sudden ban on chemical fertilisers**.[95, XI] **The highest levels of food insecurity, affecting about half of households, occur on tea plantation estates** mostly in Nuwara Eliya (Central Province), Kandy (Central Province) and Badulla (Uva Province), which feature large numbers of Indian Tamil daily wage labourers.[96] Since the majority of such estate workers engage in food-based coping strategies, disproportionate rates of undernutrition likely affect these groups, in addition to social welfare beneficiaries and female-headed households. **Under the Middle-of-the-Road scenario with rising population and rapid GDP growth by mid-century, net food demand increases** 3.8 metric tons along with greater overall crop yields, and imports of wheat and other cereals.[97] This projection, with some level of model uncertainty and inherent vulnerability, suggests that over the same timeframe **key food imports may further increase under a higher-emission SSP3-7.0 scenario by comparison, given SSP3-7.0's slower projected economic growth, higher population increase and lower annual precipitation nationally**. Projected water stress and socioeconomic conditions under SSP3-7.0 will exacerbate the effects of these trends among vulnerable groups.

X Drought risk remains high across the Dry Zone during the Yala season.

XI Using three-year averages.




- High Drought Risk + Seasonal Precip Decreases
- Medium Drought Risk
- Medium Drought Risk + Seasonal Precip Decreases
- Low Drought Risk
- Low Drought Risk + Seasonal Precip Decreases
- Minimal Drought Risk

1. **Northern Province:** High risk to Kilinochchi livestock
2. **North Central Province:** High risk to irrigation and paddy agriculture in Anuradhapura and Polonnaruwa, and livestock in Anuradhapura
3. **Eastern Province:** High risk to drinking water in Ampara, and paddy agriculture and livestock in Batticaloa
4. **Uva Province:** High risk to drinking water in Badulla and Monaragala, and irrigation in Monaragala
5. **Sabaragamuwa Province:** High risk to settlements, drinking water, irrigation, paddy and plantation agriculture, and livestock
6. **Southern Province:** High risk to Hambantota settlements, drinking water, irrigation, paddy agriculture and livestock
7. **North Western Province:** High risk to settlements, drinking water, irrigation, paddy and plantation agriculture, and livestock

**Figure 8: Drought Exposure Risk and Projected Seasonal Precipitation Deficits (2040–59) by District under the SSP3-7.0 Scenario.**[98] Based on reports of people affected by drought between 1974 and 2008. Map combines relative exposure levels of settlements, drinking water and irrigation, paddy and plantation agriculture, and livestock.

## Human Displacement

**Worsening climate-related health risks can threaten households previously uprooted by generalised violence and conflict, which often possess weakened social networks and livelihood opportunities. This can increase demand and overwhelm basic health services and specialised care, including psychological support.** The country's three decades of civil war resulted in millions of people experiencing some level of conflict-driven **internal displacement**, with roughly 870,000 people left temporarily or repeatedly displaced by the end of the civil war in 2009.[99] The 2004 Indian Ocean tsunami exacerbated conditions especially in Northern and Eastern provinces, resulted in 30,000 casualties nationally, and displaced more than one million people (see Coastal Zone section).[100] Though government resettlement programmes under various administrations since the early 2000s have reduced the number of people experiencing long-term protracted displacement, 12,000 people remain displaced by conflict as of 2023.[101] **Sri Lanka also continues to experience internal displacement due to frequent flood events, which pose nationwide risks across seasons under trends of increasing precipitation intensity** (see Floods and Droughts section). Some of the largest flood-induced displacement events occurred in Wet Zone provinces during the 2008 Southwest Monsoon season (c. 400,000 displaced), Eastern Province during the 2011 Northeast Monsoon season (c. 400,000 displaced) and nationwide during the 2016 pre-monsoon Cyclone Roanu (c. 500,000 displaced).[102, XII] **Figure 9** illustrates recent historical trends for the three mentioned sources of internal displacement according to district, noting the greatest combined levels of conflict and disaster-induced displacement in Mullaitivu, Batticaloa and Ampara.

XII IDMC defines internal displacement, reflected in these figures, as "new forced movements."

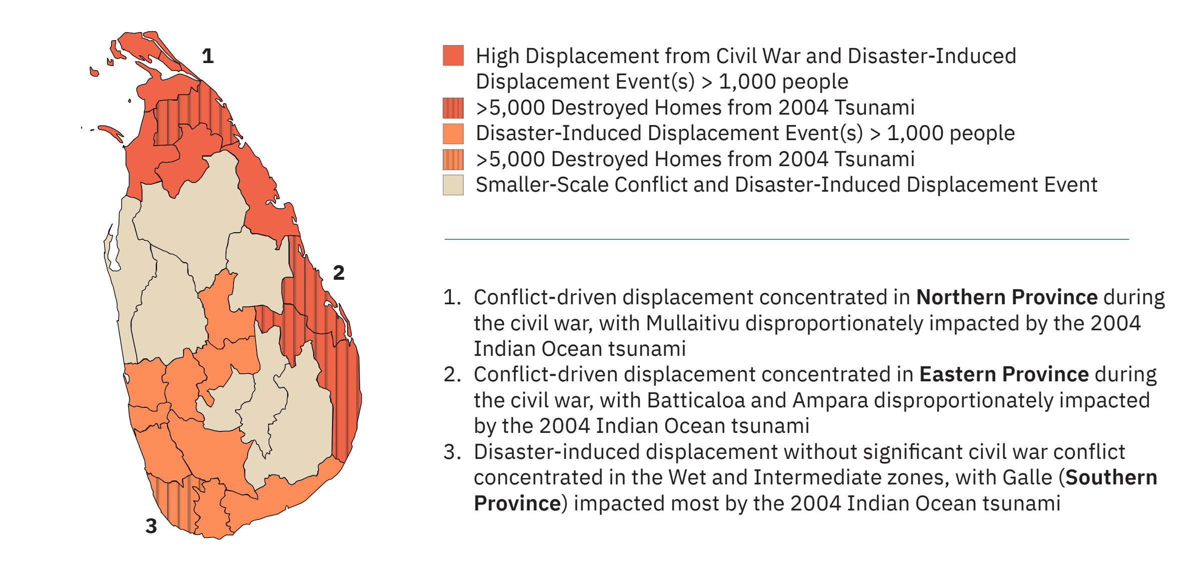



**Figure 9: Key Conflict and Disaster-Induced Displacement Trends in Sri Lanka by District.** Map combines regional internal displacement statistics for each year of the Sri Lankan Civil War (1983–2009); disaster-driven displacement events involving more than 1,000 people (2013–23), where IDMC identified regional or district-level extents; and greatest provincial impacts from the 2004 Indian Ocean tsunami, using destroyed homes as a proxy.[103]

## Ecosystems[104]

As a global biodiversity hotspot, Sri Lanka is home to more than 9,000 known species of plants and animals, many unique to the island.[105] **Forests span roughly 30% of the country's land area across temperature, precipitation and soil regimes, providing critical ecosystem services that help manage runoff and erosion, and thus lower flood and landslide risks. Sri Lanka's biodiversity also contributes important, but often less tangible cultural services**. For example, the country's coastal wetlands at risk of sea level rise (see Coastal Zone section) hold spiritual and religious, inspirational (e.g., folkloric), aesthetic, communal, medicinal, educational, and historical value.[106] **The greatest levels of biodiversity occur in forests located in the Wet Zone's Western, Southern, Sabaragamuwa and Central provinces** (see **Figure 10**). These include montane and sub-montane rainforests in the Central Highlands (located above 1,000 m) and lowland rainforests (located below 1,000 m) closer to the coast, all vital for maintaining watershed quality. Habitat loss and fragmentation most threaten amphibians, reptiles, birds and mammals in the Wet Zone, primarily due to human activity such as infrastructure development and agricultural expansion. However, **species limited to higher elevations face greater risk of extinction under changing climate conditions, especially under the sooner, more rapid mean temperature increases of the SSP3-7.0 scenario**.[107] Non-native invasive species with broader tolerable ranges also demonstrate greater likelihood to outcompete local species under such conditions.[108]

**Monsoon rainforest in the Dry Zone**, characterised by a three to six-month dry period at elevations below 600 m, conversely **faces greater potential for expansion under SSP3-7.0's expected climate conditions,** along with thorny shrubland predominant in more northern provinces.[109] The Nature Conservancy identifies critical intact areas for ecosystem conservation in this zone – Yala (Hambantota, Monaragala, Ampara), Wasgamuwa (Matale, Polonnaruwa) and Wilpattu (Puttalam, Anuradhapura) national parks.[110] Tracts of moist monsoon rainforest in the Intermediate Zone, characterised by a three-month dry period and elevations below 1,000 m, also provide potential habitat for certain species at risk of shifting climate conditions in Central and Uva provinces.[111] While increasing temperatures and extreme weather patterns will influence future terrestrial habitat ranges, scientists urge monitoring of wildfire frequency and intensity, and changes favourable to pests.[112] High evaporation rates due to increasing temperatures, drought conditions and human activity specifically threaten inland freshwater fisheries and approximately 2,000 $km^2$ of wetlands, including six internationally recognised sites under the Ramsar Convention.[113] **However, vulnerability to future climate impacts – with greater model agreement of temperature-driven changes than precipitation-driven changes – varies by species.**

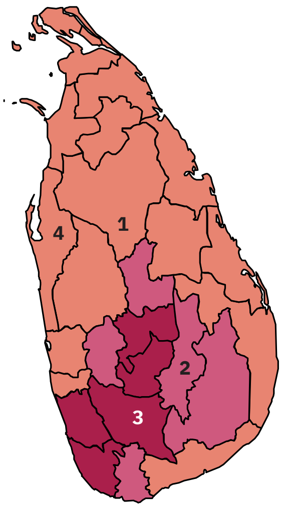



**Figure 10: Number of Representative Vertebrate, Insect and Flowering Plant Species Threatened by Climate Change by District**.[114] Vulnerability to future climate change depends, in part, on selected scenario, projected time period and location relative to boundaries of the three main climatic zones.

## Critical Infrastructure and Economy

**Sri Lanka's economic activity and infrastructure networks not only face a significant risk of impacts from flooding and sea level rise, but also the effects of water stress and extreme heat on energy costs.** Under the SSP3-7.0 scenario by 2050, Sri Lanka is highly vulnerable to GDP loss from precipitation-driven flooding (100% of GDP exposed), extreme heat (100% of population exposed), severe storms (87% of GDP exposed), and water stress (79% of GDP exposed). Based on transit route density and past flood exposure, transit networks in Gampaha (Western Province), Ratnapura (Sabaragamuwa Province) and Kilinochchi (Northern Province) districts rank highest in their vulnerability to flood impacts (see **Figure 11**). Notably, the annual expected GDP percentage affected by riverine flooding totals a higher amount under the SSP3-7.0 scenario by mid-century (2.05%) compared to the SSP1-2.6 scenario (1.31%).[115] Inundation from **sea level rise also poses a high risk** of damage to major transit corridors between Colombo and Galle, important for trade, tourism and service sector activity (see Coastal Zone).[116] In fact, **economic activity in coastal areas makes up 45% of Sri Lanka's GDP**.[117]

In the addition, the localised warming effects of hot urban surfaces in Western Province generate higher energy demand for cooling, affecting the country's 4.3 million residents and nearly half of national GDP projected by mid-century.[118] As one indicator, the SSP3-7.0 scenario projects a best-estimate increase in cooling days of 12% (at least 7.9%, 16.6% possible) by mid-century with relatively high consensus among participating models in the warm month of May, with only a slightly smaller increase expected under the SSP1-2.6 scenario. Furthermore, floods, water stress and extreme heat all carry potential to disrupt hydropower generation, which is responsible for roughly 40% of Sri Lanka's electricity.[119] Most of Sri Lanka's hydropower reservoirs and facilities occupy the western slopes of the Central Highlands, where extreme rainfall may increase and seasonal rainfall may decrease under the SSP3-7.0 scenario **(see Projected Precipitation section for levels of model uncertainty and inherent vulnerability in purple associated with linked indicators for meteorological floods and droughts)**.[120] The agriculture and forestry sector reflects high GDP exposure to water stress, in part due to the sector's contribution to economic activity (15.6% of GDP in 2019). In addition, a high percentage (53%) of rainfed crop area as well as the Dry Zone relies on Wet Zone precipitation for irrigation.[121]

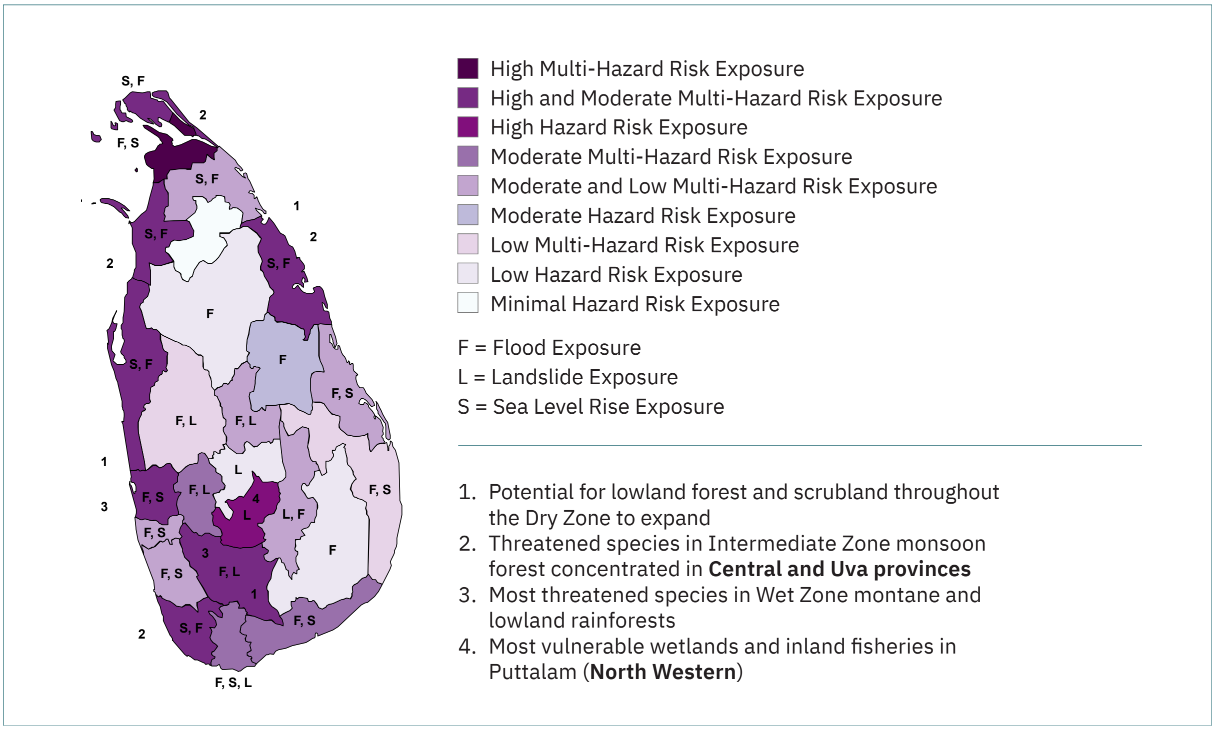



**Figure 11: Transportation Sector Risk Exposure to Flood, Landslide and Sea Level Rise in Sri Lanka by District**.[122] Based on district reports of people affected by floods and landslides between 1974 and 2008 and areas 2 m or less above sea level within 5 km of coast. Map specifies high, moderate, low, or minimal single-hazard or multi-hazard risk exposure of district-level transportation infrastructure (determined by length and density of main and secondary roads, and railroads). Letters in the legend indicate relevant hazards by district in order of severity. The same level of severity (e.g., moderate risk exposure) for each hazard, if more than one present at the district level, was weighed equally to create a relative multi-hazard risk scale in shades of purple. Vulnerability to future climate change depends, in part, on selected scenario and projected time period.

## Coastal Zone

**Sri Lanka's roughly 1,700 km-long coastline, which is home to 40% of the country's population and a large proportion of economic activity, faces multifold climate impacts**.[123] For the year 2030 under the SSP3-7.0 scenario, sea level rises above the 1995–2014 baseline by a best estimate of 9 cm in Jaffna District (Northern Province) with a similar range of probability around the island.[124] However, even this increment particularly impacts low-lying settlements and biodiverse mangrove, seagrass, and coral reef ecosystems in the shallow Gulf of Mannar.[125] According to the same scenario **by mid-century, most of the country's major coastal cities face moderately high exposure risks as a result of 23 cm best-estimate sea level rise for Colombo (Western Province)** (see **Figure 12**).[126] However, by the end of the century, the southwestern coast experiences marginally higher sea level rise compared to the island's north under the SSP3-7.0 scenario, increasing by a best estimate of 72 cm in Colombo and illustrating longer-term scenario uncertainty.[127, XIII]

**While seemingly small, sea level rise amplifies coastal flooding and storm surge from extreme storm events, worsened by non-climate drivers such as poor drainage and coastal development pressures. Figure 13** illustrates that 2 m of effective inundation threatens paddy agriculture in Northern Province and Trincomalee (Eastern Province). Slow-onset sea level rise and rapid-onset storm surge events also disproportionately affect coconut plantations, drinking water supplies and the fisheries sector in Puttalam (North Western Province) due to saltwater intrusion.[128]

XIII Probability range between 39 cm (17th percentile) and 1.10 m (83rd percentile) for 6°N, 79°E grid. This surpasses the 59 cm median projection under the SSP2-4.5 scenario for the same time period, but not the 83 cm median projection under the SSP5-8.5 scenario. Probability range between 27 cm (17th percentile) and 96 cm (83rd percentile) for SSP2-4.5, and between 49 cm and 1.23 m for SSP5-8.5.

As evidenced by the 2004 Indian Ocean tsunami during the country's civil war, the inequitable exposure of key demographic groups to physical impacts in the coastal zone plays a contributing role in the political dynamics of conflict.[129, XIV]

Finally, increasing sea surface temperatures off the coast of Sri Lanka fluctuate with currents linked to seasonal changes in monsoon wind directions. Upwelling of cooler water to the surface occurs during the Northeast Monsoon in January and throughout the summer months of the Southwest Monsoon.[130] However, **changes in sea surface temperatures alter the locations suitable for fish stock breeding and habitation, threatening economic livelihoods reliant on deep sea fishing.** Further, interannual increases in sea surface temperatures during El Niño in previous years, up to 5°C higher than average, carry the potential for large-scale coral bleaching events that destroy important, biodiverse feeding grounds and stand to become more commonplace under rising temperatures.[131] Coral reefs damaged by increasing sea surface temperatures – as well as ocean acidification – face a more difficult recovery in areas such as the northern Gulf of Mannar, where illegal fishing activity also degrade shallow marine ecosystems.[132] **Degradation and destruction of naturally protective reef, mangrove and wetland habitats ultimately raise coastal exposure to storm surge, sea level rise, and associated risks of erosion and saltwater intrusion.**

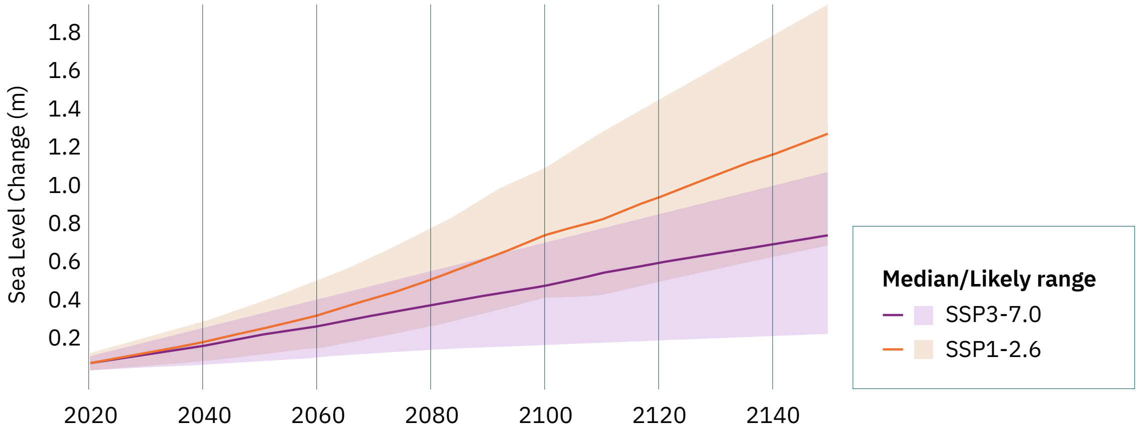
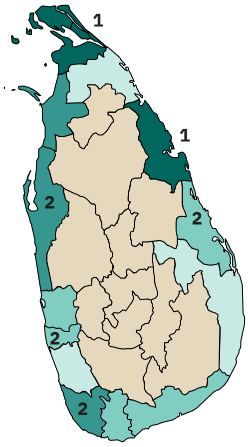



**Figure 12: Projected Sea Level Rise (m) for Colombo under the SSP1-2.6 and SSP3-7.0 Scenarios for 2020–2100 (Reference Period 1995–2014).**[133] Shaded probability ranges indicate 17th to 83rd percentiles for 6°N, 79°E grid. Note, divergence between scenario medians after mid-century.

XIV A joint World Bank and UN-commissioned report concluded that the 2004 Indian Ocean tsunami was a contributing factor to the renewal of conflict following the 2002 ceasefire. Not only did conflict-driven migration patterns expose Tamil communities in hardest-hit Northern and Eastern provinces to greater tsunami impacts, post-tsunami aid disproportionately benefitted Sinhalese ruling party constituents in Western and Southern provinces.




1. Highest exposure to coastal settlement, transportation infrastructure, and paddy agriculture in Jaffna and Kilinochchi (Northern Province), and Trincomalee (**Eastern Province**)
2. Moderately high exposure to coastal settlement and transportation infrastructure in Mannar (**Northern Province**), Puttalam (**North Western Province**), Colombo (**Western Province**), Galle (**Southern Province**) and Batticaloa (**Eastern Province**)

**Figure 13: Coastal Exposure to Sea Level Rise (Area 2 m or Less above Sea Level within 5 km of Coast) by District.**[134, XV] Map combines relative exposure levels of settlements, transportation infrastructure and paddy agriculture. Vulnerability to future climate change depends, in part, on selected scenario and projected time period.

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XV No examined climate scenarios anticipate 2 m of sea level rise in Sri Lanka until after 2100. However, this increment of sea level rise acts as an appropriate indicator for exposure to short-term climate-related impacts in coastal areas, given other climate-related risks (e.g., storm surge, saltwater intrusion), as well as physical and socioeconomic conditions (e.g., lack of coastal protection, location of settlements with low-income or disproportionately marginalised groups).

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33 Under the SSP2-4.5 scenario (warming of 2.7°C globally by 2100 and net-zero $CO_2$ emissions after 2100, more moderate than the SSP3-7.0 trajectory), average nationwide precipitation increases by a best estimate of +97.46 mm (-58.57 mm to +248.62 mm possible). By mid-century under the highest-emission SSP5-8.5 scenario (warming of 3.3°C globally by 2100 and doubled $CO_2$ emissions by 2050), average nationwide precipitation increases much higher by a best estimate of +117.05 mm (-51.27 mm to +285.55 mm possible).

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