CHAPTER 3: TAMIL NADU CLIMATE PROFILE

Climate Change is generally defined as “a change in the state of the climate that can be identified (e.g. using statistical analysis) by changes in the mean and/or the variability of its properties and that persists for an extended period, typically decades or longer” (IPCC 2014). Anthropogenic climate change is defined as a change in climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere (e.g. increase in greenhouse gases due to fossil fuel emissions) or surface characteristics (e.g. deforestation) and which is in addition to natural climate variability observed over comparable time periods. It is reported that, in India, the mean annual temperature is increased by 0.6 degree Centigrade over the last century; the monsoon rainfall is declined over the last three decades of the 20th century in many parts of the country, while some parts have showed an increasing trend in the observed frequency of heavy precipitation events.

The climate of Tamil Nadu is strikingly different from the general climate of the country. Due to its topographical features and geographical area the climate of Tamil Nadu is referred to as semi-arid and tropical monsoon. The long coastal stretch in the east, hill orography of the western rim, and plain inlands play a significant role and influence the climate of the State. The Climate of the State is tropical with little variation in summer, winter temperatures and features hot temperatures over the year except during the monsoon season. Due to proximity to the sea, the temperatures and humidity remain relatively high all the year round. The summer is hot with the temperature rising to 43°C and extends from April to June. November to February is the coolest winter period with temperatures around 18 degree Centigrade.

The State receives maximum rainfall during the months of October, November, and December (post monsoon), whereas in the rest of the country, the maximum rainfall is received in the months of June, July, August, and September months (monsoon). The State is frequently subjected to extreme weather conditions such as flooding in the coastal districts and severe droughts in some areas due to monsoon failure, which consequently affect the production and productivity of the food grains. Drought, water depletion, soil erosion, sea water incursion, forest fire, species extinction and thermal discomfort etc. are the major evidence of the climate change. Monsoon rains are major source for crop irrigation water supply, and cause people and livestock to suffer heavily when the monsoon fails or delayed. Additionally, due to Climate Extremities, the State is facing noticeably higher incidence of cyclonic events (Vardah 2016, Ockhi 2017 and Gaja 2018) severe floods (2015 and 2017) and hence, immediate action is required to analyse the current and future climate trends of the State.

Based on the latest Scientific understanding, this Chapter explains Tamil Nadu’s Historical climate and climatic variability, based on IMD data for 1950-2013, observed trends and impacts within this period, as well as projected future climatic changes and related uncertainties. For a more detailed account of Tamil Nadu’s climate and anticipated climatic changes, the reader may refer to Gosain and Rao (2018) and GIZ 2018 (www.Climatevulnerability.in).


34Geetha R Ramachandran A, Indumathi J, Palanivelu K, G. V. Uma,Bal P K &Thirumurugan P *Characterization of future climate extremes over Tamil Nadu, India, using high-resolution regional climate model simulation, Theoretical and Applied Climatology https://doi.org/10.1007/s00704-019-02901-0
3.1 CURRENT CLIMATE VARIABILITY AND TREND

The high resolution (0.25°x0.25° latitude and longitude) daily gridded rainfall dataset for 170 precipitation grids for a period of 63 years (1951–2013) and 1.0°x1.0° latitude and longitude daily gridded temperature datasets for 12 temperature grids, spanning over 63 years (1951-2013) for maximum and minimum temperature provided by Indian Meteorological Department (IMD) (Rajeevan et al. 2006) have been used to calculate the variability and trend in precipitation and temperature respectively.

3.1.1 Temperature

Long term monthly (1951 -2013) maximum and minimum temperature summary of Tamil Nadu State is given in Figure 3.1 and 3.2. Mean annual maximum temperature for Tamil Nadu is 32.2 degree Centigrade with range varying from 31.2 degree Centigrade - 33.2degree Centigrade. The highest value attained for maximum temperature (34.7 degree Centigrade) is in the pre- monsoon season (MAM) while its lowest maximum value (29.8 degree Centigrade) is attained in Post monsoon season. It is also observed that for annual maximum temperature, the highest value is attained for the districts, Chennai, Tiruchirappalli, Thiruvalur and Kancheepuram while the lowest value is attained for the districts, Coimbatore, Erode and Nilgiris lying in Western Zone and the Hilly Zone of Tamil Nadu.

Mean annual minimum temperature is 22.6 degree Centigrade with a range varying from 21.9 degree Centigrade to 23.3 degree Centigrade. It is also seen that for annual minimum temperature the highest value is attained for the districts, Ariyalur, Cuddalore, Nagapattinam, Thanjavur and Thiruvarur, while the lowest value is attained for the districts, Erode - lying in Western Zone and Nilgiris - lying in Hilly Zone, for the period 1951-2013 (63 years).

36www.climatevulnerability.in.
Figure 3.1  Spatial variation in Observed average annual Maximum and Minimum Temperature for TamilNadu (1951 to 2013) Source: www.climatevulnerability.in
3.1.2 RAINFALL

Average annual rainfall of Tamil Nadu is 987 mm with a range varying from 317.4 mm to 1890.5 mm over the 63 years period (1951-2013). Amongst all districts, Nilgiris receives the maximum average annual rainfall while districts, such as Thoothukudi and Karur receive the least. The eastern and north-eastern districts namely, Cuddalore, Chennai, Kancheepuram, Thiruvarur, Nagapattinam and the Western district viz Nilgiris have the heaviest rainfall as compared to the other districts.

The coefficient of variation in annual rainfall lies in the range of 0.21 to 0.37 (21 to 37 percent) across the districts of Tamil Nadu, thus, a marginal variability is observed across the districts. Figure 3.3 &3.4 envisaged that the post monsoon (October,November,December) rainfall contributes the maximum to annual rainfall amounting to approximately 50 percentage for Tamil Nadu State. Contribution of Pre – Monsoon (March, April, May) rainfall on average is 12.4 percentage, contribution of monsoon (June,July, August, September) rainfall in annual rainfall is about 34.4 percentage and winter rainfall (January &February) contribution is 3.4 percentage. However, districts’ lying in Western and North Western parts of Tamil Nadu, monsoon rainfall (JJAS) is the highest contributor while for rest of the districts post monsoon rainfall (OND) is the highest contributor to annual rainfall. In north east monsoon (OND), eastern and north eastern districts receive the highest rainfall. In south West monsoon season (JJAS), north eastern and western districts of the State receive the maximum rainfall.
Figure 3.3 Characteristics of long term average monthly rainfall distribution for Tamil Nadu (1951-2013) Source: www.climatevulnerability.in

Figure 3.4 Spatial Variation in observed average annual rainfall for Tamil Nadu (1951-2013) Source: www.climatevulnerability.in
The coefficient of variation (inter annual variation in rainfall) is relatively low during October, November, December (OND) and June, July, August, September (JJAS) season as rainfall variability is least during these months while very high during the other two seasons due to higher variability in rainfall during these months. The Co-efficient variation (CV) of winter rainfall is estimated to be the highest.

3.1.3 OBSERVED CLIMATE TRENDS AND IMPACTS

With global mean temperatures approximately 1 degree C higher than in the pre-industrial period, with even higher differences over land, climatic changes are already manifest. This section describes trends that can be detected in observations over the period 1951-2013.

Trend analysis has been carried out over the period of 1951 to 2013 and it is described below. Annual average and linear trend for maximum and minimum temperature for the State of Tamil Nadu is shown in Figure Error! Reference source not found.3.5 and Figure 3.6 & 3.7.

- Positive trend in both mean annual maximum temperature and mean annual minimum temperature is observed for Tamil Nadu State. The change per year for annual maximum temperature is 0.02°C, whereas, the same for annual minimum temperature is negligible.
- Trend analysis shows that the positive trend for annual maximum temperature and minimum temperature are statistically significant for Tamil Nadu, while annual minimum temperature shows statistically significant positive trend for all districts except for the Southern districts, Kanniyakumari and Tirunelveli.

**Figure 3.5** Observed average annual maximum temperature of Tamil Nadu (1951-2013)

Source [www.climatevulnerability.in](http://www.climatevulnerability.in), 2018
Figure 3.6 Observed average annual minimum temperature of Tamil Nadu (1951-2013)
(Source: www.climatevulnerability.in, 2018)

\[ y = 0.005x + 22.4 \]

Tamil Nadu - IMD gridded temperature: 1951-2013

Figure 3.7 Spatial variation in observed annual and seasonal precipitation trend for Tamil Nadu (1951-2013)
Source www.climatevulnerability.in, 2018
From Figure 3.7 it can be inferred that for the period 1951-2013 annual rainfall shows positive trend and rainy days shows negative trend for Tamil Nadu. Though the decrease in rainfall days is not significant, the increase in rainfall coupled with decrease in rainy days implies an increased intensity of rainfall for the period in the State.

### 3.1.4 ANNUAL RAINFALL DISTRIBUTION ANALYSIS

Annual rainfall distribution analysis has been studied for Tamil Nadu and its districts. The rainfall is classified as excess, normal, deficient or scanty based on the departure of the rainfall from the long period average rainfall (LPA). Based on the India Meteorological Department (IMD) classification, if the rainfall received in that particular year is within + or - 19 percent of the LPA, that year is called as a normal rainfall year, -19 percent to -59 percent of the LPA is deficient rainfall year, <59 percent of LPA is grouped under scanty rainfall year. On the other hand, if the rainfall is +19 percent to +59 percent of LPA, it is excess rain fall year and >+59% LPA is termed as wet year. The rainfall for the study area has been classified and Figure 3.8 & Figure 3.9 shows the frequency of excess, normal, deficient and scanty rainfall years.

From Figure 3.8 and Figure 3.9 it observed that from 1951-2013 the State on an average had 47 normal rainfall years, 8 excess rainfall years; 6 deficit rainfall years and 2 scanty rainfall years. It can be observed that 2001-2010 is the only decade in the State that had 2 years of scanty rainfall, decades 1961-1970 and 1991-2000 had no deficient rainfall years while decades 1951-1960 and 1981-1990 had no excess rainfall years.

The district wise classification in rainfall can also be seen from Figure 3.9. The Nagapattinam district is seen to have received the maximum number of 18 excess rainfall years, while Ramanathapuram and Virudhunagar districts have the maximum of 18 deficient rainfall years, compared to the other districts of Tamil Nadu over the period 1951-2013. The Nilgiris and Krishnagiri districts have maximum of 45 normal rainfall years.
3.1.5 EXTREME EVENTS

Beyond changes in average temperature and precipitation conditions, climate change is likely to affect the frequency and intensity of extreme events that can be temperature or precipitation-related. Maximum 1 day and maximum 5 day precipitation show positive trend for majority of the districts over the period 1951-2013. For Tamil Nadu, Gosain and Rao (2018) analyze trends in 21 Expert Team on Climate Change Detection indices (ETCCDI) of extreme events based on gridded IMD temperature and precipitation data. While detailed district-wise results are provided in Gosain and Rao (2018), the most robust (i.e. statistically significant at the 90% confidence level) trends are the following: Maximum day temperature, Warm spell duration Indicator, very wet day precipitation (R95p) and Extremely wet day precipitation (R99p), heavy and very heavy precipitation day (R10 mm and R20 mm) show positive trend. Cool night, cool days and Cold spell duration indicator shows negative trend. Precipitation shows mixed trend.

3.1.6 OBSERVED IMPACTS

Tamil Nadu is already facing various consequences of climate change, causing distress to its farmers and other local communities. States are vulnerable to different types of hazards such as floods, hailstorms, heat waves, drought, thunder and lightning, forest fires, etc. Most of these hazards mentioned above have some direct or indirect linkages with climate change. Detrimental challenges of these hazard effects Tamil Nadu agricultural crops, livestock’s milk productivity, forest’s net primary productivity etc. Some of the recent events occurred due to increasing temperature and variable rainfall in the state are as follows (source: News papers):
Gaja takes heavy toll on crops

Tamil Nadu has recorded a heavy rain on Tuesday, which has caused damage to crops. The State government has declared a "tide alert" and has advised farmers to take precautions.

CRIM SYMPOSIUM

A teacher who directed a storm path accidently turned hero

Water and air pollution keep migratory birds away

Common migratory birds to visit Andhra Pradesh and Kerala

A cyclonic circulation over Tamil Nadu, extending between 4.5 km to 5.8 km, will bring rainfall over several districts. The rain may be heavy at a few places in Coimbatore, Vellore, Kanniyakumari and Thoothukudi districts, till Friday. During the past 24 hours, ending 8.30 a.m. on Thursday, Jayankondam in Aruvanur district recorded the highest volume of 16 cm of rainfall, followed by Mayi luctural in Nagaonpur district with 13 cm. Many areas in Tiruvallur district, including Cholapuram and Chemburambakkam, received 3 cm of rainfall.

Cyclonic activity

N. Purvisaram, director, Regional Cyclone Warning Centre, Chennai, said coastal areas would receive thunder showers during evening hours.

The Kancheepuram-Nagaonpur belt would get light to moderate rain.

Another cyclonic circulation around September 15 could bring rainfall over the State.

Chennai will experience a partly cloudy sky.

There is a possibility of light to moderate rain in some areas during evening or night hours.

This season, Chennai district registered 42 cm of rainfall.
Tamil Nadu has become warmer over the years: Experts

Updated: Aug 10, 2015, 15:51 IST

Check any professional entrance exam with M Academy

Tamil Nadu has become warmer over the years: Experts

A three-day workshop on climate change got under way on Tuesday.

Dr S Balachandran, scientist with the Regional Meteorological Centre in Chennai, said rainfall received during monsoons and their patterns have also been changing. He was in the city to attend the inaugural function of the three-day workshop on climate change.

Climate change: Crisis is here & now

By S Govindarajan

Longer summers and erratic rainfall in Tamil Nadu have raised doubts over whether the state is experiencing impacts of climate change. Even if present-day weather uncertainties cannot be conclusively linked to climate change, there are several indications that unpredictable climate will become the norm in the coming years. Is the state prepared to deal with the situation?
Cyclone Nilam Kills 12, Displaces Thou

By Pratik Bhan
Nov 1, 2012 6:03 pm IST

Cyclone Nilam, which hit India’s southeastern coast late Wednesday, forced thousands to flee their homes in the state of Tamil Nadu, and claimed at least 12 lives across southern India.

Though the tropical cyclone, which moved four times its size, weakened as it moved northward, it caused “significant damage” to infrastructure, plantations and livestock along Tamil Nadu’s eastern coast, M. Jayaraman, a senior disaster management official, told India Real Time.

Cyclone Gaja damaged nearly 1 crore coconut trees, 70,000 farmers hit: Tamil Nadu

Three weeks after the cyclonic storm stuck the state on November 16, leaving 65 people dead and more than 1.34 lakh electricity poles damaged, officials in the state agriculture department said at least 70,000 coconut farmers have been directly affected in mainly four districts - Thanjavur, Pudukottai, Thiruvarur and Nagapattinam.

Climate change impact significant on insects and plants

The Inter-Governmental Panel on Climate Change, a panel of international experts assessing the current scientific knowledge on climate, has asserted that warming of the earth’s climate system is “unequivocal.”

The panel’s report, titled “Climate Change 2013: The Physical Science Basis,” concluded that the increase in global average temperatures is the result of human activities, particularly the emissions of greenhouse gases from the burning of fossil fuels.

Coral reefs in danger due to climate change

It will have direct impact on coastal communities in A.P. and T.N., says M.S. Srinivasan

Ganzirri M.S. Srinivasan on Monday said that many coral reefs in the country were in danger due to climate change.

In his inaugural video-speech from Chennai during the three-day national workshop on ‘Coral Reefs’, Mr. Srinivasan has expressed that the climate change would have direct impact on the coastal communities in Andhra Pradesh and Tamil Nadu.

57
3.2 PROJECTED CLIMATE VARIABILITY AND TREND

This section presents future projections of relevant climatic variables for different socio-economic scenarios, namely the RCPs4.5 and 8.5 used for IPCC AR5. This section is primarily based on projections analyzed by Gosain and Rao (2018) who report the multi-model mean (MMM) of for a 10-run ensemble of 3 regional climate models (RCMs) that were run for the South Asia region under the CORDEX initiative,\(^{37}\) nested into a set of diverse Global Circulation Model (GCM) boundary conditions. While the ensemble and multi-model mean are used to mitigate climate model uncertainty, it ought to be borne in mind that multiple sources of uncertainty remain (including inter alia related to socio-economic scenarios and climate model accuracy) and that projections reported here are consequently subject to these (Sharma et al. 2017)\(^{38}\).

3.2.1 IPCC AR5 CLIMATE CHANGE SCENARIOS – TAMIL NADU

The CORDEX South Asia modelled climate data on precipitation, maximum temperature, and minimum temperature, have been analysed for Tamil Nadu and 32 of its districts for mid-century (MC, 2021-2050) and end-century (EC, 2071-2100) with respect to baseline (BL, 1981-2010). Projected change in climate for precipitation, maximum temperature and minimum temperature has been assessed.

3.2.2 REPRESENTATIVE CONCENTRATION PATHWAYS (RCPs)

The IPCC scenarios provide a mechanism to assess the potential impacts on climate change. Global emission scenarios were first developed by the IPCC in 1992 and were used in global general circulation models (GCMs) to provide estimates for the full suite of greenhouse gases and their potential impacts on climate change. Since then, there has been greater understanding of possible future greenhouse gas emissions and climate change as well as considerable improvements in the general circulation models. The IPCC, therefore, developed a new set of emissions scenarios. The process by which these new scenarios are being produced differs from earlier scenario development.

The new process aims to both shorten the time required to develop and apply new scenarios, and to ensure better integration between socio-economic driving forces, changes in the climate system, and the vulnerability of natural and human systems. Rather than starting with socio-economic scenarios that give rise to alternative greenhouse gas emissions, the new scenarios take alternative futures in global greenhouse gas and aerosol concentrations as their starting point. These are called Representative Concentration Pathways (RCPs). The Representative Concentration Pathways (RCP) are based on selected scenarios from four modelling teams/models working on integrated assessment modelling, climate modelling, and analysis of impacts.

RCPs are four greenhouse gas trajectories adopted by the IPCC for its Fifth Assessment Report (AR5). The four RCPs; RCP2.6, RCP4.5, RCP6, and RCP8.5, are named after a possible range of radioactive forcing values in the year 2100. Table 3.1 gives the overview of four RCPs.

\(^{37}\)Namely, REMO (MPI), RCA4 (SMHI) and CCAM (CSIRO)

\(^{38}\)Tarul Sharma; H. Vittal; Surbhi Chhabra; Kaustubh Salvi; Subimal Ghosh; Subhankar Karmakar (2018) *Understanding the cascade of GCM and downscaling uncertainties in hydro-climatic projections over India.* International Journal of Climatology Volume 38 Issue 51 ppe178-e190
Table 3.1 Overview of Representative Concentration Pathways (RCPs) adopted by IPCC AR5

<table>
<thead>
<tr>
<th>RCP</th>
<th>Description</th>
<th>IA Model</th>
<th>Publication – IA Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>RCP8.5</td>
<td>Rising radioactive forcing pathway leading to 8.5 W/m² in 2100.</td>
<td>MESSAGE</td>
<td>Riahi et al. (2007), Rao&amp;Riahi (2006)</td>
</tr>
<tr>
<td>RCP6</td>
<td>Stabilization without overshoot pathway to 6 W/m² at stabilization after 2100</td>
<td>AIM</td>
<td>Fujino et al. (2006), Hijioka et al. (2008)</td>
</tr>
<tr>
<td>RCP4.5</td>
<td>Stabilization without overshoot pathway to 4.5 W/m² at stabilization after 2100</td>
<td>GCAM (MiniCAM)</td>
<td>Smith and Wigley (2006), Clarke et al. (2007), Wise et al. (2009)</td>
</tr>
<tr>
<td>RCP2.6</td>
<td>Peak in radiative forcing at ~ 3 W/m² before 2100 and decline</td>
<td>IMAGE</td>
<td>van Vuuren et al. (2006; 2007)</td>
</tr>
</tbody>
</table>

(Source: [http://sedac.ipcc-data.org/ddc/ar5_scenario_process/RCPs.html](http://sedac.ipcc-data.org/ddc/ar5_scenario_process/RCPs.html))

Resolution of the projected climate data is at a grid-spacing of 0.5°x0.5° for IPCC AR5 scenarios, namely, RCP8.5 (a scenario of comparatively high greenhouse gas emissions and does not include climate policy interventions) and RCP4.5 (moderate emission scenario and assumes climate policy intervention to transform associated reference scenarios). Ensemble mean of 3 regional climate models (RCM), namely, REMO (from MPI), RCA4 (from SMHI) and CCAM (from CSIRO) has been used for the analysis. Ensemble mean is chosen to reduce model related uncertainties and ensemble mean climate is closer to observed climate than any individual model.

3.3 CLIMATE CHANGE PROJECTIONS FOR TAMIL NADU

For Tamil Nadu State and districts, IPCC AR5 RCP4.5 and RCP8.5 scenarios has been analysed for the annual maximum and minimum temperature and precipitation.

3.3.1 Projected Temperature

The MMM climate projections analysed for mid–Century (2021-2050) and end–century (2071-2100) with respect to base line period of (1951-2013) for the State of Tamil Nadu indicate that the annual mean maximum temperature in the State may rise by up to 1.7 degree Centigrade to 3.4 degree C by end century under RCP4.5 and RCP8.5 scenarios respectively. By mid – century, the MAM projected change in this statistics is 1.0 degree C and 1.2 degree C for RCP4.5 and RCP8.5 respectively. Spatial differences in projected changes again are small whereas seasonal differences are pronounced, with the increase being highest for March- May (MAM) pre monsoon season (Figure 3.11).

While spatial differences in changes of annual mean maximum temperature are higher increase in RCP8.5 than that of RCP4.5 (Figure 3.10), Seasonal differences between the degree of change are more pronounced, with the increase being highest for March- May (MAM) pre monsoon season (Figure 3.11).

As similar for global trends, projected changes for annual mean minimum tempaertaure are even more pronounced. The average minimum temperature in the district is predicted to 2.2 degree Centigrade to 3.8 degree Centigrade for the MMM under RCP4.5 and 8.5 scenarios, respectively, by the end of the century (Figure 3.12). For mid-century, this increase would be of 1.2 degree Centigrade to 1.4 degree Centigrade for RCP4.5 and RCP8.5 respectively. Spatial differences in projected changes again are small whereas seasonal differences are pronounced, with the increase being most notable for the period June- September for both pathways and time periods considered (Figure 3.13).
Projected Future Changes in Annual Maximum Temperature for Mid-Century and End-Century with respect to Baseline (1981 - 2010) for Tamil Nadu

**Figure 3.10 Projected Changes in Mean Annual Maximum Temperature for RCP4.5 (top) and RCP 8.5 (bottom)**

*Source: Credx South Asia daily weather datasets provided by the Indian Institute of Tropical Meteorology, Pune*

Multi Model Ensemble of 3 RCMs - CSIRO-CCAM, SMHI-RCA4 and MPI-CSC-REMO2009
Baseline (1981-2010), Mid-Century (2021-2050), End-Century (2071-2100)

Temperature Change (°C)
Figure 3.11 Projected change wrt baseline (BL) in annual and seasonal maximum temperature by mid-century (MC) and end of century (EC) under RCP4.5 (top) and RCP8.5 (bottom)
Source:www.climatevulnerability.in,2018
Figure 3.12 Projected Changes in Annual Minimum Temperature for RCP4.5 (top) and RCP 8.5 (bottom)

Source: www.climatevulnerability.in, 2018
Figure 3.13 Projected change wrt baseline (BL) in annual and seasonal minimum temperature by mid-century (MC) and end of century (EC) under RCP4.5 (top) and RCP8.5 (bottom)

Source: www.climatevulnerability.in, 2018
3.3.2 Projected Precepitation

Average rainfall in Tamil Nadu State is projected by the MMM to increase marginally, by 4.4% towards mid-century and increase about 20.5% towards end-century while for RCP8.5 scenario it is projected to increase marginally by 6.7% towards mid-century and 26.1% towards end-century for the State. Thus the percentage of the projected rainfall increase is low towards MC and EC for both the climate scenarios. In winter season (JF) highest rainfall increase is projected towards MC and EC for Tamil Nadu State for IPCC AR5 RCP4.5 scenario. In winter season (JF) rainfall decrease is projected while in monsoon season (JJAS) highest rainfall increase is projected towards Mid Century (MC) and End Century (EC) as compared to Baseline (BL) for Tamil Nadu State for RCP 8.5 scenario (Figure 3.14). Since currently, more than three quarters of the annual total rainfall amount is concentrated in the monsoon season, the projected increase in monsoonal rainfall accounts for the overall increase in annual rainfall. Regionally, too, there are differences, although consistent trends are more hardly discernible.

3.3.3 Projected Extreme Events

Gosain and Rao (2018) analysed the trends in Tamil nadu for selected extreme event indices based on MMM projections, although due to the poor RCM performance in replicating historical extreme events caution is required when interpreting these trends. While they find positive trends in certain temperature-related indices (such as Maximum of day time temperature (TXx), Maximum of night time temperature (TNx) and Minimum of day time temperature (TXn) and Minimum of night time temperature (TNn)) that indicate a warming up for both time periods and RCPs, these trends are statistically significant for limited geographical areas (districts) only. Moreover, the percentage of warm days and warm nights is projected to increase and percentage of cool days and cool nights is projected to decrease under all scenarios and time periods. Cold spell duration indicator is projected to decrease and warm spell duration indicator is projected to increase, too.

In terms of precipitation extreme Indices, none of the indices show significant trends for the majority of the districts of Tamil Nadu for both IPCC AR5 climate scenarios. An exception is the CDD (consecutive dry days) index, which shows a statistically significant positive trend for majority of the districts for RCP 4.5 scenario. Annual total precipitation on wet days and the average precipitation on wet days, moreover, are projected to increase, and so are very wet days precipitation and extremely wet days precipitation, pointing at further increases in rainfall intensity.
Figure 3.14 Projected spatial differences in seasonal precipitation changes for RCP4.5 (top) and RCP8.5 (bottom)

Source: www.climatevulnerability.in, 2018