

POLICY FRAMEWORK AND PREPAREDNESS

for Implementing Measures to Effectively Deal with Climate Change



An Analysis For
The State Of
TAMIL NADU

A study titled "Policy Framework and Preparedness for Implementing Measures to Effectively Deal with Climate Change: An Analysis of four states in India" was conducted through the support of the Heinrich Böll Foundation¹.

The objective of the study was to assess climate change vulnerability of four states namely, Tamil Nadu, Andhra Pradesh, Goa and Karnataka. The aim of the study was also to understand the implications of the predicted Climate Vulnerability and Mitigation potential under various scenarios generated under the Intergovernmental Panel on Climate Change (IPCC) from the states' perspective.

Further, a detailed gap analysis was done to understand which actions, interventions and solution mentioned under the State Action Plan on Climate Change (SAPCC) (mandated under Ministry of Environment, Forest and Climate Change (MoEFCC)) were aligned with the IPCC AR5 report.²

This pull out comprises of findings for the state of Tamil Nadu. It also lists out common recommendations that have emerged from the study. It has been prepared to initiate the discussions at the state level, on the status of the implementation of their climate change action plans.

Tamil Nadu State Profile

Energy Profile

Located in the southernmost part of the Indian Peninsula, Tamil Nadu, lies between latitudes 8°50 and 13°35'N and longitude 76°15' and 80°20'E. The state stretches along a 1070 km coastline which spans across 13 districts. Tamil Nadu shares its borders with Andhra Pradesh in the north, Kerala in the west and Karnataka in the north-west.

The total population of Tamil Nadu is more than 7.2 crores and with a population density of 555 persons per sq. km (much greater than the national average of 382 persons per sq. km). The population growth rate of the state is 15.6%.³

Between the financial years 2004-05 and 2015-16, the Gross State Domestic Product (GSDP) of Tamil Nadu grew at compound annual growth rate (CAGR) of 12.31%, reaching at 175.33 Billion US Dollars in 2015-16.⁴ In year 2013-14 the growth in GSDP at constant price (2004-05) was 7.29% mainly supported by services sector (9.31%) and agriculture sector (7.24%).⁵

Over the years, the contribution of agriculture industry and services sectors on the GSDP of Tamil Nadu has undergone a change. The share of agriculture in Tamil Nadu's GSDP had declined from 11.87% to 7.76% from FY 2004-05 to FY 2013-14.⁶

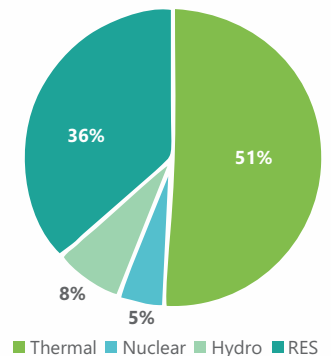
Demographic profile of the state shows a decadal growth rate of 15.6% for 2001-2011 as compared to 11.70% for 1991-2001⁷. Among health indicators for Tamil Nadu, the Life Expectancy by birth was 70.6 years between 2010-14⁸ which has increased from 68.9 years in 2006-10⁹. Infant Mortality Rate has reduced from 31 in 2008 to 21 in 2013¹⁰. Maternal Mortality Rate also has declined from 90 in 2010-12 to 79 in 2011-13¹¹.

Tamil Nadu is ranked third among other states for electricity generation capacity in India. The total installed capacity by the end of May 2017 was 29912.27 MW. Installed capacity for thermal power was 14836 MW¹³. Among other conventional technology sources, for nuclear it was 1448 MW and for hydro the installed capacity was 2203 MW.

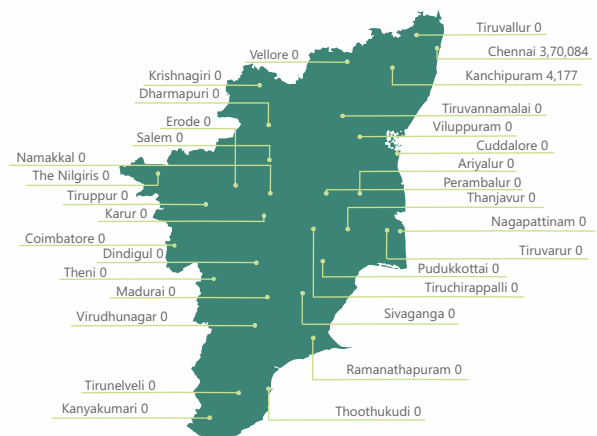
Tamil Nadu is in the forefront for harnessing energy through new and renewable energy sources (RES). As on May 31, 2017 the installed capacity for RES stands at 10625MW. This largely consists of wind power.

Tamil Nadu's per capita consumption has reached around 1616 kWh in 2013-14, which is higher than the national average of 1010 kWh¹⁴. Approximately one-third of the total energy comes from renewable sources such as wind, solar and hydro.

Tamil Nadu ranks the highest in installed grid capacity of renewable power (9448.68 MW) in the country,¹⁵ mainly for harnessing wind energy. The Joint Electricity Regulatory Commission (JERC)/State Electricity Regulatory Commissions (SERC) of Tamil Nadu has notified regulations/tariff order for grid connected solar rooftop projects.



**Energy Generation Profile
Tamil Nadu**



Total LEDs distributed in Tamil Nadu - 4,38,826

National Ujala Dashboard, as accessed on July 14, 2017

The state plans to add 5,000 MW capacity in the wind power by the end of 2017. Global Wind Energy Council is also working to assess the potential of wind energy in India with special focus on Tamil Nadu¹⁶. Tamil Nadu is also taking measures to improve energy efficiency. The National Ujala scheme has been launched in the state. And is currently being implemented by Energy Efficiency Service Limited (EESL) in Tamil Nadu.

Vulnerability and Impacts

Vulnerability and impacts profile of Tamil Nadu is based on the climate change impacts on the state. The parameters taken include rainfall patterns and variation from mean precipitation levels. Natural disasters like drought and cyclone have been factored in to assess the vulnerability of the state. Groundwater availability is also taken as a parameter to assess potential vulnerability due to inadequate groundwater replenishment and high extraction.

Data sources for the Report -

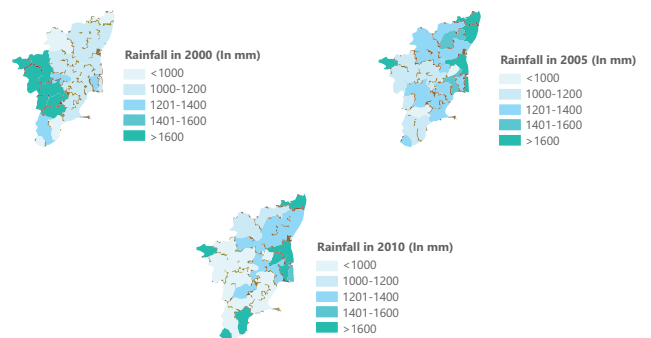
Vulnerability maps have been prepared on these parameters to have a perspective of the most vulnerable districts for these Indian States. The maps have been made using Arc GIS and Quantum GIS software.

The data has been mapped in time series to show the progressive changes in the vulnerabilities of the state.

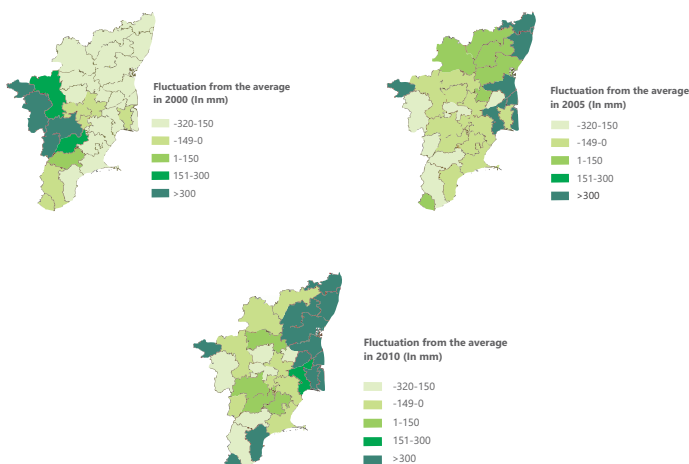
Indicator	Data Source	Time Series
Rainfall fluctuations	IMD	2000-2010
Cyclones	IMD	1891-2008
Droughts	IMD	2002-2014
Ground Water Stress	CGWB	2010-2050 (Projections)

Rainfall Pattern

About 50% of the total annual average rainfall in Tamil Nadu is during the north-east monsoon and 3% from south-west monsoon¹⁷. The normal annual rainfall that the state receives is 958.4 mm¹⁸. Decrease in the rainfall has been observed from 2000 to 2010.



Rainfall Pattern of Tamil Nadu



Fluctuation in rainfall is observed in the state's mean precipitation level. The overall trends show a decrease in rainfall pattern with irregularities within districts.

Rainfall Variation

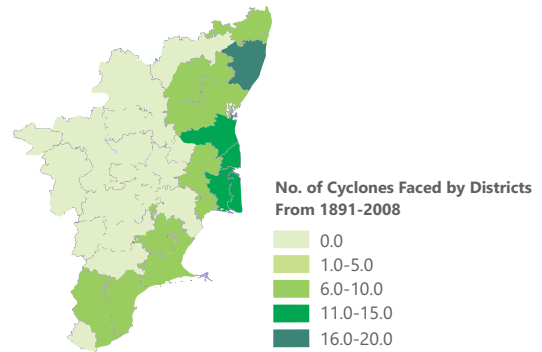
Rainfall Variation In Districts Of Tamil Nadu

In 2000, five western districts received rainfall much higher than normal, within the maximum deviation category (greater than 1000 mm fluctuation) than the state average rainfall of 1282.4 mm. In 2005, four coastal districts had precipitation higher than the state average of 1304 mm¹⁹. While in 2010, the districts Nilgiris, Cuddalore, Kanyakumari, Nagapattinam and Thiruvallur received heavy rainfall as compared to state average of 1122 mm.

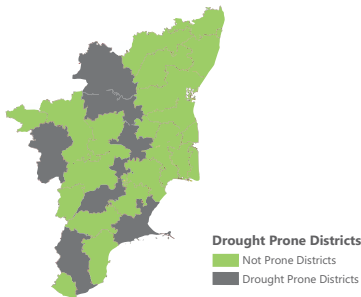
The number of districts that experienced rainfall higher than the state average in 2005 and 2010 were mostly coastal districts of Cuddalore, Kanyakumari, Nagapattinam and Thiruvallur.



The coastal region in Tamil Nadu is prone to cyclones originating in the Bay of Bengal. The latest cyclone encountered by the state, was Cyclone 'Vardha' in December 2016, which caused havoc in Chennai, Tiruvallur and Kanchipuram districts²⁰. These cyclones cause heavy rainfall and high intensity wind in coastal region of Tamil Nadu. From the year 1891 to 2006, a total 32 storms hit the coastal Tamil Nadu of which 30 were severe cyclonic storms. Most of the cyclones, occur during monsoon months from May to November. The frequency of cyclones faced by the Kaneechpuram and Nagapattinam districts had increased 13 and 10 times, respectively from 1891 to 2008 and are most vulnerable to cyclones.



Cyclone Affected Districts of Tamil Nadu



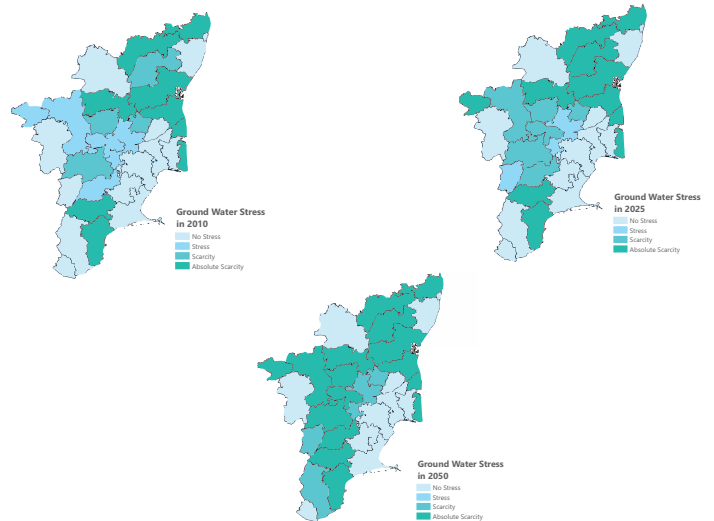
In February 2017, 32 districts in Tamil Nadu were declared drought struck²¹. Tamil Nadu has been facing droughts, with seven districts most drought prone, which include Dharmapuri, Salem, Tiruchirapalli, Madurai, Coimbatore, Tirunelveli and Ramanathapuram.



Drought Prone Districts in Tamil Nadu



Net annual ground water availability of Tamil Nadu is 20,649 MCM and annual ground water potential is 22,943 MCM (SAPCC). From the map, it can be seen that in the year 2010 only nine districts are under "absolute scarcity" and 13 districts are classified under "not stress". However the 2050 predicted water availability shows, 16 districts will have "absolute scarcity" of ground water. In 2025, Tiruvannamalai, Namakkal, Perambalur and Dindigul districts are predicted to have water scarcity but by 2050 these districts may go dry with absolute water scarcity.

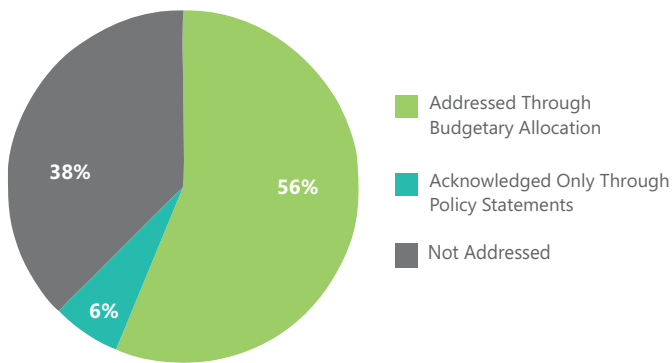


Groundwater Stress in Tamil Nadu

Gaps & Status of Preparedness

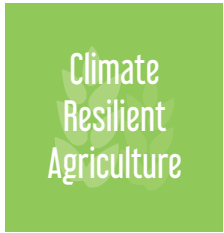
Climate Resilient Agriculture | Climate Resilient Ecosystem | Social Adaptation | Climate Resilient Infrastructure | Sustainable Water Management | Energy | Sustainable Smart Cities

This section looks at Tamil Nadu’s state of preparedness with respect to seven categories mentioned above. The recommendations for each of these categories are based on references from IPCC “Summary for Policymakers” AR5 report²² and the New Climate Economy report (NCE)²³.



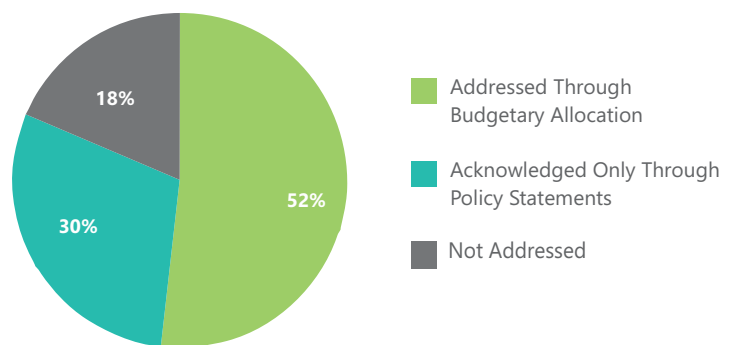
Recommendations Addressed Through Climate Resilient Agriculture In Tamil Nadu

56% of the IPCC and NCE recommendations have been addressed in this category, through a policy focus coupled with budgetary allocations such as promoting use of new crops and animal varieties by setting up Tamil Nadu State Seed Development Agency for the supply of quality seeds for agricultural crops, distribution of milch cows and goats/sheep, etc. 6% of the recommendations have been taken cognizance of through policy statements, while 38% of the recommendations such as improved public support or better public service delivery to farmers are not addressed.



30% of the recommendations have been taken cognizance of through policy statements or focus. 52% of the recommendations have been addressed through budgetary allocation such as the

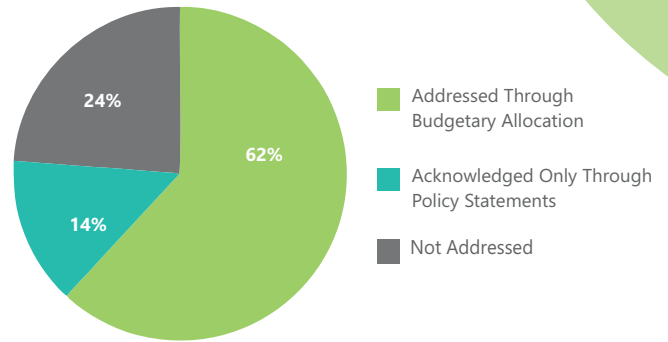
Comprehensive Flood Protection Plan for Coastal Zone or the National Calamity Contingency Fund. In addition, Tamil Nadu is also vigorously implementing the Tamil Nadu Tree Plantation programme under the National Afforestation and Eco-development programme. The remaining 18% of the recommendations have not been addressed at all.



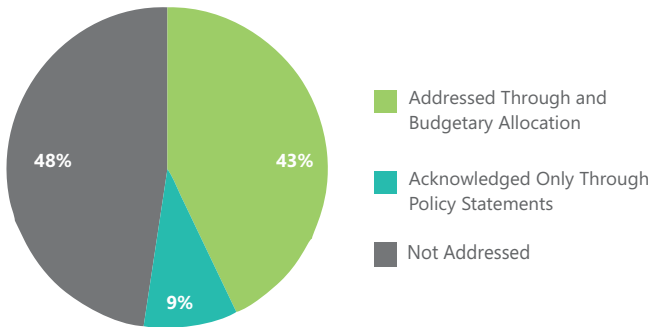
Recommendations Addressed Through Climate Resilient Ecosystem In Tamil Nadu

Social Adaptation

The recommendations in this category have been addressed through various state and national schemes such as the national rural health mission and the national vaccine policy. Overall, 62% of the recommendations in this category have been addressed through policy measures and initiatives coupled with budgetary allocations. An additional 14% of the recommendations are taken cognizance of through policy initiatives that are not supported by budgetary allocations. 24% of the recommendations in this sector have not been addressed.



Recommendation Addressed Through Social Adaptation In Tamil Nadu



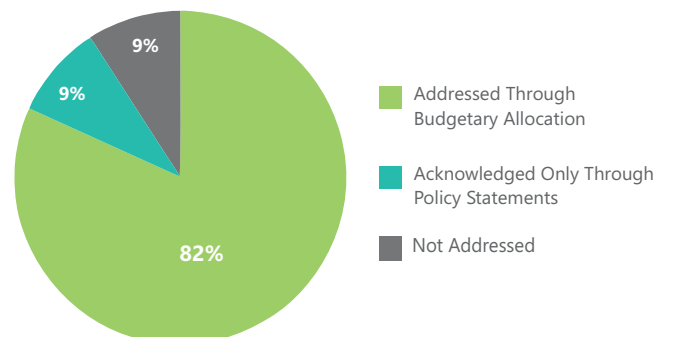
Recommendation Addressed Through Climate Resilient Infrastructure In Tamil Nadu

Urban development in Tamil Nadu is prone to vulnerabilities due to the frequent impact of extreme events. The Chennai City development mission and Integrated urban development mission focus on building resilient infrastructure in the state. 43% of the recommendations in this category have been addressed through policy initiatives coupled with budgetary allocation but 48% of the recommendations remain unaddressed.

Climate Resilient Infrastructure

Sustainable Water Management

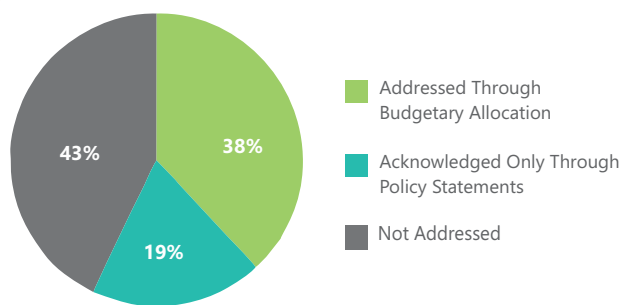
Surprisingly, sustainable water management does not figure as a priority in the Tamil Nadu State Action Plan on Climate Change. Despite that, only 82% of the recommendations in this category are being addressed through state policy initiatives coupled with budgetary allocations. An additional 9% of the recommendations are taken cognizance of through policy statements and priorities not necessarily supported through budgetary allocations. Only 9% of the recommendations under this category remain unaddressed.



Recommendation Addressed Through Sustainable Water Management In Tamil Nadu



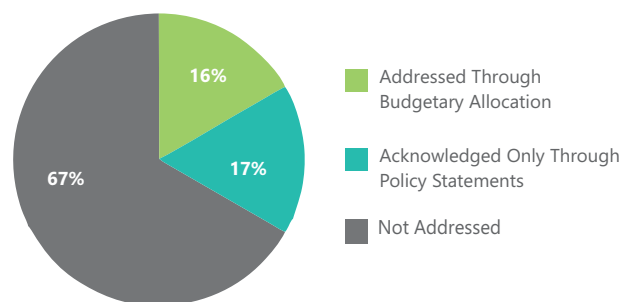
19% of the recommendations in this category have been taken cognizance of through policy initiatives that are not coupled with any budgetary allocations. The specific measures that have been taken under this bucket of actions include energy efficiency norms and standards through Energy Conservation Building Code (ECBC) and National Labelling schemes address the recommendations for energy efficiency. In addition, 38% of the recommendations have been addressed through policy initiatives coupled with budgetary allocations which include Green Energy Corridor Project, Solar Rooftop Capital Incentive scheme, UJALA scheme for distribution of LED bulbs, etc. However, 43% of the schemes remain unaddressed.



Recommendation Addressed Through Energy In Tamil Nadu

Sustainable Smart Cities

Under the Smart Cities Mission, 12 cities have been identified to be developed as smart cities in Tamil Nadu. While 16% of the recommendations are being addressed through policy initiatives coupled with budgetary allocations, another 17% are being taken cognizance of through policy priorities. Despite this, however, 67% of the recommendations have not been addressed at all.



Recommendation Addressed Through Smart And Sustainable Cities In Tamil Nadu

Sources -

- ¹ Policy Framework & Preparedness for Implementing Measures to effectively Deal with Climate Change, An Analysis of four states, 2016. Can be accessed on goo.gl/sJHQuj
- ² IPCC, 2014, Summary for Policymakers. In: Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change, Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA. Available online at: goo.gl/XtJNHl
- ³ States Census 2011, available online at: goo.gl/bHTmZZ
- ⁴ India Brand Equity Foundation, May 2017, About Tamil Nadu: Tourism, Industries, Economy, Agriculture, Climate, Geography. An initiative by Ministry of Commerce and Industry, GoI, Available at: goo.gl/U7TsYz
- ⁵ Economic Survey, 2015, Chapter: State of the Economy, Tamil Nadu, GoI. Available online at: goo.gl/dFi25P as accessed on July 5, 2017.
- ⁶ Economic Survey, 2015, Tamil Nadu, Chapter 2: State Income Page 21, GoI. Available online at: goo.gl/jHKJcQ as accessed on July 5, 2017.
- ⁷ Census 2011. Tamil Nadu, GoI Available at: goo.gl/ydLLDB as accessed on July 06, 2017.
- ⁸ Census 2011, Abridged Life Tables- 2010- 14, Page5, GoI. Available online at: goo.gl/QZSQiG As accessed ON July 06, 2017.
- ⁹ Census 2011, Abridged Life Tables- 2003 -07 to 2006 -10, Page6, GoI. Available online at: goo.gl/3WmUHH as accessed on July 06, 2017
- ¹⁰ NITI Aayog, 2014, State Statistics: Infant Mortality Ratio (IMR) (per 1000 live births), Available online at: goo.gl/oJfLx as accessed on July 06, 2017
- ¹¹ NITI Aayog, 2014, State Statistics: Maternal Mortality Ratio (MMR) (per 100000 live births), Available at: goo.gl/CEJ8M6 as accessed on July 06 2017.
- ¹² Raman Mehta and Srinivas Krishnaswamy, 2016, Policy Framework and Preparedness for Implementing Measures to Effectively Deal with Climate Change: An Analysis of four states in India, funded by HenrichBoll Stiftung, Delhi. Available at: goo.gl/sJHQuj
- ¹³ Central Electricity Authority, (CEA), May 2017. Installed Capacity (In Mw) Of Power Utilities in The States/UTs Located in Southern Region Including Allocated Shares In Joint & Central Sector Utilities (As on 31.05.2017). Available online at: goo.gl/xtgkZD
- ¹⁴ Ministry of Power, May 2015, Annex 2, Annex Referred To In Reply To Part (A) Of Unstarred Question No. 1631 Answered In The Rajya Sabha On 11.05.2015. All India & State Wise Per Capita Electricity Consumption, Ministry of Power, GoI. Available at: goo.gl/9GeBDK as accessed on July 06, 2017.
- ¹⁵ Energy Statistics, 2017, Central Statistics Office Ministry of Statistics and Programme Implementation, GoI. Available at : goo.gl/bn3ZY3 as accessed on July 06, 2017.
- ¹⁶ India Brand Equity Foundation (IBEF), 2017, About Tamil Nadu: Tourism, Industries, Economy, Agriculture, Climate, Geography. An initiative of the Ministry of Commerce and Industry, GoI. Available at: goo.gl/sP85bz as accessed on July 06, 2017.
- ¹⁷ Tamil Nadu State Action Plan for Climate Change, May 2015, Section 4. 2 Observed Climate, Rainfall pattern, Page 26, GoI. Available at: goo.gl/SugMZX as accessed on July 06, 2017
- ¹⁸ *ibid*



RECOMMENDATIONS

The following recommendations have been based on the study of four states - Tamil Nadu, Andhra Pradesh (including Telangana), Goa and Karnataka. The recommendations are common to all the states addressed in this study.

It is further based on the review of the seven categories in the four states. Some issues /areas need to be addressed for states to enhance their capacities and preparedness to address climate change. The following recommendations are placed for concrete action for successful implementation of the respective State Action Plans on Climate Change.

This becomes important in context of the Paris Agreement being ratified in 2015, under which countries across the globe are required to be proactive in issuing policies and programs to ensure effective implementation of the Agreement. Within the Indian context, implementation of the Paris Agreement requires national and state governments to formulate policies and programmes to address climate change and ensure compliance of targets.

The recommendations are as follows -

- **Long-Term Development Vision:** Tamil Nadu needs to develop a long term 'Development Vision' which factors in challenges and risks emanating due to climate change.
- **Road Map for Implementation:** following in line with the 'Development Vision' the state needs to develop an implementation road map with milestones and targets.
- **Institutional and Governance Structures:** to ensure holistic and integrated development planning and implementation of institutional and governance structures ought to be in place. As opposed to current pattern of planning and implementation of programmes and policies that are in silos.
- **Adequate Financing:** state ought to ensure that adequate financing is available for integrated development. Current budget allocation is based on departmental/ ministerial budgets.
- **Capacity Building and Training:** the state has a penchant for pursuing hard technological solutions to address climate change. But soft skills and capacities that are required to address climate change, tend to remain unaddressed. For example, adequate focus on capacity building, training, information sharing, creating repositories of good practices etc.
- **Context Relevant Solutions:** the state seems to be going for solutions which are oft tried and tested without delving into see whether these solutions continue to be appropriate with changing times and situations. For example, a couple of decades back, coal was perhaps the most viable source of electricity, while in today's world, renewable energy has proved to be more viable source of electricity. But states, continue to pursue options of generating electricity from coal, despite this.
- **State-Centre Linkages:** the Central Government needs to ensure that States are kept abreast of developments at international climate negotiations at various forums including the United Nations Framework Convention on Climate Change (UNFCCC) from time to time.
- **Specific Institutional Arrangements at State Level:** states need to create specific institutional arrangements that can enable them to meaningfully assist the Central Government in meeting its reporting and other obligations to the UNFCCC and its governance arrangements.