IGBC

Confederation of Indian Industry

A STUDY ON

GREEN AND LIVEABLE

CITIES IN TAMIL NADU

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A STUDY ON GREEN AND LIVEABLE CITIES IN TAMILNADU

Strategies for a sustainable and liveable urban future

MESSAGE

Dr R. Nandini
Chairperson
CII Southern Region

Tamil Nadu stands at the forefront of urbanization in India, with nearly 48% of its population residing in urban areas—a figure projected to rise in the coming years. This rapid urban growth necessitates innovative and sustainable urban planning to ensure that our cities remain not only livable but also thrive as green urban centres. A green and livable city is also expected to attract more investments and talent, leading to economically vibrant cities.

Under the visionary leadership of **Hon'ble Chief Minister Thiru M.K. Stalin**, the Government of Tamil Nadu has launched several forward-thinking initiatives to enhance the green and livability quotient of both cities and villages across the state. The Confederation of Indian Industry (CII) congratulates the Chief Minister and all government officials for their commitment and leadership in driving this progressive agenda.

Some of the cities in Tamil Nadu, including Chennai, Coimbatore, and Tiruppur, have demonstrated excellence in many of the parameters related to green and livability. Coimbatore, in particular, has taken proactive strides in building climate resilience through the creation of micro forests, the expansion of green cover and public open spaces, and the promotion of green building practices. These are not just initiatives—they are bold, transformative steps toward creating inclusive, future-ready urban environments.

This report outlines actionable recommendations designed to support policymakers, urban planners, and stakeholders in accelerating these efforts. It marks the beginning of a larger journey to position Tamil Nadu as a global leader in green, sustainable urban development.

CII looks forward to continuing its collaboration with the Government of Tamil Nadu. Together, we can build cities that not only set national benchmarks but also inspire the world.

MESSAGE

B Thiagarajan
National Chairman
CII-IGBC

Tamil Nadu is at the forefront of a transformative urban expansion, with nearly half of its population now residing in cities. As this urban shift accelerates, the state stands at a critical juncture where strategic planning and sustainability must go hand in hand to ensure long-term resilience, economic prosperity, and an enhanced quality of life for its citizens.

Recognizing this imperative, the Government of Tamil Nadu has proactively launched programmes such as the Tamil Nadu Sustainable Urban Development Project, Tamil Nadu Climate resilient urban development programme and Urban development fund etc. These efforts have laid a strong foundation for cities that are not only modern and efficient but also environmentally responsible.

As India's leading proponent of green infrastructure, the Confederation of Indian Industry's Indian Green Building Council (CII-IGBC) has been instrumental in advancing sustainable urban development through frameworks like IGBC Green Cities. By integrating eco-friendly design, efficient resource management, and smart infrastructure, this framework provides a clear roadmap for cities aiming to minimize their environmental footprint while maximizing liveability and economic vibrancy.

Tamil Nadu is already making significant strides in Green Buildings and Built environment. Out of the total 13.26 billion sq. ft. of IGBC-registered green projects across India, 5% originates from Tamil Nadu, reflecting the state's commitment to sustainability. IGBC has also initiated collaborations with Tiruppur and Coimbatore Urban Local Bodies as part of its efforts to embed sustainability principles at the grassroots level.

CII-IGBC remains deeply committed to working alongside the Government of Tamil Nadu to accelerate this journey. Together, we can position Tamil Nadu as a leader in sustainable urban development—creating cities that are not just built for today but are resilient, resource-efficient, and future-ready.

EXECUTIVE SUMMARY

The rapid growth of economic activities and population in urban areas has placed immense pressure on existing infrastructure and the environment, significantly impacting the quality of life in cities. Climate change has further intensified these challenges, making it imperative to address both urban sustainability and liveability in an integrated manner.

A green and liveable city is the one that harmoniously balances economic, environmental, and social dimensions, fostering sustainable development while enhancing the standard of living and overall quality of life for its people.

This study evaluates the green performance and liveability of six selected cities in Tamil Nadu — Chennai, Coimbatore, Madurai, Trichy, Tiruppur, and Salem and identify key areas for improvement. The assessment framework comprises over 75 parameters spanning broad indicators, including Green and Public open spaces, Transportation and Mobility, Power supply, Assured Water supply, Air pollution control, Waste water management, Solid waste management, Urban Flooding and Urban heat Island effect.

Tamil Nadu government and urban local bodies have taken several initiatives for improving green performance and liveability index. This report captures these pioneering initiatives and acknowledges their impact. CII congratulates the Tamil Nadu government for these excellent efforts.

Based on the performance analysis, specific recommendations have been developed for each of the areas for implementation in the form of direct interventions requiring capital investments, change in policies or regulations and joint initiatives with private sector in public private partnership mode.

These recommendations are also specific to individual cities based on their performance. The report also highlights the practices already adopted or projects implemented by the best performing cities in the respective areas at national and international level for inspiration and learning. The implementation authority needs to further work out the details of the project and the cost.

The summary of recommendations is as below:

RECOMMENDATIONS

Recommendation	Chennai	Coimbatore	Madurai	Trichy	Tiruppur	Salem
Green and Public Open Spaces						
Earmark specific areas for green and public open spaces as part of Master Plans in new areas under development.	●	●	●	●	●	●
Mandate allocation of 15-20% green space for all new residential, commercial and infrastructure projects.	●	●	●	●	●	●
Improve the public open spaces per capita to atleast 4-5sqm per person in next 5 years.	●	●	●	●	●	●
Initiate city wise plantation drives with public private partnerships	●	●	●	●	●	●
Transportation and Mobility						
Ensure safe and accessible pedestrian infrastructure	●	●	●	●	●	●
Include pedestrian infrastructure as part of Master Plans, Comprehensive Mobility Plans, and City Development Plans.	●	●	●	●	●	●
Create infrastructure for bicycling	●	●	●	●	●	●
Initiate awareness and campaign on bicycling for enhancing health and wellbeing	●	●	●	●	●	●
Power Supply						
Accelerate the implementation of smart meters prioritising the consumers having higher energy consumption.	●	●	●	●	●	●
Review and improve sufficiency of streetlights specifically in suburban areas	●	●	●	●	●	●
Offer incentives and encourage adoption of Green Building concepts in Buildings.	●	●	●	●	●	●
Mandate energy audits in large buildings/ societies having connected load of more than 500 KVA.	●	●	●	●	●	●
Assured Water Supply						
Expand direct water supply connections to achieve at least 80% coverage.	●	●	●	●	●	●
Transfer from intermittent water supply to a continuous 24x7 system in a phased manner.	●	●	●	●	●	●
Monitor water supply by installing digital water meters and reduce the NRW to less than 10%	●	●	●	●	●	●
Create awareness on upkeep and maintenance of rainwater harvesting systems.	●	●	●	●	●	●
Monitor the ground water table by carrying out hydrological study once in 3 years.	●	●	●	●	●	●

Air Pollution Control						
Increase number of Ambient Air Quality Monitoring Stations as per CPCB norms	●	●	●	●	●	●
Reduce Vehicular Emissions	●	●	●	●	●	●
Ban burning of waste in public / open spaces	●	●	●	●	●	●
Control dust emissions from construction sites and road.	●	●	●	●	●	●
Expand Urban Green Cover with public private partnership.	●	●	●	●	●	●
Waste Water Management						
Improve wastewater collection efficiency and target to achieve at least 80%	●	●	●	●	●	●
Mandate the reuse of wastewater for industrial requirements and landscape applications.	●	●	●	●	●	●
Mandate setting up of wastewater treatment plants in societies exceeding 100 dwelling units.	●	●	●	●	●	●
Segregate stormwater drains from sewage lines and strengthen the network	●	●	●	●	●	●
Solid Waste Management						
Improve efficiency of solid waste collection and target & achieve 80%	●	●	●	●	●	●
Address dry waste by increasing the recycling or energy generation or conversion to refuse derived fuels	●	●	●	●	●	●
Utilize MSW as fuel in cement plants.	●	●	●	●	●	●
Have a policy and implement measures to achieve on Net zero waste to land fill.	●	●	●	●	●	●
Urban Heat Island						
Encourage green roofing and cool roof solutions	●	●	●	●	●	●
Explore afforestation projects or drives in all major cities	●	●	●	●	●	●
Create green bufffer zones in industrial areas and increase shaded public spaces	●	●	●	●	●	●
Urban Flooding						
Increase the stormwater drainage network to ensure 100% coverage and capable of handling 50 mm/hour of rainfall	●	●	●	●	●	●
Mandate 30% permeable surfaces, introduce flood resilent building codes and encourage 50% stormwater reuse	●	●	●	●	●	●

Legend:	
	Direct Implementation Through Investment
	Policy Implications
	Public-Private Partnership (PPP) Models
●	Meeting norms/ Better than National Average
●	Action Required

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1 Introduction

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INTRODUCTION

1.1 Present Scenario

Tamil Nadu, one of India's most urbanized states, is witnessing rapid urban expansion, bringing both opportunities and challenges. Cities such as Chennai, Coimbatore, Tiruppur and Trichy serve as economic engines, driving industrial growth, employment, and infrastructure development. However, this growth has led to significant environmental and urban challenges, including air and water pollution, rising traffic congestion, inefficient waste management, and depletion of natural resources. The increasing demand for housing, mobility, and public services has placed immense pressure on existing infrastructure, affecting the overall quality of life for urban residents.

Recognizing these challenges, Tamil Nadu has taken several initiatives for increasing green cover, addressing the issues related to waste water and solid waste management in the cities, strengthening the public transport network etc for improving urban liveability. Cities in Tamil Nadu are performing better than National average in many of the parameters related to Green and Liveability. CII congratulates the government of Tamil Nadu for implementation of these initiatives and their leadership in the country.

CII study indicates that gaps remain in holistic urban planning, with concerns over unplanned urban sprawl, loss of green spaces, and vulnerability to climate risks such as flooding and heat stress. As cities continue to expand, there is an urgent need to assess and strengthen their green and liveability standards, ensuring that development is not only economically robust but also environmentally responsible and socially inclusive.

For assessing the Green and Liveability standards CII carried out this study in select cities (Chennai, Coimbatore, Trichy, Madurai, Tiruppur and Salem) which are having population over more than 10 lakhs. The Tamil Nadu government may consider taking the similar study in rest of the cities for implementation of measures for enhancing the performance of green and liveability. .

1.2 Objectives

The study aims to:

- Assess and evaluate the performance of the select cities based on the green and livability framework
- Enable the city authorities to understand the present status of their city as per the performance parameters of green and livability framework.
- Highlight opportunities for improvement and encourage city authorities to implement measures and enhance the green performance & livability in the city.

1.3 Overall Approach

First CII has studied and analyzed Nationally and internationally available green and liveability frameworks. The comparative analysis of some of the renowned frameworks are as below:

Table 1: Comparative Analysis of National and International Green and Livability Frameworks

Index Name	Key Focus Areas	Methodology	Scale & Indicators
EU Green City Index	CO emissions, energy efficiency, air quality, waste management, water use	Min-Max normalization, benchmarking	Scale 1-10 for assessment
Asian Green City Index	CO reduction efforts, energy efficiency, waste & water management	City-wise performance assessment	Evaluates sustainability actions
Climate Smart Cities Assessment Framework	Urban planning, biodiversity, climate resilience, energy efficiency	Indicator-based performance evaluation	Ranks cities based on actions taken
ISO 37120 Sustainable Cities Indicators	Water, air quality, transport, economy, waste, governance	Standardized urban metrics	Benchmarking based on performance
NIUA Liveability Standards (India)	Housing, mobility, economy, safety, environment, governance	Framework based on measurable parameters	Covers 79 parameters across 15 categories
IGBC Green Cities Rating (India)	Eco-sensitive urban planning, climate resilience, energy efficiency, waste & water management, air quality, transport, housing, citizen welfare, ICT	Performance-based rating system	Covers 75 parameters across 24 green city indicators

Based on the analysis, CII has developed a framework considering all critical parameters for evaluating the green and liveability. A green and liveable city is the one that harmoniously balances economic, environmental, and social dimensions, fostering sustainable development while enhancing the standard of living and overall quality of life for its people.

Methodology for analysing each of the parameters in the framework is guided by the IGBC Green Cities Rating and the NIUA Liveability Standards. This framework provides a structured approach and has strong emphasis on physical parameters, which play a crucial role in determining the quality of urban infrastructure and services.

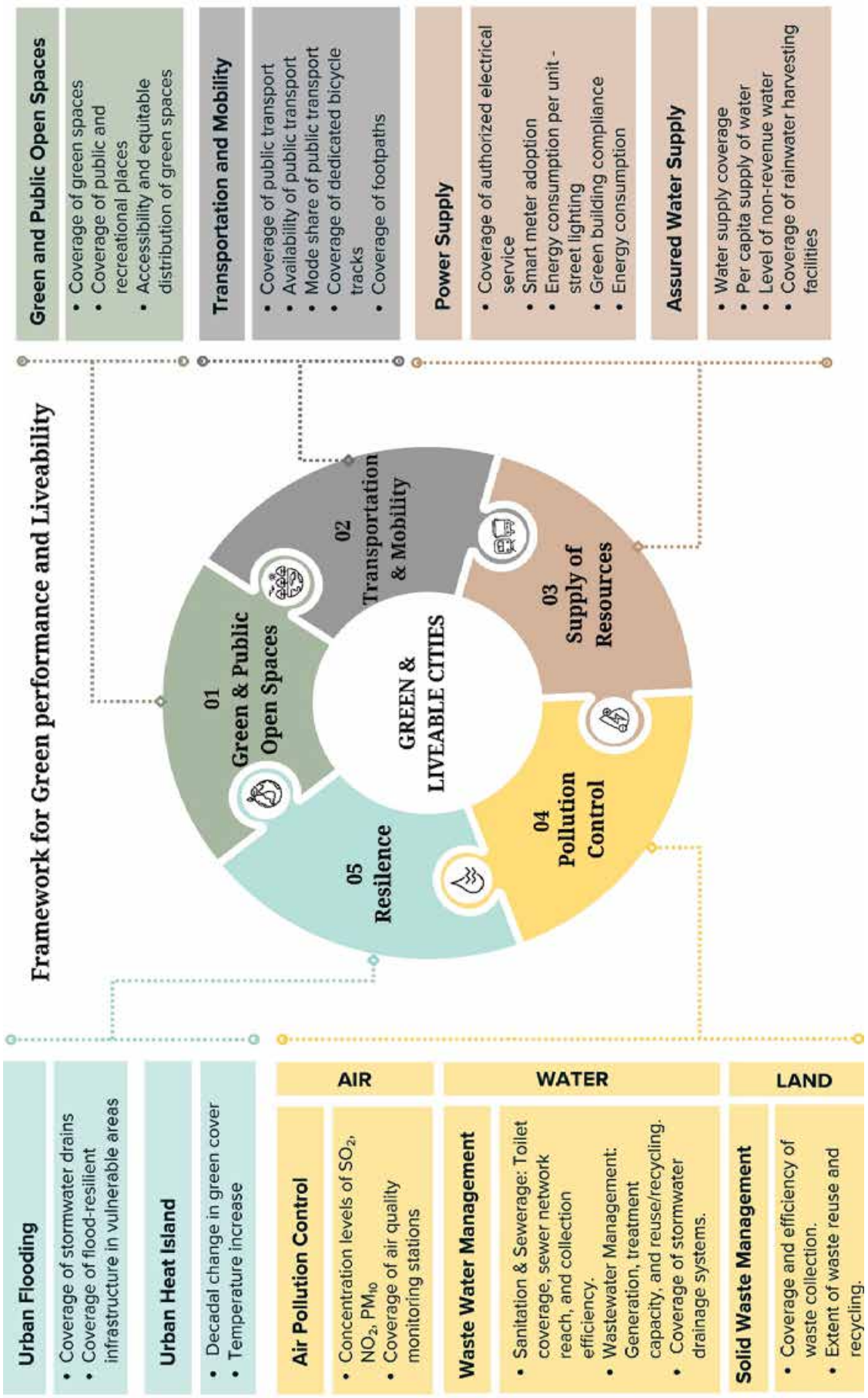

Figure 1: Framework for Green performance and Liveability

Data Collection and Analysis

The evaluation has been conducted primarily using publicly available data from master plans, comprehensive mobility plans, city development reports, and other government-published datasets, ensuring a transparent and data-driven approach. The detailed sources of information and datasets referenced in the assessment are also enclosed.

During the course of data collection, it was understood that for some of the parameters data are not available and / relatively old. Wherever direct sources were missing, efforts were taken to collect data from secondary sources such as research reports, publications etc produced by private or educational institutions.

Development of Recommendations

The recommendations are developed to provide practical and actionable solutions for enhancing green performance and liveability of cities in Tamil Nadu. These recommendations are based on:

- A comprehensive assessment of the current urban scenario
- Data-driven evaluations and performance of cities against each parameter of the green and liveability framework.
- Best practices or projects that are already implemented by similar cities at national or international level. These practices are highlighted separately as part of the analysis for reference.

The recommendations in general are of the following nature:

1. Direct interventions that need to be taken by the Government of Tamil Nadu or the urban local bodies or the concerned department. These direct interventions require capital investment.
2. Policies or regulations that need to be taken up by the urban local bodies to enable private organizations or common public to implement the suggested measures.
3. Joint initiatives by the Government and Private sector by involving all the relevant stakeholders.

Proposed Way Forward

The implementation of recommendations can be taken by the Government of Tamil Nadu by nominating the Department of Housing and Urban Development as the nodal agency for monitoring and implementation.

Key steps for implementation include:

The Department Housing and Urban Development may form an advisory group under the leadership of the Secretary involving the relevant stakeholders. CII Tamil Nadu expresses its willingness to participate in this advisory board and support implementation efforts.

- The recommendations can be prioritised and allocated to the respective departments and the urban local bodies for implementation.
- Tamil Nadu government or the concerned urban local bodies to allocate funds for the implementation on the priority basis
- CII and its members will support wherever there is a need for public private partnership and industry participation requirement.

Through this approach, Tamil Nadu can continue to lead in sustainable urban development, enhancing both the environmental resilience and quality of life in its cities.

Green and Liveable Cities-

Performance Analysis

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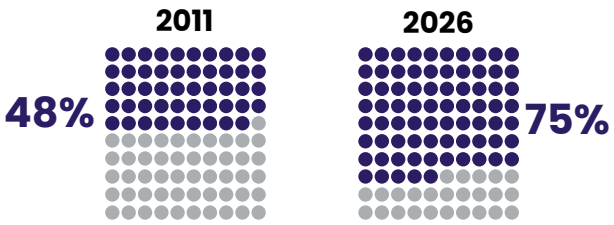
Study Area Profile

Tamil Nadu: An Overview

Population: ~72 million

Density: ~555 persons/sq. km

Urban Population in Tamil Nadu



Source: https://tcp.tn.gov.in/urbanscenario)
https://indiaat75.in/wp-content/themes/Indiaat75/myassets/pdf/national_and_state_vision_document/Tamilnadu.pdf

Chennai

426 Area (sq. km)	6,697,000 Population
157 Population Density (PPH)	1,810,270 Households

Coimbatore

257 Area (sq. km)	1,985,420 Population
77.3 Population Density (PPH)	536,597 Households

Madurai

148 Area (sq.km)	1,723,347 Population
116.5 Population Density (PPH)	465,227 Households

Tiruchirappalli

167 Area (sq.km)	1,270,000 Population
76 Population Density (PPH)	343,243 Households

Tiruppur

159 Area (sq.km)	1,784,000 Population
112 Population Density (PPH)	482,162 Households

Salem

91 Area (sq. km)	1,212,000 Population
133 Population Density (PPH)	327,600 Households

** Data is specifically for the City Municipal Corpoartion Limits*

2.1
Green and Public Open Spaces

Background

Public green and open spaces are lung spaces for the city. These spaces contribute to the health, wellbeing and quality of life for the citizens. Public green spaces include parks, botanical gardens, green spaces along water bodies (tank, nala, pond, lake, canal, river), playgrounds, multipurpose open spaces etc.

Increasing green spaces in cities can reduce the heat island effect, which contributes to increase in temperatures in urban areas. More green cover also improves air quality, supports biodiversity and can even boost food security by allowing urban farming. Apart from these, the public open spaces have also become recreational areas for people.

Globally there are efforts from the municipal administrations to increase the public open spaces or enhance the usability of the existing public open spaces. As per World Health Organization, the recommended per capita public open space in urban areas is 9 sqm.

As part of this study, the per capita availability of green spaces and the per capita availability of public and recreational spaces were evaluated for each of the identified cities in Tamil Nadu.

Methodology

Data from the respective city master plans and the publicly available sources have been utilized for estimating per capita availability of green spaces and per capita availability of public and recreational spaces.

The following formulae have been used for calculating the same:

1. Per capita availability of green spaces

$$\frac{\text{Total area of green space (sq.m.)}}{\text{Total population of the city}} = \text{Per capita availability of green spaces (\_\_\_\_\_ sq.m.)}$$

2. Per capita availability of public and recreational places

$$\frac{\text{Total area of public and recreational places (sq.m.)}}{\text{Total population of the city}} = \text{Per capita availability of public and recreational places (\_\_\_\_\_sq.m.)}$$

Present Status

Table 2 : Comparative Analysis for Cities under Green & Public Open Spaces indicator

Indicators	Chennai	Coimbatore	Madurai	Trichy	Tiruppur	Salem	National Average	URDPFI*	WHO
Per capita availability of green spaces (sqm)	18.05	46.6	14.93	10.5	1.6	7.99	24.6	10-12	50
Per capita availability of public and recreational places (sqm)	8.5	1.92	2.36	0.86	0.78	0.75	1.2 - 1.5	4 - 5	9

*The Urban and Regional Development Plans Formulation and Implementation (URDPFI) guidelines

Inference

The key challenges for public green and open spaces include rapid urbanization, limited land availability, unplanned development, and preference for commercial and residential projects over green areas.

As of 2023, 36% of the total area of Coimbatore city is under green cover, which makes it the best performing city in Tamil Nadu with 46.6 sqm per capita green cover, whereas the national average is 24.6 sqm per capita. China has a goal of expanding its green cover to 45% in 70% of their cities by 2050

Figure 2 (a) : Global Best Practice - Public Open Spaces

Public Open Spaces (Parks & Recreational areas): Chennai Municipal Corporation has taken efforts to increase per capita availability of public and recreational spaces to 8.5 sqm, which is by and large at par with WHO recommendations.

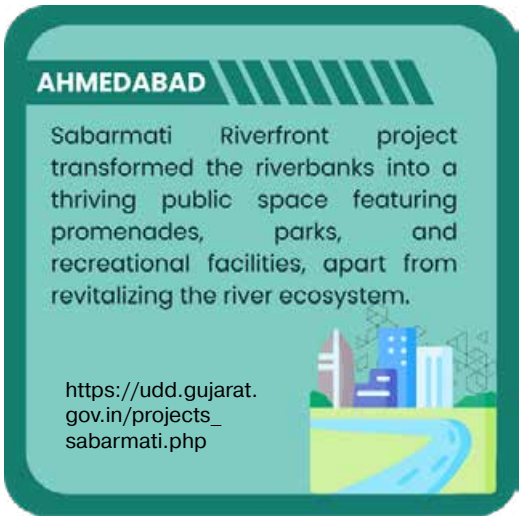


Figure 2 (b) : National Best Practice

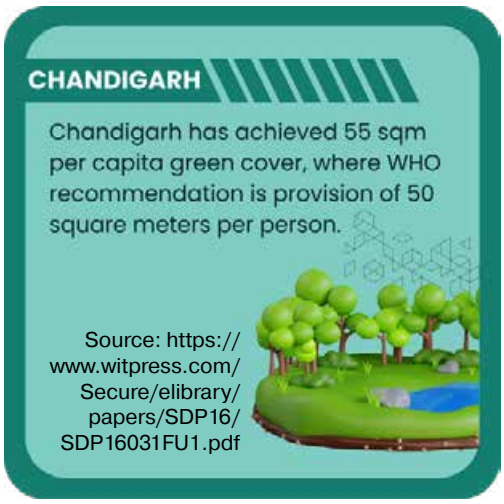


Figure 2 (c) : National Best Practice - Green Cover

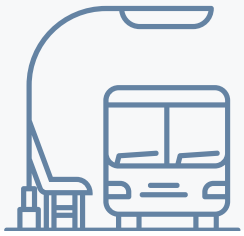
Rest of the cities including Coimbatore, Madurai, Trichy, Tiruppur and Salem have the per capita availability of public and recreational spaces less than 2 sqm which is at par with national average. However, much lower than WHO recommendations. There is need to significantly increase the per capita availability of Green and Public & recreational spaces in line with the WHO recommendation.

Recommendation

- Municipal Corporations of Coimbatore, Madurai, Trichy, Tiruppur and Salem shall earmark specific areas in newly developed areas and in Master Plan for public open spaces.
- Mandate 30% green space allocation for all new public infrastructure projects.
- Municipal Corporation shall plan to improve the public open spaces per capita to atleast 4-5 sqm per person (50% of WHO recommendation) in next 5 years.
- Initiate city wise plantation drives with public private partnerships with a target of doubling the green cover in the next 5 years.

Chennai

2.2
Transportation and Mobility



Background

Transportation is essential for daily life, facilitating not only personal commutes to work, school, or other destinations but also the movement of goods and services. Network of transportation and mobility and the related infrastructure in a city, significantly impacts livability and the quality of life in the city.

Increased use of personalized transportation leads to increased emissions, air pollution at city level and the greenhouse gas emissions contributing to climate change globally. Apart from these environmental issues, the increase in traffic also leads to an increase in non-productive hours spent on roads and the related negative economic impacts.

Globally, efforts are taken by urban local bodies to promote the following:

- Public transportation through a well-integrated transit network.
- Bicycle and pedestrian-friendly infrastructure to ensure a comfortable cycling or walking experience, enhance public safety, and improve overall health.

As part of this study, the availability of public transportation, mobility network and the infrastructure for encouraging walking and cycling were evaluated in the identified cities.

Methodology

Data from the respective city master plans and the publicly available sources have been utilized for estimating the following along with the respective formulae:

1. Geographical coverage of public transport :

$$\frac{\text{Total length of public transport network (road km)}}{\text{Total area of the city (sq.km)}} = \_\_\_\_\_ \text{ road kms. per sq. km.}$$

2. Availability of public transport :

$$\frac{\text{Average number of public transport vehicles available per day X 1,000}}{\text{Total population of the city}} = \text{(per 1,000 person)}$$

3. Mode share of public transport :

$$\frac{\text{Total public transport trips}}{\text{Total trips through all modes in the city}} = \text{X 100 } \_\_\_\_\_ \%$$

4. Percentage of road network with dedicated bicycle tracks :

$$\frac{\text{Total length of bicycle network}}{\text{Total length of road network in the city}} = \text{X 100 } \_\_\_\_\_ \%$$

5. Percentage coverage of footpaths – wider than 1.2 m :

$$\frac{\text{Total length of footpaths (wider than 1.2 m) available in the city}}{\text{Total length of road network in the city}} = \text{X 100 } \_\_\_\_\_ \%$$

Table 3 : Comparative Analysis for Cities under Transportation and Mobility indicator

Indicators	Chennai	Coimbatore	Madurai	Trichy	Tiruppur	Salem	National Average	Standard
Public transport coverage/ urban road density (km/ sq.km)	13.06	6.01	8.60	4.69	8.35	6.03	8.4	-
Availability of public transport (buses per lakh people)	27	63	242	58	22	159	24	50-120
Mode share of public transport	51%	43%	26%	22%	4.30%	30%	27%	30%
Percentage of road network with dedicated bicycle tracks	3%	4.17%	-	-	4%	-	3.8	25%
Percentage coverage of footpaths – wider than 1.2m	18%	-	-	-	2%	-	30%	100%

Inference

The cities in Tamil Nadu have performed very well in creating the public transport network and increasing their share amongst the total transport available. The mode of share of public transport in many of the cities is either at par with national standard or significantly exceeding the same.

Tiruppur being the textile city, the mode share appears to be lower because of the transportation arrangements (industry-owned and private transport) made by the individual companies for their employees. Tiruppur city administration may evaluate this further and explore the possibility of increasing the public transport for facilitating easy commutation of textile industry workers and common public in Tiruppur.

Figure 3 (a) : Global Best Practice

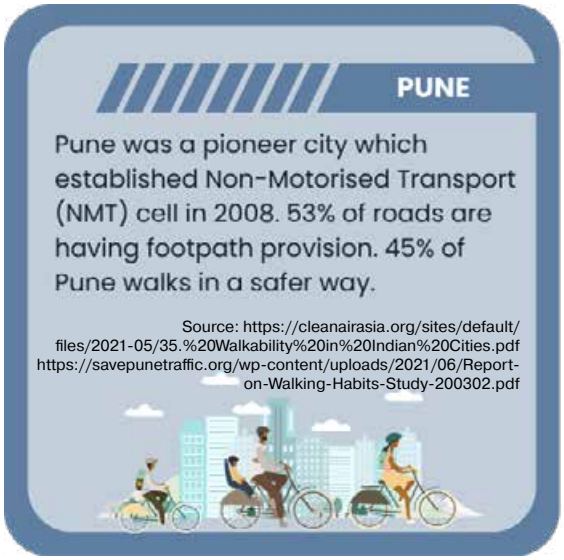


Figure 3 (b) : National Best Practice

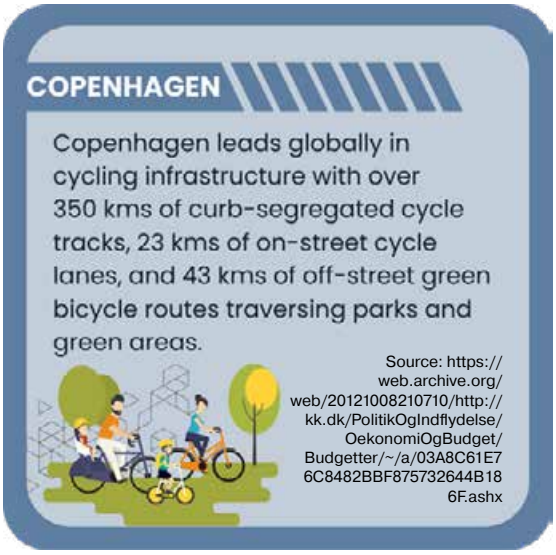


Figure 3 (c) : Global Best Practice

The cities are not bicycle or pedestrian friendly. There is a need for significantly improving the infrastructure for bicycling and pedestrians. Chennai, despite being a metro city, has only 18% footpath coverage and Tiruppur (0.3%) is severely lacking the pedestrian infrastructure, while the national average is 30%. Other cities such as Coimbatore, Madurai, Trichy and Salem do not have data as part of their master plan, but the trend suggests that pedestrian infrastructure is inadequate across cities.

Figure 3 (d) : National Best Practice

Chandigarh and Pune are often cited as having the best overall footpath coverage. Cities like Singapore, Tokyo, and Zurich have seamless integration between buses, trains, metros, and even cycling infrastructure. Cities like Shenzhen, China have fully electrified their bus fleets, reducing emissions. Copenhagen and Amsterdam promote cycling by providing extensive cycling lanes and bike-sharing services.

Recommendations

Create infrastructure for Footpath: Expansion and maintenance of foot path should be a priority, especially in Chennai, where only 18% of roads have proper footpaths. Cities like Tiruppur and Trichy need urgent improvements to make walking safe and accessible.

Coimbatore, Madurai, Trichy and Salem cities need to focus on creating and maintaining pedestrian infrastructure and include the same as part of their master plan report, Comprehensive Mobility Plan and City Development Plan.

Chennai

Create infrastructure for Bicycling - All cities need dedicated bicycle lanes to promote eco-friendly transport. Municipalities may focus on creating the infrastructure in new developments and roads approaching schools.

The urban local bodies along with NGOs can initiate awareness and campaign on bicycling for enhancing health and wellbeing of the public.

2.3 Power Supply

A reliable power supply is vital for cities, supporting industries, transportation, and households. To maintain sustainability and resilience, urban areas must incorporate a diverse mix of energy sources, including renewables.

Across the world, cities are shifting toward renewable energy, smart grids, and energy-efficient technologies to lower carbon emissions and improve reliability. Many are also implementing decentralized solutions such as solar rooftops, battery storage, and electric vehicle integration to enhance energy resilience.

To prepare for future energy demands, cities must adopt clean energy policies and develop infrastructure that minimizes environmental impact.

This study evaluates the following key power supply parameters for the selected cities in Tamil Nadu.

1. Percentage of city population with authorized electrical service
2. Percentage of electrical connections covered through smart meters
3. Energy consumption per unit - street lighting
4. Percentage of new and redeveloped buildings following green building norms
5. Total energy consumption per capita

Methodology

Data from the publicly available sources have been utilized for estimating the parameters and the following formulae have been used for calculating the same:

1. Percentage of city population with authorized electrical service

$$\frac{\text{Number of authorized electrical connections at household level}}{\text{Total number of households in the city}} \times 100 = \_\_\_\_\%$$

2. Percentage of electrical connections covered through smart meters

$$\frac{\text{Number of electrical connections (residential and commercial) with smart meters}}{\text{Total number of electricity connections in the city}} \times 100 = \_\_\_\_\%$$

3. Energy consumption per unit - street lighting (kWh per installation)

$$\frac{\text{Energy consumption on street lighting}}{\text{Total number of street light installations}} = \_\_\_\_ \text{kWh per installation}$$

4. Percentage of new and redeveloped buildings following green building norms

$$\frac{\text{Built up area of new/redeveloped buildings completed in a year that have received green ratings}}{\text{Total built up area of all new/redeveloped buildings completed during the same year)}} \times 100 = \_\_\_\_\%$$

5. Total energy consumption per capita (kWh per capita)

$$\frac{\text{(Total energy consumption (for all uses) in the city}}{\text{Total population of the city}} = \_\_\_\_ \text{kWh per capita}$$

Chennai

Present Status

Table 4 : Comparative Analysis for Cities under Power Supply indicator

Parameters	Chennai	Coimbatore	Madurai	Trichy	Tiruppur	Salem	National Average	Global Best
Percentage of city population with **authorized electrical service**	100%	99%	100%	100%	100%	100%	95-98%	100%
Percentage of electrical connections covered through **smart meters**	6%	-	-	-	-	-	15-20%	100%
Energy consumption per unit - **street lighting** (kWh per installation) per year	234	421	135	126	41	217	255–330	-
Percentage of new and redeveloped buildings following **green building norms**	8.4%	1.3%	0.01%	0.02%	0.06%	0.001%	5%	80%
Total household **per capita energy consumption** (kWh per capita)	1,111	1,194	1,139	1,111	1,277	1,139	1,080	-

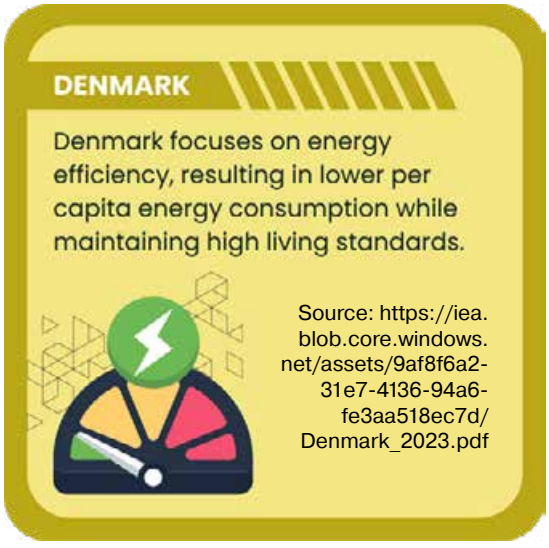


Figure 4 (a) : Global Best Practice

Inference

Tamil Nadu has been in the forefront in demonstrating strong performance in electrification, achieving 100% city-wide access to authorized electrical services. The higher reported figures of Madurai (104%) may suggest that multiple electricity connections in the same premises.

The adoption of smart meters in Tamil Nadu cities is still very low and clearly indicates that there is a need for targeted interventions to accelerate implementation of smart metering.

Street light energy consumption is an important indicator from the point of view of facilitating people movement during nighttime and ensuring public safety. In cities such as Chennai, Madurai, Trichy and Tiruppur the street light energy consumption is far below the energy consumption in Coimbatore and Salem as well as the national average. Though extensive use of LED lamps in cities would have contributed to reduction in energy consumption, this is an indication of insufficiency in streetlighting.

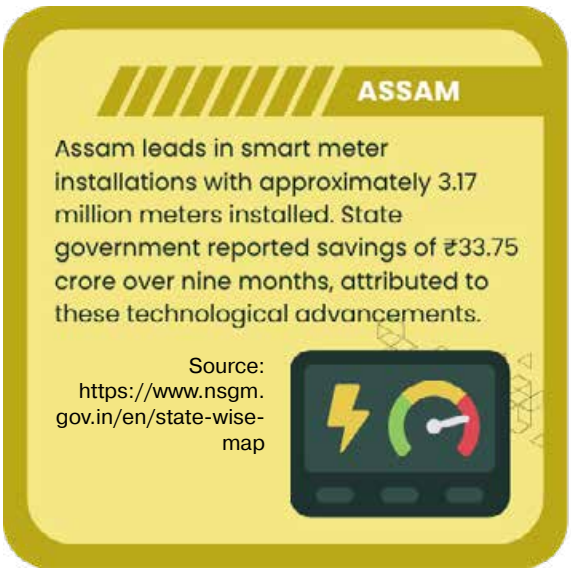


Figure 4 (b) : National Best Practice

India has over 13 billion square feet of certified green building space with more than 15,000 projects as of 2024. Tamil Nadu has 1,087 projects going green amounting to 597 million sq.ft. Tamil Nadu stands no. 5 in the country. There is a need for encouraging the buildings and built environment in the major cities to go green and improve Tamil Nadu's position at the National level in this regard.

Figure 4 (c) : Global Best Practice

The per capita energy consumption is an indication of the economic growth of the country or the state. The per capita household energy consumption in Tamil Nadu cities is more compared to the national average. Though the improved standard of living demands higher energy consumption, there is a need for improving energy efficiency at the individual homes.

Recommendation

- Tamil Nadu Electricity board shall accelerate the implementation of smart meters prioritising the consumers in the order of higher to lower energy consumption. This can be first implemented in cities having higher per capita energy consumption.
- Review the sufficiency of streetlights in Chennai, Madurai, Trichy and Tiruppur specifically in sub urban areas and improve.

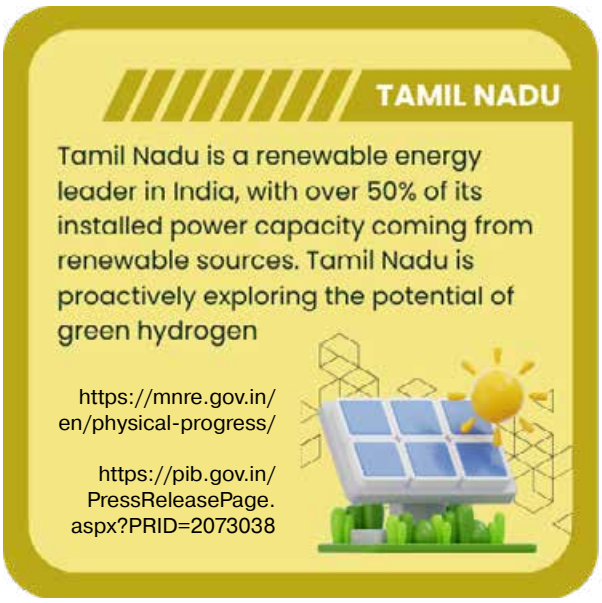


Figure 4 (d) : National Best Practice

- Encourage adoption of green concepts in buildings and built environment (New & Existing) through incentives / enabling policies such as additional FAR / reduction in property tax etc.
- Encourage energy efficiency improvement in homes and residential societies in major cities. Energy auditing can be made mandatory once in three years in large buildings and built environment having connected load of more than 500 kVA to start with.

2.4
Assured Water Supply

State governments and urban local bodies are implementing initiatives to ensure that every urban household to have access to clean and reliable tap water. The percentage of households in a city that have direct piped water connections indicates the extent of water supply network coverage.

Key performance indicators for urban water supply, as outlined by the Ministry of Housing and Urban Affairs (MoHUA), include coverage of piped water connections, 135 lpcd per capita supply, reduction of non-revenue water, 24x7 availability, and adherence to water quality standards. Non-revenue water (NRW) is mostly on account of the leakages, which is a major concern in cities.

Rainwater harvesting can play a significant role in ensuring availability of water for public in cities. Many cities have taken initiatives to make rainwater harvesting mandatory in residential & commercial projects. There is a need for monitoring the effectiveness and impact of rainwater harvesting systems.

As part of the study, household level coverage of direct water supply connections, the per capita supply of water, level of non-revenue water, and percentage of plots with rainwater harvesting facility were evaluated for each of the identified cities in Tamil Nadu.

Methodology

Data from the respective city master plans, city sanitation plans and the publicly available sources have been utilized for estimating the 4 indicators :

The following formulae have been used for calculating the same:

1. **Household level coverage of direct water supply connections**

$$\frac{\text{Total number of households with direct water supply connection}}{\text{Total number of households in the city}} \times 100 = \_\_\_\_\_\%$$

2. **Per capita supply of water**

$$\frac{\text{Total quantity of water supplied into the distribution system}}{\text{Total population of the city}} = \_\_\_\_\_$$

3. **Level of non-revenue water - NRW**

$$\frac{\text{Quantum of water put into distribution system (mld) - Quantum of water sold (mld)}}{\text{Quantum of water put into the distribution system (mld)}} \times 100 = \_\_\_\_\_$$

4. **Percentage of plots with rainwater harvesting facility**

$$\frac{\text{Number of new developments/ redevelopments (of designated plot size),commercial and public buildings with RWH facility}}{\text{Total number of new developments/ redevelopments (of designated plot size), commercial and public buildings in the city}} \times 100 = \_\_\_\_\%$$

Present Status

Table 5 : Comparative Analysis for Cities under Assured Water Supply indicator

Indicators	Chennai	Coimbatore	Madurai	Trichy	Tiruppur	Salem	National Average	MoHUA
Household level coverage of direct water supply connections (%)	98%	55%	36%	53%	100%	57%	85.5%	100%
Per capita supply of water (lpcd)	108	125	105	135	118	85	100	135
Level of non-revenue water – NRW (%)	11%	28%	10%	6%	19%	15%	38%	20%
Percentage of plots with rainwater harvesting facility (%)	68%	87%	83%	87%	87%	87%	30%	All plots of 100 sqm or more

Inference

The national average household-level coverage of direct water supply connections in India is estimated at 80-90% in urban areas. Metro cities have relatively high coverage, but water supply duration is limited (e.g., intermittent supply in many areas) and smaller cities often have lower coverage between 50-70%.

The cities such as Coimbatore, Madurai, Trichy, and Salem face significant challenges in water supply coverage. Thus, it requires strategic interventions to enhance accessibility to urban water infrastructure. MoHUA recommends 135 lpcd for domestic use. Whereas, except Coimbatore, Tiruppur and Trichy, the rest of the cities including Chennai, Madurai and Salem receive much lower water supply.

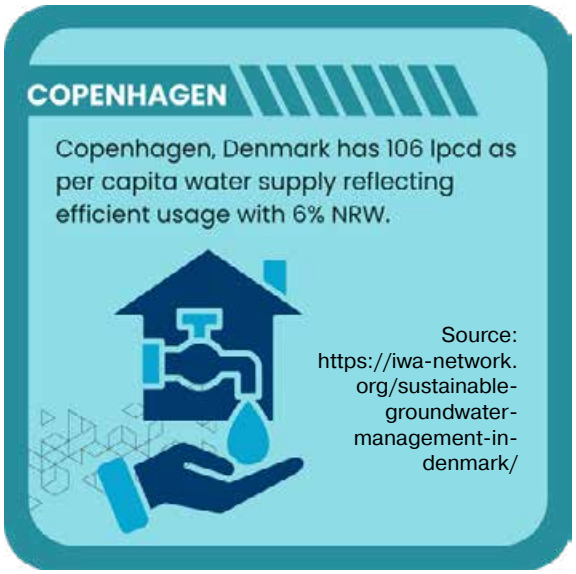


Figure 5 (a) : Global Best Practice

The average NRW level in India is approximately 38%, with variations across different cities and regions. Higher NRW levels indicate substantial water losses through leakage or non-metered water supply. Trichy has achieved an NRW level of 6%, aligning with world-class standards. There is a need for significantly reducing the level of NRW percentage in cities such as Coimbatore, Tiruppur and Salem. Copenhagen, Denmark has 104 lpcd as per capita water supply reflecting efficient usage with 6% NRW. Singapore and Tokyo have reduced its NRW to 5% and 3% respectively. Through advanced monitoring and stringent control measures.

Tamil Nadu, is a pioneer in implementing rainwater harvesting systems. It is mandatory for all existing and new buildings to incorporate rainwater harvesting facilities under municipal laws. As of February 2018, approximately 87% of buildings in municipal corporations (excluding Chennai) and municipalities had been fitted with RWH structures. However, maintenance of rainwater harvesting system is very important for its effectiveness and augmenting the water table.

Recommendation

- Expand direct water supply connections in Coimbatore, Madurai, Trichy and Salem to achieve atleast 80% coverage.
- Develop and implement a phased strategy to transition from intermittent water supply to a continuous 24x7 water supply system in metro cities like Chennai and Coimbatore, to start with. Studies have indicated that a continuous water supply will result in improved water efficiency and hence lower water consumption.
- Advanced digital water metering systems are available nowadays. The urban local bodies can explore the possibility of installing digital water meters first to monitor area wise water consumption and reduce leakages and NRW. Municipalities can target reducing NRW below 10% in the next 3 to 5 years.

Figure 5 (b) : Global Best Practice

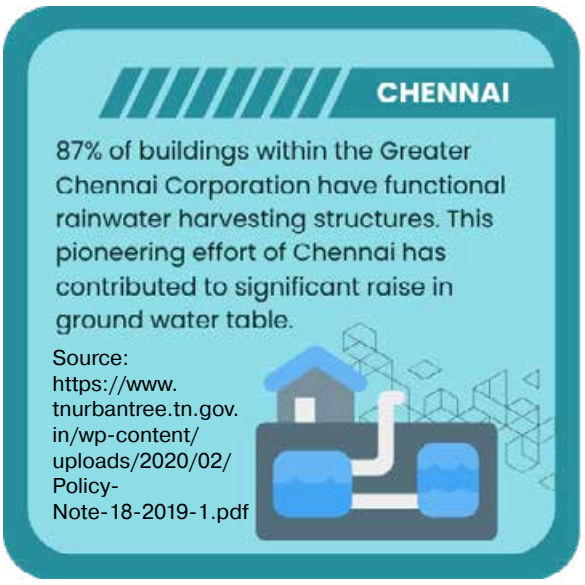


Figure 5 (c) : National Best Practice

- Municipalities to create awareness among public about importance of upkeep and maintenance of rainwater harvesting systems. Carry out inspection on RWH systems atleast once in a year, preferably before monsoon and advice the owner of the premises to carry out the maintenance based on requirements.
- To evaluate the impact of rainwater harvesting in each area, municipalities to monitor the ground water table once in three years by carrying out hydrological study.

Trichy

2.5
Air Pollution Control

Across India, over 130 cities under the National Clean Air Programme (NCAP) aim to reduce $PM_{2:5}$. and PM_{10} levels by 20-30% by 2024, emphasizing data-driven policymaking, industrial compliance, and clean mobility solutions. Tamil Nadu cities have taken initiatives to track pollution hotspots and implement timely interventions by deploying air quality monitoring stations at strategic locations.

Key performance indicators for urban air quality management, as outlined by the Tamil Nadu Pollution Control Board, include maintaining SO_2, NO_2, and PM10 levels better than the prescribed National Ambient Air Quality Standards and reducing the number of poor air quality days.

As part of the study, the concentration levels of SO_2, NO_2, and PM10 were evaluated for each of the identified cities in Tamil Nadu.

Methodology

Data from the National AQI dashboard, Tamil Nadu Pollution Control Board and the publicly available sources have been utilized for estimating the following indicators

- Concentration of SO_2 - Mean concentration over 24 hours of SO_2 given in ppb
- Concentration of NO_2 - Mean concentration over 24 hours of NO_2 given in ppb
- Concentration of PM10 - Mean concentration over 24 hours of PM10 given in µg/m3

Present Status

Table 6 : Comparative Analysis for Cities under Air Pollution Control indicator

Indicators	Chennai	Coimbatore	Madurai	Trichy	Tiruppur	Salem	National Average	WHO Guideline
Concentration of SO2	3 ppb	4 ppb	3 ppb	7 ppb	7 ppb	8 ppb	7 ppb	6 ppb (24-hour mean)
Concentration of NO2	7 ppb	5 ppb	8 ppb	-	5 ppb	7 ppb	11 ppb	5.31 ppb (24-hour mean)
Concentration of PM10	61 µg/m³	63 µg/m³	101 µg/m³	-	83 µg/m³	84 µg/m³	60 µg/m³	15 µg/m³

Inference

The air quality assessment in Tamil Nadu highlights controlled SO_2 levels but significant challenges with NO_2 and PM_{10} pollution.

While SO_2 remains within national and WHO limits, Tiruppur and Salem show elevated levels due to industrial and vehicular emissions. NO_2 concentrations vary, Madurai recording the highest levels (8 ppb), exceeding WHO guidelines, signalling the need for stricter emission controls.

PM_{10} pollution is the most critical concern, surpassing WHO limits in all cities, with Madurai (101 µg/m³) at the highest.

Addressing these issues requires stricter enforcement of emission norms, cleaner industrial processes, and sustainable mobility solutions, with a potential 15-20% reduction through enhanced

monitoring, green infrastructure, and electric mobility adoption.

Recommendation

- Strengthen the number of continuous Ambient air quality monitoring stations in Madurai, Coimbatore, Trichy, Salem and Tiruppur. All these cities have a population of more than 10 Lakh and as per the CPCB norms these cities shall have minimum 4 nos. of continuous Ambient Air Quality monitors, whereas all these cities have only 1 monitoring station.

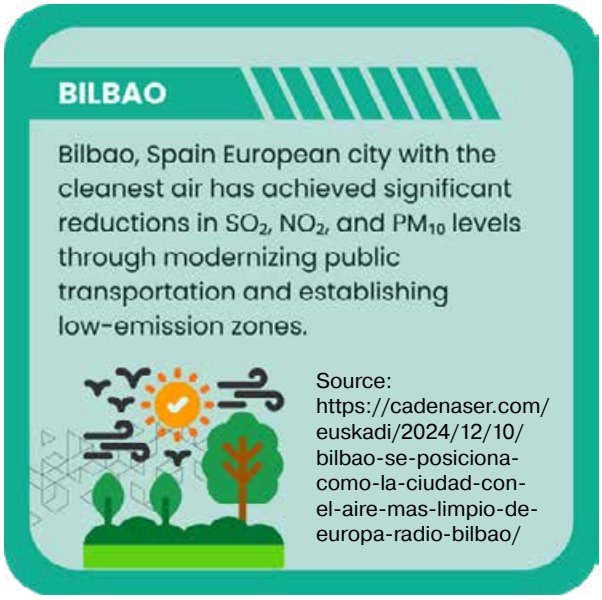


Figure 6 (a) : Global Best Practice

- Reduce Vehicular Emissions - Promote Electrical Vehicles adoption, clean public transport and non-motorized transport. The city administration may enforce Periodic Emission Testing (atleast once in 6 months) and reducing vehicular emissions.
- Ban burning of waste in public / open spaces: Municipality may consider banning burning waste and stringent measures for controlling the same.
- Control Construction and Road Dust – Municipalities may mandate dust suppression measures at the construction sites.
- Expand Urban Green Cover with public private partnership. This has been addressed as part of the recommendations under Green and open spaces.

Chennai

2.6
Waste Water Management

Waste water management in urban areas involves the systematic collection, treatment, and sustainable disposal or reuse of treated waste water to mitigate pollution, protect public health and reduce potable water demand. This process integrates centralized treatment plants, innovative decentralized solutions, and advanced technologies to enhance efficiency and resource recovery.

Globally, there is a growing emphasis on sustainable waste water management through circular water economies, nature-based treatment solutions, and smart monitoring systems. Governments and industries are investing in Zero Liquid Discharge (ZLD) policies and advanced reuse strategies to minimize environmental impact and ensure long-term water security.

This study evaluates the following key parameters in the selected cities in Tamil Nadu.

- Coverage of toilets
- Coverage of sewerage network and/or septage
- Collection efficiency of sewerage network
- Extent of reuse and recycling of waste water
- Coverage of storm water drains

Methodology

Data from the publicly available sources have been utilized for estimating the parameters and the following formulae have been used for calculating the same:

1. Coverage of toilets

$$\frac{\text{Total number of properties with access to individual and/or community toilets}}{\text{Total number of properties in the city}} \times 100 = \text{Coverage of toilets}$$

2. Coverage of sewerage network and/or septage

$$\frac{\text{Total number of properties with connection to waste water management systems}}{\text{Total number of properties in the city}} \times 100 = \text{Coverage of sewerage network and/or septage}$$

3. Collection efficiency of sewerage network

$$\frac{\text{Total waste water collected per day}}{\text{Total waste water generated in the city per day}} \times 100 = \text{Collection efficiency of sewerage network}$$

4. Extent of reuse and recycling of waste water

$$\frac{\text{Quantum of waste water recycled or reused per day}}{\text{Total waste water received at treatment plants per day}} \times 100 = \text{Extent of reuse and recycling of waste water}$$

5. Coverage of storm water drains

$$\frac{\text{Total length of covered primary, secondary and tertiary drains (of pucca construction)}}{\text{Total length of road network (wider than 3.5m) in the city}} \times 100 = \text{Coverage of storm water drains}$$

Madurai

Present Status

Table 7 : Comparative Analysis for Cities under Waste Water Management indicator

Indicators	Chennai	Coimbatore	Madurai	Trichy	Tiruppur	Salem	National Average
Coverage of toilets	89.2%	99.98%	89.2%	95%	89.2%	83%	82.5%
Coverage of sewerage network and/or septage	97%	80%	70%	88%	70%	71%	62%
Collection efficiency of sewerage network	41%	74%	33%	57%	15%	26%	41.9%
Quantity of waste water generation (in MLD)	750	231	186	118	94.4	325	-
Installed Capacity of waste water treatment plant (in MLD)	727	205	172	58	15	98	-
Extent of reuse and recycling of waste water	80%	18%	80%	51%	57%	80%	37%

Inference

Tamil Nadu's higher toilet coverage (89.2%) compared to the national average (82.5%) reflects strong sanitation policies and urban infrastructure. The state also has performed very well in setting up higher percentage (70-97%) of sewerage or septage network across major cities, which is significantly higher compared to the national average (62%).

The estimation of collection efficiency based on the total waste water collected and the total waste water generated (estimated) vary significantly from 15 - 74%. This clearly indicates that there is a need for reviewing the coverage of sewerage and septage network in the cities specifically in slum areas and sub urban areas.

The installed capacity of waste water treatment plants shall be atleast 20% more than the quantity of waste water generation to ensure 100% treatment of waste water in a city. Presently in Chennai and Madurai, the treatment capacity of plants just matches with the quantity of waste water generation, whereas in Tiruppur, Coimbatore, Salem and Trichy the installed capacity of the plants are much lower than the waste water generation. There is an urgent need for augmenting the treatment capacities in these cities.

Indore has 100% waste water treatment and reuses treated water for irrigation and industrial purposes. Bangalore houses 30+ STPs, treating 1,500+ MLD waste water daily. Also, there is mandatory waste water reuse policy for large apartments and industries. Singapore's NEWater Project recycles waste water into high-quality drinking water (used for industries and even direct consumption). Over 90% of waste water is recycled and reused.

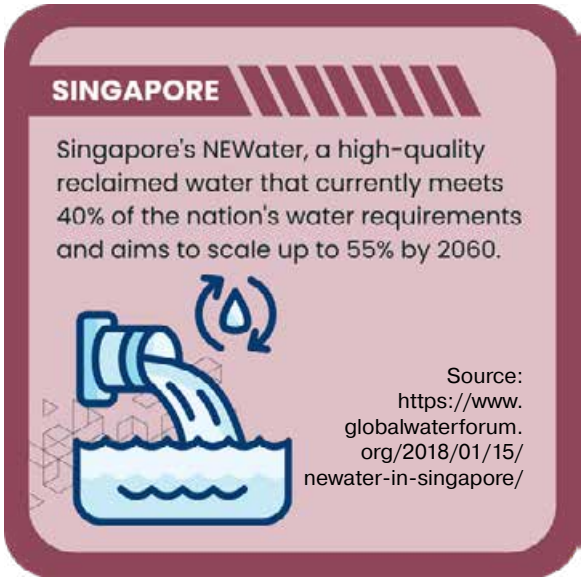


Figure 7 (a) : Global Best Practice

Higher waste water reuse and recycling rates (above the 37% national average) highlight effective policies and water scarcity-driven initiatives. The extent of reuse and recycling waste water in Coimbatore is much lower than national average. There is a need for reviewing the reuse and recycling in Coimbatore and explore the possibility of increasing the same.

One of the major challenges in cities is having the same drainage system for both stormwater and sewage. Cities have realised the need for segregating these two. Chennai has taken several initiatives for having a separate stormwater drainage to address the issues related to flooding. Other cities such as Coimbatore, Madurai and Salem have to take similar initiatives for improving the stormwater drainage network.

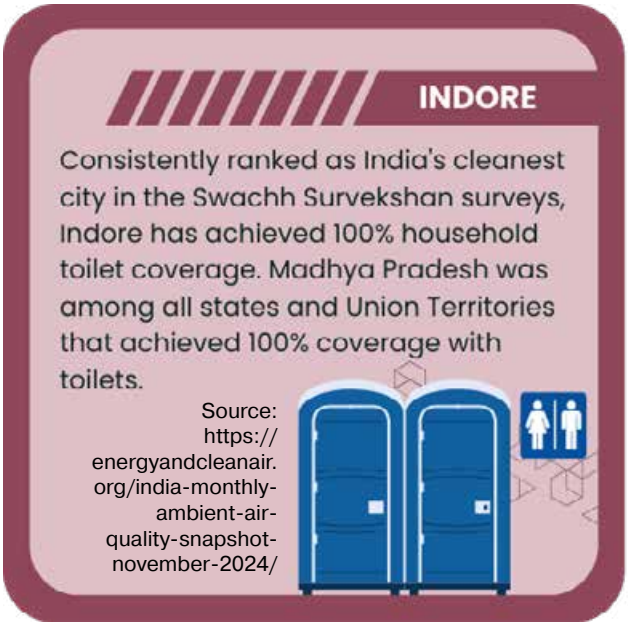


Figure 7 (b) : National Best Practice

Recommendation

- Tamil Nadu has demonstrated commendable progress in sanitation and waste water management, surpassing national averages in several key indicators. However, targeted interventions are required to address regional disparities and optimize urban infrastructure for long-term sustainability. The following recommendations are proposed:
- Enhance Waste water Collection & Treatment: Prioritise the infrastructure development for wastewater collection and treatment in major cities where the collection efficiency is lower such as Chennai, Madurai, Tiruppur, and Salem. Target to achieve the collection efficiency of atleast 80% in the next 3 years.

Figure 7 (c) : National Best Practice

- Increase the waste water treatment capacities to meet the treatment requirements in Coimbatore, Salem, Trichy and Tiruppur.
- Increase Waste water Reuse: Mandate the reuse of waste water for industrial requirements and landscape applications.
- Mandate setting up of localised waste water treatment plants and reuse of the waste water for residential societies exceeding 100 dwelling units.
- Strengthen Stormwater Drainage: segregate storm water drains from sewage lines and strengthen the network in Coimbatore, Madurai and Salem.

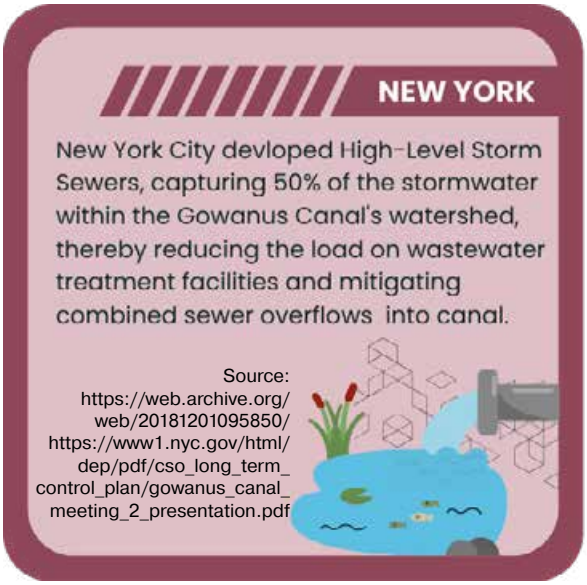


Figure 7 (d) : National Best Practice

2.7
Solid Waste Management

Background

Waste generation in every city has increased due to population growth, urbanization, and industrialization. Municipal solid waste management plays a vital role in terms of urban management and involves handling different types of domestic waste – wet & dry, industrial waste, street sweepings, biomedical waste, E-waste and construction & demolition waste.

Integrating solid waste management effectively enhances environmental protection, public health & sanitation, resource conservation and recycling, economic benefits and climate change mitigation. As part of this study, the municipal solid waste management practices such as waste collection, its efficiency and the extent of reuse have been evaluated for the identified cities.

Tamil Nadu being the most urbanized state, construction of residential and commercial projects are happening in all major cities. Handling the construction and demolition waste and converting them to useful products which can again be used in buildings become essential. Otherwise, the construction and demolition waste will go as landfills and result in contaminating the land and ground water.

Methodology:

Data from the respective city master plans and the publicly available sources have been utilized for estimating the following along with the respective formulae

1. **Household level coverage of municipal solid waste collection:**

$$\frac{\text{Total number of households and establishments covered through doorstep collection}}{\text{Total number of households and establishments in the city}} \times 100 = \_\_\_\_\_\%$$

2. **Efficiency of collection of municipal solid waste:**

$$\frac{\text{Total quantum of MSW collected by the ULB or private operator}}{\text{Total quantum of MSW generated in the city}} \times 100 = \_\_\_\_\_\%$$

3. **Extent of municipal solid waste recovered through reuse:**

$$\frac{\text{Average quantum of MSW that is processed or recycled (tons per month)}}{\text{Average MSW generated in the city (tons per month)}} \times 100 = \_\_\_\_\_\%$$

Present Status

Table 8 : Comparative Analysis for Cities under Solid Waste Management indicator

Indicators	Chennai	Coimbatore	Madurai	Trichy	Tiruppur	Salem	National Average	MoHUA
Household level coverage of municipal solid waste collection	97%	100%	100%	100%	100%	100%	50-90%	100%
Total Waste generated (metric tones)	5,400	1,100	862	460	700	450	-	-
Efficiency of collection of municipal solid waste	94%	93%	95%	95%	66%	100%	95.4%	100%

Indicators	Chennai	Coimbatore	Madurai	Trichy	Tiruppur	Salem	National Average	MoHUA
Total Waste collected (metric tones)	5,100	1,023	815	436	700	450	-	-
Total Dry Waste processed (metric tones)	788	302	614	410	30	267	-	-
Total Wet Waste processed (metric tones)	1,483	519			130		-	-
Extent of municipal solid waste recovered through reuse	43%	75%	72%	89%	23%	59%	76%	95%
Waste to landfill (metric tones)	3,129	279	248	50	540	183	-	-
Percentage of Waste to Landfill	57%	25%	28%	11%	77%	41%	19%	< 5%

Inference

Publicly available data indicate that the household level coverage of municipal solid waste collection in all the cities is 100%. However, the efficiency of collection of municipal solid waste varies from 66% to 85%. This indicates there is a need for specific focus on collection of solid waste from public spaces including streets and commercial spaces.

Figure 8 (a) : Global Best Practice

Figure 8 (b) : National Best Practice

The extent of municipal solid waste recovered through reuse is also lower than 50% in Chennai, Tiruppur and Salem. One of the major reasons for lower recovery is segregation of waste at source. Municipalities have taken steps to segregate the waste centrally and addressing biodegradable or wet waste scientifically. There is sufficient evidence for having addressed wet waste through composting, Bio methanation. However, sufficient focus was not given for addressing non-biodegradable waste and

recycling. Significant quantities of dry waste are still dumped in dump yards.

In all the identified cities, there is no specific focus for handling the construction and demolition wastes. The C&D wastes are mostly dumped in dump yards. There is an urgent need for implementing measures for addressing the C&D waste.

Indore has 100% door-to-door waste collection & segregation at source and uses GPS tracking for garbage trucks to ensure timely waste pickup. The SWaCH cooperative (Self-Employed Women's Association) initiative of Pune employs over 3,500 waste pickers for door-to-door waste collection.

Over 99% of waste is recycled or converted into energy in Sweden. San Francisco, USA, known for Zero-Waste Policies diverts 80% of its waste from landfills through strict waste segregation laws.

Figure 8 (c) : National Best Practice

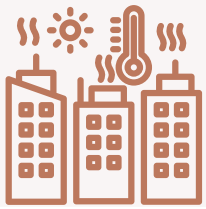
Recommendations

- All the cities have to focus on improving the efficiency of collection by focusing on cleaning of public spaces, roads and streets. The cities may target the efficiency of collection to reach atleast about 80% in the next 1 to 2 years.
- Cities have to be focus on addressing dry waste and increasing the recycling or energy generation or conversion to refuse derived fuels which can be used in cement plants.
- All the identified cities except Chennai have cement plants within about 100 Kms distance. The municipalities can explore the possibility of the cement plants utilizing the dry waste from MSW as fuel in their plants.
- The municipalities can bring in stringent policies on Zero land fill. Heftier fines on land fill will enable reduction of waste at source and enable the growth of recycling industry or alternative utilization of waste.

Figure 8 (d) : National Best Practice

Coimbatore

2.8
Urban Heat Island



Background

Urban areas experience significantly higher temperatures than their surrounding rural areas. The urban heat island effect occurs due to structures such as buildings, roads, and other infrastructure absorb and re-emit the sun's heat more than natural landscapes such as forests and waterbodies.

Urban Heat Island effect lead to increased energy consumption (higher demand for air conditioning), poor air quality and smog formation, higher health risks (heat strokes, dehydration, respiratory issues) and greater strain on water resources etc.

The Intergovernmental Panel on Climate Change's Sixth Assessment Report (IPCC AR6) highlights the rising risks of severe heat stress, compounded by drought, water scarcity, forest fires, and tropical cyclones. These conditions are expected to lead to a 1,540% increase in health-related deaths among people over 65 years by 2090, with India projected to face an additional 1 million heat-related deaths if warming continues unchecked.

There is a need for mitigating urban heat island and reducing microclimatic temperatures. Urban forests, green spaces and cool roof solutions are expected to reduce urban heat islands and cool down the environment.

As part of this study, land surface temperature increase and vegetation loss over a decade are analysed to assess the impact in the identified cities.

Methodology

1. Temperature increase (Decadal increase in Land Surface temperature (LST))

Maximum LST at Present – Maximum LST a decade ago = Decadal increase in LST(°C)

2. Vegetation loss (Decadal change in green cover)

$$\frac{\text{Green Cover at Present} - \text{Green Cover a Decade Ago}}{\text{Green Cover a Decade Ago}} \times 100 = \text{Change in Green Cover (\%)}$$

Present Status

Table 9 : Comparative Analysis for Cities under Urban Heat Island indicator

	Chennai	Coimbatore	Madurai	Trichy	Tiruppur	Salem
Increase in Land Surface temperature (LST) (°Celsius)	6.53	1	4.5	2	1.5	1
Change in percentage of green cover in last decade	- 13.33%	-7.2%	-17.4%	-2.5%	-1.7%	-1.5%

Figure 9 (a) : Global Best Practice

Inference

Coimbatore, Trichy, Tiruppur and Salem are performing better compared to Chennai and Madurai with respect to increase in land surface temperature (LST), i.e. 6.53°C & 4.5°C in Chennai and Madurai respectively.

Also, the decrease in green cover is directly related to the increased Land Surface Temperature. This has been evident in all the cities that are analysed. Increase in land surface temperature results in decrease in green cover and vice versa.

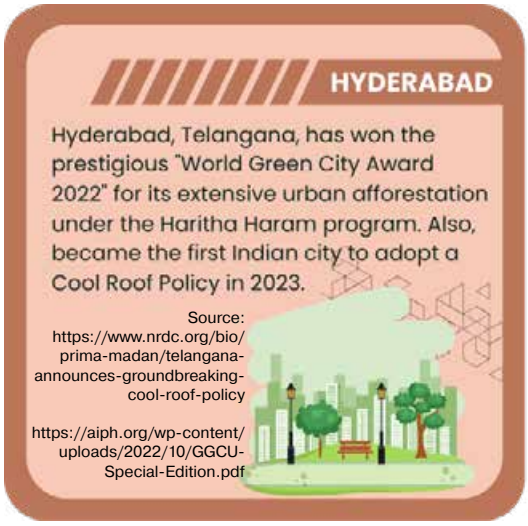


Figure 9 (b) : National Best Practice

State's Combined Development and Building Rules (TNCDBR 2019) do not explicitly address Urban Heat Island (UHI) mitigation. As per TNCDBR, Solar Energy Capture (Solar water heating and Erection of solar photo voltaic panels) is mandatory in all buildings in the category of High Rise Buildings and Non High Rise Buildings exceeding 16 dwelling units and 300 sq.m of commercial building. This may partly address the issues related to Urban Heat Island effect.

There is a need for a specific focus in Tamil Nadu cities for addressing the Urban Heat Island effect.

Recommendations

- There is a need to pay special attention towards Chennai and Madurai in terms of encouraging green roofing and cool roof solutions (Application of High SRI paints / tiles on the roof) in new and existing buildings. This can be done by incorporating the cool roof requirements in the bye laws.
- The urban local bodies along with NGO may explore the afforestation projects/ drives in all the major cities in Tamil Nadu
- The government of Tamil Nadu may strengthen policy to prevent deforestation, create green buffer zones in industrial areas, increase shaded public spaces in the cities.

Figure 9 (c) : National Best Practice

Chennai

2.9
Urban Flooding

Environmental Safeguards in Development Plans shall ensure that any development activity must incorporate measures to protect existing natural features. The macro drainage system, when strategically planned and executed, can enhance the overall flood resilience of cities. It would involve the construction of large-scale drainage channels and conduits designed to efficiently carry stormwater away from urban areas, thereby reducing the risk of flooding. Additionally, the interlinking of water bodies can create a network that disperses excess water across multiple outlets, minimizing the impact on any one particular area.

Certain approaches in storm water management aim to rebuild the natural water cycle, i.e. to store run-off water (e.g. retention basins) for a certain time, to recharge ground water (e.g. infiltration basins) and to use the collected water for irrigation or household supply. Most indigenous approach to storm water management collects the rainwater run-off in surface watersheds such as ponds, lakes in the region. It is recommended to clean and regenerate the existing water bodies and link them to create a hierarchy of water collection system. Rainwater harvesting and management hold tremendous potential for alleviating storm water run-off and increasing groundwater, particularly in urban areas.

Key performance indicators to assess and enhance urban resilience against climate-related challenges, including urban flooding, as outlined by MoHUA are:

- Percentage of stormwater drainage network coverage in urban areas
- Reduction in waterlogging incidents and flood-prone areas.

These KPIs help cities track the effectiveness of flood mitigation strategies, improve resilience, and ensure sustainable urban water management

Methodology

$$\frac{\text{Total length of covered primary, secondary and tertiary drains (of pucca construction)}}{\text{Total length of road network (wider than 3.5m) in the city}} \times 100 = \text{\_\_\_\_\_ \% (Coverage of storm water drains)}$$

This study has also considered the city specific studies on Geospatial Urban Flood risk assessments carried out Government, Academic institutions and research organizations.

Present Status

Table 10 : Comparative Analysis for Cities under Urban Flooding indicator

Indicators	Chennai	Coimbatore	Madurai	Trichy	Tiruppur	Salem	National Average	MoHUA
Coverage of storm water drains	69%	25%	12%	52%	100%	41%	50%	100%
Study initiated for Geospatial Urban Flood Risk Assessment	Yes	Yes	Yes	Yes	No	Yes	-	-

Inference

Tamil Nadu has deployed urban flood monitoring systems and real-time rainfall data analytics to predict and manage flood-prone areas, ensuring proactive interventions. These efforts align with national guidelines on stormwater management, emphasizing data-driven urban planning, decentralized water conservation, and resilience-building measures to reduce flood risks and improve urban water sustainability.

Sponge City Initiative is a concept which focuses on enhancing urban areas' capacity to absorb and reuse rainwater, thereby reducing surface runoff and mitigating urban flooding. The Greater Chennai Corporation (GCC) has embarked on the creation of 57 sponge parks across the city.

Figure 10 (a) : Global Best Practice

These parks are designed to collect and store rainwater during heavy rainfall, thereby mitigating flood risks in low-lying areas. Additionally, they contribute to groundwater recharge and enhance urban green spaces.

In 2015 during Chennai's flooding incident, the city's stormwater drainage system was insufficient (29%), with only 855 km of drains against 2,847 km of urban roads, leading to severe waterlogging. Chennai city aims to increase the coverage of stormwater drainage networks from present 69% to 100% by implementing various investment projects. CII congratulates excellent initiatives taken by

Figure 10 (b) : Global Best Practice

Government of Tamil Nadu and Chennai Municipal corporation.

Trichy, Tiruppur, and Salem have stormwater network coverage that is approximately on par with the national average. Madurai and Coimbatore have limited stormwater network coverage and require substantial improvements to bridge the gap.

Numerous geospatial flood risk assessments have been conducted in Tamil Nadu, including studies in Chennai, Coimbatore, and Tiruchirappalli. These studies were carried out by academic institutions and research organizations. Additionally, the 'Climate Risk Assessment and Adaptation Plan of Tamil Nadu Cities' report highlights Salem as one of the cities vulnerable to climate hazards such as floods, heatwaves, and droughts.

Figure 10 (c) : Global Best Practice

Recommendation

- Expand and upgrade the stormwater drainage network to ensure 100% coverage in urban areas, prioritizing flood-prone zones in Madurai and Salem. The stormwater drainage capacity can be increased to handle at least 50mm/hour of rainfall (aligned with global benchmarks).
- In building byelaws mandate minimum of 30% permeable surfaces in the new developments. Revise zoning laws to integrate flood-resilient building codes and buffer zones along water bodies. The building byelaws can also encourage 50% of stormwater reuse in commercial, large residential and government building projects.

Chennai

3 Key Green and Liveability Indicators

Chennai	33
Coimbatore	35
Madurai	37
Trichy	39
Tiruppur	41
Salem	43

Chennai

GREEN COVER

Public and recreational space
8.5 sqm per capita

At par with WHO standard of 9 sqm

Last decade

6.53°C increase in Land Surface Temperature

13.33% Loss of Green Cover

8.4% Green Buildings

State among Top 5 States

PUBLIC TRANSPORT

13.06 km/sqkm

National average 8.4

27 Buses per lakh population

National average 50-120

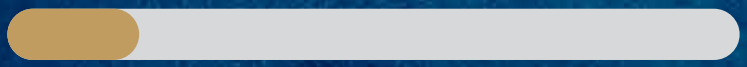
51%

Public Transport mode share

Global Standards recommend minimum 30%

3%

Roads with bicycle tracks



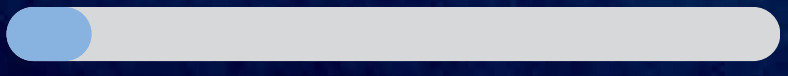
18%

Roads with footpaths

ASSURED WATER SUPPLY

98%

Household water supply coverage



11%

Non revenue water - National Average is 38%

68%

plots with rainwater harvesting facility

Chennai

SOLID WASTE MANAGEMENT

97%
Household Coverage

94%
Waste Collection Efficiency

43%
MSW recovered through reuse
National Average is 76%

57% Diverted to Landfill

POWER CONSUMPTION

234 Kwh per streetlight per year
National average is 225-300 kWh

6% Smart meter penetration
National average is 15-20%

100%
Households with authorised electrical sevice

WASTE WATER MANAGEMENT

97%
Coverage through sewage network and septage

41%
Collection efficiency of sewerage network

80% **Reuse of treated water**
National average of 37%

URBAN FLOODING

69%
Coverage of storm water drains

Among top 5 cities in India

AIR QUALITY

24-hour mean

3 ppb
SO2 concentration, well below WHO guidelines of 6 ppb

61 µg/m^3
PM10 concentration, poor as per WHO guidelines of 15 µg/m^3

Coimbatore

GREEN COVER

1°C increase
in Land Surface Temperature in last decade

46.6 sqm per capita
meeting WHO standard of 50 sqm

1.3%
Green Buildings

ASSUREDWATER SUPPLY

125 LPCD
supply of water per capita

55%
Household water supply coverage

28%
Non revenue water, MoHUA guidelines max 20%

PUBLIC TRANSPORT

43%
Public Transport mode share
Global Standards minimum 30%

63
Buses per lakh population
Global Standards recommend 50 - 120 buses

SOLID WASTE MANAGEMENT

1/4 th waste generated is **Diverted to Landfill**

100% **Household Coverage**

93% **Waste Collection Efficiency**

75% **Recycle**

Coimbatore

URBAN FLOODING

87%
plots with rainwater harvesting facility

AIR QUALITY

24-hour mean

4 ppb SO_2 concentration,
well below WHO guidelines of 6 ppb

5 ppb NO_2 concentration,
at par with WHO guidelines of 5.31 ppb

63 µg/m^3 PM10 concentration,
poor as per WHO guidelines of 15 µg/m^3

WASTE WATER MANAGEMENT

74%
collection efficiency of sewerage network

Coverage through sewage network and septage

18% Reuse

Much lower than the national average of 37%

POWER CONSUMPTION

421 Kwh

National average is 225-300 kWh per streetlight per year

99%

Households with authorised electrical sevice

Madurai

GREEN COVER

Forest & Public Greens

14.93 sq.m
Per capita
WHO standard of 50 sqm

4.5°C increase
in Land Surface Temperature
in last decade

PUBLIC TRANSPORT

242

Buses per lakh population
Global Standards recommend
50 - 120 buses

26%

Public Transport mode share
Global Standards recommend
minimum 30%

ASSURED WATER SUPPLY

105 LPCD
supply of water per capita

36%
Household water supply coverage

10%
Non revenue water, MoHUA max 20%

83%
Plots with rainwater harvesting facility

SOLID WASTE MANAGEMENT

25% waste generated is **Diverted to Landfill**

100%
Household Coverage

95%
Waste Collection Efficiency

75% Recycled

Madurai

AIR QUALITY

24-hour mean

3 ppb SO_2 concentration
well below WHO guidelines of 6 ppb

101 µg/m³ PM10 concentration
poor as per WHO guidelines of 15 µg/m³

WASTE WATER MANAGEMENT

70%

Coverage through sewage network and septage

33%
collection efficiency of sewerage network

80%
wastewater recycled

Better than National average of 37%

POWER CONSUMPTION

134 Kwh

National average is 225-300 kWh per streetlight per year

Trichy

GREEN COVER

10.5 sqm per capita
Forest & Public Greens

POWER CONSUMPTION

126 Kwh
National average is 225-300 kWh per streetlight per year

100%
Households with authorised electrical sevice

PUBLIC TRANSPORT

22%
Public Transport mode share
Global Standards recommend minimum 30%

58
Buses per lakh population
Global Standards recommend 50 - 120 buses

4.69 km per sq.km
Public transport coverage
National average is 8.4 km per sq.km

AIR QUALITY

24-hour mean
7 ppb SO_2 concentration
WHO guidelines 6 ppb

SOLID WASTE MANAGEMENT

100% **Household Coverage**

95% **Waste Collection Efficiency**

11% Waste to Landfill

89% **Recycled**

Trichy

ASSURED WATER SUPPLY

135 Litres Per Capita Per Day

water supply per capita

MoHUA recommends 135 LPCD

53%

Household water supply coverage

6%

Non revenue water, MoHUA guidelines max 20%

87%

plots with rainwater harvesting facility

WASTE WATER MANAGEMENT

88%

Coverage through sewage network and septage

51%

Recycling and Reuse

Higher than the national average of 37%

57%

collection efficiency of sewerage network

URBAN FLOODING

52%

Coverage of storm water drains

URBAN HEAT ISLAND

Last decade

2.5% Loss of Green Cover

Tiruppur

GREEN COVER

Forest & Public Greens

1.6 sq.m
Per capita
WHO standard
of min 9 sqm

1.7% Loss of
Green Cover

1.5°C increase
in Land Surface
Temperature

ASSURED WATER SUPPLY

118 LPCD
supply of water per capita
MoHUA recommends135 LPCD

PUBLIC TRANSPORT

22

Buses per lakh population
Global Standards recommend
50 - 120 buses

4.3%
Public Transport mode share
National Average is 27%

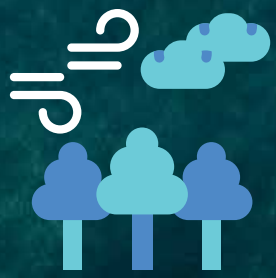
8.35 km per sq.km
Public transport coverage
National average is 8.4
km per sq.km

4%
Bicycle tracks
identified

100%
Household water supply coverage

19%
Non revenue water, MoHUA max 20%

87%
plots with rainwater
harvesting facility



AIR QUALITY

24-hour mean

7 ppb SO_2 concentration,
WHO guidelines is 6 ppb

5 ppb NO_2 concentration,
at par with WHO guidelines of 5.31 ppb

83 µg/m^3 PM10 concentration,
poor as per WHO guidelines of 15 µg/m^3

Tiruppur

SOLID WASTE MANAGEMENT

100% Household Coverage

66% Waste Collection Efficiency

23% MSW recovered through reuse

National Average is 76%

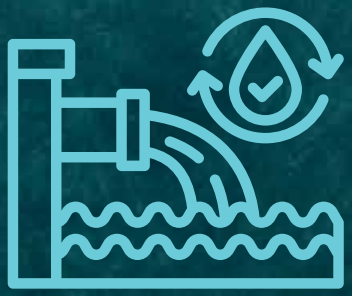
77% Diverted to Landfill

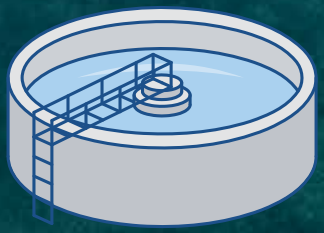
WASTE WATER MANAGEMENT

15% collection efficiency of sewerage network

70%

Coverage through sewage network





15% Treatment capacity

POWER CONSUMPTION

100% Households with authorised electrical sevice

1,277 Kwh household per capita energy consumption

National Average is 1,080 kWh per capita

Salem

GREEN COVER

Forest & Public Greens

8 sq.m
Per capita
WHO standard of 50 sqm

1°C increase
in Land Surface Temperature
in last decade

1.5% Loss of
Green Cover
in last decade

AIR QUALITY

24-hour mean

8 ppb SO_2 concentration
WHO guidelines 6 ppb

84 µg/m^3 PM10 concentration
poor as per WHO guidelines of 15 µg/m^3

PUBLIC TRANSPORT

30%
Public Transport mode share
Global Standards recommend
minimum 30%

159
Buses per lakh
population

Global Standards
recommend 50 - 120 buses

6.03 km per sq.km
Public transport coverage
National average is 8.4 km per sq.km

URBAN FLOODING

41%
Coverage of
storm water drains

Salem

POWER CONSUMPTION

100%
Households with authorised electrical sevice

217 Kwh
National average is 225-300 kWh per streetlight per year

ASSURED WATER SUPPLY

85 LPCD
supply of water per capita

57%
Household water supply coverage

15%
Non revenue water, MoHUA max 20%

87%
Plots with rainwater harvesting facility

WASTE WATER MANAGEMENT

71%
Coverage through sewage network and septage

26%
collection efficiency of sewerage network

80%
wastewater recycled

30% **Treatment capacity**

SOLID WASTE MANAGEMENT

100%
Household Coverage

100%
Waste Collection Efficiency

41%
Waste to Landfill

59%
Recycled

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Green and Public Open Spaces

Green Cover comprises of 'forest cover' and 'public green & open spaces'.

Chennai

Chennai is governed by the GCC, and the jurisdiction is spread across 426 sq. km in 2021. Vegetation Cover is recorded as 17% (74.35 sq.km) during the same period, which corresponds to 8.5sqm per capita. Chennai has an overall 0.50% of parks which is 9.3 sq.km in area and 0.06% of tree cover which contributes to 72.8 sq.km of its area. Population of the Chennai Municipal Corporation in 2021 considered for calculation (6,697,000) .

Source

https://chennaicorporation.gov.in/gcc/pdf/CCAP_GCC_CSCL_ENGLISH.pdf

https://www.census2011.co.in/data/town/803339-chennai-tamil-nadu.html

https://www.irjet.net/archives/V12/i1/IRJET-V12I178.pdf

https://www.ijfmr.com/papers/2024/5/29663.pdf

https://www.mnd.gov.sg/

Coimbatore

In Coimbatore, approximately 36% of the city's total area (257 sqkm) is under green cover which is 92.52 sqkm, which is approx. 46.6 sqm per capita. Population of the Coimbatore City Municipal Corporation in 2020 considered for calculation (1,985,420). Coimbatore has 1.486% of the area under parks and open spaces (3.82 sqkm) which is calculated as 1.92 sqm per capita.

Source

https://www.capacitiesindia.org/wp-content/uploads/2020/11/Coimbatore_GHG-Emissions-Inventory_Summary-Note.pdf

https://southasia.iclei.org/wp-content/uploads/2022/04/Coimbatore_City-Profile.pdf

https://egov.eletsonline.com/2022/02/using-urban-management-to-increase-urban-green-cover-a-case-of-coimbatore-tamil-nadu/

Madurai

In 2023, City's green cover stands at approximately 25.67 sqkm (17.39%) which include forest & hills (1.42 sqkm), water bodies (23.06 sqkm) and 10% of Institutional spaces (1.19sqkm). Madurai City Municipal Corporation (MCMC) is covering an area of 147.99 sq.km, which corresponds to 14.93 sqm per capita green cover. A total of 484 parks that significantly contribute to the Madurai Corporation's landscape (5,00,034.59 sqm). Additionally, 10% of water bodies & institutional spaces has been considered as public open spaces (35,70,848 sqm). Thus, 2.36 sqm per capita green open space is estimated.

Source

http://madurailpa.com/assets/pdf/Final%20Madurai%20-%20Vol%201%20-%20Print.pdf

Trichy

As per Trichy Climate Resilient City Action Plan, TCC has a green cover of 90.98 sq.km which includes trees (very high density forest) and shrubs). Thus, city is having a green cover of 10.6 sq.m / person which exceeds WHO's recommendations of 9sq.m / person. Thus includes 234 public parks and gardens with good accessibility. Considering the 0.43 sqkm parks and 0.55 sqkm playgrounds, 0.04 sqkm open space reservations, the total public open spaces is 1.02 sqkm, which corresponds to 0.86 sqm per capita.

Source

https://www.scribd.com/document/756450977/Trichy-Master-Plan-Volume-1

https://worldpopulationreview.com/cities/india/tiruchirappalli

https://www.trichycorporation.gov.in/wh-assets/tccdetails/CAP.pdf

Tiruppur

As per the existing land use 2021 highlighted in Tiruppur Master Plan 2041, 10% of Institutional & Water bodies has been considered as green cover (1.368 sqkm). The population of Tiruppur in 2021 is 1,063,416. This corresponds to a green cover of 1.6 sqm per capita. Considering the recreational area and 10% of institutional area (0.668 sqkm), the city has very minimal public and recreational places approx. 0.63 sqm per capita.

Source

https://tiruppur.nic.in/departments/local-planning-authority/

Salem

Salem Land Use Plan indicates 10% area under green cover, which has been considered to estimate that 9.13 sqkm green cover. The population of Salem Corporation has been considered as 1,143,000 as on date. Thus, per capita green cover is approx. 8 sqm. City has 794,721 sqm parks and 591,852 sqm Mookaneri Lake. Considering the park area and 10% of lake as recreational area, the city has approx. 853,906 sqm as parks and recreational area, which corresponds to 0.75 sqm per capita.

Source

https://mohua.gov.in/upload/uploadfiles/files/35TNSCB-Salem-sfcp-min.pdf

https://www.census2011.co.in/census/city/475-salem.html

National Average and Global Standards

India's urban tree cover spans 12,790 sqkms, accounting for 16.40% of the total urban area of 77,997 sqkms. As of 2023, India's urban population is approximately 519.5 million, with an estimated urban green space of 24.6 square meters per person. This aligns with global standards, as cities recognized for their urban green spaces typically have 20% to 40% green coverage of their total geographical area and provide 25 to 100 square meters of urban green space per capita. In 2001, the green cover of Delhi was 10%, which expanded to 20% by 2014, and further to 23.6% in 2021 (21.52 sqm per capita). At the same time Chandigarh was at 54.45 sqm per capita and Gandhinagar with 162.8 sqm per capita. WHO recommends an ideal provision of up to 50 square meters per person.

As per World Health Organization (WHO) norms minimum per capita green space requirement is 9 sqm per person. Also, WHO recommends that urban residents have access to at least 0.5-1ha of public green space within 300m of their home. As per MoHUA's Urban and Regional Development Plans Formulation and Implementation (URDPFI) guidelines it is about 10-12 sqm per person. The range provided in URDPFI is a gross figure of green cover and therefore a high value for a neighbourhood. The NBC standard of 3.0sqm is a baseline standard.

India's national average per capita public green space is around 1.2 to 1.5 sqm, far below the WHO recommended 9 sqm per person. Larger metropolitan cities like Delhi has around 0.8–1.2 sqm, smaller cities range from 1.5–2.5 sqms, while planned cities like Chandigarh offer 3–4 sq. meters per person. As per CSCAF's assessment of 126 cities in 2022, it is observed that 65 cities are meeting the prescribed URDPFI norm of 12-18 % green cover within their municipal boundaries.

Source

https://www.moef.gov.in/uploads/2019/06/Draft-Guidelines-for-conservation-development-and-management-of-Urban-Greens.pdf

https://niua.in/c-cube/blog/content/cscaf-monitoring-urban-green-spaces

https://www.macrotrends.net/global-metrics/countries/IND/india/urban-population

https://pmc.ncbi.nlm.nih.gov/articles/PMC4824703/#CR10

https://www.researchgate.net/figure/SOME-IMPORTANT-INDIAN-CITIES-WITH-PER-CAPITA-GREEN-SPACE_tbl1_272912162

https://www.ijfmr.com/papers/2024/5/29663.pdf

https://www.ijert.org/research/proposal-for-ideal-green-spaces-at-town-and-neighborhood-level-a-case-of-new-chandigarh-IJERTV10IS060019.pdf

https://www.eea.europa.eu/publications/who-benefits-from-nature-in

Transportation and Mobility

Chennai

Public transport coverage in Chennai stands at 13.06 km per square kilometer, ensuring connectivity within urban areas. The availability of public transport indicates 27 buses per lakh people. Public transport accounts for 51% of the total mode share. In terms of non-motorized transport infrastructure, dedicated bicycle tracks cover only 3% of the road network, while 18% of footpaths meet the standard width of 1.2 meters.

Source

https://chennaicorporation.gov.in/gcc/department/road/#bus

https://chennaicorporation.gov.in/gcc/about-GCC/greater-chennai-corporation/brief-note-about-GCC/

https://mtcbus.tn.gov.in/Home/fleet_scheduled_services

https://www.macrotrends.net/global-metrics/cities/21321/madras/population

https://olawebcdn.com/ola-institute/ease-of-moving-chennai-city-profile.pdf

http://cscl.co.in/bicycle-lane

https://www.tnhighways.tn.gov.in/en/

Coimbatore

In Coimbatore, public transport coverage stands at 6 km per square kilometer, reflecting moderate urban road density. The city has a relatively high availability of public transport with 63 buses per lakh people. Public transport accounts for 43% of the total mode share. 4.17% of the road network featuring dedicated bicycle tracks.

Source

https://www.capacitiesindia.org/wp-content/uploads/2020/11/Coimbatore_GHG-Emissions-Inventory_Summary-Note.pdf

https://mdl.donau-uni.ac.at/binucom/pluginfile.php/402/mod_page/content/22/Final%20City%20profile%20revised%20%2824%29-2.pdf

https://olawebcdn.com/ola-institute/Ease_of_Moving_Coimbatore_City_Profile.pdf

https://www.iisd.org/articles/deep-dive/road-sustainable-transport-infrastructure-why-cost-benefit-analyses-need

https://www.bikemap.net/en/l/1273865/

Madurai

Madurai has a public transport coverage of 8.60 km per square kilometer, indicating a relatively well-connected road network. The city has 242 buses per lakh people, ensuring a high level of availability for commuters. Despite this, public transport accounts for only 26% of the total mode share.

Source

http://madurailpa.com/assets/pdf/Final%20Madurai%20-%20Vol%201%20-%20Print.pdf

https://www.orfonline.org/research/towards-a-comprehensive-framework-for-public-transport-system-planning-in-india

https://indjst.org/download-article.php?Article_Unique_Id=INDJST6530&Full_Text_Pdf_Download=True

Trichy

Trichy's public transport coverage stands at 4.69 km per sq. km, with only 58 buses per lakh people, limiting accessibility. With public transport accounting for just 22% of the mode share.

Source

https://www.tnurbantree.tn.gov.in/roads/

https://www.scribd.com/document/756450977/Trichy-Master-Plan-Volume-1

https://worldpopulationreview.com/cities/india/tiruchirappalli

Tiruppur

With 8.35 km/sq. km public transport coverage and 22 buses per lakh people, transit accessibility is poor, and usage remains low at 4.3% mode share. While 4% of roads have bicycle tracks, and only 2% of footpaths meeting the 1.2m standard.

Source

https://tiruppur.nic.in/departments/local-planning-authority/

https://www.bikemap.net/en/l/1254348/

Salem

Salem has 6.03 km/sq. km public transport coverage, with 159 buses per lakh people, supporting decent accessibility. Public transport accounts for 30% of the mode share.

Source

https://salem.nic.in/

https://www.salemcorporation.gov.in/

https://www.tnurbantree.tn.gov.in/roads/

https://citeseerx.ist.psu.edu/document?doi=15e73b05ff1d3308728a535838731faad017d01e&repid=rep1&type=pdf

National Average and Standards

On average, public transport covers about 50-55% of urban geographical areas. In metropolitan cities, public transport networks are relatively extensive, covering 75-85%. The existing availability of buses is around 24 (public and private) buses per lakh population, whereas national and international standards recommend 50-120 buses per lakh population. Public transport mode share in urban areas is 30%. Most Indian cities have 1-4% of their roads dedicated to cycling infrastructure. The national average footpath coverage in India wider than 1.2 meters is estimated at 30% of the road network in urban areas.

Proximity to public transport networks and hubs, as well as tourist, educational, and commercial centres can encourage first-and-last mile connectivity with cycles, facilitating short-distance trips within 5 km through improved infrastructure and shared mobility options.

Source

https://mohua.gov.in/upload/uploadfiles/files/Service_level.pdf

https://mohua.gov.in/upload/uploadfiles/files/2688HUA-ENGLISH-19-4-2023.pdf

https://www.niti.gov.in/sites/default/files/2023-02/Shared-mobility.pdf

https://asiantransportobservatory.org/documents/261/Mumbai_transport_sector_profile.pdf

https://shaktifoundation.in/wp-content/uploads/2021/11/Annex-1-National-Investment-program-for-bus-based-public-transport-systems-in-India.pdf

https://www.ppiaf.org/sites/ppiaf.org/files/documents/toolkits/UrbanBusToolkit/assets/1/1c/1c7.html

https://wri-india.org/sites/default/files/FINAL_Public%20Bicycle%20Sharing%20India_WP_3July.pdf

https://itdp.org/2024/09/09/this-indian-city-proves-walkable-infrastructure-has-big-climate-and-health-benefits/

https://cleanairasia.org/sites/default/files/2021-05/35.%20Walkability%20in%20Indian%20Cities.pdf

Power Supply

Chennai

As per 2019 data from Planning & Development Department, Government of Tamil Nadu under sustainable development goals monitoring platform, the percentage of city population with authorized electrical service is 100%. As per the 2021 annual report of the TNPCB, total number of households in Chennai is 21,21,669. As part of the smart city project, 1.28 lakh smart meters have been installed in T Nagar and a portion of Kodambakkam, covering 6% of households with smart meters.

The Greater Chennai Corporation maintains 2,77,902 streetlights, where energy consumption per unit of street lighting is 234 kwh/ streetlight. Chennai's per capita energy consumption is 1,111 kWh per capita, as per Data Portal for Cities, an open data platform for all South Asian countries developed by the Global Covenant of Mayors for Climate and Energy.

Tamil Nadu has 1,087 green building projects, out of which Chennai has more than 560 buildings, accounting for 332 million sq.ft (56% of the total Green buildings in State). As of 2015, Chennai's built-up area was approximately 3,660 million sq.ft. Considering a decadal growth rate of 0.74% (based on 2000-2015), the present built-up area of Chennai will be approx. 3,940 million sq.ft. Thus, 8.4% of new and redeveloped buildings are following green building norms.

Source

https://tnsdg.tn.gov.in/sustainable-development-goals/indicator/139/district-level-values/

https://tnpcb.gov.in/pdf_2024/ActionplanChn.pdf

https://cmdachennai.gov.in/pdfs/go/2022/go184.pdf

https://www.cmdachennai.gov.in/pdfs/advertisement/ExpertsSelection-20-11-2023/ToR.pdf

https://chennaicorporation.gov.in/gcc/department/electrical/#streetlights

https://www.nsgm.gov.in/en/state-wise-map

https://cea.nic.in/wp-content/uploads/resource_adequacy_st/2025/01/Resource_Adequacy_Plan_for_Tamil_Nadu_Up_to_2034_35.pdf

https://www.c40.org/case-studies/smart-led-street-lighting-in-chennai/

https://dataportalforcities.org/south-asia/india/state-tamil-nadu/chennai

https://citizenmatters.in/chennai-waste-management-budget-mcc-mrf-composting-landfills-biomining/

https://www.itpi.org.in/uploads/journalfiles/oct3_11.pdf

https://www.statista.com/statistics/911320/india-built-up-area-chennai/

https://www.researchgate.net/figure/Population-growth-Chennai-metropolitan-area-1971-2001_fig1_280689746

https://igbc.in/frontend-assets/images/IndiaGreenStatistics.jpg

https://rsisinternational.org/Issue3/31-34.pdf

Coimbatore

Coimbatore City Municipal Corporation (CCMC) has approximately 99% of households with access to electricity with 5,34,858 connections for 5,39,858 households in 2023. A smart meter manufacturing facility has been inaugurated in Coimbatore in April 2024 with a capacity of 4 million meters per year, expandable to 10 million, while large-scale smart meter deployment in Coimbatore is yet to commence.

The Coimbatore City Municipal Corporation maintains 53,521 streetlights, with a total energy consumption of 22,570,764 kWh. This results in an average energy consumption of approximately 421 kWh per streetlight. Coimbatore's per capita energy consumption is 1,194 kWh per capita, as per Data Portal for Cities developed by the Global Covenant of Mayors for Climate and Energy.

Tamil Nadu has 1,087 green building projects, out of which Coimbatore has 23 green building projects (51 million sq.ft). As on 2024 Coimbatore built up area will be 3,700 million sq.ft. Thus, 1.3% of new and redeveloped buildings are following green building norms.

Source

https://tnsdg.tn.gov.in/sustainable-development-goals/indicator/139/district-level-values/

https://www.nsgm.gov.in/en/state-wise-map

https://www.capacitiesindia.org/wp-content/uploads/2020/11/Coimbatore_GHG-Emissions-Inventory_Summary-Note.pdf

https://community.connective-cities.net/system/files/2023-09/Coimbatore%20City%20Municipal%20Corporation_City%20profile.pdf

https://dataportalforcities.org/south-asia/india/state-tamil-nadu/coimbatore

https://www.annauniv.edu/cccdm/districtprofiles/coimbatore.html

https://www.oemupdate.com/news/fully-integrated-smart-meter-manufacturing-facility-opens-in-coimbatore/

https://ijaseit.insightsociety.org/index.php/ijaseit/article/download/8080/pdf_1026

Madurai

As of 2024, Madurai City has achieved nearly 100% electrification, with approximately 4,91,000 households connected to the power grid. The National Smart Grid Mission (NSGM) provides comprehensive dashboards detailing smart metering progress. As of February 2025, other cities in Tamil Nadu apart from Chennai are yet to implement smart meters.

The city maintains around 25,398 streetlights, with a total energy consumption of 3,416,136 kWh per year. This equates to an average energy consumption of approximately 134.5 kWh per streetlight annually. Madurai's per capita energy consumption is 1,139 kWh per capita, as per Data Portal for Cities developed by the Global Covenant of Mayors for Climate and Energy.

Tamil Nadu has 1,087 green building projects, out of which Madurai has 6 green building projects. Thus, less than 0.01% of new and redeveloped buildings are following green building norms.

Source

https://tnsdg.tn.gov.in/sustainable-development-goals/indicator/139/district-level-values/

http://madurailpa.com/assets/pdf/Final%20Madurai%20-%20Vol%201%20-%20Print.pdf

https://www.maduraicorporation.co.in/projects/street-light-led

https://www.maduraicorporation.co.in/aboutus/street-lights

https://www.nsgm.gov.in/en/state-wise-map

https://dataportalforcities.org/south-asia/india/state-tamil-nadu/madurai

Trichy

Tiruchirappalli (Trichy) has made significant advancements in electrification and achieved nearly 100% electrification, with approximately 2,59,301 households in Municipal Corporation connected to the power grid. The National Smart Grid Mission (NSGM) provides comprehensive dashboards detailing smart metering progress. As of February 2025, other cities in Tamil Nadu apart from Chennai are yet to implement smart meters. 126kWh of power consumption per streetlight per year.

Trichy's per capita energy consumption is 1,111 kWh per capita, as per Data Portal for Cities developed by the Global Covenant of Mayors for Climate and Energy.

Tamil Nadu has 1,087 green building projects, out of which Trichy has 11 green building projects (0.7 Million sq.ft) out of approx. BUA of 350 Million sq.ft in Corporation Area. Thus, 0.002% of new and redeveloped buildings are following green building norms.

Source

https://tnsdg.tn.gov.in/sustainable-development-goals/indicator/139/district-level-values/

https://www.nsgm.gov.in/en/state-wise-map

https://www.scribd.com/document/756450977/Trichy-Master-Plan-Volume-1

https://dataportalforcities.org/south-asia/india/state-tamil-nadu/tiruchirappalli

Tiruppur

Tiruppur has a population of 8,52,711 with 100% of 2,38,172 households connected to the power grid. Tamil Nadu Generation and Distribution Corporation (TANGEDCO) had initiated a global tender to install approximately 8.2 million smart meters across the state, including Tiruppur, under the Revamped Distribution Sector Scheme. As of February 2025, other cities in Tamil Nadu apart from Chennai are yet to implement smart meters.

The Tiruppur City Municipal Corporation oversees 35,213 streetlights. Tiruppur's per capita energy consumption is 1,277 kWh per capita, as per Data Portal for Cities developed by the Global Covenant of Mayors for Climate and Energy.

Tamil Nadu has 1,087 green building projects, out of which Tiruppur has 22 green building projects (34 Million sq.ft) out of approx. BUA of 328 Million sq.ft in Corporation Area. Thus, 0.06% of new and redeveloped buildings are following green building norms.

Source

https://tnsdg.tn.gov.in/sustainable-development-goals/indicator/139/district-level-values/

https://www.nsgm.gov.in/en/state-wise-map

https://tiruppur.nic.in/departments/local-planning-authority/

https://www.tnurbantree.tn.gov.in/tiruppur/street-lights/

https://www.thiranmigutiruppur.com/scp11.php

https://dataportalforcities.org/south-asia/india/state-tamil-nadu/tiruppur

Salem

Salem has a population of 11,43,000 with 100% of 3,09,700 households connected to the power grid. As of February 2025, other cities in Tamil Nadu apart from Chennai are yet to implement smart meters.

As per Salem Corporation, 6.2 million units are consumed by 29,000 streetlights in Salem. This translates to an estimated annual energy consumption of around 217 kWh for each streetlight. Salem's per capita energy consumption is 1,139 kWh per capita, as per Data Portal for Cities developed by the Global Covenant of Mayors for Climate and Energy.

Salem has 12 green building projects (0.43 Million sq.ft) out of approx. BUA of 478 Million sq.ft in Corporation Area. Thus, 0.001% of new and redeveloped buildings are following green building norms.

Source

https://mohua.gov.in/upload/uploadfiles/files/35TNSCB-Salem-sfcp-min.pdf

https://www.salemcorporation.gov.in/download/Revenue%20Fund%2023-24.pdf

https://www.salemcorporation.gov.in/download/Revenue%20Fund%2021-22.pdf

https://www.tnerc.tn.gov.in/Orders/files/TO-Order%20No%206150720241000.pdf

https://kcpinfra.com/Infrastructure/LED-Street-Lights.php

https://www.tnurbantree.tn.gov.in/street-light/

Assured Water Supply

Chennai

The assessment of Assured Water Supply reveals that 98% of households in Chennai have direct water supply connections. However, the per capita water supply remains relatively low at 108 liters per capita per day (lpcd). This is further confirmed based on recent C40 study of Chennai Climate Action Plan (CCAP), 53% houses dependent on external sources for drinking water. The non-revenue water (NRW) level of 11%, significantly lower than the national average of 38%, indicates efficient water management and reduced losses in the distribution system. Within the GCC, about 68% of buildings (approximately 7 lakh) have functional rainwater harvesting (RWH) structures. Also, an additional 1.85 lakh buildings have RWH systems that are not properly maintained, which can be improved.

Source

https://www.cmdachennai.gov.in/Volume3_English_PDF/Vol3_Chapter07_Infrasructure.pdf

https://chennaicorporation.gov.in/gcc/pdf/CCAP_GCC_CSCL_ENGLISH.pdf

https://www.census2011.co.in/census/city/463-chennai.html

https://watercenter.sas.upenn.edu/splash/climate-change-not-only-reason-blame-indias-chennai-water-crisis

https://iwaponline.com/ws/article/23/5/1917/94445/Efficiency-of-non-revenue-water-reduction-in

https://www.tnurbantree.tn.gov.in/wp-content/uploads/2020/02/Policy-Note-18-2019-1.pdf

https://ecologicalprocesses.springeropen.com/articles/10.1186/s13717-021-00341-1

https://citizenmatters.in/chennai-water-supply-groundwater-cmwssb-monitoring-extraction-rainwater-harvesting/

Coimbatore

In Coimbatore, approximately 55% of households have direct water supply connections, ensuring a substantial portion of the population receives piped water. The city's per capita water supply stands at 125 liters per day, which is close to CPHEEO recommendation of 135 liters per capita per day for urban areas. Notably, the level of non-revenue water (NRW) stands at 28%, indicating moderate inefficiencies in the distribution system. On a positive note, 87% of plots in Coimbatore are equipped with rainwater harvesting facilities, reflecting a strong commitment to sustainable water management practices.

Source

https://iwaponline.com/ws/article/23/5/1917/94445/Efficiency-of-non-revenue-water-reduction-in

https://www.ccmc.gov.in/img/upload/swachhplan.pdf

https://www.tnurbantree.tn.gov.in/wp-content/uploads/2020/02/Policy-Note-18-2019-1.pdf

https://www.capacitiesindia.org/wp-content/uploads/2020/10/CRCAP_Coimbatore_August2018.pdf

Madurai

In Madurai, 36% of households have direct piped water access. Per capita water supply in Madurai is 105 liters per day, falling short of the CPHEEO-recommended 135 LPCD for urban areas. NRW is at 10%, reflecting an efficient distribution system with minimal losses. Rainwater harvesting facilities are installed in 83% of plots across Coimbatore, according to 2020 report.

Source

https://www.maduraicorporation.co.in/aboutus/water-supply

https://iwaponline.com/ws/article/23/5/1917/94445/Efficiency-of-non-revenue-water-reduction-in

https://www.tnurbantree.tn.gov.in/wp-content/uploads/2020/02/Policy-Note-18-2019-1.pdf

Trichy

In Trichy, direct piped water access is available to 53% of households. Trichy's per capita water supply meets the CPHEEO-recommended standard of 135 LPCD for urban areas. NRW level is at 6%. More than 87% of plots in Trichy are equipped with rainwater harvesting facilities. (

Source

https://www.scribd.com/document/756450977/Trichy-Master-Plan-Volume-1

https://www.tnurbantree.tn.gov.in/wp-content/uploads/2020/02/Policy-Note-18-2019-1.pdf

Tiruppur

In Tiruppur, 100% of households have direct water supply connections. The city's per capita water supply stands at 122 liters per day, which is close to CPHEEO recommendation of 135 liters per capita per day for urban areas. NRW level is at 19%.

Source

https://tiruppur.nic.in/departments/local-planning-authority/

https://iwaponline.com/ws/article/23/5/1917/94445/Efficiency-of-non-revenue-water-reduction-in

https://www.tnurbantree.tn.gov.in/wp-content/uploads/2020/02/Policy-Note-18-2019-1.pdf

Salem

Salem has 57% of households covered through direct water supply connections. Per capita water supply in Madurai is 85 liters per day, much lower than CPHEEO-recommended 135 LPCD for urban areas. NRW level is at 15%. More than 87% of plots in Trichy are equipped with rainwater harvesting facilities.

Source

https://mohua.gov.in/upload/uploadfiles/files/35TNSCB-Salem-sfcp-min.pdf

https://iwaponline.com/ws/article/23/5/1917/94445/Efficiency-of-non-revenue-water-reduction-in

https://www.tnurbantree.tn.gov.in/wp-content/uploads/2020/02/Policy-Note-18-2019-1.pdf

Air Pollution Control

Chennai:

Chennai recorded a SO2 concentration of 3 ppb, well within the WHO guideline limit of 6 ppb. NO2 levels stood at 7 ppb, which is slightly above the annual WHO guideline of 5.31 ppb. The PM10 concentration was measured at 61 µg/m³, exceeding the WHO recommended level of 15 µg/m³ but close to the national average of 60 µg/m³.

Coimbatore:

Coimbatore reported an SO2 level of 4 ppb, remaining within safe limits. The NO2 concentration was 5 ppb, aligning with WHO standards. However, PM10 levels were 63 µg/m³, exceeding WHO guidelines but comparable to national averages.

Madurai:

Madurai recorded a SO2 concentration of 3 ppb and NO2 levels at 8 ppb, slightly higher than Chennai and Coimbatore. PM10 levels were notably high at 101 µg/m³, reflecting a significant concern for air quality and public health.

Trichy:

Trichy recorded a SO2 concentration of 7 ppb. This highlights the need for improved air quality monitoring infrastructure in the city.

Tiruppur:

Tiruppur's SO2 levels were recorded at 7 ppb, aligning with the national average. NO2 concentration was 5 ppb, within WHO guidelines, while PM10 levels were considerably high at 83 µg/m³, indicating air pollution concerns.

Salem:

Salem exhibited the highest SO2 concentration at 8 ppb, slightly exceeding the national average. NO2 levels stood at 7 ppb, while PM10 concentration was 84 µg/m³, reinforcing air pollution challenges.

Source

https://www.aqi.in/

Waste Water Management

Chennai

According to the National Family Health Survey (NFHS-5) (2019-2021), 89.2% of households in Tamil Nadu have access to toilet facilities. The city has around 640,000 properties, with 97% (621,649 properties) connected to wastewater management systems, but the collection efficiency of sewerage network is 41%. Chennai generates approximately 750 million liters of sewage daily, while the installed sewage treatment capacity stands at 727 MLD. 80% of treated wastewater is recycled and reused.

Source

https://cmwssb.tn.gov.in/sites/default/files/whats_new/Annual%20Performance%20Report_0.pdf

https://link.springer.com/referenceworkentry/10.1007/978-3-319-78000-9_163?

https://rchiips.org/nfhs/NFHS-5Reports/NFHS-5_India_Report.pdf?utm_source

https://mahindratericoe.com/assets/pdf/Water_Sustainability_Assessment_of_Chennai.pdf

https://ruralindiaonline.org/en/library/resource/national-family-health-survey-nfhs-5-2019-21-tamil-nadu/

Coimbatore

In Coimbatore, nearly all households, about 99.98%, have access to individual toilets, with open defecation being almost non-existent. The city's sewerage and septage systems cover approximately 80% of the area, contributing to improved sanitation infrastructure. Coimbatore produces around 231 MLD of waste water daily, of which 170 MLD is collected through the sewerage network. The city's waste water treatment facilities have a total capacity of 205 MLD. About 18% of the treated water is reused or recycled.

Source

https://ccmc.gov.in/img/upload/swachhplan.pdf

https://ccmc.gov.in/img/upload/10_Appendix%20FINAL%20IEE%20Coimbatore%20Sewerage.pdf

https://www.capacitiesindia.org/wp-content/uploads/2020/11/Coimbatore_GHG-Emissions-Inventory_Summary-Note.pdf

https://www.newindianexpress.com/states/tamil-nadu/2024/May/29/120-families-in-coimbatore-reap-benefits-of-recycling-waste-water

https://www.centurytechnologies.in/waste-water-plant-coimbatore.html

Madurai

In Madurai, approx. 89.2% of households have access to toilet facilities, as per the National Family Health Survey (NFHS-5). The city's sewerage network and septage coverage stand at 70% with 33% collection efficiency. Madurai generates around 186 MLD of waste water daily, while the total waste water collected per day is about 61 MLD. The installed waste water treatment capacity is 172 MLD, with nearly 80% of the treated waste water being reused or recycled.

Source

https://ruralindiaonline.org/en/library/resource/national-family-health-survey-nfhs-5-2019-21-tamil-nadu/

https://dhan.org/document/waterwatch/Water-Watch-Magazine-August-2018.pdf

https://www.maduraicorporation.co.in/projects/underground-sewerage-system

https://www.ijcrar.com/4-8-2016/J.S.%20Amarnath%20and%20U.%20Sridevi.pdf

https://iwaponline.com/ws/article/21/2/736/78226/Integrated-urban-water-resources-management

Trichy

In Trichy, approximately 95% of households have access to individual toilets. The city's sewerage network and septage coverage stand at 88%, with a collection efficiency of 57%. Trichy generates around 118 MLD of waste water daily, while the installed waste water treatment capacity is 58 MLD. Of the total waste water generated, about 51% is recycled or reused.

Source

https://www.trichycorporation.gov.in/wh-assets/tccdetails/CAP.pdf

https://swachhbharaturban.gov.in/RPT_DashBoard.aspx?id=c00b0004d25a9f22ba135c5c0bdcfb19&utm_source=chatgpt.com

https://iihs.co.in/knowledge-gateway/wp-content/uploads/2021/03/Sanitation-Situation-Assessment-of-Trichy_23-october-2020.pdf

https://tnussp.co.in/wp-content/uploads/2020/10/Assessment-of-Community-and-Public-Toilets-in-Tiruchirappalli.pdf

https://tnussp.co.in/wp-content/uploads/2020/10/Assessment-of-Fecal-Sludge-Decanting-Stations-in-Tiruchirappalli.pdf

Tiruppur

89.2% of households in Tamil Nadu have access to toilet facilities. In Tiruppur, the existing Underground Sewerage Scheme (UGSS) covers only 70% of the old municipal area (Zones 1 to 4), while newly annexed areas rely on septic tanks. The city generates approximately 94.4 million liters of sewage daily, while the installed sewage treatment capacity stands at 15 MLD. Currently, about 7 to 8 MLD of waste water is treated.

Source

https://ruralindiaonline.org/en/library/resource/national-family-health-survey-nfhs-5-2019-21-tamil-nadu/

https://tiruppur.nic.in/departments/local-planning-authority/

https://www.tnurbantree.tn.gov.in/tiruppur/sewerage/

https://www.tnurbantree.tn.gov.in/tiruppur/wp-content/uploads/sites/145/2021/01/3.Tiruppur-Environmental-Screening-Report.pdf

Salem

In Salem, approximately 83% of households have access to individual toilets. The sewerage network and septage management cover 71% of the city, ensuring partial sanitation coverage. The city generates around 325 MLD of waste water daily, while the total waste water collected through the sewerage network is 83.6 MLD. The installed capacity of the waste water treatment plant is 98 MLD, with about 83.6 MLD of waste water reaching treatment facilities. Of this, approximately 66.88 MLD is recycled or reused.

Source

https://ruralindiaonline.org/en/library/resource/national-family-health-survey-nfhs-5-2019-21-tamil-nadu/

https://salemcorporation.gov.in/download/EIA%20REPORT-SALEM%2035%20MLD-SUBMITTED.2012%20%281%29.pdf

https://salemcorporation.gov.in/download/GEO-MILLER-VANDIPETTAI-EIA-report.pdf

https://greentribunal.gov.in/sites/default/files/news_updates/Status%20Report%20filed%20by%20R6%20in%20OA%20No%2051%20of%202015%28SZ%29.pdf

https://thinkindiaquarterly.org/index.php/think-india/issue/view/1270

Solid Waste Management

Chennai

Chennai, with a total of 2,121,669 households and 200 municipal wards, has achieved 100% household-level coverage for door-to-door municipal solid waste (MSW) collection. The city generates approximately 5,400 metric tonnes per day (TPD) of MSW as of 2024. However, only 5,100 TPD of waste is collected and removed daily, indicating a collection efficiency of around 94%. Despite having existing processing facilities with a combined capacity of 2,271 TPD, the city's ability to process or recycle waste remains limited to 43%. This suggests that a significant portion of waste still ends up in landfills (57%).

Source

https://sbmurban.org/swachh-bharat-mission-progess#solid_waste

https://resilientcitiesnetwork.org/wp-content/uploads/2024/07/UrbanOcean_WasteProfile_Chennai.pdf

https://www.thecirculateinitiative.org/wp-content/uploads/Project-Statement_Chennai.pdf

https://chennaicorporation.gov.in/departments/solid-waste-management/index.htm

https://www.census2011.co.in/census/city/475-salem.html

Coimbatore

Coimbatore has a total of 494,404 households (as per City Sanitation Plan 2018) spread across 100 municipal wards, with 100% household-level coverage for door-to-door municipal solid waste (MSW) collection. As of 2024, the city generates approximately 1,100 TPD of waste. Of this, around 1,023 TPD is collected by the Urban Local Body (ULB) and private operators, resulting in 93% collection efficiency. The city's waste processing infrastructure includes the Compost Plant (700-850 TPD), a vermi-composting plant (100 TPD), four biogas plants (6 TPD), and 34 micro-composting centers (162 TPD), with a total processing capacity of 821 TPD. This means that 75% of the collected waste is processed or recycled, while the remaining 25% waste is sent to landfills.

Source

https://sbmurban.org/swachh-bharat-mission-progess#solid_waste

https://ccmc.gov.in/img/upload/swachhplan.pdf

https://www.jetir.org/papers/JETIR2408579.pdf

https://www.capacitiesindia.org/wp-content/uploads/2020/11/Coimbatore_GHG-Emissions-Inventory_Summary-Note.pdf

https://community.connective-cities.net/system/files/2023-09/Coimbatore%20City%20Municipal%20Corporation_City%20profile.pdf

https://www.beil.co.in/ciwmcpl

Madurai

Madurai, as per the 2011 Census, had a total of 794,887 households. The city comprises 100 municipal wards, all of which have achieved 100% door-to-door municipal solid waste (MSW) collection. As of 2011, Madurai generated approximately 862 metric tonnes per day (TPD) of MSW, with 815 TPD being collected, resulting in a collection efficiency of 95%. According to the SBM progress update, 614 TPD, equivalent to 75% of the collected waste, is processed or recycled, while the remaining 25% is disposed of in landfills.

Source

https://sbmurban.org/swachh-bharat-mission-progess#solid_waste

http://madurailpa.com/assets/pdf/Final%20Madurai%20-%20Vol%201%20-%20Print.pdf

Trichy

Tiruchirappalli comprises of 65 municipal wards, all of which have achieved 100% door-to-door municipal solid waste (MSW) collection. As of 2024, the city generates approximately 460 metric tonnes per day (TPD) of MSW, with 436 TPD being collected daily, resulting in a collection efficiency of about 95%. According to the SBM progress update, 410 TPD, equivalent to 89% of the collected waste, is processed or recycled, while the remaining 11% is disposed of in landfills.

Source

https://sbmurban.org/swachh-bharat-mission-progess#solid_waste

https://www.scribd.com/document/756450977/Trichy-Master-Plan-Volume-1

Tiruppur

Tiruppur, with 1,81,231 households across 65 municipal wards, has achieved 100% household-level coverage for door-to-door municipal solid waste (MSW) collection. As of 2024, the city generates approximately 700 metric tonnes per day (TPD) of waste. However, only 460 TPD is collected by the Tiruppur City Municipal Corporation, indicating a collection efficiency of around 66%. Of the collected waste, 160 TPD (23% waste) is processed at Micro Composting Centres (MCC), while the remaining 77% waste is dumped in an abandoned stone quarry due to a lack of alternative disposal sites.

Source

https://sbmurban.org/swachh-bharat-mission-progess#solid_waste

https://tiruppur.nic.in/departments/local-planning-authority/

Salem

Salem, comprising 60 municipal wards, has achieved 100% door-to-door municipal solid waste (MSW) collection. The population of Salem Corporation has been considered as 1,143,000. As of 2022, the city generates approximately 550 metric tonnes per day (TPD) of MSW, all of which is collected daily, indicating a 100% collection efficiency. However, the existing processing facilities can process only 267 TPD, suggesting that a significant portion of the waste (41%) is not processed or recycled.

Source

https://sbmurban.org/swachh-bharat-mission-progess#solid_waste

https://mohua.gov.in/upload/uploadfiles/files/35TNSCB-Salem-sfcp-min.pdf

https://www.census2011.co.in/data/town/803463-salem-tamil-nadu.html

https://xbin.in/blog/454/Solid_Waste_Management_in_Salem_Muncipal_Corporation/

National Average and Global Standards

As of the 2021-22 Central Pollution Control Board (CPCB) report, India generates approximately 170,338 tonnes per day (TPD) of municipal solid waste (MSW), amounting to nearly 62.2 million tons annually, with a collection efficiency of 95.2%, equating to 162,187 TPD being collected. According to the same CPCB report, the average per capita waste generation in urban India is 123.45 grams per person per day.

In 2001, the solid waste processing rate in India was less than 10%, which improved to around 25% in 2014. By 2021, the processing capacity had expanded significantly, reaching 76%. Cities such as Indore, Pune and Bengaluru have shown remarkable progress in waste management. However, 24% of the country's waste is still ending up in landfills or open dumps.

As per the MoHUA's Swachh Bharat Mission-Urban (SBM-U) 2.0 guidelines, Indian cities aim to achieve 100% waste segregation, complete elimination of landfill dumping, and enhanced waste processing. Globally, European cities recycle over 50% of their waste, and India's national recycling and composting rate of approximately 53.7% is in line with the global average.

Source

https://pib.gov.in/PressReleaseIframePage.aspx?PRID=2003989

https://sbmurban.org/swachh-bharat-mission-progess#solid_waste

https://cpcb.nic.in/uploads/MSW/MSW_AnnualReport_2021-22.pdf

https://mohua.gov.in/pdf/627b825fd31b3Circular-Economy-in-waste-management-FINAL.pdf

Urban Heat Island

Chennai

Change detection of NDVI and LST in CMA shows a decrease of green cover by 13.33% and an increase of LST by 6.53 °C between 2013 and 2022.

Source

https://www.researchgate.net/publication/377383460_Impact_of_Urban_Vegetation_Loss_on_Urban_Heat_Islands_A_Case_Study_of_Chennai_Metropolitan_Area

Coimbatore

Coimbatore district encompasses a total area of approximately 7,649 square kilometers, with forested regions covering about 693.48 sq.kms. Coimbatore experienced a reduction of 50.01 sq km in forest cover. Therefore, change in percentage of green cover in last decade in Coimbatore is minus 7.2% and increase in LST is 1 °C.

Source

https://tnmines.tn.gov.in/pdf/dsr/9.pdf

https://elsafoundationcharity.org/wp-content/uploads/2023/07/Coimbatore-Brick-Kilns-Encroachment-Impact-on-Wildlife-2013.pdf

https://www.coimbatoreonline.in/guide/coimbatore-forest-division

https://www.researchgate.net/publication/362014046_Estimation_of_land_surface_temperature_for_Coimbatore_District_using_Landsat_imagery

Madurai

Landsat satellite data and NDVI analysis has shown that areas with high built-up density in Madurai exhibit LST increases of up to 4-5°C compared to surrounding vegetated regions. A study focusing on Madurai district observed a decrease in vegetation cover, as indicated by the Normalized Difference Vegetation Index (NDVI), from 0.345 in 2013 to 0.171 in 2019. This reduction in vegetation was associated with an increase in LST, highlighting an inverse relationship between these variables.

Source

https://www.academia.edu/73234919/Detection_of_Soil_Surface_Warming_in_Madurai_District_South_India_Using_Geospatial_Techniques

Trichy

Over the past decade, Trichy has experienced a 2.5% decrease in tree cover, equating to a loss of 490 hectares. The urban growth corresponded with a maximum LST increase from 41°C to 43°C, particularly in built-up regions in last decade.

Source

https://www.globalforestwatch.org/dashboards/country/IND/31/26/?category=forest-change

https://www.mdpi.com/2673-4834/3/2/36

Tiruppur

Between 2013 and 2022, Tiruppur experienced a 1.7% decrease in tree cover, equating to a loss of approximately 603 hectares. The increase in Land Surface temperature of Tiruppur is 1.5°C.

Source

Tiruppur, Tamil Nadu, India Deforestation Rates & Statistics | GFW

https://www.researchgate.net/publication/383040123_MODELLING_URBAN_HEAT_ISLAND_USING_REMOTE_SENSING_INDICES_IN_TIRUPPUR_MUNICIPAL_CORPORATION_TAMIL_NADU

Salem

Over the past decade, Salem district in Tamil Nadu has experienced a 1.5% decrease in tree cover, equating to a loss of approximately 1,070 hectares (10.7 sq kms). The increase in Land Surface temperature of Salem is 1°C.

Source

https://www.globalforestwatch.org/dashboards/country/IND/31/18?category=forest-change

https://www.e3s-conferences.org/articles/e3sconf/pdf/2024/21/e3sconf_icecs2024_02042.pdf

Urban Flooding

Chennai

The Greater Chennai Corporation maintains Bus Route Roads to a length of 387 km and interior roads to a length of 5,270 kms. Thus, Corporation maintains 5,933 kms of road. As per record, city's stormwater drainage network is around 4,077 kms. Thus, 69% of the road network is having covered primary, secondary and tertiary drains (of pucca construction). Chennai's vulnerability to flooding has prompted both governmental and collaborative studies to assess and mitigate flood risks. Notable initiatives include Flood Risk and Land-Use Analysis, Geospatial Flood Risk Assessment, Post-2015 Flood Initiatives, Comparative Flood Studies, Transdisciplinary Flood Management Research and Decadal Progression of Flood Risk Assessment.

Source

https://chennaicorporation.gov.in/gcc/department/road/

https://indianinfrastructure.com/2024/06/14/around-75-per-cent-swd-construction-work-completed-at-kavalam-basin-in-chennai-tamil-nadu/

https://chennaicorporation.gov.in/gcc/department/storm-water/

https://pubmed.ncbi.nlm.nih.gov/37639084/

https://www.internationalscholarsjournals.com/articles/flood-risk-and-context-of-landuses-chennai-city-case.pdf

https://www.mdpi.com/2073-4441/16/17/2477

https://www.environmentandsociety.org/arcadia/rains-floods-case-chennai-2015

https://iwaponline.com/wp/article/25/12/1175/98901/Progression-of-flood-risk-assessment-in-India-at-a

Coimbatore

Coimbatore City Municipal Corporation (CCMC) maintains a road network of approximately 2,128 kms. Additionally, National Highways Department maintains 7.46 km, and State Highways Department oversees 3.20 km within the corporation limits. Around 2,140 km length of road network is present in CCMC. Regarding stormwater drainage, the CCMC maintains approximately 603.50 km of stormwater drains. Coimbatore has undertaken several government-initiated studies and projects to assess and mitigate flood risks, including Storm Water Drainage (SWD) Survey and Development, Demarcation of Flood Hazard Prone Areas Using Remote Sensing and GIS, Disaster Management Plan Incorporating Flood Risk Zones.

Source

https://ccmc.gov.in/index.php/services/Engineering

https://ccmc.gov.in/index.php/department/ugd

https://www.isoe.de/fileadmin/Edit/PDF/Pr/SWFI/SWFI_Report_Analysis.pdf

https://tojqi.net/index.php/journal/article/view/973

https://timesofindia.indiatimes.com/city/coimbatore/survey-on-swds-in-north-zone-coimbatore/articleshow/105948249.cms

Madurai

Madurai City Municipal Corporation maintains a total road length of approximately 1,595 kms. The city is equipped with a stormwater drainage system extending up to 170 kms, accounting for 11% of the total road network. The initiatives to enhance the city's resilience to flooding and ensure the safety and well-being of its residents include District Disaster Management Plan (DDMP), Urban Diagnostic and Climate Hazard Assessment, Review of Early Warning Systems (EWS), Sustainable Precipitation Management Study among others.

Source

https://www.maduraicorporation.co.in/pdf/buget%20eng%2012-13.pdf

https://www.mohua.gov.in/upload/uploadfiles/files/42Mdr_TN_sfcp-min.pdf

https://ndmindia.mha.gov.in/ndmi/images/pdf/04_ReviewofEWSMadurai.pdf

https://assets.publishing.service.gov.uk/media/57a089d1ed915d622c0003fd/Madurai-Urban-Diagnostic-Final-17-01-14-without-annex.pdf

https://link.springer.com/article/10.1007/s43621-024-00262-x

Trichy

Tiruchirappalli City Corporation (TCC) oversees a road network of 1,423 kms. TCC maintains a drainage system extending over 747 kms, covering approximately 52% of the city's road network. Trichy has proactively engaged in various studies and initiatives to assess and mitigate flood risks including Integrated Hydrologic and Hydraulic Flood Modeling, Flood Hazard Delineation in Ungauged Catchments, Estimation of Flood Mitigation Parameters, Climate Risk Assessment and Adaptation Plan, Net-Zero Climate Resilient City Action Plan.

Source

https://www.trichycorporation.gov.in/wh-assets/tccdetails/CAP.pdf

https://pubmed.ncbi.nlm.nih.gov/33030599/

https://nopr.niscpr.res.in/bitstream/123456789/55089/1/IJMS%2049%287%29%201269-1279.pdf

https://www.annauniv.edu/cccdm/reports/csreports/cswater.pdf

Tiruppur

Around 1332 km length of road network is present in Tiruppur Municipal Corporation. In that, 55 km length of road network is maintained by Highways department and remaining 1277 km length maintained by municipal corporation. The covered and uncovered drain length of corporation is 1506.47 km, which confirms that 100% of road network is having stormwater drains.

Source

https://tiruppur.nic.in/departments/local-planning-authority/

Salem

Salem Corporation a has about 748.13kms. of surfaced roads under its control and maintenance. 41% of Salem's road network is equipped with stormwater drains. Salem, has been proactive in assessing and mitigating flood risks through various initiatives including District Disaster Management Plan (DDMP), Tamil Nadu State Disaster Management Plan (SDMP), Climate Risk Assessment and Adaptation Plan, Urban Flood Hazard Classification, among others.

Source

https://www.ijmra.us/project%20doc/IJMIE_JULY2012/IJMRA-MIE1333.pdf

https://ndma.gov.in/sites/default/files/PDF/SDMP/TN_DisasterManagement-Plan.pdf

https://tnsdma.tn.gov.in/img/document/DDMPPDF/Salem.pdf

https://chennaicorporation.gov.in/images/TNCDRBR-2019.pdf

https://www.annauniv.edu/cccdm/reports/csreports/cssuh.pdf

https://int.thinkhazard.org/en/report/17879-india-tamil-nadu-salem/UF

IGBC

About IGBC

The Indian Green Building Council (IGBC) was established by the Confederation of Indian Industry (CII) in 2001 to actively promote the Green Building concept in India. The Council is committee-based, member-driven and consensus-focused. Represented by all stakeholders of the construction industry, its partners comprise of architects, developers, product manufacturers, corporate, Government, academia and nodal agencies, who actively participate in the Council's activities spread across its 30 local chapters. The Council also closely works with governments, the World Green Building Council, and bilateral and multilateral agencies in promoting green building concepts in India.

The Council offers a wide array of services which include developing new green building rating programmes, certification services and green building training programmes.

The Green Building movement in India has been advancing at a rapid pace and transforming India, into one of the global leaders in green built environment. India has achieved a milestone of 13 billion sq. ft. of registered green building footprint with over 15,400 projects adopting IGBC's 32 green and net zero rating systems. IGBC is a market leader with 90% of the India's green building projects adopting IGBC Green and Net Zero Rating Systems.

IGBC Green Cities Rating program has been adopted by more than 15 urban local bodies across India including Indore, Pune, Pimpri Chinchwad, Navi Mumbai, Tiruppur, Bhopal, Panchkula, Rajkot, New Town, Visakhapatnam, to name a few.

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Confederation of Indian Industry

About CII

The Confederation of Indian Industry (CII) works to create and sustain an environment conducive to the development of India, partnering Industry, Government and civil society, through advisory and consultative processes.

For more than 125 years, CII has been engaged in shaping India's development journey and works proactively on transforming Indian Industry's engagement in national development. With its extensive network across the country and the world, CII serves as a reference point for Indian industry and the international business community.

In the journey of India's economic resurgence, CII facilitates the multifaceted contributions of the Indian Industry, charting a path towards a prosperous and sustainable future. With this backdrop, CII has identified "Globally Competitive India: Partnerships for Sustainable and Inclusive Growth" as its Theme for 2024-25, prioritizing 5 key pillars. During this year, it would align its policy recommendations, initiatives, and activities with this overarching framework to facilitate strategic actions for driving India's global competitiveness and growth through a robust and resilient Indian Industry.

CII - Green Business Centre

CII Green Business Centre (CII – GBC) was established in 2004 as CII's developmental institute on Green Practices & Businesses. It is aimed at offering world class advisory services on conservation of natural resources through energy management, green building rating systems (IGBC), green company rating systems (GreenCo), renewable energy, GHG inventorization, green product certification (GreenPro), waste management and cleaner production processes.

The Green Business Centre was inaugurated by His Excellency Late Dr. A. P. J. Abdul Kalam, the then President of India, on 14 July 2004. The Green Business Centre was the world's greenest building in 2003 and has been an IGBC Platinum Net Zero Energy Building since 2019.

CII – GBC works closely with all stakeholders in facilitating India emerge as one of the global leaders in Green Business by the year 2025.

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