

STATE OF ENVIRONMENT REPORT FOR CHANDIGARH UT-2021

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MESSAGE

The Chandigarh Administration is diligently working to ensure environmentally sound growth and to meet national targets.

The State of Environment Report 2021 has been prepared by the Department of Environment in collaboration with The Energy and Resources Institutes, New Delhi and in consultation with various stakeholder departments of UT Chandigarh. This report has been structured using the Driver-Pressure-State-Impact-Response Framework to discuss the environmental conditions and related issues of Chandigarh, primarily focusing on critical areas such as energy, land, water, air and waste management.

I am hopeful that this report will serve as a valuable resource for the departments of UT Chandigarh, aiding them in developing policies that further the goals of sustainable development.



(RAJEEV VERMA)





Abhijit Vijay Chaudhari, IAS



Secretary Environment
Union Territory, Chandigarh

MESSAGE

Protecting and preserving the environment is a collective responsibility for one and all. Chandigarh, one of India's greenest cities, is making strides by providing green spaces, developing cycling tracks, and adopting renewable energy resources.

The State of Environment Report 2021 was collaboratively developed by the Department of Environment, stakeholder departments, and The Energy and Resources Institutes, New Delhi. This report offers insights into the environmental state of Chandigarh and is instrumental in providing valuable information to policymakers, planners, researchers, environmental enthusiasts, and other stakeholders.

I am confident that this report will act as a tool to foster awareness and drive collective actions towards sustainable and environmentally conscious policymaking.

A handwritten signature in blue ink that reads 'Abhijit Chaudhari'.

(Abhijit Vijay Chaudhari)





TC Nautiyal, IFS



Director
Department of Environment
Chandigarh Administration
Union Territory, Chandigarh

MESSAGE

The Chandigarh Administration has demonstrated a strong commitment to environmental improvement through a series of impactful initiatives. Chandigarh has established a bird park, green spaces, and a wildlife sanctuary to enhance eco-tourism. The city is also promoting eco-friendly transport through electric vehicle initiatives, cycling, and public bicycle sharing systems. Furthermore, the advancement of rooftop solar power plants in homes and private buildings reinforces its status as a Model Solar City committed to renewable green energy.

I am delighted to share that the EIACP PC Hub of the Department of Environment, Chandigarh Administration, in collaboration with The Energy and Resources Institute, New Delhi, has successfully completed the "State of Environment, Chandigarh, 2021" report. This report offers a detailed view of Chandigarh's environmental health and provides vital data for strategic planning and decision-making.

I am hopeful that this report will be instrumental in enhancing the quality of life in Chandigarh, serving as a vital resource for government agencies, policymakers, and academic circles engaged in environmental planning and management.

TC Nautiyal, IFS
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ACKNOWLEDGMENT

The Environmental Information, Awareness, Capacity Building, and Livelihood Programme (EIACP) Programme Center-Hub, Department of Environment, Chandigarh Administration, has undertaken the challenging task of bringing out the State of Environment Report (SoER 2021), covering seven important environmental themes. This report follows a standardized template based on the DPSIR framework (Drivers, Pressures, State, Impact, Response), addressing Forests, Biodiversity and Hotspots, Land Degradation and Desertification, Air and Noise Pollution, Water and Water Pollution, Energy, Environment and Health, as well as Solid Waste Management. This current report continues the series initiated by the department in 2004, 2008, 2012, 2014, 2016 and 2018.

I am deeply grateful to Shri Rajeev Verma, IAS, Advisor to the Administrator, Chandigarh Administration, for his generous support.

I am deeply thankful to Shri Abhijit Vijay Chaudhari, IAS, Secretary Environment, Chandigarh Administration, for actively supporting this initiative.

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My heartfelt appreciation goes to the EIACP Hub team, including Dr. Brij Bhushan (Coordinator), Mr. Mohit Badhwar (Senior



Programme Officer), Ms. Smriti Thakur (Information Officer), and Mr. Surinder Sharma (IT Officer), for their collaboration with TERI in providing data and inputs for this report.

Special thanks to The Energy and Resources Institute, Delhi (TERI) for their significant contributions to writing and compiling the report, enriching it with their expertise and research

I also extend my gratitude to the Department of Engineering, Chandigarh Pollution Control Committee, Department of Forest and Wildlife, CREST, Tourism Department, Deputy Commissioner's Office, Municipal Corporation Chandigarh, Transport Department, Health Department, Economics & Statistics Department, Electricity Department, and others for their cooperation and support. I acknowledge and appreciate the steadfast support of all staff members of the Environment Department.

With valuable inputs and suggestions from all departments and agencies, I am confident that this report will mark another milestone in advancing Chandigarh towards becoming a clean and eco-friendly city.



(Navneet Kumar Srivastava, IFS)

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LIST OF ACRONYMS

AMRUT	Atal Mission for Rejuvenation and Urban Transformation
AQI	Air Quality Index
ARI	Acute Respiratory Infections
BEE	Bureau of Energy Efficiency
BMW	Bio-Medical Waste
BOD	Biochemical Oxygen Demand
BPC	Bharat Petroleum Corporation
C&D Waste	Construction and Demolition Waste
CAGR	Compound Annual Growth Rate
CFL	Compact Fluorescent Lamps
CGWB	Central Ground Water Board
CHB	Chandigarh Housing Board
CHIAL	Chandigarh International Airport Limited
CNG	Compressed Natural Gas
COD	Chemical Oxygen Demand
COPD	Chronic Obstructive Pulmonary Disease
CPCB	Central Pollution Control Board
CPCC	Chandigarh Pollution Control Committee
CREST	Chandigarh Renewal Energy, Science, and Technology Promotion Society
CSCL	Chandigarh Smart City Corporation Limited
CTU	Chandigarh Transport Unit
CVD	Cardiovascular Disease
DEP	District Environment Plan
DLDD	Desertification, Land Degradation, and Drought
DO	Dissolved Oxygen



DOAHD	Department of Animal Husbandry and Dairying
DPSIR	Drivers Pressures State Impact Response
DRR	Disaster Risk Reduction
DSMs	Demand Side Measures
EEAT	Environment Education Awareness and Training
EIA	Environmental Impact Assessment
ETP	Effluent Treatment Plant
EWEDC	Electricity Wing of Engineering Department Chandigarh
FRLHD	Foundation for Revitalisation of Local Health Traditions
GDP	Gross Domestic Product
GFC	Garbage Free Cities
GHG	Green House Gases
GMSH	General Multi-Specialty Hospitals
GSDP	Gross State Domestic Product
GSVA	Gross State Value Added
GVA	Gross Value Added
HCF	Healthcare Facilities
HDI	Human Development Index
HPC	Hindustan Petroleum Corporation
HW	Hazardous Waste
ICCC	Integrated Command Control Center
ICDS	Integrated Child Development Services
IDSP	Integrated Disease Surveillance Project
IMR	Infant Mortality Rate
IOC	Indian Oil Corporation
ISFR	Indian State of Forest Report
IWRIS	India Water Resources Information System
JERC	Joint Electricity Regulatory Commission
JNNURM	Jawaharlal Nehru National Urban Renewal Mission
LED	Light Emitting Diode
LPCD	Litres Per Capita Per Day
LPG	Liquified Petroleum Gas



LULC	Land Use Land Cover
MCC	Municipal Corporation of Chandigarh
MEAs	Multilateral Environment Agreements
MGD	Million Gallons Per Day
MMR	Maternal Mortality Ratio
MNRE	Ministry of New and Renewable Energy
MGNREGA	Mahtma Gandhi National Rural Employment Generation Act
MoEFCC	Ministry of Environment, Forest, and Climate Change
MoHFW	Ministry of Health and Family Welfare
MoHUA	Ministry of Housing and Urban Affairs
MOP&NG	Ministry of Petroleum and Natural Gas
MoSPI	Ministry of Statistics and Programme Implementation
MoU	Memorandum of Understanding
MSW	Municipal Solid Waste
NABARD	National Bank for Agriculture and Rural Development
NCD	Non Communicable Diseases
NDC	Nationally Determined Contributions
NEP	National Environmental Policy
NFHS	National Family Health Survey
NGC	National Green Corps
NGO	Non-Governmental Organisations
NGT	National Green Tribunal
NHMCHD	National Health Mission Chandigarh Administration
NHP	National Health Policy
NIF	National Indictaor Framework
NMPB	National Medicinal Plants Board
NMR	Neonatal Mortality Rate
NNCP	National Nature Camping Programme
NSDP	Net State Domestic Product
NSGM	National Smart Grid Mission
NWMP	National Water Monitoring Programme
PEC	Punjab Engineering College



PGIMER	Post Graduate Institute of Medical Education and Research
PKVY	Paramparagat Krishi Vikas Yojana
PMFBY	Pradhan Mantri Fasal Bima Yojana
PPE	Personal Protective Equipment
PRO	Producer Responsibility Organisation
PWD	Public Works Department
RDF	Refuse Derived Fuel
RFA	Recorded Forest Area
RGCTP	Rajiv Gandhi Chandigarh Technology Park
SAPCC	State Action Plan on Climate Change
SBM	Swachh Bharat Mission
SDA	State Designated Agency
SDGs	Sustainable Development Goals
SLF	Sanitary Landfill
SoER	State of Environment Report
SPCB	State Pollution Control Boards
SPM	Suspended Particulate Matter
STEPS	Society for Tourism & Entertainment Promotion
STP	Sewage Treatment Plant
STPI	Software Technology Parks of India
SUP	Single Use Plastics
SWM	Solid Waste Management
SWS	Sukhna Wildlife Sanctuary
T&D	Transmission and Distribution Losses
TERI	The Energy and Resources Institute
TSDF	Treatment Storage Disposal Facility
UFW	Unaccounted for Water
UMR	Under Five Mortality Rate
UN	United Nations
UNCCD	United Nations Convention To Combat Desertification
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme



VAMBAY	Valmiki Ambedkar Awas Yojna
VBDs	Vector Borne Diseases
VCM	Voluntary Carbon Markets
WASH	Water, Sanitation, and Hygiene



EXECUTIVE SUMMARY

The State of the Environment (SoE) Report provides an assessment of the present status and trends of the state's environment whose purpose is to advocate for proper environmental protection and to sensitize the stakeholders on the needs and benefits of the sustainable environmental management. The report is an overview of the environmental scenarios that serve as a baseline document for the state and assists in logical and information-based decision making. It aims to provide policy directives and strategies for resource allocation, based on the analysis of trends and states of our environment.

The present State of Environment Report prepared for Chandigarh U.T. is an outcome of the initiative by the Department of Environment (DoE), Chandigarh U.T. in collaboration with the think tank TERI, Delhi. The main objectives of the report are to a) examine the environmental pressure and its impact in Chandigarh b) to identify various initiatives in terms of response which targets to reduce or eliminate the environmental impacts and c) to understand the policy implications on the environment with respect to the above objectives. It is a comprehensive report encompassing various segments of the environment such as Forest, Wildlife and Biodiversity, Land Degradation and Desertification, Air and Noise Pollution, Water Resources and Water Pollution, Agriculture and Allied Sectors, Energy, Environment and Health, Waste and its Management and provides policy recommendations addressing resource management and abatement of pollution in the U.T.

The SoE Report has been prepared, following the DPSIR (drivers-pressures-state-impact- response) framework. The framework helps in assessing the driving forces through pressures to states and impacts on ecosystems, environment and human health over a period of time and eventually leading to responses with the policy angle.

The segments in this report introduce the entire study with background need of the study, aims and objectives along with the selected methodology and data base. It highlights the scope and limitation of study. Each segment is assessed based on the DPSIR framework to determine crucial environmental issues.

Section I presents **Regional Context and Priorities** wherein it describes the brief profile of Chandigarh with characteristics of bio-physical profile, socio-economic and cultural pattern, biodiversity, climate and economy base.

Section II presents the current status of environmental and natural resources, the pressure behind the environmental changes and the impacts associated with these changes. The state and trends have been analyzed under the **D-P-S-I-R framework**.



Forest, Wildlife and Biodiversity

The chapter outlines the magnificent forest ecosystem of Chandigarh, giving details regarding the types, extent of forest cover, vegetation, administration, policy management, development programs, new initiatives of the Chandigarh Administration, threats and initiatives.

Land Degradation and Desertification

The chapter gives a brief overview on the land use/land cover and the status of land degradation in Chandigarh. Land degradation, its cause and effects, different types of soil and related problems like soil erosion, lack of nutrients, loss in productivity etc. are discussed in detail in the chapter.

Air and Noise Pollution

The chapter on “Air and Noise Pollution” includes the sources of air pollution level in the city and describes noise pollution. The chapter further deep dwell into the pollutants concentrations in the atmosphere along with greenhouse gas emissions by different sectors like agriculture, industrial processes, energy, and water. The effects of air and noise pollution, health hazards and monitoring and abatement measures are discussed in chapter in detail. Sound levels beyond the limit in an industrial area, commercial area, residential area, and silence zone is leading to noise pollution in the city. Several measures are taken up to prevent air and noise pollution through air pollution monitoring networks, the expansion of public transport, the use of clean cooking fuels, and the implementation of integrated transportation systems.

Water Resources and Water Pollution

The chapter focuses on surface water and ground water availability in Chandigarh. The chapter reveals on how the growing population, rapid industrialization and large-scale urbanization increase the demand of water supply and puts a stress on the available resource. In addition to this, the changing rainfall patterns affect the water availability and puts further stress on the resource. Installation of water treatment facilities in industries, adoption of rainwater harvesting throughout the city, drip and sprinkler irrigation, cultivation of crops that require little water could effectively conserve water resource.

Agriculture and Allied Sectors

The chapter discusses various environmental concerns related to agriculture such as declining production, change in an agricultural area, the impact on labor force, agro-forestry systems, land degradation and deterioration of soil health, impact of chemical fertilizers and pesticides, impact of irrigation leading to water logging and salinity, and impact of climate change which results in anomalies in weather parameters such as rainfall, temperature and humidity leading to change in the monsoon patterns. Rapid urbanization and expansion of Chandigarh city has led to gradual acquisition of agriculture land. Adaptation of strategies such as Universal Public Distribution System; Organic Farming; Vermi-composting, bio-fertilizers, organic agriculture, and secondary agriculture and various programs and schemes of the government addresses the critical aspects of economic, social and environmental sustainability.

Energy

The chapter explains on how industries, cooking and lighting, and fuels for transportation are causing huge energy consumption in the city. It provides an overview of the commercial energy production, total commercial energy consumption (coal, crude oil, and natural gas), electricity generation, and electrification rate in the city. Energy being a pre-requisite for economic growth is paramount in fostering development. The strategies suggested to reduce and conserve energy are to incorporate more renewable energy sources into the energy mix and to make industrial processes more energy-efficient.



Environment and Health

The chapter on Environment Health looks at human health and diseases, determined by factors in the environment including natural and anthropogenic factors (the built environment). The chapter provides a description of the health care infrastructure and delivery system in Chandigarh at all levels of health care—primary, secondary, and tertiary levels and the associated population that depends on it. The chapter examines in details the sanitation-related matters, airborne diseases and conditions, water-related diseases and conditions, and health problems associated with excessive UV radiation exposure-related diseases and conditions. It also focuses on the influence of climate change data on the number of years of life with impairments as a result of a particular environmental issue.

Solid Waste and its Management

The chapter deals with the generation, handling and disposal of municipal, industrial, hazardous, electronic and bio-medical waste. Rapid urbanization and changing lifestyles have exacerbated the waste management due to heterogeneous nature of waste, lack of awareness of amongst the public. The quantity and composition of the municipal solid waste and status of solid waste management in Chandigarh is further described in detail in chapter. Management of MSW needs improvement at all stages i.e., collection, transportation, treatment and disposal. Source separation of waste is of utmost importance for using the waste as secondary resource for recycling process, composting, waste-to-energy generation etc.

Section III presents the **Environmental Expenditure**, the amount of money spent on all purposeful activities that are directly aimed at the prevention, reduction and elimination of pollution and /or any other degradation of environment resulting from the production of good and services. In Chandigarh, main departments such as personnel administration, police, education, transport, health, rural development, engineering, electricity, sports, estate offices, industries, tourism and excise are with the Chandigarh Administration headed by Administrator, U.T whereas certain works such as water supply, storm, drainage, internal roads, sanitation, fire wing, enforcement, health were transferred to Municipal Corporation to manage the services falling in the jurisdiction of Chandigarh Municipal Corporation. The budget allocation in Chandigarh is largest for the infrastructure sector followed by law and order, education, health, administrative, transport and social welfare in descending order.

Section IV focuses on the **Extreme Event Preparedness and Disaster Management of Chandigarh**. It examines the occurrence of natural and man-made disasters, the loss incurred and the relief work undertaken by the government to deal with them. It identifies the disaster-prone areas and mitigation plans undertaken. As Chandigarh lies in seismic zone IV, it is extremely vulnerable to earthquakes. The district is also susceptible to other natural and man-made disasters, such as floods, storms, cold waves, fires, and accidents. As a part of overall preparedness, the Chandigarh Administration has a State Disaster Management Authority to evaluate the city's preparedness for natural extreme events and disasters to ensure coordinated mitigation, preparedness and response measures whenever disaster strikes.

Section V on **Environment, Information, and Awareness** outlines the work done by the Department of Environment and other committees such as the Chandigarh Pollution Control Committee (CPCC) and the municipality to provide information on environment and related issues, sensitize the public with the aim of generating awareness, and shift towards sustainable consumption, disposal, and related practices. Various flagship programmes like National Green Corps (NGC) "Eco-club" programme and National Nature Camping Programme (NNCP) are being run by the government to enhance the understanding of



people at all levels about the relationship between human beings and the environment and to develop capabilities to improve and protect the environment. To promote environmental protection in the city, financial assistance is provided to various organizations for undertaking activities and awareness campaigns for the protection of the environment in Chandigarh.

Section VI on Transformative Pathways and Sustainable Development Goals is an integrated approach that highlights, Chandigarh's progress and strategies developed to achieve sustainable development goals in the region incorporating social, economic and environmental dimensions of development. The U.T. continues to be on the top in the country in providing quality education. It has the lowest dropout rate, highest gross enrolment ratio and best language proficiency in the country. 100% of its schools have access to basic infrastructures, such as electricity and drinking water. Among UTs, Chandigarh is the best in achieving "zero hunger" and has achieved a 100% target for individual household toilets constructed under the Swachh Bharat Mission (SBM). The segment offers information on several Chandigarh-specific issues relating to current environmental and natural resource conditions, the pressures driving those changes, and the results of those changes. The study further highlights the achievements of the U.T. Chandigarh in SDGs related to the environment and achievements toward compliance with various MEAs (Multilateral Environment Agreements) including UNFCCC, UNCCD, and CBD.







1

**THE REGIONAL CONTEXT
AND PRIORITIES**

INTRODUCTION

Chandigarh city lying on the foothills of Shivalik, is among one of the first planned cities in the country and is known for its advanced architecture and urban design. The city, designed by French artist Le Corbusier, represents modern architecture and is one of the best examples of town planning in the 20th century. Chandigarh that signifies “The Fort of Chandi” was named after the ancient temple – Chandi Mandir devoted to the Hindu goddess Chandi. The city was a part of the larger Punjab Province (was divided into East and West Punjab) during India’s partition in 1947. The town was created to serve as a capital to the East Punjab region and settle thousands of earlier uprooted refugees from the West Punjab region. The Government of Punjab in 1948 after consultations with the Indian Government approved the foothills of Shivalik as the site for the new capital and laid the foundation stone of the city in 1952. Subsequently, Chandigarh and its surrounding areas were entitled as Union Territory on 1 November 1966. The town acts as the joint capital for the two states - Punjab and Haryana, primarily due to the city’s territory bounded by Haryana State on the east and Punjab on all the other sides.

The city’s total area is 114 sq. km, and there are about 22 villages that fall under its jurisdiction. It is famous for wide tree-lined roads, managed gardens, unique architecture, greenery, the Rock Garden, Sukhna Lake, and the quality of life for its citizens. Since the city was created, all of its functions, such as water supply, sewage, storm-water drainage, city roads, solid waste management, fire wing, etc., are being looked after by the Chandigarh administration. There are respective departments explicitly assigned to deal with each of the sector-specific issues/domains. (Statistical Abstract of Chandigarh, Chandigarh Administration, 2020)

The architecture of Chandigarh city is planned to allow access to all the facilities nearby and promote a healthy living environment. In their close vicinity, every sector in the town has a school, nursing home, shopping area, parks, and gardens for the general public. The city also has three multi-specialty hospitals named Post Graduate Institute of Medical Education & Research, Government Medical College & Hospital, and Government Multi-Specialty Hospital. In its effort to improve the quality of life for its citizens, the Chandigarh administration has been undertaking tremendous work in eradicating slums in the city by rehabilitating the slum dwellers. One such colony that came upon the land of Punjab University was taken up for rehabilitation by Chandigarh Municipality and was rehabilitated to Sector 25 Chandigarh. Most of the development work in a colony, like a road construction, water supply, sewage system, storm water drainage, etc., is handled by the municipality alone. (Municipal Corporation of Chandigarh, 2017).

Weather and Climatic Conditions

Chandigarh UT ranges in the North part of the Himalayan ecosystem and is situated on the Indo-Gangetic Plain (a short distance southwest of the Shivalik Range between two seasonal hill torrents; the Sukhna and Patiali Rivers). It lies in 76° 47' 14E Longitude and 30° 44' 14N Latitude. The city’s altitude is 304-



365 meters above the Mean Sea Level (MSL) with a 1% drainage gradient. The town falls under the Koeppen's CWG (Climate with dry winters) category and experiences cold, dry winter, hot summer, and sub-tropical monsoon. The annual rainfall received in the city in 2020 was 1218.5 mm/year on average. The city experiences its monsoon season between June – September, May and June's months are some of the hottest during the entire year. The mean daily maximum and minimum temperatures are 37° C and 25° C, respectively. January is recorded as the coldest month, with mean maximum and minimum temperatures being 23° C and 3.6° C. Winds blow from northwest to southeast direction and some exception of it flowing in easterly and south easterly winds on few days during the summer season (Profile of UT Chandigarh, MSME- Development Institute, 2016).

Geologically, the city is occupied by Kandi (Bhabhar) on the northeastern side and Sirowal (Tarai) and alluvial plains in the remaining part. The subsurface formation of the region includes beds of boulders, pebbles, gravels, sand, silt, clay and stones. In this region, two seasonal rivulets are drained: Sukhna Choe present in the east and Patiala Choe in the west. The central part forms surface water and has two minor streams. The stream passing through the central part is called N-Choe and the other stream initiates at Sector 29. (City Development Plan Chandigarh, Chandigarh Administration).

Demography

The population in Chandigarh rose from 9, 00, 914 people in 2001 to 10, 54, 686 people in 2011, with a growth rate of merely 17.10%. Previous decades witnessed high population growth rates. Demographic data between 1961 and 1971 indicates that the population rose by 114.59%. As per the 1981 Census data, the population grew by another 75.55% between 1971 and 1981, followed by 42.16% between 1981 and 1991, and 40.28% between 1991 and 2001. (Statistical Abstract of Chandigarh, Chandigarh Administration, 2020)

Table 1: Population of Chandigarh from 1961 to 2011 (Based on Census figures)

Year	Total	Males	Females	Decennial Rate of Growth
1961	119881	72576	47305	-
1971	257251	147080	110171	+114.59
1981	451610	255278	196332	+75.55
1991	642015	358614	283401	+42.16
2001	900635	506938	393697	+40.28
2011	1055450	580663	474787	+17.19

Source: Chandigarh Master Plan 2031; Statistical Abstract of Chandigarh, Chandigarh Administration, 2020

Census of India made projections for the population from 2011-2026. As per these projections, the city has a population of 14,38,000 in 2011, and for 2021 and 2026 population was projected as 22,26,000 and 25,18,000 respectively. These projections were based on the assumed growth rate of 59.67% for 2001-11, 54.80% for 2011-21, and 13.12% for 2021-26. However, the actual population in 2011 was much lower than the projected one. Additionally, the increasing population density in Chandigarh has also been posing a huge challenge in maintaining the quality of life and providing basic and essential services to people in the city. The city experienced doubled population density between 1961-71 as the



number rose from 1051 to 2257 persons per sq. km. The density surged rapidly in subsequent decades with 3961 persons per sq. km. in 1981, 5632 persons per sq. km. in 1991, 7900 persons per sq. km. in 2001, and 9252 persons per sq. km. in 2011. The sex ratio (female per 1000 male) was 777 in 2001 and 818 in 2011. As per Census 2011, 97.25% of the Chandigarh population was urban while 2.75% was rural. The infant mortality rate is 53%. Chandigarh city observed an increased literacy rate due to its highest quality of educational infrastructure. There are about 8,09,653 literate people in the town of UT as per census 2011. The city has an average literacy rate of approximately 86.43% and ranked seventh among the other States and UTs in the country (Chandigarh Master Plan 2031). The literacy rate for males was 90.54%, and females witnessed a much lower literacy rate of 81.38%. Chandigarh UT also has many labour colonies built on undeveloped government land, and some created on private land. There are about 18 such existing colonies. The slum population was recorded as 332473 in 2011 and 429744 in 2017.

Economic status

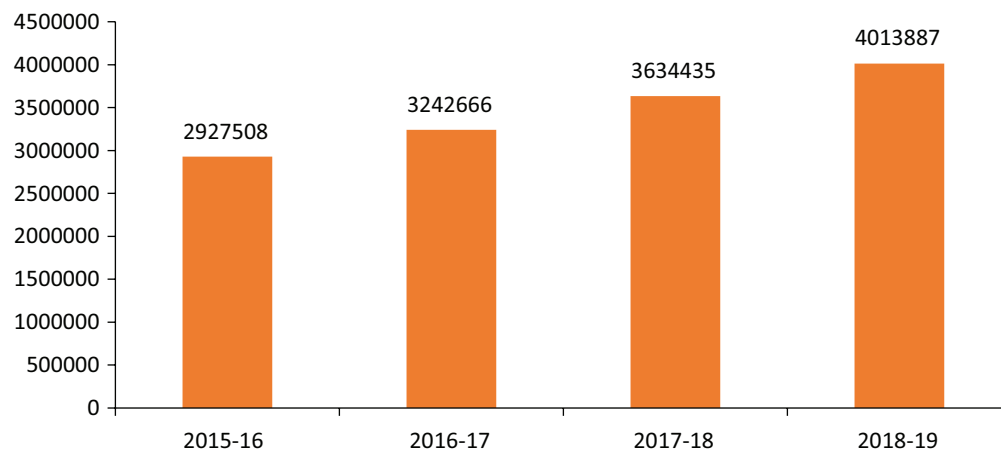


Figure 1: Gross State Domestic Product of Chandigarh at current prices

Source: Statistical Abstract of Chandigarh 2021

Chandigarh is one of the wealthiest cities in India. The city has a lot of advantages - such as being the focal point to the states of Punjab, Haryana, and Himachal Pradesh. There is an enormous scope to set up new and advanced knowledge based on the economic activities in the city.

Chandigarh's Gross State Domestic Product (GSDP)

Chandigarh's Gross State Domestic Product (GDP) in 2018-19 was INR 4, 211, 38.60 million (US\$ 6, 025.73 million). The GSDP of the State rose at a CAGR of about 12.89% between the year 2015 to 2016 and 2018 to 2019. The per capita GSDP in 2018-19 was Rs. 359, 026.94 (US\$ 5137.03). The State per capita GSDP rose at a CAGR of 11.49% in 2015-16 and 2018-19. The Net State Domestic Product (NSDP) was INR 359, 026.94 (US\$ 5, 137.03) in 2018-19. (IBEF, 2021) Out of the total union budget of 2021 - 2022, a large chunk of INR 950.41 crore (US\$ 130.57 million) was allocated to Housing and Urban Development sector. It also included the Smart City Project.



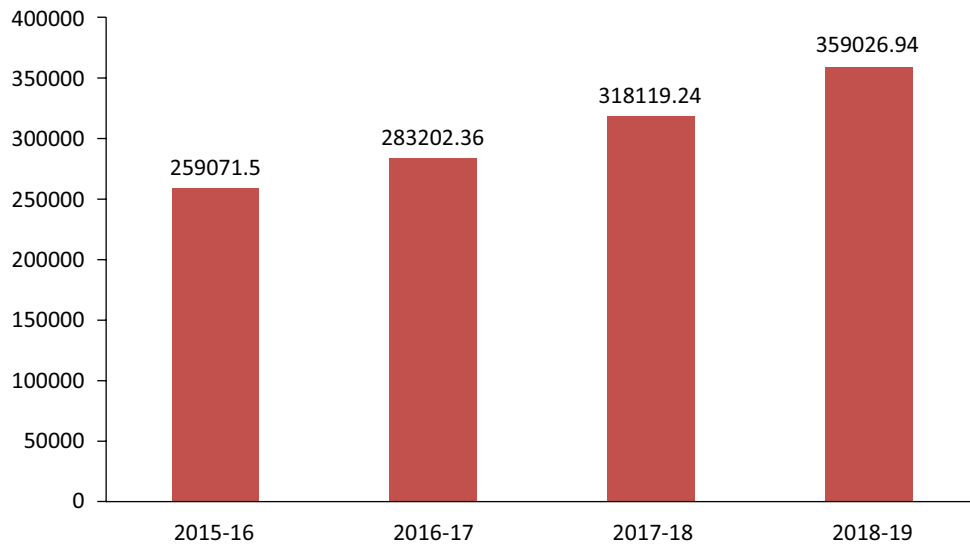


Figure 2: Gross State Domestic Product per capita of Chandigarh

Source: Ministry of Statistics and Programme Implementation (MOSPI)

Percentage distribution of Gross State Value Added (GSVA)

In Chandigarh, the secondary sector contribution to GSVA in 2018-19 was 11.18%, the tertiary sector was the maximum at 88.29%, while the primary sector was the least at 0.52%. During the years 2015-16 to 2018-19, the primary sector recorded an increase of CAGR up to 3.80%, secondary sector with a CAGR of 11.31%, and tertiary sector with a CAGR of 11.04%. The rise was driven by sectors like trade, hotels, real estate, finance, and others.

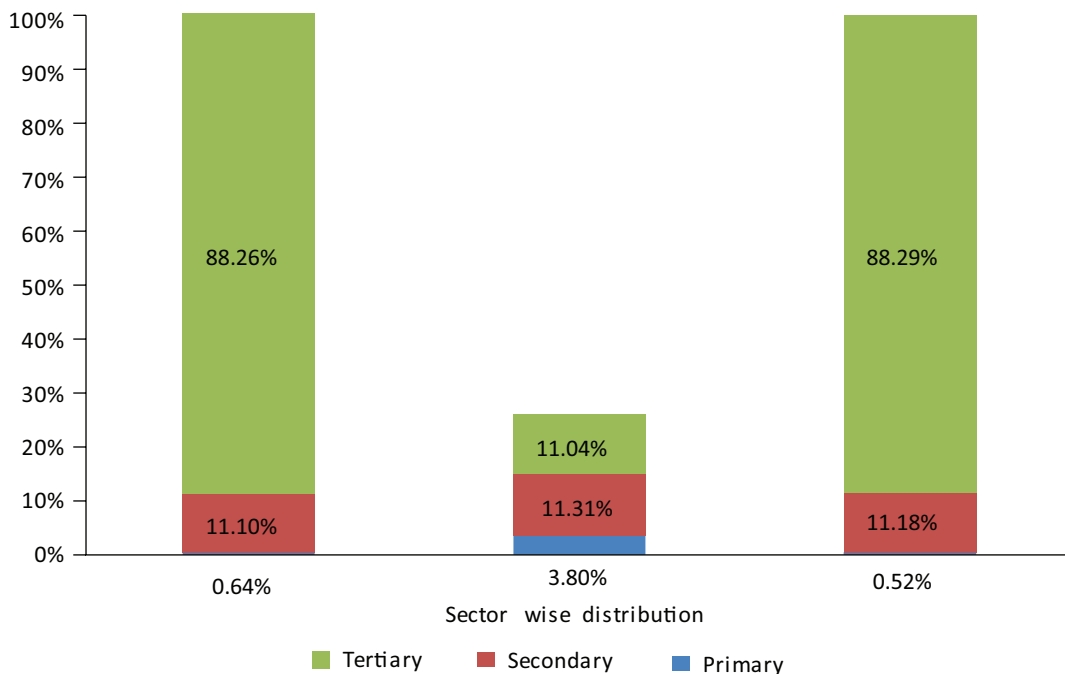


Figure 3: Percentage distribution of Gross State Value Added in Chandigarh

Source: Ministry of Statistics and Programme Implementation (MOSPI)



Industrial Scenario

The city consists of 2950 small-scale and 15 medium to large scale units (Chandigarh Export Promotion Plan, Ministry of Commerce, 2021). Over the last few years, the growth of the industrial sector has been limited due to limited city area. Out of the total 2950 small scale existing industries, 40% of the industries are ancillary units that produce components for tractor manufacturers, and the rest of 60% of the industrial units produce industrial fasteners, electrical/ electronic items, machine tools, pharmaceuticals, plastic goods, sanitary fittings, steel/wooden furniture, food products, etc. Chandigarh UT does not have many large-scale units due to land constraints. Existing large-scale units face challenges as the most important input in these industries is coal and iron, which are not locally available. Also, pollution authorities discourage big industries operations. The total estimated annual output of industries is about INR 650 crore (Profile of UT Chandigarh, MSME- Development Institute, 2016).

Information Technology (IT) Sector Industry in Chandigarh

Chandigarh is a leading IT destination among the tier-II cities. Various initiatives carried out by Chandigarh Administration earlier showed excellent results. The State government of Chandigarh is active in creating a progressive business environment. The State provides a wide range of fiscal and policy initiatives for businesses under the Chandigarh Policy Initiative (2015). Chandigarh Administration's main aim earlier was to develop the IT sector in the city. The Government took various steps to establish the associated ecosystem, installed high-speed data communication facilities for software development, and focused on its export by providing a NODE at Punjab Engineering College (PEC), Chandigarh. The UT also collaborated with the Software Technology Parks of India (STPI). As per the Chandigarh Export Promotion Plan, Chandigarh UT allowed the setting up of the IT-based industries, but any activity that entails the direct customer interface was prohibited. (IBEF, 2021) The Rajiv Gandhi Chandigarh Technology Park (RGCTP) in the city became the talk of various international settings providing an engaging platform for research and professional bodies to prepare a roadmap for the development of Chandigarh. This project was inaugurated in September 2005 and was one of the premier initiatives of the Chandigarh Administration. Few International IT companies like Infosys, Virsa, Net-Solutions, Taurus agile, and IBM established their units in the city (Industries Department, Chandigarh Administration, n.d.).

Table 2: Industries at a glance

Head	Particulars
Registered Micro & Small/Medium Units	3060
Registered Large Units	04
Employment in MSME Sector	26839
Employment in Large Industries	5579
No. of Industrial Areas	-
Turnover of MSME Sector	249759.00 (in INR)
Turnover of Large Sector	126412.00 (in INR)

Source: Chandigarh Export Promotion Plan, Ministry of Commerce, 2021



Exports from Chandigarh

During the Financial Year (FY) 2012-16, exports from Chandigarh city registered a negative CAGR of about 8.7% to reach USD 89.71 million. During this time, India's overall export experienced a negative growth with a CAGR of -2.07%. In FY 2016, based on the value terms, Industrial machinery for Dairy stood top position in the export product group with a share of about 26.49% in the city's overall exports. It was followed by products of Iron and Steel (22%), agrochemicals (9.74%), industrial machinery for Dairy (26.49), and Electric Machinery and Equipment (3.75%). These top 5 product groups contributed to about 62% of Chandigarh's overall exports in FY 2016. The significant items exported from Chandigarh include industrial machinery, telecom instruments, engineering products, and electronic components. (IBEF, 2021)

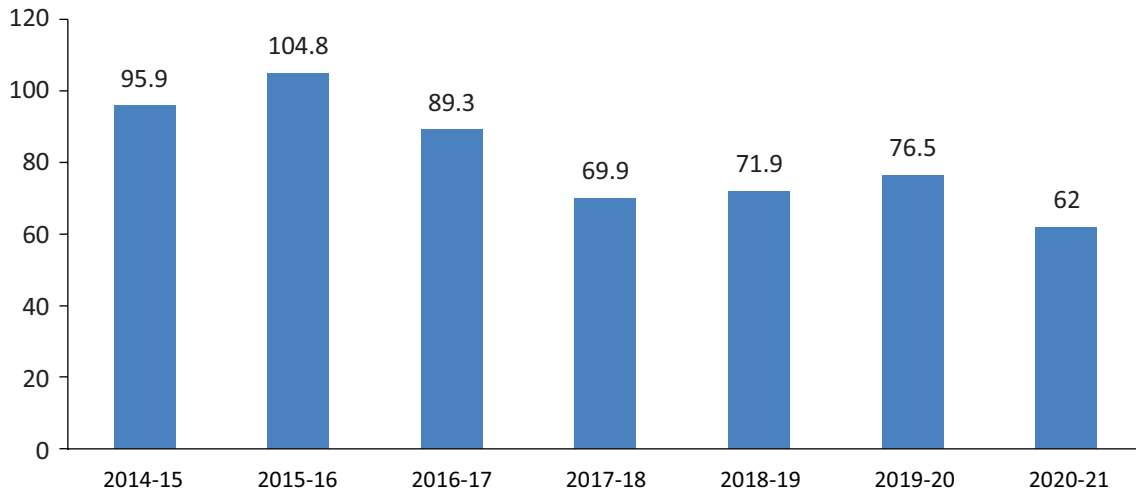


Figure 4: Export trend in Chandigarh

Source: Directorate General of Commercial Intelligence and Statistics, Ministry of Commerce & Industry

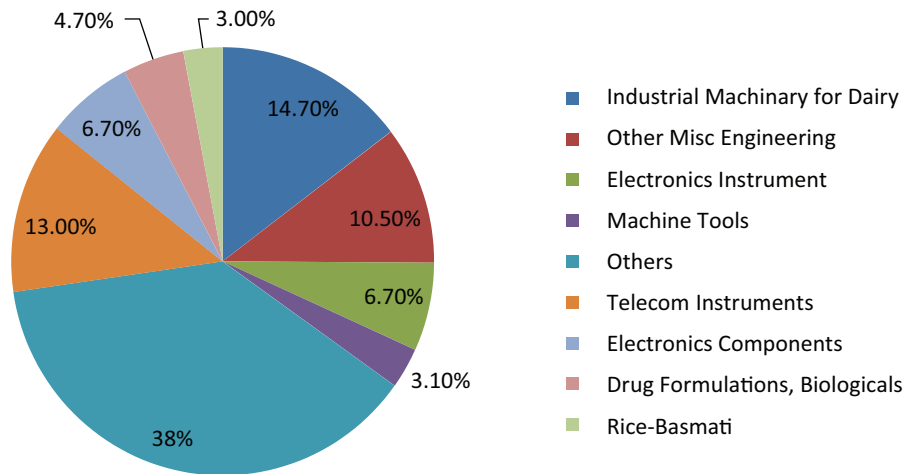


Figure 5: Composition of key items exported from Chandigarh

Source: Directorate General of Commercial Intelligence and Statistics, Ministry of Commerce & Industry



Infrastructure

Since the time city was created, the Chandigarh administration has been putting in a lot of effort to create a world-class city. The city ranked second in the Human Development Index in 2019. The city also experiences good governance as the administration works hard to achieve its efficient work culture. Chandigarh's recognition as the third best city and first best UT in the Niti Aayog's first Sustainable Development Goals (SDG) Urban India Index demonstrates its alignment with key targets outlined in SDG 11 (NITI Aayog, 2021).

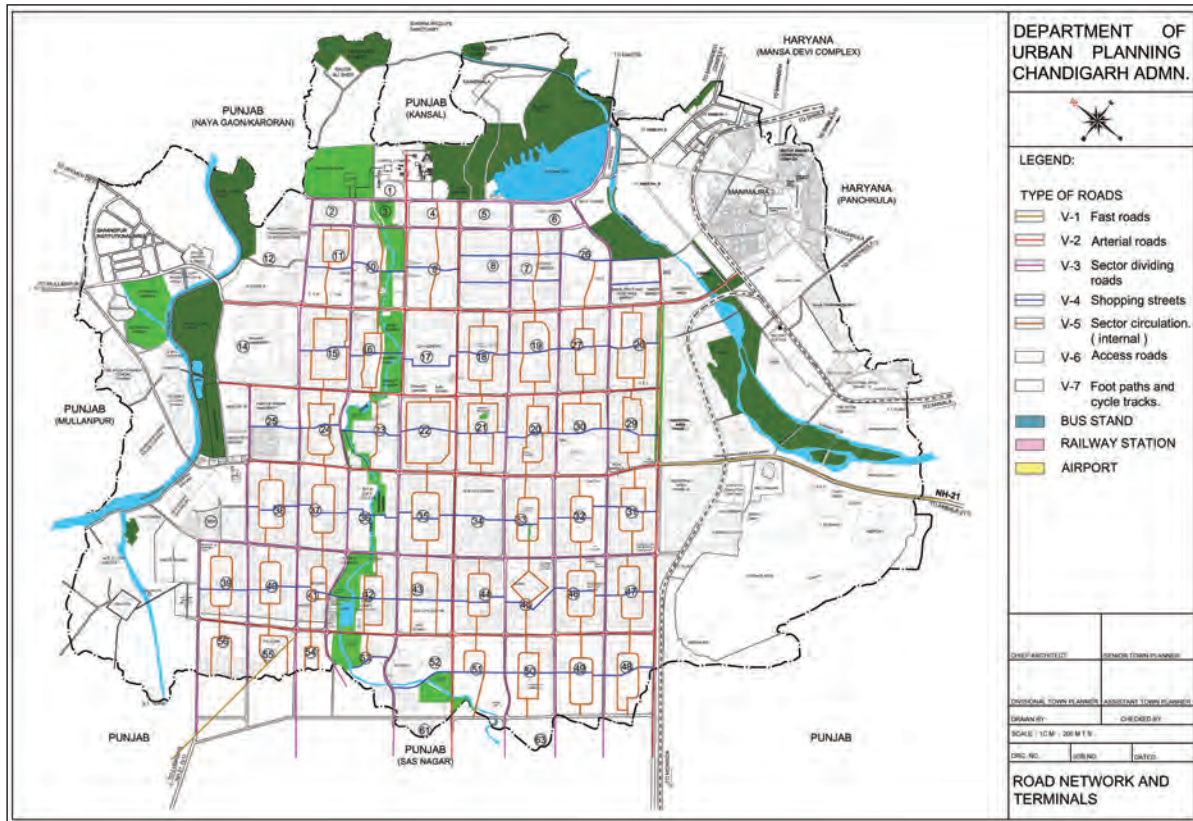


Figure 6: Road network of Chandigarh

Source: Chandigarh Master Plan 2031

Transport Infrastructure

The city possesses well-developed social, physical, and industrial infrastructure with proper connectivity. There are excellent road and railway networks with about 3 major ports, 15 minor ports, and airports that provide full connectivity. The city is the first to have 100% metalled road connectivity. The total road length of the city is 3269.75 km, and one national highway has a total length of 15.3 kms. The municipality's responsibility is to look after and manage the 244.03 kms of road network; PWD manages the 537.52 kms of the road network and panchayat manages 163.41 kms of the rural roads. The transportation network in the city is outstanding. The road network of the city is based on grid pattern



and the roads have been divided into seven categories known as a system of 7Vs i.e, V1, V2, V3, V4, V5, V6 and V7. Construction and maintenance of roads V1 to V3 is the responsibility of the Engineering Wings of Chandigarh administration as it comes under their jurisdiction area. Roads V4 to V6 are known as Internal roads; these roads are present in front of markets and residential complexes and are being looked after by Municipal Corporation of Chandigarh. V7 roads are intended for pedestrians movement. The total road network under the jurisdiction of the Municipal Corporation of Chandigarh is about 1250 km (approximately) (City Development Plan Chandigarh, Chandigarh Administration). The city's transportation sector also improved over the years, and many of the public transport numbers have risen by 24%. Digital technology is being adopted by the Chandigarh Transport Unit (CTU) through systems like electronic ticketing systems, passenger information systems, and vehicle tracking systems. Creating dedicated cycle tracks and roads under the bridge has also been undertaken. CTU is now planning to develop a new innovative driving training system facility. Diesel autos in the city have witnessed a decline from 750 to 445, and CNG autos have increased from 2950 to 4200. The city also has well- connected railway tracks, such as twin-track railway lines running from Delhi and Mumbai through Ambala. The city also has airports, the Ministry of Defence manages one domestic airport and one is operated by Chandigarh International Airport Limited (CHIAL). In order to reduce vehicular pollution and improve the air quality, Chandigarh Administration has already procured 80 electric buses.

Chandigarh UT has an Engineering Department responsible for developing the entire infrastructure in the city. This involves the establishment of roads, water, providing and laying down of proper water supply system, laying of underground sewage and storm water drainage system, distributing of power supply, and construction of various houses and buildings. The municipal corporation of Chandigarh city manages the infrastructural services, but the development of these services in multiple sectors is taken care of and carried out by the Engineering department (Engineering Department, Chandigarh Administration, n.d.).

Table 3: Infrastructure present in Chandigarh

Industrial Infrastructure in Chandigarh	
Operational Public Private Partnership projects	17
Exporting Special Economic Zone (SEZs) as of February 2020	1
Physical Infrastructure in Chandigarh	
Installed power capacity (MW) as of February 2021	212.16
Wireless subscribers (million) as of September 2020	1.63
National highway length (km) as of December 2019	15.28
Airports (No.)	2
Average per capita consumption (units per annum)	1168
Average power requirement (lac units per day)	49

Source: Statistical Abstract of Chandigarh, Chandigarh Administration, 2020

Power Infrastructure

The installed power capacity as of February 2021 in Chandigarh is 212.16 MW. The Government and private sector own these power utilities. Chandigarh Administration looks after the local power



distribution; about 1480 employees, 4 executive engineers, and 1 superintending engineer take care of this dissemination. The city has a power requirement of about 282 MW; the central and State generating stations meet this requirement. The city also receives 67% of power from Mohali PSEB, 10% from Dhulkote (BBMB), and 23% from Nalagarh. The city was developed as the 'Model Solar City' by the Chandigarh Renewal Energy, Science and Technology Promotion Society (CREST) in 2012. The solar city aimed to generate about 69 MW through rooftop based on the SPV power generation capacity by 2022.

Urban & Social Infrastructure

Chandigarh city invested very much in its urban design and architecture. The city was initially planned for a limited population of 5 lakhs. It was created in Phase I, including sectors 1-30 and Phase II sectors 31-47. City also developed Chandigarh Master Plan 2031; as per this plan, the prevailing density of Phase I of the city as per 2001 census was 26 persons per acre, whereas for Phase II, it was 60 persons per acre (Chandigarh Master Plan 2031).

1. Education Infrastructure

Chandigarh city was designed to provide the best of amenities to its people. The city is known for providing comfort and convenience to people and is among the most favoured places, particularly senior citizens. The social infrastructure consists of educational and health facilities, religious worshipping places, and recreational areas. The size of this infrastructure varies from neighbourhood to neighbourhood and to the city level. Most schools, sports complexes, and health facilities are supported by vertical green belts alongside. (Department of Education, Chandigarh Administration, n.d.) To maintain the city's cultural, social, and economic vibrancy, employment, basic amenities of life, and self-sufficiency are some of the critical factors. In this context, social and welfare schemes by the Chandigarh Administration include:

Chandigarh UT has a robust infrastructure for education and a good network of schools in the city. Department of Education, Chandigarh Administration is the main body looking after education in the city. There are about 114 Govt. schools, 7 Govt. - Aided schools, 75 recognized private schools, 7 central govt. schools run by the Kendriya Vidyalaya/ Navodaya Vidyalaya Samiti/Air Force. These schools are composite and cover grades from 1st Standard to 10th/12th Standard. There are various schemes introduced in these schools, like mid-day meal schemes, free textbooks & stationary, and free uniforms. (Department of Education, Chandigarh Administration, 2022)

Table 4: Social Infrastructure of Chandigarh

Social Infrastructure in Chandigarh	
Government Schools	114
Private Schools	75
Central Government Schools	7
Government Colleges	6
Universities	3
Colleges	25
Engineering Colleges	10
Polytechnic Institutes	2



Social Infrastructure in Chandigarh	
Total Number of Schools in Chandigarh	
Primary	8
Middle	3
High and higher secondary schools	93
Gross enrolment ration (in%)	
Primary level	81.44
Upper primary level	95.33
Pupil teacher ratio*	
Primary	13
Upper primary	9

Source: Department of Education, Chandigarh

The city under the Sarva Shiksha Abhiyan enrolled many children. The main scope of this Abhiyan (initiative) is to spread its wings to cover all the drop-outs children by the end of the financial year 2018. This task will be accomplished by carrying out a household survey that will help us understand the number of children who dropped out of school. These initiatives will encourage literacy amongst illiterate adults; different schemes in collaboration with the Government of India are being launched every year. Many new and innovative literacy centers are being opened around every corner of the city so that each adult can be educated and achieve minimum educational qualifications.

2. Social and Welfare Schemes

Chandigarh Administration consists of a particular department named the Department of Social Welfare, Women and Child Development. Under this department, various schemes, programs, and institutions run to benefit Scheduled Caste (SC), other backward classes. The department hires non-governmental agencies to manage the Nari Niketan and other Institutions. They have running schemes like post-delivery financial assistance to women for nutrition, Apni Beti Apna Dhan, Holiday camps for SC, Encouragement to inter-caste marriages, development of skills amongst the SC children living in Slums areas, Seminar on life, Mission & work of Baba Saheb Ambedkar, Monetary Relief/ Rehabilitation of Victims of Atrocities, Strengthening of machinery for enforcement of PCR Act. Schemes available for women and children welfare and their social security include crèches for children of working mothers, home for neglected children, children in need of care and protection, financial assistance to widows/ destitute women, Nari Niketan, incentive to new born child and provision for Disaster Risk Reduction (DRR). Schemes available for the disabled are subsidies on petrol/diesel, prosthetic aid, unemployment allowance, etc. Senior citizens are provided with schemes like Old age pension and identity cards. Department of Social Welfare, Women and Child Development also releases an Ex gratia payment to the family of deceased government servants. They also release pension under the Scheme of Old age pension, pension to disabled persons, pension to widows and destitute women, and financial assistance to dependent children of a widow and is transacted through Aadhaar seeded bank account. (Department of Social Welfare, Women and Child Development, Chandigarh Administration, n.d.)



The Chandigarh administration undertook various social welfare initiatives in 2018-19. On 8 March 2018, POSHAN Abhiyaan was launched; its main aim was to reduce under nutrition by converging various nutrition-related schemes. Chandigarh UT was honored with the status of best UT by the Ministry of Women and Child Development, Government of India. The city also bagged the eighth position in State Level Awards (Individual and for State-level category); two state-level awards for Best Social Media Campaign, and Maximum reach across all the 8 themes. City under this POSHAN initiative launched a booklet named “SUPOSHAN” – a handbook on nutrition-related information designed for Specially-abled (Deaf & Dumb) in sign language. About 116 Anganwadi centers were upgraded with a project cost of INR 87 Lakh. This amount was utilized to build child-friendly toilets for children and infrastructural development of Anganwadi centers. About 450 Anganwari centers are currently functioning in Chandigarh UT under the ICDS Scheme. Under this Scheme, about 53097 beneficiaries were enrolled (Social Welfare Department, Chandigarh Administration).

3. Housing

Chandigarh city's main objectives include providing good quality housing that possesses all the amenities and offers services to the poor. Initially, the city was planned for only two kinds of housing – Public and Private. The Government employees were provided with subsidized rental public housing. This housing was built in the initial years of the city's development. The private housing includes residential plots which vary in size from 125 sq. yds. to 4000 sq. yds. These plots were made available to individual buyers at cost price to build their own houses shortly.

Chandigarh housing board (CHB) mandates building reasonable, affordable price dwelling units for the different socio-economic categories living in the city. CHB was formed in 1976 by extending the Haryana housing board act of 1971 to the Union Territory. This board also looks after the construction activities of commercial units and other schemes for the Chandigarh Administration. It acts like the nodal agency which implements administration schemes that rehabilitates residents living in unauthorized settlements in the city. The board also constructed houses for the poor under the schemes like Valmiki Ambedkar Awas Yojna (VAMBAY) and Jawahar Lal Nehru Urban Renewal Mission (JNNURM). (Chandigarh Housing Board, n.d.)

Tourism

Chandigarh city, also referred to as “People's Paradise” still possesses a traditional touch despite having various modern and new aspects. Three principal facades make ‘City Beautiful’, i.e., its greenery, serenity, and cleanliness. A cutting-edge, legendary architecture defines the city, but its matchless style is captivating. The city is known globally for its vast buildings, road network, and many well-landscaped gardens and parks. Rock Garden is among the famous gardens present in the city, fascinating to various tourists. This Garden creates a fantasyland out of industrial waste and rock materials. It is also a gateway to multiple other tourist locations in the nearby States, like proximity to hill stations like Shimla, Manali, and Dharamshala. People visiting Chandigarh should surely visit its famous Sukhna Lake, Zakir Hussain Rose Garden, Bird Park, Open Hand Monument, Government Museum, and Art Gallery. Tourists visiting the city can soak themselves up in the sheer amount of culture, urban design, space, restaurants, shopping, and infectious zest of life of people. The city is a natural beauty with pleasant weather, picturesque skylines, and incredible sunsets. It is the best place that offers outdoor fun-filled activities like boating, theme parks, golfing, etc. (Chandigarh Tourism Department)



The total inflow of domestic and international tourists in Chandigarh UT has been listed below:

Table 5: List of inflow and outflow of tourists in Chandigarh between 2014-2020

S. No.	Year	Domestic Tourists	Foreign Tourists
1.	2014	10, 61, 419	28, 365
2.	2015	10, 73, 842	29, 538
3.	2016	11, 82, 504	31, 549
4.	2017	14, 25, 781	32, 762
5.	2018	15, 38, 796	39, 681
6.	2019	15, 63, 795	44, 132
7.	2020	04, 17, 953	12, 218

Source: Tourism Department of Chandigarh

Department of Tourism, Chandigarh Administration is working towards achieving various strides of progress among the domestic and international tourism scenario. They organize various tourism events like Rose Festival, World Music Day, Teej Festival, World Tourism Week, Chandigarh Carnival, Lohri Festival, etc. Post-March 2020, there was a surge in the COVID19 situation observed in the country; the department made sincere efforts and engaged citizens of the city by coming up with information and entertainment posts on various social media platforms of the Architecture Museum of Chandigarh by Director Le Corbusier Centre. Recent initiatives in 2021 included Lohri Festival celebrations with special children at Aashrey Home on 13 January 2021 with a lot of enthusiasm and maintaining all the COVID19 protocols. One inaugural event, "Walk of Art" was also organized at Sukhna Lake; the event was organized in collaboration with Chandigarh Lalit Kala Akademi and Engineering Department, UT, mainly to raise awareness on the green heritage of the city. The department also presented Art Workshops, Photography exhibitions, and the Sound & Light Show at the Rose Festival in 2021. This was organized at Govt. Museum & Art Gallery between 26 February 2021 to 1 March 2021. One heritage walk was organized at Le Corbusier center on 13 March 2021. One Exhibition, which is based on the work of Pierre Jeanneret on his 125th birth anniversary, was collected between 22 March 2021 to 31 March 2021 at Underpass connecting Rose Garden to Sector 17 Chandigarh.

Tourism department took various initiatives in the past which include the following:

- Upgrading of the Chandigarh Airport
- Opening of 5-star hotels in Chandigarh
- Developing and maintenance of parks and valleys in Chandigarh
- Creation and maintenance of tourist information centers
- Organizing various cultural and other festivals in the city
- Arrangements of transport systems for incoming and outgoing tourists
- Hop on Hop off tourist coaches
- Setting up of Society for Tourism Entertainment & Promotion (STEPS) in Chandigarh

Society for Tourism Entertainment & Promotion (STEPS) was set up in Chandigarh UT to promote Tourism and Entertainment in the city which abides by the policies and action plans of the Chandigarh



Administration. This platform enables Chandigarh city to be remembered at national and international levels. The main aim behind setting up this society was to promote medical tourism, heritage tourism, adventure tourism, sports tourism, cinematic tourism, and various types of tourism (Department of Environment, 2013).

Tourist Places in Chandigarh UT

War Memorial

It is the largest post-independence war memorial present in the country with about 8459 names of deceased soldiers, since 1947 from the Army Air Force and Navy. The place was designed to pay homage to the Jawans and it was located in Bougainvillea garden. This place was inaugurated by Late APJ Abdul Kalam in 2006. The memorial walls are made up from the Pink Sandstone. The terrace consists of sitting area and is a perfect place for the open air theatre to conduct beautiful light and sound show.

Major attractions includes 22 Feet sculpture at the centre, names of the martyrs inscribed on the black granite and walls made up of the pink sandstone

Museums

1. Government Museum and Art Gallery

This museum is among one of the most prominent museums present in India, as it speaks about the Indian history and the partition. It was established in 1947, with its unique architecture and was created so it can encourage appreciation of values which were embedded in the art and bring people close to the lives of people through interpretation of its rich collection and innovative programs. Major attractions Gandhara sculpture, Pahari and Rajasthani miniature paintings, Ancient rock idols, coins, metal idols, Child art gallery and Souvenir shop.

2. Natural History Museum

This museum exhibits covers about 5000 years of Indian history from Indus valley civilization to the present day. The museum displays the open air sculptural artworks and is organized into 5 galleries. Major attractions include 2 storeyed cyclorama which depicts the evolution of life of earth, dinosaur gallery with real fossils, evolution of man from hominid cousins and ancestors and collection of astronomy and geology.

3. Chandigarh Architecture Museum

This museum was set up in the year 1997 basically to document, preserve and showcase the rare documents drawings sketches and archives etc. which pertain to the making of Chandigarh UT. The museums building is sculptural and true corbusier in the way it looks and museum is entered via a tube like stairway and is divided into 4 levels.

4. National Gallery of Portraits

It was setup in the year 1977 in Chandigarh UT, it has a vibrant and varied collection of portraits, busts, sculpture, images, prints, photos, and paintings that are based on the struggle of Independence. Major attractions include Ghadar movement, Kamagatamaru episodes, prints of newspaper and photographs of victims, portrait of Rani Laxmi Bai of Jhansi, cloth painting of Taj Mahal, Diorama which depicted burning of foreign cloth during Swadeshi movement and paintings of Jallianwala Bagh.



5. International Dolls Museum

This museum was established in 1985 in the complex Bal Bhawan and showcases the collection of heritage dolls from about 25 countries. It comprised exotic and indigenous dolls having historical, socio-cultural, geographic artistic, fashion design and custom features. The museum also consists of colourful life size cutouts of dolls with hollow space designed for kids. Major attractions include tribal dolls, bridal dolls, International dolls, toy train model, and shadow puppets.

6. Pierre Jeanneret Museum

Pierre Jeanneret, one of the chief architect who lived in the house number 57, sector 5, Chandigarh UT for about 11 years and assisted & advised the local government here back then. His house was converted to a museum in order to honour him and keep his memory alive. This museum consists of 2 storeyed building with ample outdoor space and broad balconies with latticed brick screens. Major attractions include display of models, photographs of furniture, 1st building of Chandigarh UT and residence of Pierre Jeanneret.

7. Le Corbusier Centre

Le Corbusier Centre, an old architects office is among the earliest buildings of Chandigarh UT. The museum was once a place of Le Corbusier workplace and his team and hence, this building holds immense historic value to Chandigarh UT. The major attractions include insight towards the urban planning, photographs, sketches, models, modern sculptures and installations, furniture and souvenir shop.

8. High Court Museum

The museum was established in 2006 and provides a better perspective towards historical development of Punjab and Haryana in order to appreciate the legal journey. The museum helped develop the historical understanding of the working of the courts and various landmark judgements in legal history of India were housed here. This include the trial of Bhagat single at lowers, creation of post of Chief justice, arrest of Dr. Kitchlew and Pt. Nehru etc. Major attractions include landmark judgements, original copy of Constitution of India, handcuffs of Nathuram Godse, collection of stamps and seals which are used in High Court, recreation of mini courtroom and display of court weapons.

Bird Park

The Department of Forest & Wildlife, UT Chandigarh established Chandigarh Bird Park in 2021 at Nagar Van behind Sukhna Lake, Chandigarh with the purpose to create awareness amongst the general public towards bird conservation. The Chandigarh Bird Park provides ample space for birds with 58 feet flying height and is spread over an area of 6.5 acres. The park is surrounded by various plants of varying canopies giving an ideal habitat, food and shelter for these birds to fly and breed. The major attractions of the park includes African Love Birds, Budgerigars, White Swan, Black Swan, Wood duck, Golden Pheasant, Yellow Golden Pheasant, Green Wing Macaw, Dun Conures, African Grey Parrot, Finches and Melanistic Pheasant.



Greens and Gardens

Table 6: Greens and Gardens in Chandigarh

S. No.	Greens and Gardens
1.	Leisure Valley
2.	Rajinder Park
3.	Bougainvillea Garden
4.	Fitness Trails
5.	Rose Gardens
6.	Shanti Kunj
7.	Hibiscus Garden
8.	Garden of fragrance
9.	Smriti Upavan
10.	Botanical garden
11.	Terraced garden
12.	Topiary Garden
13.	Garden of Silence, Sukhna Lake
14.	Japanese Garden
15.	Rock Garden

Source: Tourism Department of Chandigarh





2

**STATE, TRENDS, AND
RESPONSES**



I

**FOREST BIODIVERSITY
AND HOTSPOTS**

FOREST BIODIVERSITY AND HOTSPOTS

CHAPTER

1. Introduction

Chandigarh's Union Territory (UT) harbours a total Recorded Forest Area (RFA) of 35 sq. km, accounting for 30.70% of the state's Geographical Area of 114 sq. km (ISFR, 2021). The term forest area or Recorded Forest Area (RFA), refers to all the geographic areas recorded as 'forests' in the official government records irrespective of the actual trees growing on such lands. RFA mainly includes Reserved Forests and Protected Forests and Unclassed Forests under Indian Forests Act, 1927 or respective State Forest Act. (ISFR, 2021). On the other hand, the Forest Cover includes all the lands having more than one hectare area with tree canopy density greater than 10%. The forest cover does not make distinction between tree species and encompasses all types of lands irrespective of their ownership, legal status, and land use.

The total Geographical Area of Chandigarh including the Sukhna Wildlife Sanctuary is 140 sq. km (GCAP, 2020). Physio-graphically, the UT falls in the Great Indian Northern Plains with the Shivalik Hills in the backdrop on the northern side. The seasonal rivulets – the N Choe and Sukhna Choe defines the UT boundaries on the eastern and western sides. In addition, another seasonal stream in the west- Patiala-ki-Rao, which originates from the Shivalik hills, enters Chandigarh and later merges into the Ghaggar River. The N Choe passing through the city of Chandigarh was converted to a continuous green belt (also known as the Leisure Valley, spread over 400 acres), while the damming of Sukhna Choe in 1958 has provided Chandigarh with its much-loved Sukhna lake (Chandigarh Master Plan 2031). The Chandigarh UT is the country's first planned city with multiple sectors meant for residential and commercial purposes, thus being dominated by urban land use. Yet it is one of the greenest cities in India with a special thrust on Urban Forestry promoted and managed by the dedicated Forest Department of Chandigarh UT. Thus, tree plantation along avenues, open spaces, green belts and around building complexes is an enthralling feature of the city. Green belts run across the length and breadth of the town; currently, there are a total of 26 parks and a total of 70 Green belts in the city (Municipal Corporation Chandigarh, 2017).

As per the (Champion & Seth Classification of Forest Types, 1968), the forests of Chandigarh are Tropical dry deciduous in nature and are divided into two Forest Types. i.e., Northern dry mixed deciduous forest and dry deciduous scrub (ISFR, 2021). The Protected Area Network in the UT has two Wildlife Sanctuaries, covering an area of 26.01 sq km, which is 22.81% of the geographical area of the Union Territory viz Sukhna Wildlife Sanctuary and City Bird Wildlife Sanctuary (ISFR, 2021).

The main trees in Chandigarh UT include *Senegalia catechu* (Khair), *Senegalia modesta* (Phulai), *Vachellia nilotica* (Kikar), *Vachellia leucophloea* (Raeru), *Dalbergia sissoo* (Shisham), *Terminalia anogeissiana* (Dhaura), *Azadirachta indica* (Neem), *Bombax ceiba* (Semal), *Butea monosperma* (Dhak), *Bauhinia variegata* (Kachnar), *Phyllanthus emblica* (Amla), *Morus alba* (shattut), *Lannea coromandelica* (Jhingan), *Diospyros melanoxylon var. tupru* (Kendu), *Bergera koenigii* (Kari patta), *Neltuma juliflora* (Mesquite), *Cassia fistula* (Amaltas), *Ziziphus*



mauritiana var. *mauritiana* (Ber), *Vitex negundo* (Bana or nirgundi), *Carissa spinarum* (Karaunda), *Justicia adhatoda* (Vasaka), *Tripidium bengalense* (Moonj), *Tinospora cordifolia* (Giloye), and *Abrus precatorius* (Rati) (BSAP Chandigarh, 2001).



Figure 7: Migratory birds like Northern Pintails visiting Sukhna Wildlife Sanctuary each winter

Source: TERI

The diverse habitats of wetlands, woodlands, scrublands, grasslands, agricultural fields, and orchards support rich varied biodiversity especially the Avifauna. Around 239 of species of birds belonging to 156 genera, 54 families and 17 orders were found in a study. Analyses of data on residential status revealed that of the total 239 species of birds, 140 species were either residents or local migrants (including birds with winter and summer influx) and rest 99 were long range migrants to Chandigarh (Kumar and Paliwal, 2012). The mammalian diversity with major species such as Sambar (*Cervus unicolor*), Blue Bull (*Boselaphus tragocamelus*), Spotted Deer (*Axis axis*), Golden Jackal (*Canis aureus*), Jungle Cat (*Felis chaus*), Wild Pig (*Sus scrofa*), Rhesus macaque (*Macaca mulatta*), Indian Crested Porcupine (*Hystrix indica*) and occasional sightings of Leopard



Figure 8: Roadside plantations and green belts around building complexes in Chandigarh

Source: TERI

