सत्यमेव जयते

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Governor of Punjab
And
Administrator
Union Territory, Chandigarh

सत्यमेव जयते

Punjab Raj Bhawan,
Chandigarh

Message

I am glad that ENVIS Hub of the Department of Environment,, U.T., Chandigarh has brought out a report on the "State of Environment Report-2018 Chandigarh". This report will be a valuable document for all, concerned with the environment and its development. This will not only help to formulate, execute action plans and strategies but also will improve the state of the environment of Chandigarh and the welfare of its people.

Keeping the policy in view, Chandigarh Administration has initiated a number of schemes for sustainable development and prudent conservation of the healthy environment of the city. The Chandigarh Administration is committed to create a clean and healthy environment for its residents, commuters and the tourists visiting the city. At the same time, all of us have to discharge our legal and ethical responsibilities, towards environment conservation.

I am sure that various departments of Chandigarh Administration and of Punjab & Haryana government will make full use of this report, for the sustainable development of Chandigarh and its surrounding areas

V P Singh

(V.P. Singh Badnore)

Manoj Parida, IAS

सत्यमेव जयते

Adviser to Administrator
Union Territory, Chandigarh

Message

The deterioration of the earth's environment increasingly pressurizes the natural resource base and processes upon which all the life on earth depends. Consequently, conservation and sustainable use of environmental resources remains one of the major challenges of our era and an indispensable component of sustainable development.

Chandigarh's infrastructure was originally planned for merely 5 lakh population, but the city has expanded rapidly over the last three decades thereby putting additional pressure on the existing infrastructure. Increasing population leads to the excessive consumption of natural resources, excessive emissions in air, water & soil, along with the over burden of vehicles on the roads. However, the UT administration is consistently working to fulfil the increasing demands & managing pressure on environmental quality of the city.

I appreciate the sincere efforts of ENVIS Hub of Department of Environment, Chandigarh Administration, UT Chandigarh for regularly bringing out the detailed report on State of Environment of the city, on biennial basis. I hope that the present edition of this report will be valuable document for all, concerned with the environment, its development and conservation.

I am highly confident that this comprehensive report on the City of Chandigarh will be a benchmark for sound environmental planning in the future and for conserving the environmental resources of the area.

(Manoj Parida)

Arun Kumar Gupta, IAS

सत्यमेव जयते

Principal Secretary Environment & Forests
Union Territory, Chandigarh.

Message

Chandigarh is one of the greenest cities of India with more than 40% of the total geographical area covered under green cover. It has many feathers in its cap like one of the best planned cities, wider roads and high living standards. Chandigarh Administration has taken firm steps to control the projected deterioration in the environment of the city by initiating various environment-friendly steps like the establishment of botanical gardens, increasing green belts, development & maintenance of new parks and water bodies, well laid out bicycle track etc.

I am glad that ENVIS Hub of the Department of Environment, Chandigarh Administration, U.T., Chandigarh has prepared "State of Environment Report 2018 Chandigarh". This report covers the status and initiatives of the Administration on five key environmental issues including Land, Air, Water, Waste Management and Energy.

I hope that the data presented in the report will help all to reflect on the past actions & achievements of the city and trigger a thought process which will promote affirmative action in future to achieve sustainable development based on sound principles of the environment.

(**Arun Kumar Gupta**)

Debendra Dalai, IFS

सत्यमेव जयते

Director,
Department of Environment,
Chandigarh Administration,
(U.T.) Chandigarh.

Message

The greatest threat to our planet is the belief that "Someone else will save it" Everybody is aware and threatened of the changing environmental conditions of the planet but very few think about the reasons behind it and initiate actions to control them.

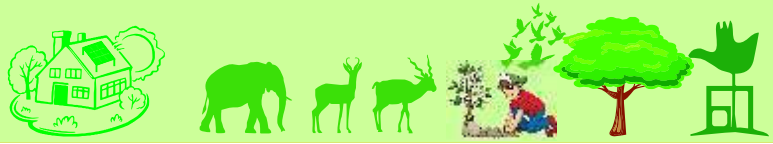
Chandigarh with 'State-of-the-Art' infrastructure is a well planned city of India. Exotic gardens, green belts, and beautiful road avenues are few of the main attractions of the city. The high per capita income and modern life style of the people exerting high pressure on daily energy demands. Taking account of the changing climate trends worldwide, the Chandigarh Administration is consistently progressing towards harnessing the Solar Energy to meet the power renewable sources and Chandigarh has become a leader in Rooftop SPV power systems.

The present report entitled "State of Environment Report- 2018 Chandigarh", brought out by the ENVIS Centre of Department of Environment, Chandigarh Administration, brings in notice to various issues pertaining to the environment of Chandigarh. It is a bench-marking exercise of Chandigarh Administration to provide a clear image of present environmental status on key issues and provide collective knowledge to the various stakeholders.

I am sure that, this State of Environment report will provide the basis for a coherent, sustained and systematic plan of action for improving the quality life of Chandigarh and will be useful to all the departments of the government, researchers and students of environment planning and management.

I would like to thank the entire team of ENVIS Hub, Chandigarh for making hard efforts in preparing compiling, designing and timely brining out (SoER-2018). and designing and appreciable piece environment information in the form of " State of Environment Report

(Debendra Dalai)



Acknowledgment

Environment Information System (ENVIS Hub) of the Department of Environment, Chandigarh (U.T.) has taken up the challenging task of bringing out State of Environment Report (SoER-2014) to highlight the major environmental concerns, trends and significant remedial action being undertaken in the city, related to five important environmental issues that include Land Use Pattern, Air Quality, Water, Waste Management and Energy. The present report is next in the series of reports brought out by the department in year 2004, 2008, 2012, 2014 and 2016. Government of India initiated the SoE reporting process with all State Governments and Union Territories of India under 10th Five-Year Plan. The process was started in October 2002 and merged with the ENVIS Scheme in 2008-09. It was anticipated that through the SoER's, the State Governments and UT Administrations would be able to integrate environmental dimensions in their social, economic and sustainable development planning.

I am extremely thankful Shri Arun Kumar Gupta, (IAS), Principal Secretary (Environment & Forests), Chandigarh Administration, for actively supporting this initiative.

I express my sincere thanks and gratitude to Shri Debendra Dalai (IFS), Director Environment, Chandigarh Administration, for sparing his valuable time and putting in extra efforts in giving final shape to the report.

I am highly grateful to ENVIS Hub team comprising of Mr. Mohit Badhwar (Programme Officer), Ms. Tanveer Kaur (Information Officer) & Mr. Surinder Sharma (IT Officer), who have compiled, designed and prepared this report.

The co-operation in providing useful inputs by the departments of Engineering UT, Chandiagrh Pollution Control Committee, Deputy Commissioner's office, Municipal Corporation Chandigarh, Registering & Licensing Authority, Transport, Land Acquisition office, Industries Department, Town Planning, Tourism Department, Economics & Statistics Department and Panjab University is highly appreciated. My thanks are due to all the staff members of Environment Department for their constant support.

With valuable inputs & suggestions from all the departments/agencies, I am sure, this report would prove to be another milestone in making Chandigarh a clean & eco-friendly city.

(Vivek Pandey)
Scientist 'SD', Department of Environment &
ENVIS Coordinator
Chandigarh Administration, UT, Chandigarh

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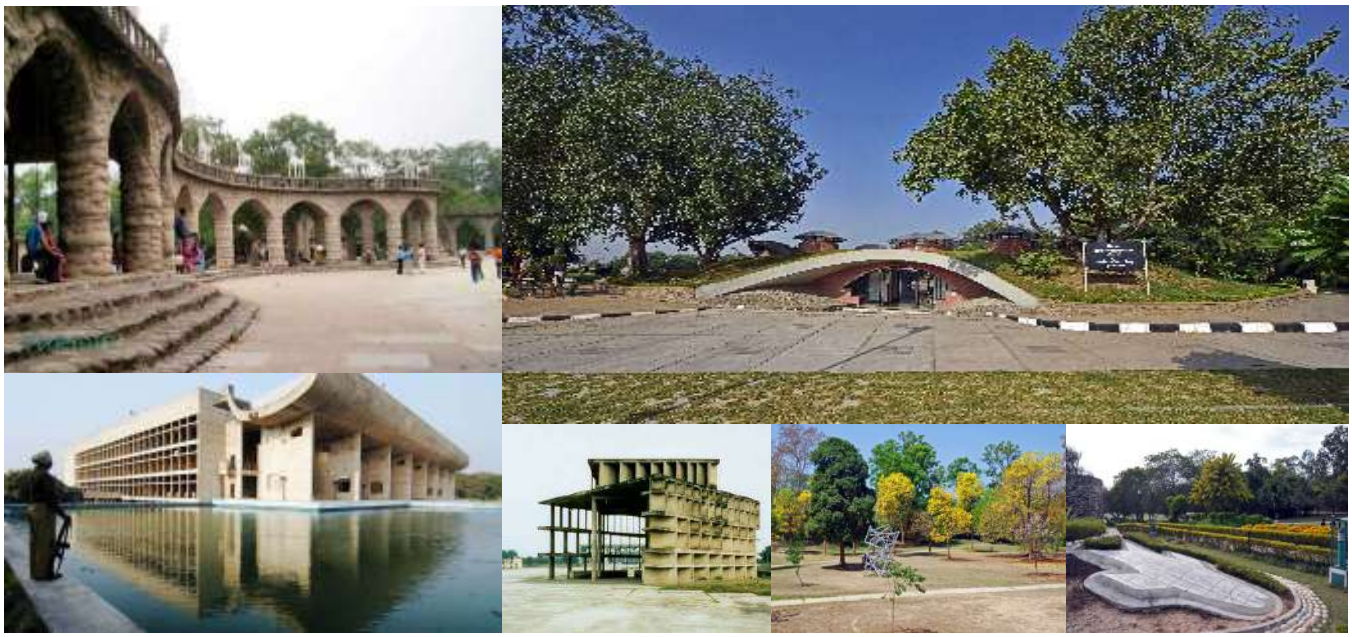
EXECUTIVE SUMMARY



Chandigarh, the union territory of India, located about 165 miles (265 km) north of New Delhi, the territory is bounded by the state of Haryana on the east and by the state of Punjab on all other sides. It is situated on the Indo-Gangetic Plain a short distance southwest of the Shivalik Range (Shivalik Range), between two seasonal hill torrents, the Sukhna and Patiali rivers. Chandigarh is known internationally for its architecture and urban design. Planned modern city, significant as a symbol of a developing, progressive and free India, Chandigarh is a pragmatic mix of the functional and the aesthetic romanticism blended with practicality. Born as a direct result of a violent and black period of Indian history- "the partition", Chandigarh has acquired the unique distinction of being capital to two states i.e. Haryana & Punjab. The wide tree-lined roads, managed gardens, unique architecture, greenery, the Rock Garden, Sukhna Lake, and its citizens; all together merge to characterize a city of the future, with no baggage of the past.

Famous as "The City Beautiful", Chandigarh was designed by French architect Charles-Édouard Jeanneret, popular as Le Corbusier. The word Chandigarh literally means "The Fort of Chandi". The name comes from the ancient temple called Chandi Mandir, devoted to Hindu goddess Chandi. Located near the foothills of the Shivalik range of the Himalayas in northwest India, Chandigarh covers an area of approximately 140 sq km (which includes 26 sq km of Sukhna wild life sanctuary) and shares borders with Haryana and Punjab. As per census 2011, over 10.54686 lakh people reside in Chandigarh with a population density of 9,252 persons/sq.km.

Le Corbusier has conceived the Master Plan of Chandigarh as analogous to the human body with a head (Capitol Complex, Sector 1), heart (The City Centre, Sector 17), lungs (The leisure valley, open spaces and sector parks), intellect (cultural & educational institutions), circulatory system (the road network) and viscera (the industrial area).

Under the INDC India has pledged to reduce the emissions intensity of its economy by 2030.

Planned for just half a million people, the city now is grooming over a million people in the same defined area of 114 sq. km. with thousands of migrants reaching here in search of better living and opportunities.

Chandigarh architecture is based on neighbourhood concept which allows the access of all facilities within the walking distances, to control the vehicular movement and promote healthy living. Each sector is occupied separately by a school, nursing home, shopping area, parks and gardens for its residents. Moreover the city has also provided with three multi-speciality hospitals including Post Graduate Institute of Medical Education & Research, Government Medical College and Hospital, Sector 32, Chandigarh, Government Multi Specialty Hospital, Sector 16, Chandigarh and the city also has Homeopathy & Ayurveda hospitals.

With the promise to keep Chandigarh clean and green, the Administration has initiated a programme to eradicate the slums by rehabilitating the entire slum population. All the villages are urbanized and provided with all basic amenities. The Punjab New Capital (Periphery) Control Act, 1952 was promulgated in 1952 to control haphazard growth around Chandigarh.

LAND

The Master Plan of UT Chandigarh covers an area of approximately 114 sq km (excluding 26 km area of Sukhna Wildlife Sanctuary). This includes the nearly fully developed 70 sq km of the area planned by Le Corbusier and his team and the 44 sq km of its 3% share of the 16 km periphery controlled area. The 44 sq km periphery area of Chandigarh is regulated by the Punjab New Periphery Control Act, 1952 with the exception of the abadi deh of the villages falling within it namely Sarangpur, Khudda Ali Sher, Khudda Jassu, Khudda Lahora, Maloya, Dadumajra,Palsora, Kajheri, Raipur Kalan, Raipur Khurd, Behlana, Hallomajra, Makhanmajra, Kishangarh and Manimajra. The area also includes the three natural rivulets of the Patiali Ki Rao, N-Choe and the Sukhna Choe.

Maximum land use of Chandigarh is in urban category. Census of 2011 reveals that 97.01% of households are in urban area and 2.98% is in rural area. Categorization of total area is as given below :

Out of total area in Chandigarh, 10672.16 acre is under residential area, 1339.73 acre of land is under commercial area, 2046.1 acre is under transport, 1326.5 acre is under industrial area, 2968.79 acre is under public/semi public, 2428.47 acre is under recreational use, 302.33 acre is under public utilities, 136.29 acre is under railway land, 1573 acre is under defence, 2113.97 acre of land is under forest land, 2046.1 acre of the total land is vacant, 277.29 acre of land is under green belts and 302.33 acre of land is under water treatment plant/ sewage treatment plant.

With total area of 140 sq. km, Chandigarh is blessed with 57.56 sq. km. of green cover which is 41.11% of UT's total area. This 57.56 sq. km. includes 10.00 sq. km of tree cover outside the forest area and 47.56 sq. km. of forest cover.

In the last two decades, city has observed 39% increase in green cover.

Air pollution is the third highest cause of death among all health risks, ranking just above smoking in India.

AIR

The ambient air quality of Chandigarh is monitored at the six major places of the city i.e. (1) Punjab Engineering College, (2) Industrial Area (3) Kaimbwala Village, representing village area (4) Sector 17, a commercial place (5) IMTECH, Sec 39 (6) Government College of Commerce and Business Administration, Sector-50 . These areas are located in the different parts of the city and are hence, covering almost whole of the city.

There are four major air pollutants that are monitored, namely, SO_2, NO_x and RSPM (PM10), PM 2.5. Out of these, NO_x and SO_2 are well within permissible limits (40 µg/m^3 and 50 µg/m^3), whereas, PM10 and PM 2.5 levels are certainly higher than the permissible limits, which is 60 µg/m^3/annually. This is due to reasons like illegal burning of leaves, pollens from trees, anthropogenic activities like burning of agro-residue, various industrial activities and vehicular pollution.

'वात आ वातु भेषजं शंभु मयोभु नो हृदे, प्रण आयूंषि तारिषत'

Pure fresh air is an invaluable drug, which is useful for our heart as a medicine, is enjoyable. The heart gets it and increases our age.

ऋग्वेद 10/186/01

MONITORING OF AIR QUALITY OF CHANDIGARH

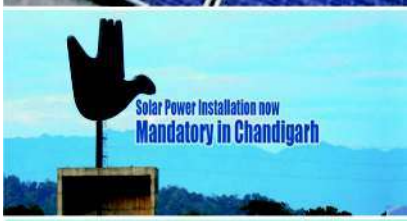
Several steps are taken to improve and monitor the deteriorating air quality of the city - Chandigarh Transport Undertaking (CTU) has decided to engage a consultant for undertaking the route analysis; resource planning using transport modeling techniques; find out the gaps in service and make suggestions for enhancing the bus service in order to increase the frequency of service to match the traffic demand.

The tender for Public Bike Sharing (PBS) is being implemented by the Chandigarh Smart City Ltd. which shall promote cycling in Chandigarh as means of transport. Besides, Engineering Department has set up target to complete 180 Km of cycle track by the end of 2019. The assistance of some experts/ IT Company is being sought, as the same is also part of short-term Strategies Plan for Mobility in Chandigarh.

CTU buses are checked for Air Pollution at regular interval of time and Pollution Under Control Certificate are issued from authorized Pollution Checking Centres (by STA/UT) for all buses. In addition, CTU has also procured (4) four Nos. of pollution Testing Machines for in-house pollution checking of buses. A new Fuel Injection Pump is procured at cost of Rs. 1.53 crores for calibration of diesel Fuel Injection Pumps and fuel injectors, which shall further reduce emissions.

The section 52 of Motor vehicle act is implemented and any vehicle which is modified without approval is challaned. Moreover Inspection and Certification (I&C) Centre is being established for machines based fitness level of the vehicle in Chandigarh.

ENERGY



The UT of Chandigarh is receiving power from 400/220 KV Nalagarh S/S of Power Grid Corporation of India Limited (PGCIL), from Mohali S/S of Punjab State Transmission Corporation Limited (PSTCL) and from Dhulkote S/S of Bhakra Beas Management Board. As per generation plan, UT of Chandigarh has already tied up for supply of additional capacity of around 118.27MW by FY 2018-19 (allocation from Central Sector and IPP Projects) through conventional energy sources. In addition, 39MW, through non-conventional energy sources is also tied up.

As such the total available capacity by FY 2018-19 is expected to be 496.94MW (452.62MW conventional and 44.32MW Renewable).

A Master Plan for Model Solar City was prepared by, "The Energy and Resource Institute" (TERI) and approved by MNRE, GOI in Jan 2012. The Solar City plan is aimed to reduce the dependence on conventional electricity consumption. MNRE, GOI has set 69 MW as Solar PV target for Chandigarh Administration to be achieved by 2022. Projects have been identified to achieve the target, Chandigarh has already installed and commissioned 26.069 MWp Grid tied Rooftop Solar Plants as on 31st Dec, 2018 including private sectors.

WATER

Chandigarh is having one of the best water drainage systems in India and most of the waste water is treated before discharge into the drain. Drinking water supply has been given to authorized and rehabilitated colonies and village areas. Special measures have been taken for remote areas. To improve the waste water disposal and to establish the same for newly built areas, up-gradation of sewerage system is ongoing. Polythene was found to be a drainage choker. To solve this problem, the manufacture and use of polythene/plastic carry bags have been completely banned in Chandigarh from 2nd Oct.2008. During the month of November and December 2018, 129 Nos. challans have been issued against the ban on polythene/plastic carry bags. The Challan under Soild Waste Management -Bye Laws is of Rs.500/- & challans for use of plastic/polythene is of Rs.5000/-.The Municipal corporation is under process to issue revised Solid Waste Management Bye-Laws in which the rate of challans is going to be increased from Rs.500/- to 5000/-. The Municipal Corporation is also regularly checking the activity of the whole sellers dealing with disposal and polythene/ carry bags.

Fate of Treated Waste Water

Chandigarh has a properly hooded sewerage facility in addition to a fully functional treatment facility. Out of the total water being supplied to the residents of Chandigarh, 54 MGD sewage effluent is

Biofuels are being considered an alternative to reduce the country's crude oil imports worth Rs. 7 lakh crore.

being generated per day. According to the Action Plan for Control of Pollution in river Ghaggar, at present, 48.85 MGD is being treated in the city with the total proposed STP capacity of 56.33 MGD. Considering the importance of water, Chandigarh initiated tertiary treatment of waste water at Diggian STP (10 MGD) and later supplied it for the non-potable uses such as irrigation of gardens, washing purposes, etc to different sectors.

Water Demand in Chandigarh

Chandigarh is recipient to heavy rainfall during the months from July to September and receives an average rainfall of 1059.3 mm, which is calculated to be approximately 60380.1 million liters or 13241 gallons or 36.28 MGD per annum. It is this water source that helps in recharging of ground water and various confined/ unconfined aquifers.

The demand for water in Chandigarh has increased considerably owing to its highly dense population structure. It is estimated that by 2026, the water demand will be 523.41 (Millions of liters per day) MLD (116.31 MGD) that is about 22.73% higher than the 2011 demand of 426.50 MLD (94.78 MGD). This is due to excessive pumping of water than the required replenishment. As a result, the ground water level of deep aquifers in Chandigarh have been suppressed on an average of 4m in 6 years at different locations throughout the city.

ACTION PLAN FOR WATER CONSERVATION

As per the action plan for water consumption, following actions are taken to manage the balance of water intake-

All new buildings are being fitted with water efficient fixtures and water less urinals, resulting into reduction of 15% of the water consumption.

An agency is being decided from the Empaneled agency of MoUD to study the non revenue water, however strict monitoring results in leakage control in the tune of 5%.

It has been notified in the Chandigarh Water Supply Bye Laws that all the malfunctioning water meters shall be replaced by the consumers from their own, otherwise the penal rate will be charged from water charges which is being strictly followed resulting in 80% of the malfunctioning water meters replaced.

In order to attain Landscape Water Conservation- Tertiary Treated Water network has been provided and it has been mandatory for all the residential houses above 1 kanal to have T.T connection for irrigation purpose.

All the green belts/parks are being irrigated with T.T. Water and the work is in progress to cover the entire city within next 3 months.

For Water Audit

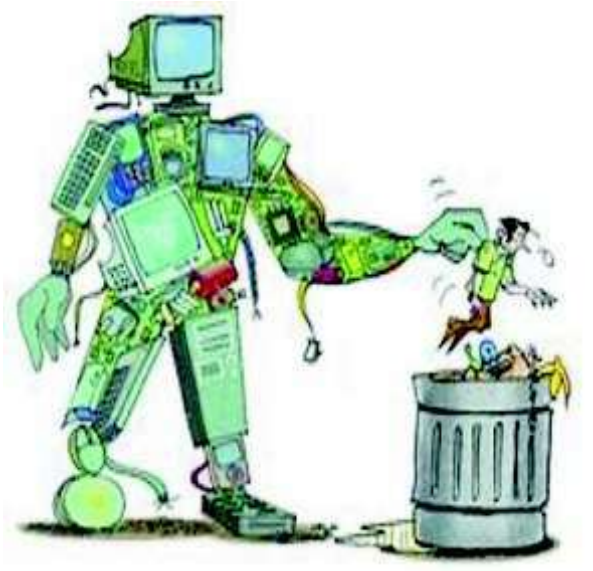
EESL has been engaged for the water audit and survey work is in progress.

WASTE

On an average, 450 MT to 500 MT waste is generated everyday which is being handled by the Municipal Corporation of Chandigarh. Owing to the ever increasing pollution, population and lifestyle change are possible reasons for increase in waste genration. Although due to efficient collection and segregation schemes launched by the administration, the collection efficiency has increased from 97% to 100%. The MC has resolved the scheme for solid waste management for Chandigarh in terms of scrutiny for un-attended areas for the collection of door-to-door garbage.

Bio-Medical Waste Generation in Chandigarh

The total bio-medical waste generation in Chandigarh is around 2503 kg. per day including 2207 kg from bedded facilities and 296 kg/day from non bedded small health care facilities. Presently, there are 788 Health Care Facilities (HCFs) operational in Chandigarh.These HCFs include 583 small clinics/dispensaries, 13 veterinary institutions, 3 animal houses, 118 pathological laboratories, 4 blood banks, 4 research institutes and 14 ayush clinics/hospitals. The total bed strength is 4413 in Chandigarh (as per 2018 annual report).



E-Waste (Electronic Waste) in Chandigarh

As per annual record of CPCC, in 2017, 29 MT of e-waste is generated and disposed off.. It was also found that most of the e-waste generated was from the use of Electrical and Electronic Equipment (EEE) such as Mobile phones, Laptops, Cameras, Washing machines, Air conditioners, Heaters, Geysers, LEDs and LCDs. Moreover, taking the annual GDP growth rate of India into account e-waste generation from households was estimated to reach 9565.1 tons/annum by 2020.

India's renewable energy capacity stands at more than 74 GW today including about 25 GW from solar.

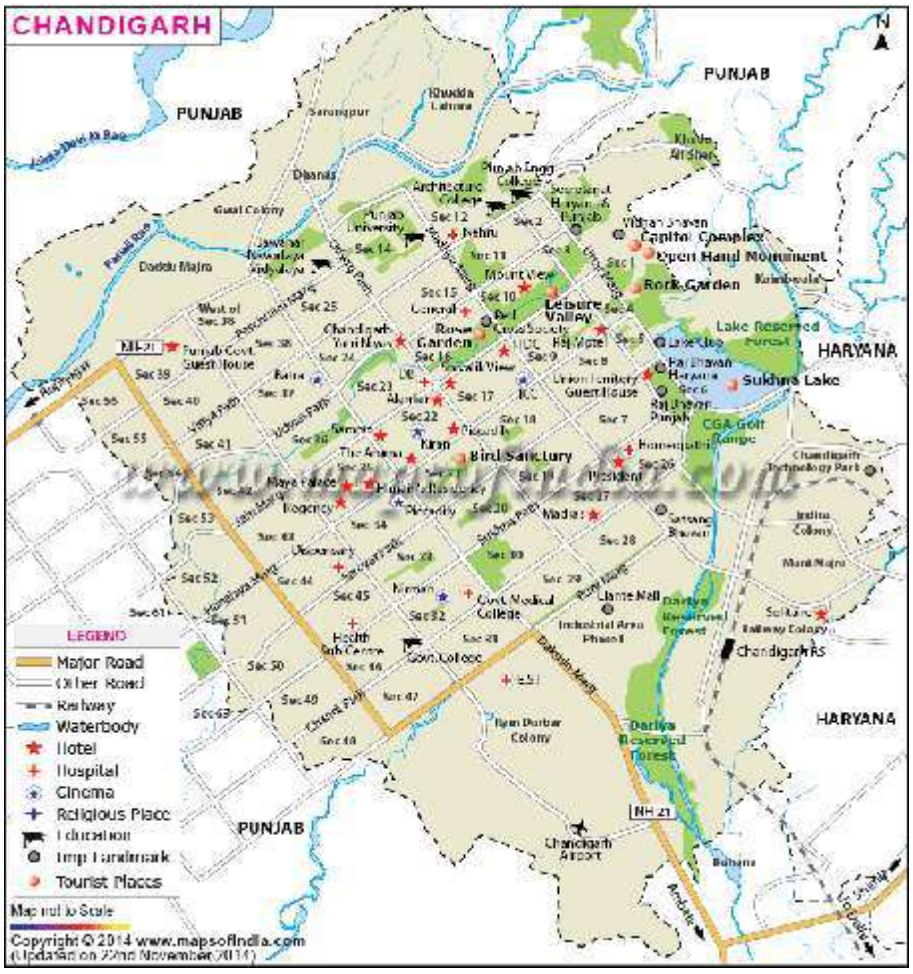
Initiatives

In order to promote onsite composting, 26 bulk waste generators in Chandigarh are practicing onsite processing of wet waste at their respective premises. Additionally, there are 11 institutes wherein pit composting have already been implemented. Moreover, 105 parks/ Gardens have on-site composting facility. Besides, many households are also practicing onsite composting.

- For the effective treatment of wet waste, MCC has installed Bio-Methanation plant with a capacity of 5TPD for the effective treatment of wet waste .
- The MC has developed the required infrastructure to collect & transport wet and dry waste in a segregated manner. The wet waste will finally be sent to the compost unit of JP plant.
- The Municipal Corporation has hired an agency named, (M/s Speedways Advertising) for promoting of Information, Education and Communication (IEC) activities. They will also be preparing IEC material for schools including the general public to convey the messages for effective waste management.
- The MC has installed bins for the collection of E-waste in different commercial areas of the City. The same has also been put up on the website of the MC, Chandigarh.
- The upgradation of STPs is proposed to be executed by Chandigarh smart city limited in next two years in a phased manner.
- The bad odour will be removed at STPs itself , if proposed to have BOD design less than equal to 10 mg/ltr.

Almost 90% of disasters are water-related and affects 60% of humanity that lives along coastlines by flooding and tsunamis.

INTRODUCTION



Chandigarh, the dream city of India's first Prime Minister, Sh. Jawahar Lal Nehru, was planned by the famous French architect Le Corbusier. Picturesquely located at the foothills of Shivaliks, it is known as one of the best experiments in urban planning and modern architecture in the twentieth century in India.Chandigarh derives its name from the temple of "Chandi Mandir" located in the vicinity of the site selected for the city. The deity 'Chandi', the goddess of power and a fort of 'garh' laying beyond the temple gave the city its name "Chandigarh-The City Beautiful".The city has a pre-historic past. The gently sloping plains on which modern Chandigarh exists, was in the ancient past, a wide lake ringed by a marsh. The fossil remains found at the site indicate a large variety of aquatic and amphibian life, which was supported by that environment. About 8000 years ago the area was also known to be a home to the Harappans.

Since the medieval through modern era, the area was part of the large and prosperous Punjab Province which was divided into East & West Punjab during partition of the country in 1947. The city was conceived not only to serve as the capital of East Punjab, but also to resettle thousands of refugees who had been uprooted from West Punjab.In March, 1948, the Government of Punjab, in consultation with the Government of India, approved the area of the foothills of the Shivaliks as the site for the new capital. The location of the city site was a part of the erstwhile Ambala district as per the 1892-93 gazetteer of District Ambala.

The foundation stone of the city was laid in 1952. Subsequently, at the time of reorganization of the state on 01.11.1966 into Punjab, Haryana and Himachal Pardesh, the city assumed the unique distinction of being the capital city of both, Punjab and Haryana while it itself was declared as a Union Territory and under the direct control of the Central Government.

Wetlands are key to climate change mitigation.

The basic geographical and demographic profile of Chandigarh is as under:

Area	**140 sq kms (Includes 26 sq km of Sukhna Wildlife Sanctuary)**
Longitude	76° 47' 14E
Latitude	30° 44' 14N
Altitude	304-365 meters above MSL with 1% drainage gradient
Annual Rainfall (2016)	910 mm
Monsoon	July-September
Temperature	Winter Min. (Nov.-Jan, 2016) 2°C - 10° C Summer Max. (April-July, 2004) 38°C - 43°C
Prevalent Winds	From the North West to South East in Winter and reverse in Summer
Total Population (2011 census)	10,55,450
Density of population/sq. km.	9,258
Birth Rate	11.7 (2018)
Death Rate	5.27 (2018)
Infant Mortality Rate (per 1000)	25.6 (2018)
Sex Ratio (females per 1000 males)	818
Decennial Population Growth	17.19%
Literacy Rate	86.0%

Geology

The Union Territory of Chandigarh is located in the foothills of the Shivalik hill ranges in the north, which form a part of the fragile Himalayan ecosystem. It is occupied by Kandi (Bhabhar) in the north east and Sirowal (Tarai) and alluvial plains in the remaining part. The subsurface formation comprises of beds of boulders, pebbles, gravel, sand, silt, clays and some kankar. The area is drained by two seasonal rivulets viz. Sukhna Choe in the east and Patiala-Ki-Rao Choe in the west. The stream passing through the central part is called N-Choe.

Climate

Chandigarh falls under Koeppen's CWG class, for example, it has cold dry winter, sweltering summer, and subtropical storm. Vanishing ordinarily surpasses precipitation and the climate is commonly dry.

The territory encounters four seasons : (i) Summer or sweltering season (mid-March to Mid-June) (ii) Rainy season (late-June to mid-September); (iii) Post storm fall/progress season (mid-September to mid-November); (iv) Winter (mid-November to mid-March). The drought of summer is long however with the incidental sprinkles or tempests. May and June are the most sizzling a very long time of the year with the mean day by day greatest and least temperatures being about 37°C and 25°C, individually. Most extreme temperatures can ascend to 44°C. Southwest rainstorm with high-power showers starts in late June. The climate right now is hot and moist. The variety in yearly precipitation on year to year premise is obvious for example 700 mm to 1200 mm. The 20-year normal precipitation for Chandigarh is 1100.7 mm. January is the coldest month with mean most extreme and least temperatures being around 23°C and 3.6°C respectively. Winds are commonly light and blow from northwest to southeast course with a special case of easterly to south-easterly breezes that blow on some days amid the mid-year season.

The Master Plan of Chandigarh

Layout plan of a Sector

Le Corbusier conceived the master plan of Chandigarh as analogous to human body, with a clearly defined head (the Capitol Complex, Sector 1), heart (the City Centre Sector-17), lungs (the leisure valley, innumerable open spaces and sector greens), the intellect (the cultural and educational institutions), the circulatory system (the network of roads, the 7Vs) and the viscera (the Industrial Area). The concept of the city is based on four major functions: living, working, care of the body and spirit and circulation. Residential sectors constitute the living part whereas the Capitol Complex, City Centre, Educational Zone (Post Graduate Institute, Punjab Engineering College, Panjab University) and the Industrial Area constitute the working part. The Leisure Valley, Gardens, Sector Greens and Open Courtyards etc. are for the care of body and spirit. The circulation system comprises of 7 different types of roads known as 7Vs. Later on, a pathway for cyclists called V8 were added to this circulation system.

Government of India has taken an ambitious goal of generating 175 GW of renewable energy by 2022.

The Capitol complex comprises three architectural masterpieces: the "Secretariat", the "High Court" and the "Legislative Assembly", separated by large piazzas. In the heart of the Capital Complex stands the giant metallic sculpture of The Open Hand, the official emblem of Chandigarh, signifying the city's credo of "open to given, open to receive".

The city centre (Sector 17) is the heart of Chandigarh's activities. It comprises the Inter-State Bus Terminus, Parade Ground, District Courts, etc. on one hand, and vast business and shopping center on the other. The 4-storey concrete buildings house banks and offices above and showrooms/shops at the ground level with wide pedestrian concourses. The Neelam piazza in the center has fountains with light and water features. Proposal to set up an eleven storey building in Sector 17 is in the offing. Sector 34 is another developed commercial sector.

Park Areas

Ample areas have been provided in the master plan of the Capital for parks. Out of a total area of 20,000 acres acquired for the first phase, about 2000 acres are meant for development of parks. Leisure Valley, Rajendra park, Bougainvillea Park, Zakir Rose Garden, Shanti Kunj, Hibiscus Garden, Garden of Fragrance, Botanical Garden, Smriti Upavan, Topiary garden and Terraced Garden are some of the famous parks of Chandigarh. Sukhna Lake, Rock Garden, Government Museum and Art Gallery are major tourist attractions of Chandigarh.

One unique feature in the layout of Chandigarh is its roads, classified in accordance with their functions. An integrated system of seven roads was designed to ensure efficient traffic circulation. Corbusier referred to these as the 7'Vs. The city's vertical roads run northeast/southwest (the 'Paths'). The horizontal roads run northwest/southwest ('The Margs'). The intersect at right angles, forming a grid or network for movement.

This arrangement of road-use leads to a remarkable hierarchy of movement, which also ensures that the residential areas are segregated from the noise and pollution of traffic.

Each 'Sector' or the neighboured unit, is quite similar to the traditional Indian 'mohalla', Typically, each sectors measures 800 metres by 1200 metres, covering 250 acres of area. Each Sector is surrounded by V-2 or V-3 roads, with no buildings opening on to them. Access from the surrounding roads is available only at 4 controlled points, which roughly mark the middle of each side. Typically a sector is divided in four parts by a V-4 road running from east to west and a V-5 road running from north to south. These four parts are easily identifiable as A, B, C and D corresponding to North, East, South and West sides. Each Sector is meant to be self-sufficient, with shopping and community facilities within reasonable walking distance.

Though educational, cultural and medical facilities are spread all over city, however, major institutions are located in Sectors 10, 11, 12, 14 and 26.

Historical Background

'SOMETHING GOOD COMETH OUT OF EVIL'; thus goes the Biblical saying. This legendry proverb aptly describes the birth of the city of Chandigarh, which was conceived immediately after India's Independence in 1947. With the partition in the subcontinent, Lahore, the capital of undivided Punjab fell within Pakistan, leaving East Punjab without a Capital. It was decided to built a new Capital city called Chandigarh about 240 kms. north of New Delhi on a gently sloping terrain with foothills of the Himalayas the Shivalik range of the North and two Seasonal rivulets flowing on its two sides approximately 7-8 kms apart. The geographical location of the city is 30 degree 50' N latitude and 76 degree 48' longitude and it lies at an altitude varying from 304.8 to 365.76 meters above sea level. Pandit Jawaharlal Nehru, Independent India's first Prime Minister, laid down the founding principles of the new city when he said “Let this be a new town, symbolic of freedom of India unfettered by the traditions of the past….. an expression of the nation's faith in the future”. The city is a product of Nehru's vision.

SELECTION OF SITE

To select a suitable site, the Govt. of Punjab appointed a Committee in 1948 under the Chairmanship of P.L Verma, Chief Engineer to assess and evaluate the existing towns in the State for setting up the proposed capital of Punjab. However, none was found suitable on the basis of several reasons, such as military vulnerability, shortage of drinking water, inaccessibility, inability to cope in flux of large number of refugees etc. The present site was selected in 1948 taking into account various attributes such as its Central location in the state, proximity to the national capital & availability of sufficient water supply, fertile of soil, gradient of land for natural drainage, beautiful site with the panorama of blue hills as backdrop & moderate climate.

PLANNER

An American Firm, M/s. Mayer, Whittlessay and Glass was commissioned in 1950 to prepare the Master Plan for the new City. Albert Mayer and Mathew Novicki evolved a fan shaped Master Plan and worked out conceptual sketches of the super block. The super block was designed as a self sufficient

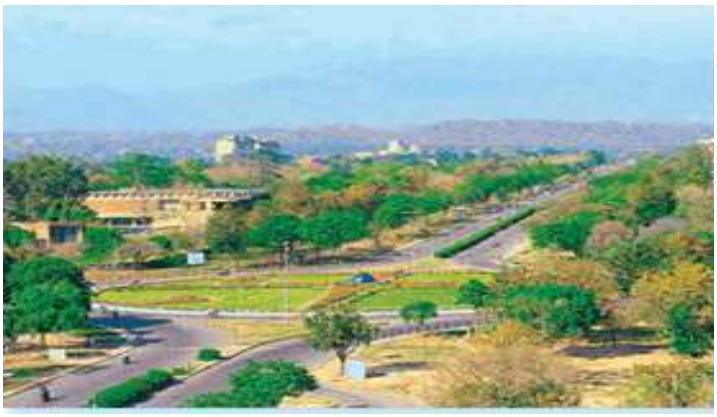
Pradhan Mantri Ujjwala Yojana The scheme was launched in 2016. It aims for providing access to clean cooking fuel.

neighborhood units placed along the curvilinear roads and comprised of cluster type housing, markets and centrally located open spaces. Novicki was tragically killed in an air accident and Mayer decided to discontinue. Thereafter, the work was assigned to a team of architects led by Charles Eduard Jeanneret better known as Le Corbusier in 1951. He was assisted by three senior architects, Maxwell Fry, his wife Jane B Drew and Corbusier's cousin, Pierre Jeanneret. These senior architects were supported by a team of young Indian architect and planner consisting of M.N. Sharma, A. R. Prabhawalkar, U.E. Chowdhary, J.S. Dethe, B.P. Mathur, Aditya Prakash, N.S. Lanbha and others.

Circulation

Le Corbusier's traffic system followed Mayer's lines but was more elaborate; he called it Les Sept Voies de Circulation, or Seven Vs. The rationale of his planning was the motor car. "From his early studies in urbanism, Le Corbusier had identified the motor car as the central factor of modern town planning. His initial, primarily aesthetic, quasi-Futurist response to the motor car and to rapid movement in the cities had, by 1950, metamorphosed into a theoretical solution to the problems of modern traffic -- a graded system of circulation, from crossing continents to walking to the front door. [As Le Corbusier put it] 'The 7 Vs act in the town plan as the bloodstream, the lymph system and the respiratory system act in biology. These systems are quite rational, they are different from each other, there is no confusion between them, yet they are in harmony ... It is for us to learn from them when we are organising the ground that lies beneath our feet. The 7Vs are no longer the sinister instruments of death, but become an organised hierarchy of roads which can bring modern traffic circulation under control'." [Prasad Sunand, 1987].

The 7Vs establishes a hierarchy of traffic circulation ranging from : arterial roads (V1), major boulevards (V2) sector definers (V3), shopping streets (V4), neighbourhood streets (V5), access lanes (V6) and pedestrian paths and cycle tracks (V7s and V8s). The essence of his plan for Chandigarh rests on preserving intact the true functions of these seven types of roads.[For details see Le Corbusier's Statue of Land]



The entrance of cars into the sectors, which are exclusively reserved to family life, can take place on four points only; in the middle of the 1,200 meters; in the middle of the 800 meters. All stoppage of circulation shall be prohibited at the four circuses, at the angles of the sectors. The bus stops are provided each time at 200 meters from the circus so as to served the four pedestrian entrances into a sector. Thus the transit traffic takes place out of the sectors; the sectors being surrounded by four wall-bound car roads without openings (the V3s).

The road system was so designed that "never a door will open on the surrounding V3s: precisely the four surrounding V3s must be separated from the sector by a blind wall all along." Buses can ply on the V4s, the horizontal connection between contiguous sectors, but not within the sector interiors. [Evenson, Norma, 1966]

Living

The functions of living occupies primary place. Keeping in view the habits of he peoples, Le Corbusier planned that every dwelling should have three elements of Sun, Space and greenery. The housing in the city can be sub-divided into two parts- Government housing and Private Housing.

Government Housing

The Govt. housing in the city was divided into 13 categories, ranging from the house for the Chief Minister to the two-room house completer with sanitary facilities, a kitchen, a veranda and a courtyard for the lowest paid employee. The socio economic conditions of the city restricted the height of most of the residential buildings to two to three storied structures.

Private House-Controlled Development

In view of the needs of various economic classes, plots of areas ranging from 114sq. mtrs. To 4500 sq. mtrs. were planned. The living habits of the people are of outdoor type because of hot summers and hot and humid rainy seasons comprising most part of the year.

Keeping this factor in view, Corbusier conceived a series of Architectural Controls / frame controls/ zoning regulations for each and every category of houses in which it was mandatory to provide open to sky

Pilibhit Tiger Reserve is home to habitat for over 127 animals, 326 bird species and 2,100 flowering plants.

courtyard both at he front and rear side of every house. These courts provided light and ventilation to houses besides serving as private open-to-sky spaces. A series of such houses were planned around community level open space which served the purpose of holding social and religious functions and outdoor activities and games by children.

Green City

The greening is an integral part of Urban Planning in U.T., Chandigarh. Tree plantation along avenues, open spaces, green belts and around building complexes are enthralling features of the city. A number of beautiful avenues with conspicuous tree species, well wooded forests along the periphery of city, 'Sukhna lake' against the backdrop of Lake Reserve Forests, green belts running across the length and breadth of the city and a beautiful 'Sukhna Wildlife Sanctuary' on its periphery, further enhance the ecological, environment and aesthetic richness of the city.Chandigarh is having total 27 parks and total 69 Green belts in city.

Architectural Controls

In important civic areas, aesthetical harmony between all buildings is a must because architectural is a visual art and the visual impact forms should be as beautiful and organized as can be. Accordingly, to curb undue individualism in the built environment, Le Corbusier conceived a number of mechanisms to regulate the development of private buildings in the city. These included architectural controls, frame controls and zoning controls in the city. The basic aim was to maintain uniformity in skyline, heights and the architectural character.

Architectural controls is applicable specially to buildings to be built by private enterprise in special areas of architectural interest such s V-2 roads, V-4 roads, City Centre etc.

Further controls on private construction in the city have been imposed through building byelaws, which govern and lay down the minimum standards of light ventilation, living area and sanitation. Each plot of land in the city is governed by the specific use and building volume that can be developed on it through 'zoning restriction'. In small residential houses frames control was devised which is an architectural element limiting projection lines and unifying heights. Opening of desired size and shape may be arranged within this frame as per individual requirements.

Similarly in shopping street, architectural order is ensured by development of shops as architectural controls. This ensures harmonious development in accordance to the plan.

Edict of Chandigarh

This edict of Chandigarh was prescribed by Mon Le Corbusier, the planner of Chandigarh for its citizens to follow in future

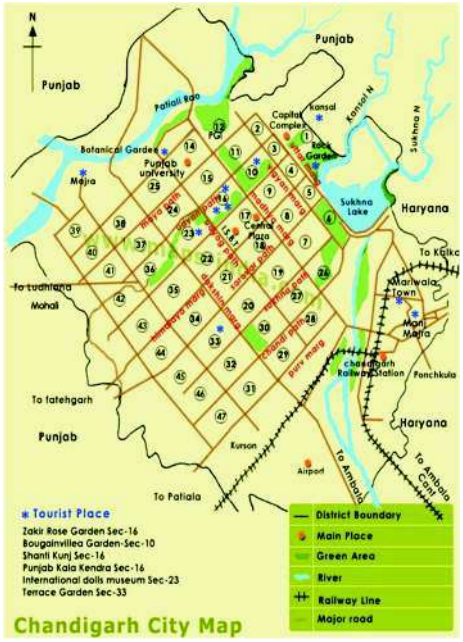
The object of this edict is to enlighten the present and future citizens of Chandigarh about the basic concepts of planning of the city so that they become its guardians and save it from whims of individuals. This edict sets out the following basic ideas underlying the planning of the city.

Human Scale

The city of Chandigarh is planned to human scale. It puts in touch with the infinite cosmos and nature. It provides us with places and buildings for all human activities in which the citizens can live a full and harmonious life. Here the radiance of nature and heart are within our reach.

Sectors

The city is composed of sectors. Each sector is(½ mile x ¾ mile) 800 meters x 1200 meters enclosed by roads allocated to fast mechanized transport and sealed to direct access from the houses.



Each sector caters for the daily needs of its inhabitants which vary from 5000 to 25000 and has a green strip oriented longitudinally stretching centrally along the sector in the direction of the mountains. The green strip should stay un-interrupted of the mountains. The green strip should stay un-interrupted and accommodate schools, sports, walks and recreational facilities for the sector.

Vehicular traffic is completely forbidden in the green strips where tranquility shall reign and the curse of noises shall not penetrate.

Roads:

The roads of the city are classified into seven categories known as systems of 7 Vs as below

- **V-1 Fast roads connecting Chandigarh to other towns.**
- **V-2 Arterial roads.**
- **V-3 Fast vehicular sector dividing roads.**
- **V-4 Meandering shopping streets.**
- **V-5 Sector circulation roads.**
- **V-6 Access roads to houses.**
- **V-7 Foot paths and cycle tracks.**

Buses will only ply on V-1, V-2, V-3 and V-4 roads. A wall shall seal the V-3 roads form the sector.

The law on single-use plastic ban sets a target to gather 90 per cent of plastic for recycling by 2029 .

Industrial Area

Located in, the south-east side of the city close to the railway station and wholesale markets of the city, the Industrial Area provides easy access to the goods, transport centre and wholesale market. Its location while planning was decided after taking into account factors such as the proximity on the access road for the entry of raw materials and exit of finished goods without having to go through the populated streets disturbing the peace of the town, thus keeping the pollution zone away from the city. Further, a buffer zone has been provided between the industrial area and the residential and administrative spaces.

Chandigarh is having total 1625 number of white category industry, 577 number of Green Category Industries, 575 number of orange category Industries, 192 number of Red Category Industries.

INITIATIVES OF CHANDIGARH ADMINISTRATION

Chandigarh is a city that has remained true to its philosophy: 'Open to receive, Open to give', as symbolized by the Open Hand Monument. The City Administration is alive to the concerns of the citizens and sensitive to their needs. Chandigarh has made rapid strides towards making the city an eready Union Territory through a host of e-Governance programmes like eSampark, m-Sampark, mobile RLA, m Directory, Cashless Chandigarh, eStamping, e-Education, e-Saksham, e-Payment, Gram Sampark, etc.

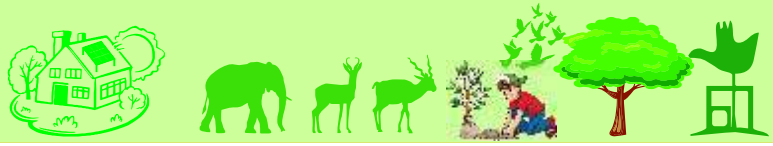
Providing Essential Public Services to the Poor

Education

Under Sarva Shiksha Abhiyan 10,400 children have been enrolled and the ambit of SSA is spreading its wings to cover all the out of school children/ drop-outs by the end of this financial year. To accomplish this task a house-hold survey has been inititated which will detect the out of school children. To encourage literacy amongst the illiterate adults, different schemes in collaboration with Govt. of India are being launched every year. Literacy centers are being opened in all the nook and corner of the city so that every adult can be educated and provided basic minimum educational qualification.

Swachhta Abhiyan

The citizens of Chandigarh along with different influential bodies like Resident Welfare Associations, NGOs, Government employees & students actively participated in the "Swachhta Hi Seva" programme initiated to sensitize people about keeping the city clean. Apart from regular manual and mechanized sweeping, 33865 complaints were received through the Swachhta App. of which 96.7% have been resolved. Also, 34,904 citizen of Chandigarh have downloaded the app Further, Municipal Corporation, Chandigarh has been awarded with Skoch Award Silver for Solid Waste Management and Women Functionaries of Area Level Federations as Swachhta Grahi 2017.



Roads

As a Long term measure, Chandigarh Administration has initiated the conversion of all bitumen roads into RCC roads. We are also using plastic waste in road construction and propose to rehabilitate our rag pickers in a planned colony. The Engineering Department will purchase plastic waste from the rag pickers and use in the construction of roads.

Power

- Long term tie ups have been made with all the Power Corporations, so as to ensure uninterrupted power supply to the City.
- Talks are going on with GAIL for a dedicated gas pipeline to the city for setting up of 250 MW Power plant.
- In touch with foreign companies for harnessing the Solar energy, which will include setting up a plant for manufacture of Solar Photovoltaic Cells.
- Power T & D losses have been brought down from 24% to 19%, which will be further brought down to 16%.

Protecting the Environment

- Botanical Garden has been developed on 178 acres in village Sarangpur, which will consist of 15 botanical sections and other features to promote eco tourism.
- 3 Lakes, two along Patiala ki Rao and 1 along Sukhna Choe are being undertaken , as a part of environmental related initiatives.
- A Project for augmentation of the Water Supply has been prepared and sent to GOI under JNNURM for approval. This will go a long way in contributing towards Rain water Harvesting, Ground Water Charging and also reducing our dependence on pumping out Ground water.
- Tertiary Water treatment plan is also under implementation which will cater to the needs of supporting 2000 parks/gardens in the city.
- Eco-tourism, Chandigarh Administration has recently notified 31 trees existing in Chandigarh that are more than 100 years old as 'Heritage Trees'.

Greening Action Plan (GAP)

- To chalk out the planning of the plantation works, its implementation, monitoring and to look into all aspects of the Silvicultural & Horticultural operations within the Union Territory of Chandigarh; Greening Chandigarh Task Group has been constituted for the preparation of annual GAP.
- The Greening Action Plan describes the plantation targets of the various departments and strategies to achieve the desired results by streamlining and unifying the efforts and inputs of all the stakeholders-Departments, NGO's, Educational Institutions, RWA's, Individuals etc.
- Greening Chandigarh Task Group has achieved more than 100% plantation targets for the year 2017-18. Against the target of 2.35 lakh seedlings, Chandigarh has done plantation of 2.39 lakh saplings during the year 2017-18.

Carbon dioxide concentrations in the atmosphere have jumped from 357 parts per million (ppm) in 1994 to 405.5 ppm in 2017.

LAND USE

The layout or arrangement in terms of use of land is known as “Land Use Pattern”. The land may be used for agriculture, forest, pasture, residential, commercial, recreational and industrial purposes. Land use is determined by many factors like relief features, climate, soil, population density, technical and socio-economic factors. Land use also involves the transformation and modification of natural environment into a built environment that include semi-natural habitats like pastures, irrigated fields etc. Out of India's total geographical area of 328.7 million hectares, the statistical information about the land use pattern in India is available for only about 305.69 million hectares. The land use has changed drastically since 1950-51. As per census 2011, Chandigarh stands second in India, in terms of the urbanized population, among the other cities, with 89.8% population living solely in urban area. Land management practices have a major impact on natural resources including water, soil, nutrients, plants and animals.

For instance, water bodies in a region that has been deforested or suffered erosion will have a varied water quality than those in areas that are forested.

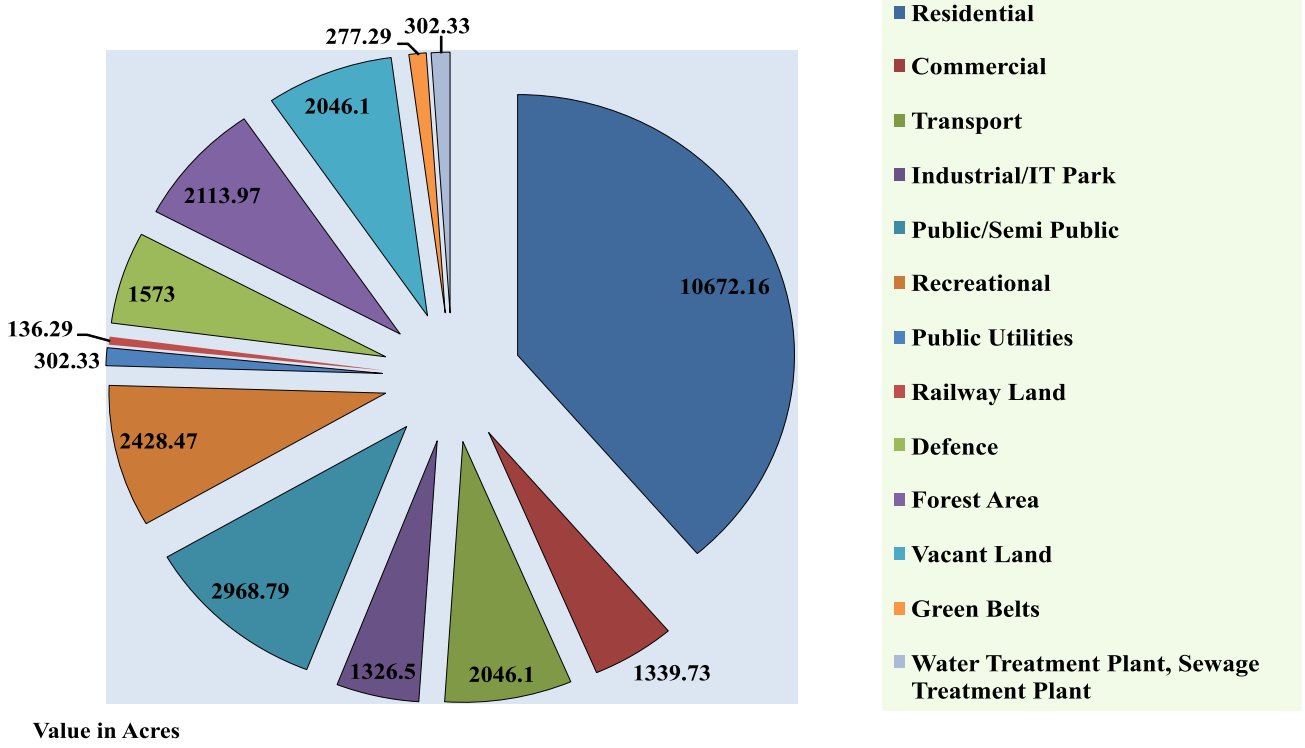
Landuse for the city of Chandigarh was defined by the Plan prepared by Le Corbusier . Based on the CIAM (Congress International de Architecture Modern) principles of the Functional City which focused on segregation of four major functions i.e. Living (the residential sectors), Working (the Capitol Complex, commercial /institutional buildings along Madhya Marg, Jan Marg, City Centre), Care of Body and Spirit (the Leisure Valley, open spaces and sector greens) and Circulation (the network of roads, the 7Vs).

The medieval Chandigarh was the home to the Harappan Civilization about 8000 years ago.

The total geographical area of Chandigarh is 140 sq. Km, which includes 26 km of Sukhna wildlife Sanctuary. Out of the total 57.56 sq. km. green cover in Chandigarh, 47.56 sq. km area is under forest cover and another 10 sq. km area is under tree cover outside the forest.

Forests of Chandigarh have been assigned rank no.1 in Planning Commissions Environmental Performance Index. Out of the many targets, plantation of 239126 no. of plant saplings, 1,50,000 no. of stem cuttings of Arundo-Dona (Good soil binder) and 3,00,000 no. of patch sowing were achieved during the year 2017-18.

Land Use Pattern



Source: Department of Urban Planning, UT, Chandigarh

Urban Area:

Maximum land use of Chandigarh is in urban category. Census of 2011 reveals that 97.01% of households are in urban area and 2.98% is in rural area. Categorization of total area is as given below:

Out of total area in Chandigarh, 10672.16 acre is under residential area, 1339.73 acre of land is under commercial area, 2046.1 acre is under transport, 1326.5 acre is under industrial area, 2968.79 acre is under public/semi public, 2428.47 acre is under recreational use, 302.33 acre is under public utilities, 136.29 acre is under railway land, 1573 acre is under defence, 2113.97 acre of land is under forest land, 2046.1 acre of the total land is vacant, 277.29 acre of land is under green belts and 302.33 acre of land is under water treatment plant/ sewage treatment plant.

Chandigarh's official emblem is the 'Open Hand' which signifies peace and reconciliation. The open hand sends a message of 'open to give and receive'.

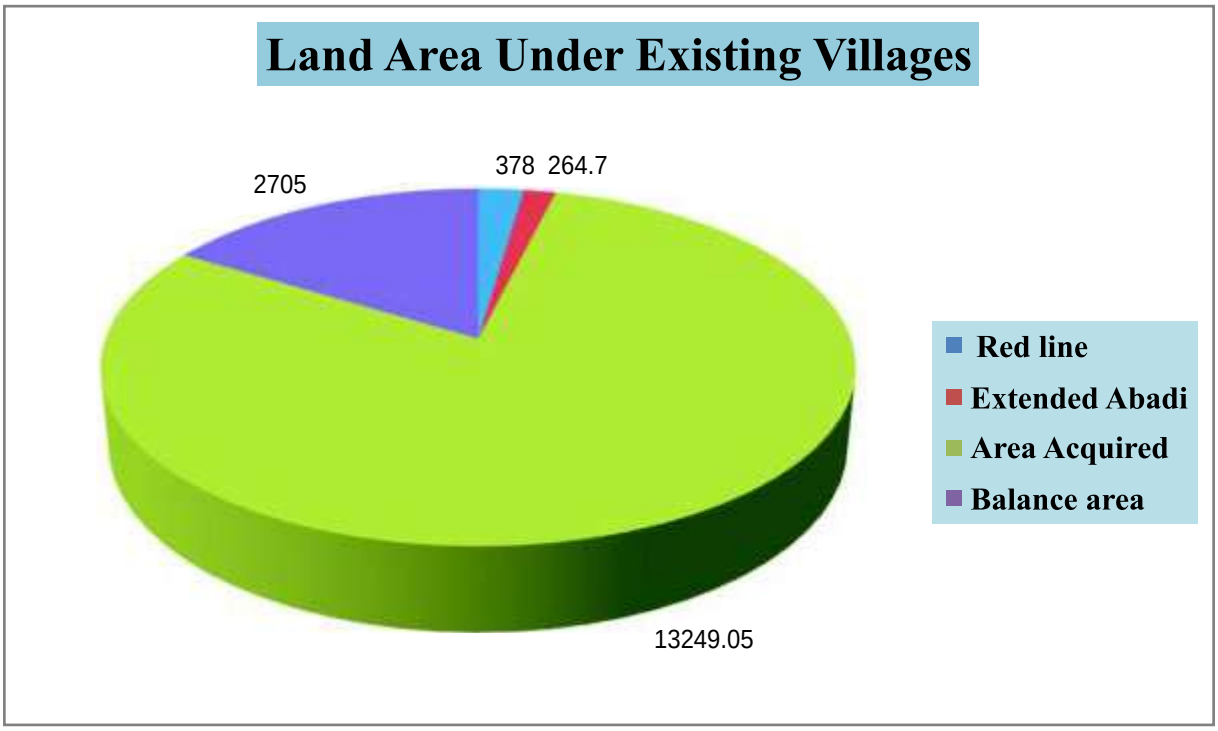
Development of Villages Under Municipal Corporation, Chandigarh

With the creation of the Municipal Corporation of Chandigarh (MCC) in July 1994, nine villages have been brought under the MCC while the rest are still rural and governed by elected Gram Panchayats. The villages under the MCC are Burail, Badheri, Attawa, Hallomajra, Palsora, Dadumajra, Maloya, Kajheri and Buterla. The unacquired non-abadi deh land which some of these villages still have, continues to come under purview of the Periphery Control Act., 1952. In 2006, "The Chandigarh Administration (Erection & Re-erection of building) Rules, 2006, for the villages in the Municipal area of Municipal Corporation of Chandigarh" were notified under Sub- Section 2 of Section 5 (2) read with Section-22 of the Capital of Punjab (Development & Regulation) Act, 1952 vide Notification No.26/6/39-UTFI(3)-2006/7869 dated 27.12.2006. These Rules initially extended to the entire unacquired area of the revenue estates of villages comprised/included in the Municipal area of Municipal Corporation of Chandigarh, including the area under the abadi deh.

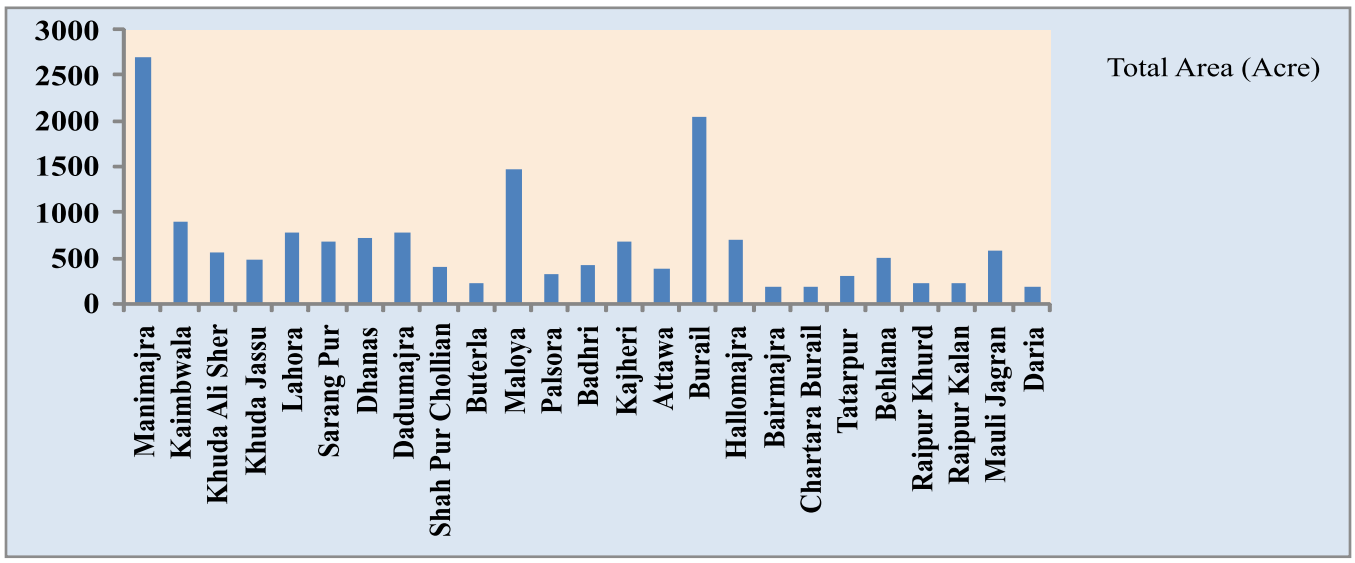
Further, As per the Chandigarh Administration, Local. Government Department vide Notification No. F-ll(B)-2018/21990, dated 30.11.2018, all the U.T. villages have been merged into the Municipal Corporation, Chandigarh.

Land Area Under Existing Villages:

Under the territory of UT Chandigarh, about 25 villages are existing with a total area of 16,597 acre. Out of which 378 acres are covered under red line area, 264.7 acre under extended abadi, 13249.05 acre is already acquired; thus the balance area remains 2705 acre.



Source: Naib Sadar Kanungo (D.C. Office Sec-17, Chandigarh)



Wetland Area Under Chandigarh

A wetland comprises both aquatic and terrestrial components of an ecosystem. It is a distinct ecosystem that plays multiple functions like water storage, purification of water, processing of carbon, soil stabilization and shelter for migratory birds. The city beautiful is glorified by Sukhna lake that was built in the year 1958 across Sukhna Choe. Previously, the Administration of Union Territory Chandigarh had declared Sukhna Lake as a wetland and specified the area covered vide notification No.3609-UTFI(1)-88/10083 dated 6th July, 1988. The size of Sukhna Wetland is 565 Acres (228.647 hectare).

Further, As per G.S.R 1203(E) Wetlands (Conservation and Management) Rules, 2017, dated 26th September, 2017, Chandigarh is under the process of re-notification of wetlands. In context to that the Union Territory of Chandigarh has constituted the Union Territory of Chandigarh Wetlands Authority as per Wetlands (Conservation and Management) Rules, 2017, chaired by Hon'ble Administrator of UT of Chandigarh.

Major Programs Implemented

A total of 190 silt retention dams, more than 200 check dams, revetments and brushwood structures had been constructed by the Forest Department to conserve the soil and to retain the silt in the water-bodies created behind silt retention dams. The National Institute of Hydrology , Roorkee reported that the rate of siltation of Sukhna lake has come down to 7 Hectare meter per annum.

Chandigarh came into notice post-independence as the capital of Punjab at that time was Lahore and needed a new capital.

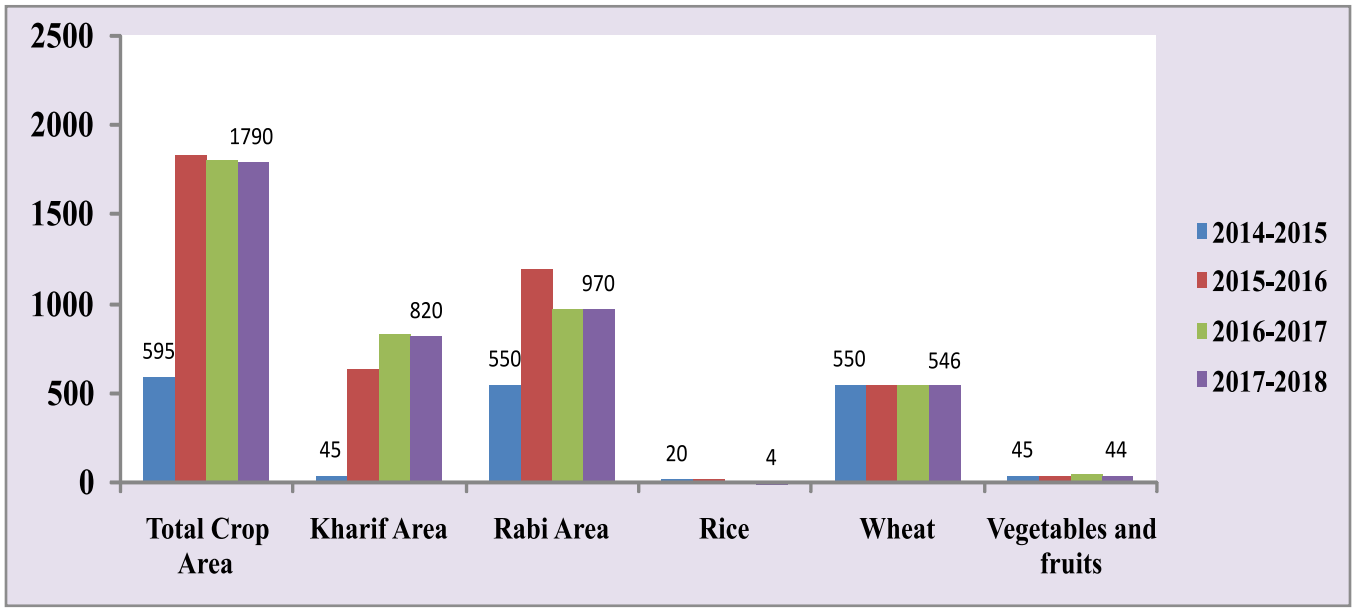
Land Classification

YEAR	2013	2014	2015	2016	2017
Total Area According to Village Papers	17361	17361	17361	17361	17361
Forests	525	525	525	525	525
Land Not Available for Cultivation	13531	13531	13531	13531	13531
Other Uncultivated Land Excluding Fallow Lands	362	362	362	362	362
Current Fallow Lands	70	70	70	70	70
Fallow Land Other Than Current Fallow	123	123	123	123	123
Net Area Sown	2750	2750	2750	2750	2750
Total Cropped Area	4328	4328	4328	4328	4328
Area Sown More Than Once	1518	1518	1518	1518	1518
Net Irrigated Area	2750	2750	2750	2750	2750
Gross Irrigated Area	2750	2750	2750	2750	2750
Unit		**Acre**	**Acre**	**Acre**	**Acre**

Source: Distt. Agri. Office, Sec-17, Chandigarh

Land is the foundation for the very existence of life. It provides base to all flora-fauna and plays a vital role in regulating their life cycle. The total area covered, according to village papers in Chandigarh from 2013 to 2017 has attained a constant of 17361 acre. The Forest Land stagnates at 525 acre from 2013 to 2017. The Land not available for Cultivation is 13531 acre, Uncultivated Land excluding Fallow Land is 362 acre, Current Fallow Land is 70 acre, Fallow Land other than Current Fallow Land is123 acres, Net Area Sown is 750 acre, Total Cropped Area is 4328 acre, Area Sown more than once is 1518, Net Irrigated Area is 2750 acre and Gross Irrigated Area is 2750 acre from 2013 to 2017.

Distribution of Cropped Area

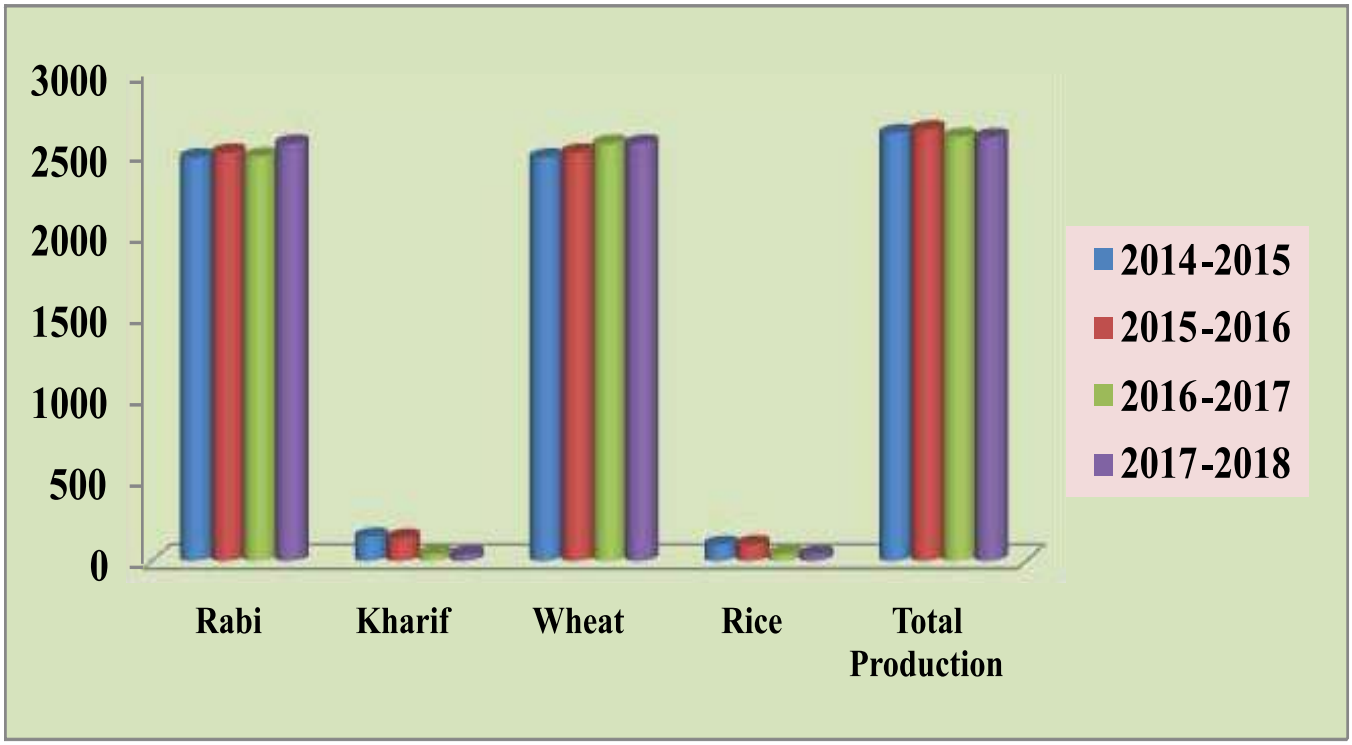


Source: Dist. Agri. Office, Sec-17, Chandigarh

Smaller wetlands (which were smaller than 2.25 hectares) cover an area of more than 5 lakh hectares across the country.

Despite of increasing urbanization, the total area available for agriculture has increased from 595 hectares to 1790 hectares from 2014-2018. Distribution of area under Kharif crop production has increased from 45 hectares to 820 hectares in the past five years. Distribution of area under Rabi crop has increased from 550 hectares to 970 hectares despite of fluctuating number between 2014-2018, as shown in the graph. Total area for rice production has decreased from 2014- 2018 from 20 hectares to 4 hectares. Total area for wheat production has decreased from 550 hectares to 546 hectares.

Total Crop Production Pattern of Chandigarh



Source: Distt. Agri. Officer Sec-17 Chandigarh.

Land Under Slum Area

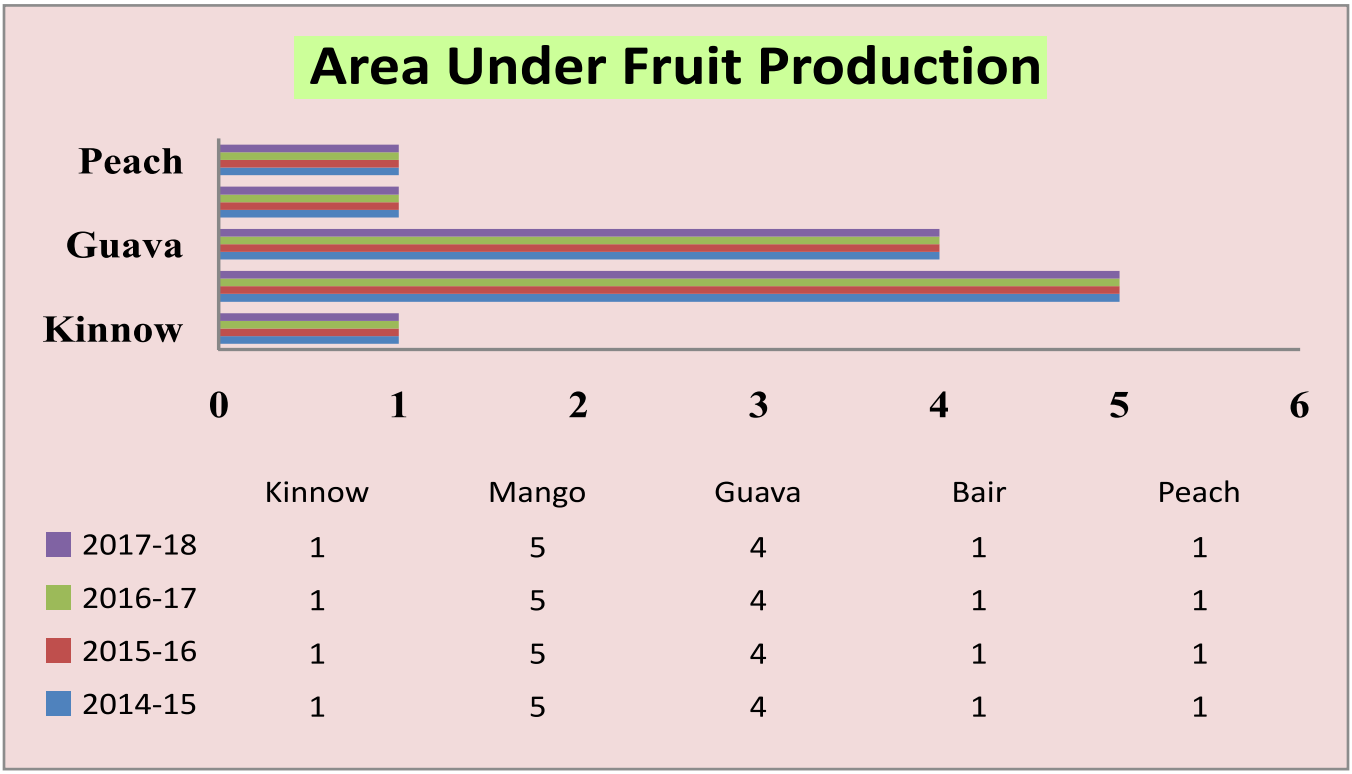
Name of Slum Area	2014	2015	2016	2017
Sanjay Colony	243	243	243	243
Shahpur Colony	230	230	230	230
Ambedkar Colony	65	65	65	65
Gurusagar (Bhathal)	140	140	140	140
Kabari Colony	65	65	65	65
Kalyan Colony	89	89	89	89
Labour Colony No. 4	5185	5185	5185	5186
Lal Bahadur Shastri Colony Palsora	697	698	699	700
Total Number of Structures (Jhuggies)	6714	5658	5658	5659

Source: The Rehabilitation Scheme: Chandigarh Small Flats Scheme- 2006, Hartron, Chandigarh. Assistant Estate Officer, U.T. Chandigarh Year 2014

In India, there are about 2,600 rhinos and more than 90% of Indian Rhino population is concentrated in Kaziranga National Park, Assam

A slum area is a closely packed housing unit with deteriorated healthcare facilities, impoverished population and incomplete infrastructure. The total number of structures (Jhuggies) has decreased from 6714 in 2014 to 5659 in 2017.

Area Under Fruits



	Kinnow	Mango	Guava	Bair	Peach
2017-18	1	5	4	1	1
2016-17	1	5	4	1	1
2015-16	1	5	4	1	1
2014-15	1	5	4	1	1

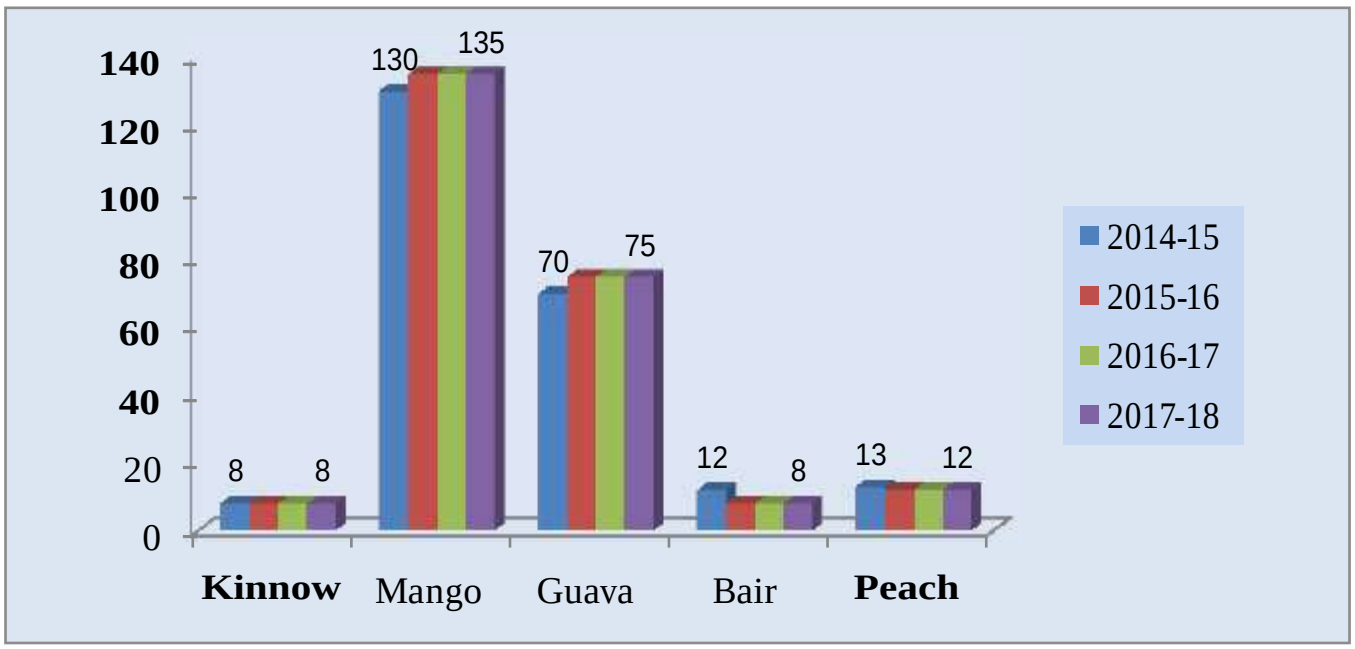
Source: Distt. Agri. Officer, Sector-17, Chandigarh

The soil of any region plays a vital role in the successful cultivation of fruits and vegetables. It is the basis of all production systems in agriculture. Soil stores the appropriate nutrients and required water in order to make them available for proper growth and development of crops, grazing land, forest and vegetation. Some of the major fruits cultivated in Chandigarh are Peach, Bair, Guava, Mango and Kinnow.

Annual Fruit Production in Chandigarh

The annual fruit production in Chandigarh for Mango has increased from 130 Metric Ton (MT) in 2014 to 135 MT in 2018. Production of Guava has increased from 70 MT in 2014 to 75 MT in 2018. On the contrary, annual Peach production has decreased from 13MT in 2014 to 12MT in 2018 and production of Bair has decreased from 12 MT in 2014 to 8 MT in 2018.

Lecanorchis taiwaniana is India's one of smallest botanically recorded orchids in terms of size and duration of bloom.



Source: Distt. Agri. Officer,m Sector-17, Chandigarh

Green Cover of Chandigarh

With total area of 140 sq. km, Chandigarh is blessed with 57.56 sq. km. of green cover which is 41.11% of UT's total area. This 57.56 sq. km. includes 10.00 sq. km of tree cover outside the forest area and 47.56 sq. km. of forest cover.

In the last two decades, city has observed 39% increase in green cover.

Greening Chandigarh Task Group has achieved more than 100% plantation targets for the year 2017-18. Against the target of 2.35 lakh seedlings, Chandigarh has achieved plantation of 2.39 lakh saplings during the year 2017-18.

Nearly half of India's forest cover is found in the state of Madhya Pradesh (20.7 percent) and the seven states of the northeast (25.7 percent)

RESPONSES:

A.Legislative and Policy Responses:

The Capital of Punjab (Development and Regulation) Act, 1952 and the Punjab New Capital Periphery (Control) Act, 1952 are the two specific laws passed to guarantee the development of Chandigarh as per the 'edict'. However, violations of the provisions of the above acts are witnessed in the city. As of today, the Chandimandir Cantonment, satellite towns of Mohali, Zirakpur, and Panchkula adversely affect the Chandigarh region in violation of the Punjab New Capital Periphery (Control) Act, 1952.

With a view to identify the potential impact of large scale development in the close vicinity of Chandigarh, a high powered coordination committee was appointed to review and evolve strategies for planned development of the areas surrounding the Union Territory (to ensure minimal impacts on the city environs). The co-ordination committee approved, in 1984, the adoption of Regional approach (as envisaged in the Chandigarh Inter State Capital Region Plan 2001) to achieve the objective. The strategy suggested:

i) Development of small and medium towns in the influence zone of Chandigarh and dispersal of population and economic activities over a wider area.

ii) Adoption of spatial development strategy providing effective linkage between cities, medium and small sized towns and rural land in order to sustain urban agglomeration of Chandigarh city and to hold back excessive urban migration to Chandigarh besides ensuring equitable distribution of population and resources for orderly growth and development in the area.

iii) The regional plan identified some immediate actions to be taken which included:

   a) Preparation of sub-regional plans by respective State Governments, of the area falling under their jurisdiction.

   b) Preparation of development plans for all regional and sub regional towns and all future developments to be taken up in accordance with these plans.

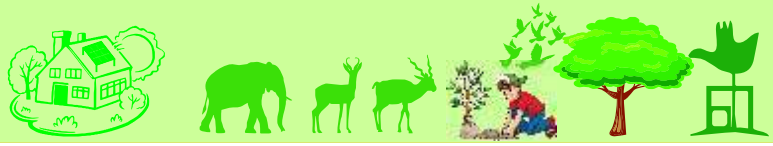
   c) Unauthorized structures near Zirakpur, Chandimandir on Kalka road, and on other major road crossings to be removed.

   d) Regional transport systems for Chandigarh urban complex and inter city movement be prepared and developed.

   e) Strict control on environmental protection and pollution be observed.

   f) Industries should be dispersed in the regional and sub regional towns by developing necessary infrastructure.

   g) Features like Shivalik hills, lake, choes and rivers must be retained green to promote natural environment and eco system. It should be further augmented by development of city forest, bird sanctuaries and deer However, despite the Committee's recommendations, expansion of the new Urban Centers of Panchkula, SAS Nagar, Naya Gram, Kharar and Zirakpur has continued.



1. The Chandigarh Pollution Control Committee is implementing Hazardous and other Wastes (Management and Trans-boundary Movement) Rules, 2016 and The Biomedical Wastes (Management & Handling) Rules, 2016.
2. With a view to control the menace of plastic & polythene carry bags, the Chandigarh Administration has already put a ban on the manufacturing, store, import, sell, transport or use polythene/ plastic carry bags vide notification no ED/2008/684 dated 30.08.2008 under Section 5 of the Environment (Protection) Act, 1986. Further, under Section15 of the Environment (Protection) Act, 1986, whoever fails to comply with the orders issued under Section 5 of the Environment (Protection) Act, 1986, shall be punishable with imprisonment for a term which may extent to five years with fine which may extent to one lakh rupees, or with both.

Recommendations

Despite the commendable actions taken by the Union Territory Administration for protection of its land resources from degradation and pollution, the following initiatives are suggested.

1. A coordinated approach in consultation with the State Governments of Punjab and Haryana may be adopted to ensure implementation of the Punjab New Capital Periphery (Control) Act, 1952. Discussions may be taken up with PUDA and HUDA to stop further expansion of satellite towns. However, it is important to realize that such pressures will continue in future. Hence, planning (like, MRTS, prevention of encroachment, etc.) for catering to these pressures may be taken up.
2. A strategy for integration of urban villages with adjoining planned sectors needs to be devised. Also, strategy for tackling problems of residential & commercial slums may be defined.
3. Commercial areas may be augmented with concept of multi level shopping.
4. Studies on characterization of solid waste need to be conducted and waste segregation at household level needs to be promoted. The citizens of Chandigarh are literate and environmentally conscious and aware, hence, this activity can be successfully initiated here.
5. For disposal of construction waste, the Administration may provide low lying area which can be filled up by Municipal authorities conveniently.
6. Land use changes in peri urban areas should be strictly curbed to retain/freeze existing land use pattern.
7. Municipal Corporation, Chandigarh is working around the concept of re-carpeting roads, in which the roads will be scratched before a new layer is poured to re-carpet them. This will not only improve the safety and durability of roads but will also improve the overall drainage system by preventing clogging of drains.
8. It is suggested to improved the quality of work of paver blocks and to manage the old paver blocks properly.
9. A 2m*2m open space all around the trees should be ensured for the roots to spread and improve aesthetic beauty of the place.

Up to 40% of amphibian species and more than a third (33%) of all marine mammals are threatened.

AIR

Air is one of the five fundamental elements vital for the very existence of any life form on planet earth. However, the world has turned into a luxurious furnace with engines pumping obnoxious emissions primarily because half the world does not have access to green technologies and cleaner fuels. In India, an estimated 1.5 million people died from the effects of air pollution in 2012, according to WHO data. Globally, air pollution both indoor and outdoor caused nearly 7 million deaths in 2012, making it the world's single largest environmental health risk, according to World health statistics 2016. One Lakh children in India alone died in the year 2016 due to air pollutants. Since young children are more susceptible to such risks, this does not bode well for the future of our country.

Chandigarh is a well planned city known all over the world for its architecture planning and landscape. Geographical area of U.T., Chandigarh is 140 Sq.Kms. (Includes 26 Sq. Kms. of Sukhna Wildlife Sanctuary) of which approx. 41.11% is Forest Area. The number of vehicles including the floating vehicles is approx. 11.00 lakhs. The fleet of vehicles is over 2 per capita household which makes Chandigarh, a city with the highest density of vehicles in India

Over the years there has been a virtual exodus of population from adjoining states namely Punjab, Haryana and Himachal Pradesh to Chandigarh resulting in untenable pressure on air quality of the city. In addition to these anthropogenic sources of air pollutants, there are a number of factors that contribute to air pollution and eventual health hazards. These include pollen, fruit yielding trees, wood burning, windblown dust etc.

Some of the major contributing factors of air pollution in Chandigarh are as follows-

1. Vehicular Density
2. Roadside Dust
3. Burning of dry leaves
4. Litter from trees & gardens in the city
5. Operation of generator sets in certain areas adjoining the city
6. Stubble burning in specific seasons of the year in neighbouring areas of Chandigarh

Air pollution is the third highest cause of death among all health risks, ranking just above smoking in India.

National Ambient Air Quality Standards

Sl. No.	Pollutant	Time Weighted Average	New Standards (Schedule VII, Rule 3 (3B) 16th Nov 2009 Concentration in ambient air		Methods of measurement
			Industrial Area Residential, Rural & other Areas	Ecologically sensitive area (Notified by Central Govt)	
1	Sulphur Dioxide (SO_2)	Annual Avg*	50µg/m^3	20µg/m^3	-Improved West and Gaeke method
		24 hours**	80µg/m^3	80µg/m^3	-Ultraviolet fluorescence
2	Oxides of Nitrogen as NO_x	Annual Avg*	40µg/m^3	30µg/m^3	-Modified Jocob and Hochheise
		24 hours**	80 µg/m^3	80µg/m^3	(Sodium Arsenite) - Chemiluminescence
3	Particulate matter (size less than 10 micro metre)	Annual Avg*	60µg/m^3	60µg/m^3	-Gravimetric -TOEM -Beta attenuation -Gravimetric -TOEM -Beta attenuation -AAS/ICP method for sampling on EPM2000 or Equivalent Filter paper -ED-XRF using Teflon filter paper
		24 hours**	100.0 µg/m^3	100.0 µg/m^3	
4	Particulate matter (size less than 2.5 micro metre)	Annual Avg*	40µg/m^3	40µg/m^3	
		24 hours**	60µg/m^3	60µg/m^3	
5	Lead (Pb)	Annual Avg*	0.5µg/m^3	0.5µg/m^3	
		24 hours**	1µg/m^3	1µg/m^3	
6	Carbon Monoxide (CO)	8 hours**	2.0 mg/m^3	2.0 mg/m^3	-Non Dispersive Infra Red (NDIR) spectroscopy
		1 hour	4.0 mg/m^3	4.0 mg/m^3	
7	Ozone	8 hours**	100.0 µg/m^3	100.0 µg/m^3	-Photometric -Chemiluminescence -Chemical method
		1 hour	180.0 µg/m^3	180.0 µg/m^3	
		24 hours**	60.0 µg/m^3	60.0 µg/m^3	
8	Ammonia (NH_3)	Annual Avg*	100.0 µg/m^3	100.0 µg/m^3	-Chemiluminescence -Indo-Phenol Blue method
		24 hours**	400.0µg/m^3	400.0 µg/m3	
9	Benzene	Annual Avg*	5.0 µg/m^3	5.0 µg/m^3	-GC based continuous analyzer -Adsorption / desorption followed by GC analysis
10	Benzo(α) pyrene	Annual Avg*	1.0 µg/m^3	1.0 µg/m^3	-Solvent extraction followed by GC/HPLC extraction
11	Arsenic	Annual Avg*	6.0 µg/m^3	6.0 µg/m^3	AAS/ICP method for sampling on EPM2000 OR Equivalent Filter paper
12	Nickel		20.0 µg/m^3	20.0 µg/m^3	AAS/ICP method for sampling on EPM2000 OR Equivalent Filter paper

- ***Annual Arithmetic mean of minimum 104 measurements in a year taken twice a Week 24 hourly at uniform interval.**
- ****24 hourly / 8 hourly or 1 hourly monitored values as applicable shall be complied with 98 % of the time in a year. However, 2% of the time, they may exceed the limits but not on two consecutive days of monitoring.**

Bharat Stage VI will bring PM in diesel cars down by 80 per cent when compared to Bharat Stage IV.

As per National Ambient Air Quality Standards of India, two major air pollutants i.e. SO_2 and NO_x lie well within the permissible limits in the city. Fortunately, the city has been able to maintain its pristine status in regard to environmental conditions through sustained endeavours. Consistent appreciable measures have been initiated over the years to contain vehicular pollution through strict implementation of policies in vogue, maintain industrial emission standards and protect the dense forest cover in the city. On the contrary, the average RSPM level (PM10) in the year 2017 was observed to be 107.4 µg/ m^3. It stands at an average of 105.8 µg/m^3 in 2018. Despite this positive deviance, the figures still remain above the permissible limit for RSPM i.e. 60 µg/m^3. Thus the need of the hour is to put in place effective futuristic strategies for better air quality in the city.

Major Institutions, working towards air quality monitoring and preservation in Chandigarh are:-

Policy and Regular Monitoring
- Chandigarh Pollution Control Committee (CPCC)
- Department of Environment
- State Transport Authority

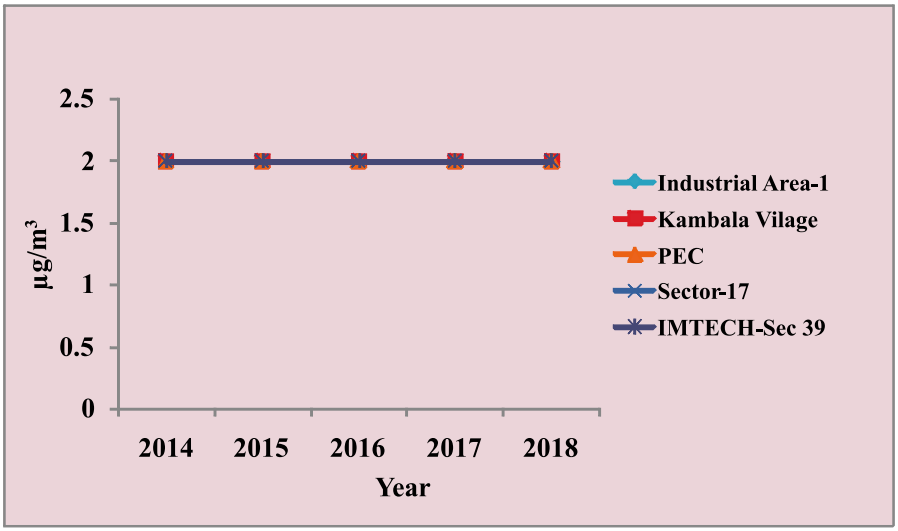
Research and Development
- Central Scientific Instruments Organization
- Punjab Engineering College
- Panjab University

In addition to the above, the State Transport Authority and Chandigarh Police are responsible for taking action for the control of vehicular pollution whereas the Municipal Corporation is responsible for the control of pollution from municipal waste.

What is ambient air quality:

Ambient air quality refers to quality of outdoor air in our surrounding environment. Air quality can be quantified by concentrations of substances identified through monitoring (It is typically measured near ground level, away from direct sources of pollution).

Trends of SO_2 in Chandigarh

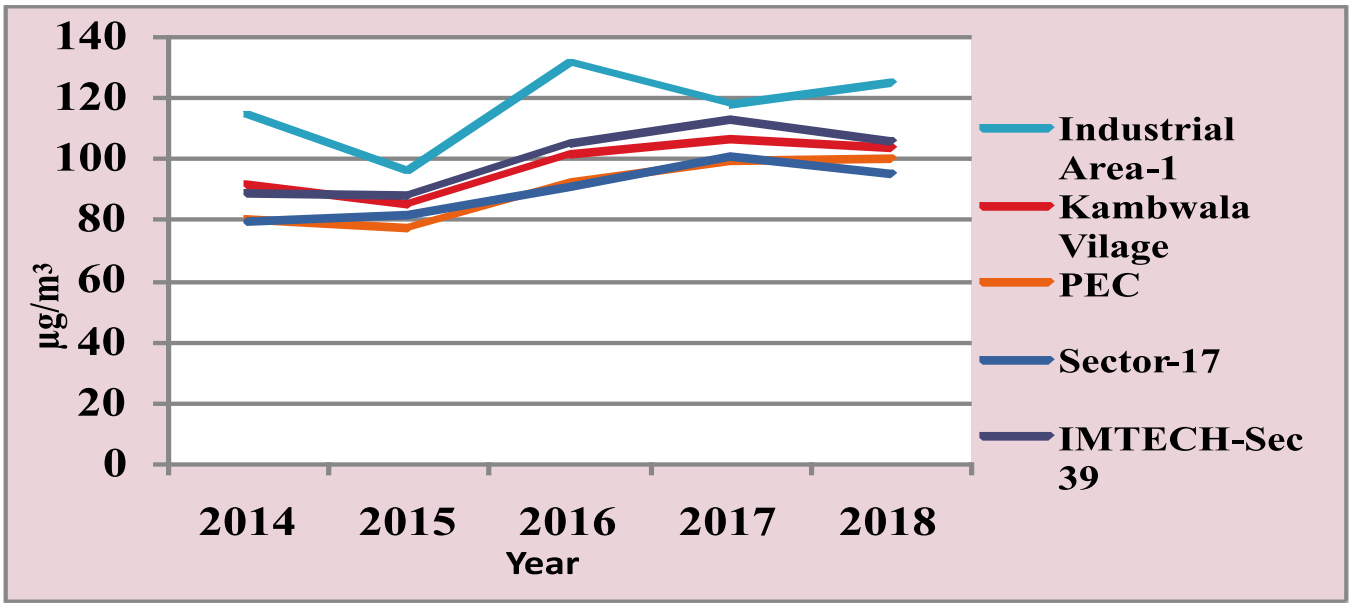


Source: Member Secretary, Chandigarh Pollution Control Committee, Chandigarh U.T.

Bharat Stage VI will bring down nitrogen oxides from diesel cars by 70 per cent and in petrol cars by 25 per cent.

The atmosphere of the city beautiful is very clear as far as the concentration of SO_2 is concerned. Although, the single largest pollutant of sulphur are the coal fired power stations. Coal based industries, in particular, emit maximum sulphur content in the air. Exploitation of coal, oil and gas for electricity power generation are other factors contributing to increased level of sulphur in the atmosphere. In addition to severe health hazards like bronchitis and other respiratory ailments, sulphur dioxide acts as a precursor to smog formation and accelerates the process of acid rain. Fortunately, industries in Chandigarh are primarily small-scale industries because of which the emissions of SO_2 are well within limits. The annual limit for sulphur dioxide is 50µg/m^3. The above graph shows the controlled level of SO_2 in the city since the year 2014. Sulphur content has thus attained a constant value of '2 µg/m^3' from 2014 up to 2018.

Yearly Trends of No_x in Chandigarh

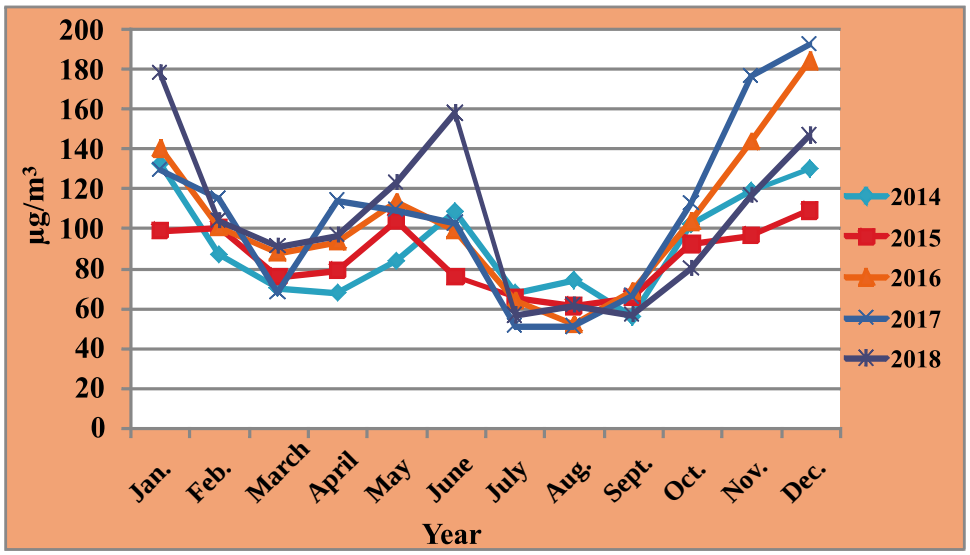


Source: Member Secretary, Chandigarh Pollution Control Committee, Chandigarh U.T.

With increase in vehicular traffic, concentration of NO_x has been fluctuating over the years. According to National Ambient Air Quality Standards, the permissible value of NO_x is set to a standard of 40 mg/m^3. The above graph depicts that the concentration of NO_x from 2014 to 2018 has remained within permissible limit. The maximum concentration was observed at the monitoring station located at Industrial area phase-1, due to excessive vehicular emissions.

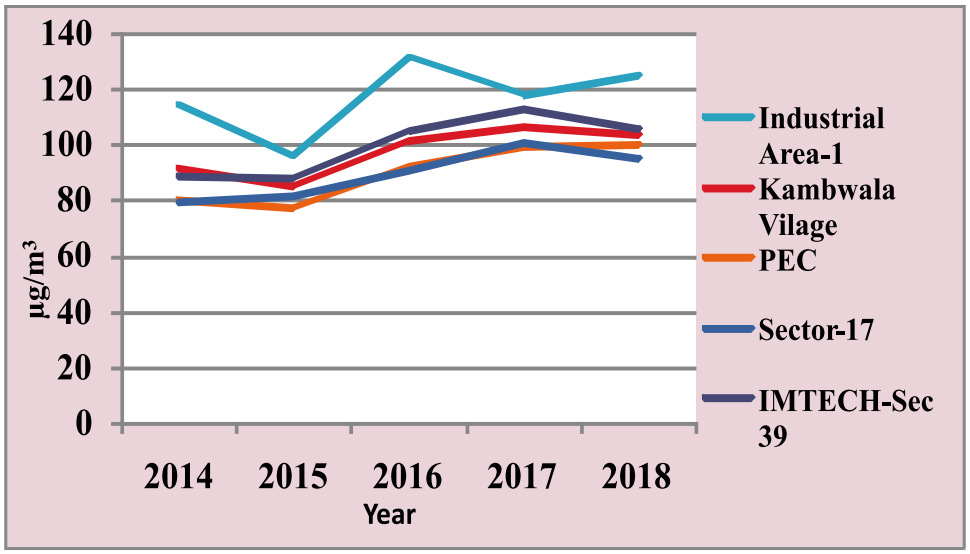
As per the World Health Organisation, (WHO) list of most polluted cities, 14 of the 15 most polluted cities in the world are in India of which four are in Uttar Pradesh.

Year-wise variation in RSPM concentration of Chandigarh



Source: Member Secretory, Chandigarh Pollution Control Committee, Chandigarh U.T.

Yearly average of RSPM at Chandigarh (Monitoring point wise)



Source: Member Secretary, Chandigarh Pollution Control Committee, Chandigarh U.T.

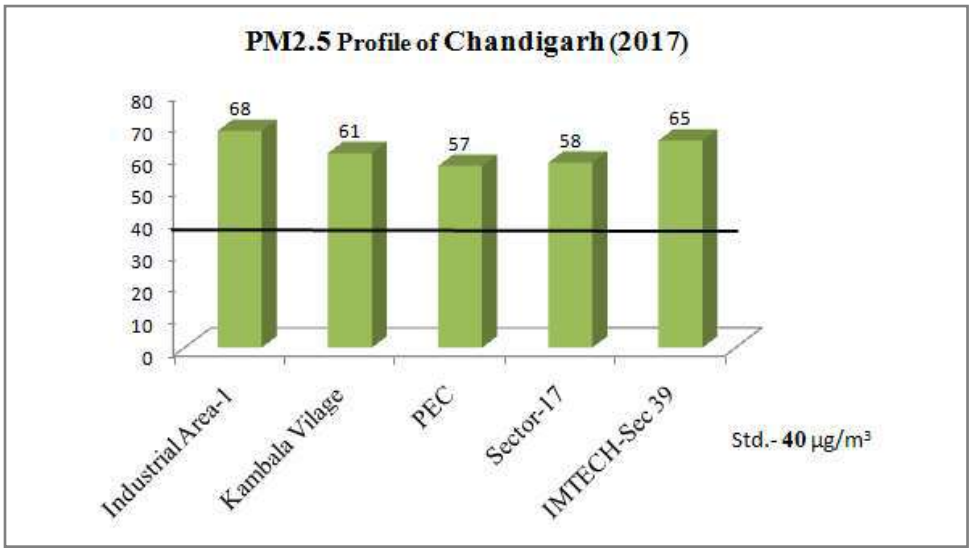
Particulate pollution is a term for a mixture of liquid droplets and solid particles found in the air. These include dirt, smoke, fog, mist, dust etc. Particulates are the deadliest form of air pollution, specially particulate matter with particles sizes less than 10 microns, also termed as (Respirable Suspended Particulate Matter) RSPM. They have a tendency to get embedded deep into the lungs and cause a broad range of respiratory illness. The annual limit for RSPM is 60 µg/m^3. The above graph shows the changing trend of RSPM levels in the city over the years. Observations reveal that the levels of RSPM have slight variations over the last five years (2014-2018). As the RSPM monitoring in Chandigarh has been performed at five different locations i.e. Industrial area Phase-1, Punjab Engineering College, Commercial Complex Sector-17, IMTECH Sector-39 and a village named Kaimbwala, following analysis were reported-

The lowest RSPM levels in the city has been monitored at Punjab Engineering College, sector 11 (89.6 avg./ 5 year).

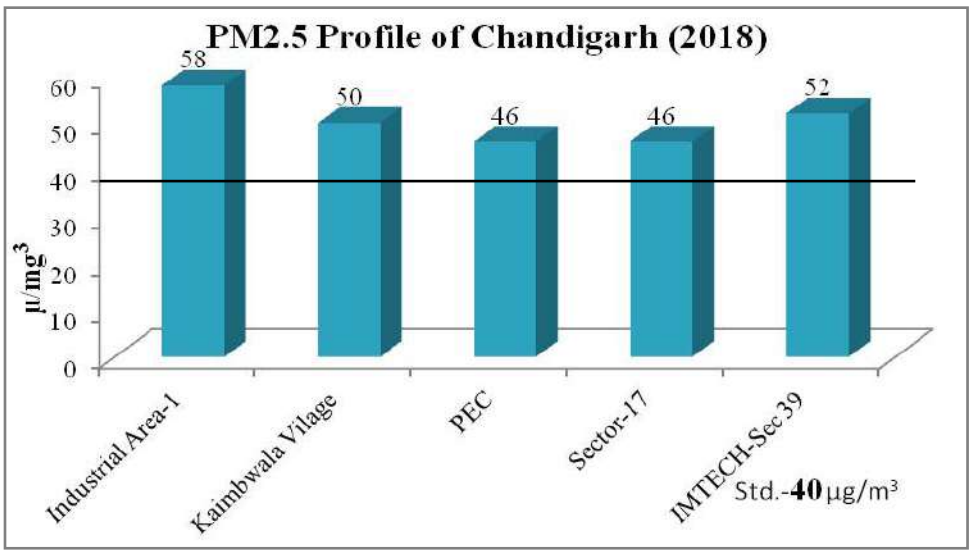
The highest RSPM levels in the city were observed at the monitoring point located at Industrial Area Phase 1 (116.8 avg./ 5 year), followed by IMTECH- Sec 39 (100.2 avg./ 5year).

PM2.5

Fine particulate matter (PM2.5) is an air pollutant that is a concern for people's health when levels in air are high. PM2.5 are tiny particles in the air that reduce visibility and cause the air to appear hazy when levels are elevated. Outdoor PM2.5 levels are most likely to be elevated on days with little or no wind or air mixing.



Source: Member Secretary, Chandigarh Pollution Control Committee, Chandigarh U.T.



Source: Member Secretary, Chandigarh Pollution Control Committee, Chandigarh U.T.

Inhailing air pollution takes away at least 1-2 years of a typical human life

Chandigarh is a land locked Union Territory in which there is no possibility of expansion and obviously there is no possibility of road length expansion. Studies have shown that the air quality in Chandigarh is mostly affected by the vehicular pollution of the city. The fleet of vehicles is over 2 per capita household. Chandigarh has the highest density of vehicles in India. The major contributor of air pollution in Chandigarh are as follows:-

✍Being surrounded by the agricultural hubs (Haryana, Punjab), the city beautiful is recipient to RSPM in bulk from various activities like stubble burning and wheat harvesting. The RSPM levels peak from April to June and from October to November.

✍Winters catalyze the RSPM concentration owing to its low temperature. This occurs due to the phenomenon called 'Inversion'. The dense air enhances concentration of trapped pollutant by restricting their atmospheric disposal.

✍Natural processes like pollen dispersal and propagation of seeds by air accounts for major proportion of RSPM levels for any city.

✍As per the information released from, Registering and Licensing Authority (RLA) department, Chandigarh: 16756 cars/ jeeps and over 27473 two wheelers have been registered with the city in the year 2018, compared to 13812 cars/jeeps and 19170 two wheelers in the year 2007. The percentage increase in the total number of vehicles in Chandigarh for more than over a decade (2007-2018) has been over 24.5.

✍ Owing to maximum vehicular density, Chandigarh suffers from highest per trip energy consumption. The population density during the last five decades (1961-2011) has increased nine fold, from 1051 to 9252 persons per sq. Km. Due to this population explosion and lack of awareness, there has been a unprecedented increase in reckless human activities like fire cracker bursting during festival seasons, stubble burning, open waste burning etc leading to elevated levels of RSPM in the city.

✍Road Dust Resuspension: Tiny bits of tyres, brake pads, and road materials become suspended in the air when vehicles pass over. Huge traffic congestion tends to re-suspend the dust onto the roads and eventually into the atmosphere.

✍Burning of dry leaves: Chandigarh is blessed with 57.56 sq.km. of green cover which 41.11% of UTs total area which generates gigantic amount of Horticulture waste. If such waste is not managed properly, it can leave negative impact on AQI. However, Chandigarh Administration has banned such practices but some miscreant finds burning effortless as compared to making compost from the same.

Air quality of the City Beautiful during Diwali

Trends of SO_2 During Diwali

The level of SO2 in Chandigarh is well within standards. Data reveals that from the past five years, the level of sulphur dioxide attained a constant value of '2', before and after Diwali, thus lying below the detectable limits (BDL).

Trends of NO_x During Diwali

Level of NOx in air is well within permissible limits in Chandigarh. Although during Diwali time, the levels of pollutants may fluctuate but they still tend to remain below permissible limits. According to National Ambient Air Quality Standards, the permissible value of NO_x is 80 $\mu g/m^3$ (24 hr avg.)

Year	Before Diwali	Diwali Day
2014	19	31
2015	23	24
2016	21	30
2017	26	28
2018	31	22

Level of Sector-22 (Values in PPM)

Year	Before Diwali	Diwali Day
2014	19	31
2015	23	24
2016	21	30
2017	26	28
2018	31	22

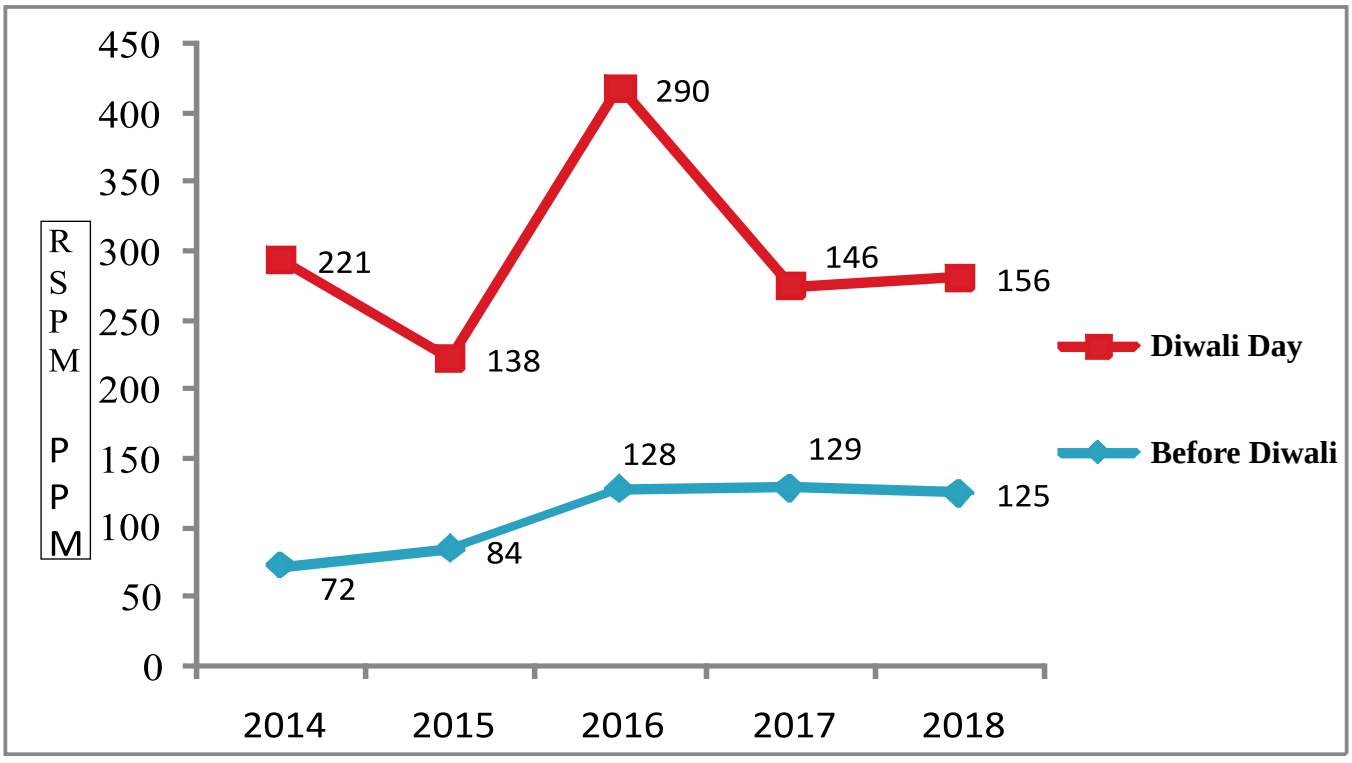
Level of Sector-17 (Values in PPM)

Trends of RSPM During Diwali

Year	Before Diwali	Diwali Day
2014	75	185
2015	63	102
2016	114	225
2017	137	97
2018	150	124

Level of Sector-17 (Values in PPM)

The table shows the levels of RSPM over the past five years, before and during Diwali.



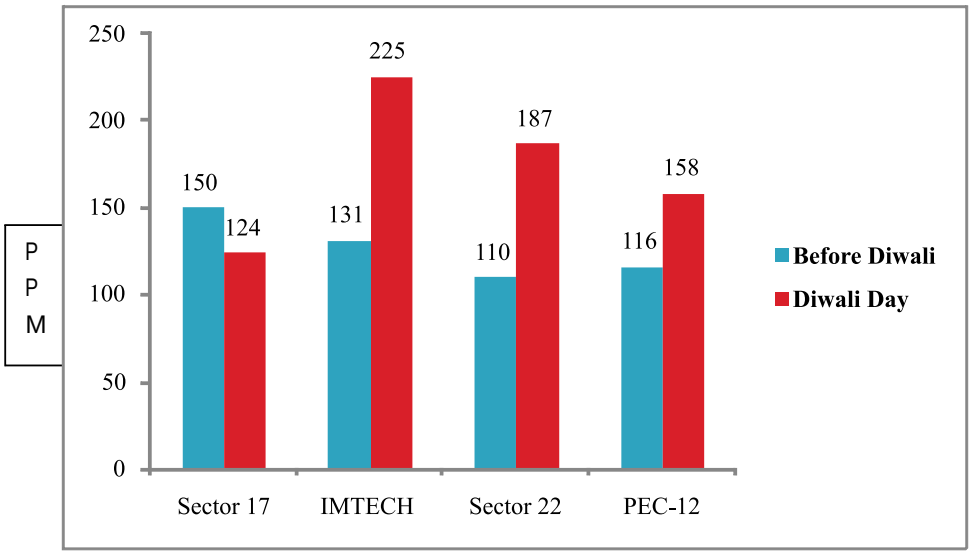
Member Secretary, Chandigarh Pollution Control Committee, Chandigarh U.T.

Producing heavy crude oil increases chances of air pollution by 40% than producing light crude oil.

The graph shows the trend of RSPM levels over the past five years before and during Diwali. Due to excessive use of fire crackers by the city residents and the adjoining states of Haryana, Punjab and Himachal Pradesh, the RSPM level of the city reached unwanted levels, over the years. Highest levels were observed in the year 2016. However, due to aggressive campaigning by the administration for Green Diwali, increasing awareness is done amongst people through FM radio, newspaper advertisements, newsletters by eco-clubs and schools organized by Environment Department, Chandigarh, a notable declining difference has been seen.

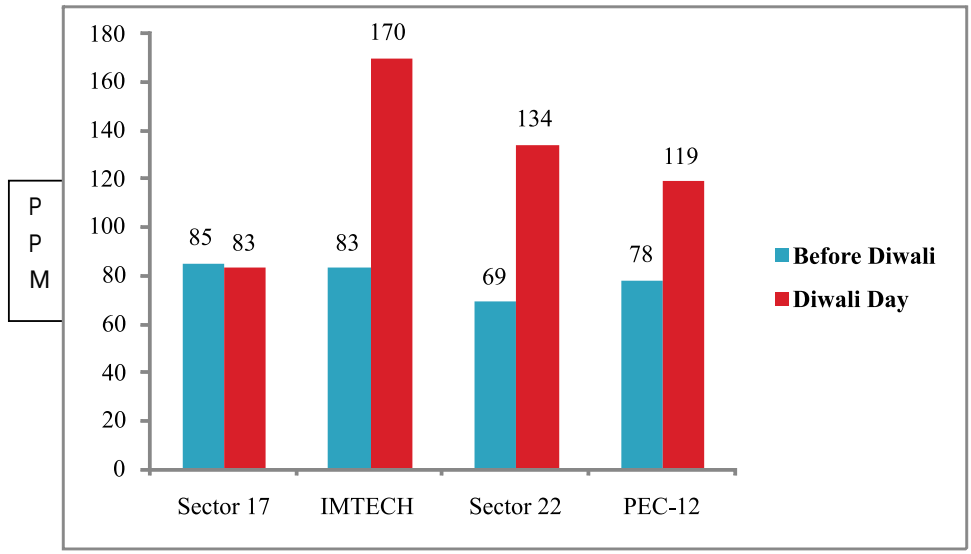
Following are the trends of RSPM-10 and RSPM-2.5 levels in the city at the respective stations in Sector-17, IMTECH, Sector-22 and PEC-12, before and after Diwali in the year 2018.

Trends of RSPM-10, 2018



Source: Member Secretory, Chandigarh Pollution Control Committee, Chandigarh U.T.

Trends of RSPM-2.5, 2018



Source: Member Secretary, Chandigarh Pollution Control Committee, Chandigarh U.T.

The RSPM levels rises during Diwali period because of smoke and other pollutants released from excessive bursting of crackers.

Administrative Actions

It is very important to mention here that despite of 60% increase in number of vehicles and 100% increase in the number of Light Motor Vehicles and no change in road lengths in last 10 years, RSPM values have not increased and are almost stable, because of following action taken by Chandigarh Administration:-

- Providing subsidy on Battery Operated Vehicles.
- Strict Enforcement of Pollution Under Control Certificate for all the vehicles.
- Increasing Green Cover of the City.

To curb emission levels released from slow movement of vehicles, initiatives have been taken to increase the number of cycle tracks, as well as encourage people to use them.

Smoking comes at a Cost

Tobacco smoking is a reprehensible habit that has spread all over the world as an epidemic. It reduces the life expectancy among smokers. It increases overall medical costs and contributes to the loss of productivity during the life span. Smoking has been shown to be linked with various neurological, cardiovascular, and pulmonary diseases. Cigarette smoke not only affects the smokers but also contributes to the health problems of the non-smokers. Exposure to environmental tobacco smoke contributes to health problems in children and is a significant risk factor for asthma. Chandigarh administration has been working with an approach to curb such activities in public with a view to sustain the natural environment and a healthy way of living. For this, certain initiatives were taken up, one of them is imposing of 'challan' for smoking in public, all over Chandigarh. Below is the table projecting the number of challans for smoking with their respective location over the past five years-

Year	Number of Challans for Smoking
2014	870
2015	1147
2016	477
2017	4214

Source: SSP, Traffic, Chandigarh

Chandigarh is declared as the first smoke free zone. As indicated above, the number of challans had increased from 870 in the year 2014 to 4214 in the year 2017.Another contributing factor is the lack of pollution check in automobiles.

Year	Number of Challans	Number of PUC Certificates Centre
2014	1128	39
2015	3600	47
2016	1812	51
2017	1385	44

Source:State Transport Authority (STA) Sector-18,Chandigarh.

Since, Chandigarh has over 2 per capita household, making it the city with highest density of vehicles in India. This practice has not only helped in reducing the elevated pollution levels but also helped in raising awareness amongst people regarding the importance of pollution check and its respective benefits. It has been possible to reduce a significant level of pollution load generated by vehicles through proper periodical inspection and maintenance which is being actively carried out by Chandigarh Pollution Control Committee and allied authorities. The given are the number of challans being imposed every year-

By 2050, 6 million people will die per year due to air pollution.

Chandigarh has a complete ban on diesel operated auto-rickshaws. Subsidies are granted to battery operated vehicles and alternate source of energy such as LPG & CNG have been promoted. All pathways in Chandigarh are occupied by active and educated traffic police officers who help maintain standards on traffic regulations. In total, 1385 challans were issued in 2017 for pollution violators in Chandigarh as compared to only 92 challans in the year 2013.

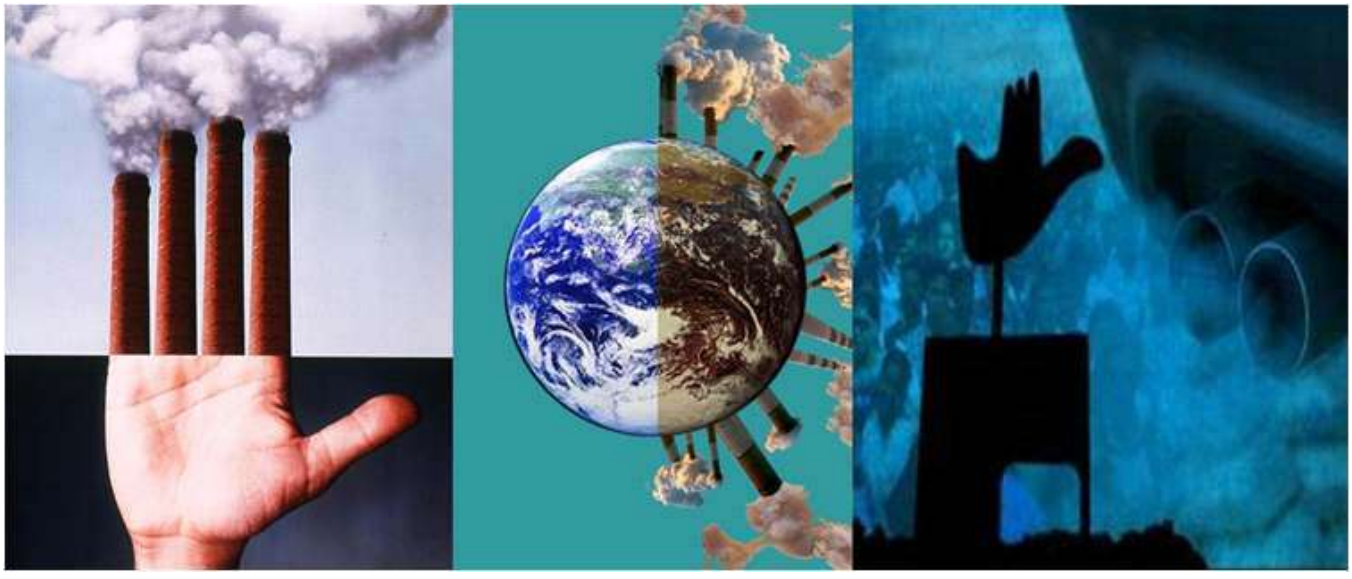
Compulsory Pollution Under Control (PUC) certificates for vehicles has been introduced by Chandigarh Traffic Police. Pollution monitoring facilities are available at most of the Petrol Pumps & Vehicle Repair Maintenance units in the city. As per data provided by the State Transport Authority, Chandigarh, 44 authorised stations are operative for issuing 'Pollution Under Control' Certificates in the year 2017 as compared to 39 centres granting PUC's in 2013.

Action Plan for Control of Air Pollution in Chandigarh

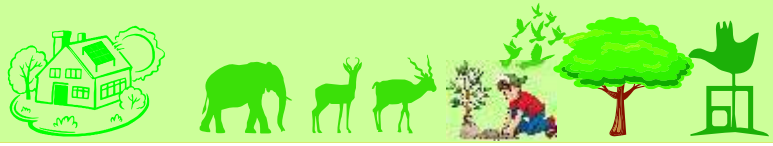
Air Quality Monitoring Committee (AQMC)

Chandigarh is one of the102 non-attainment cities of India with respect to ambient air quality. Further, as per the orders of Hon'ble National Green Tribunal (NGT) in the matter of news item published in 'The Times of India' authored by Shri. Vishwa Mohan titled “NCAP with Multiple Timelines to Clear Air in 102 Cities to be released around August 15” Air Quality Monitoring Committee (AQMC) has been constituted in Chandigarh comprised of the following members:-

1. The Director Environment, Chandigarh
2. The Commissioner, Municipal Corporation, Chandigarh
3. The Director Industries, Chandigarh
4. The Director Transport, Chandigarh
5. The Chief Architect, Department of Urban Planning, U.T. Chandigarh



During heavy traffic jam, pollutants outside can seep into your car, making the air inside you car 10 times more polluted than typical city air.



Department	Action Taken
State Transport Authority/ Traffic Police	Conducts public awareness camps with the help of Chandigarh Police from time to time.
	India is going to skip adopting BS-5 norms and progress directly to adopting BS-6 norms by 2020.
Urban Local Bodies & Police Dept.	Chandigarh Traffic Police, Chandigarh has proposed that parking of vehicles in non-designated areas will also be enforced by towing vehicles and locking of wheels by wheel lock clamps
Chandigarh Administration	The trees will be planted every year on the Municipal land along the road. There is a target of plantation of 5508 trees in the year 2018-19. Till date 5100 trees have been planted on the roads under the jurisdiction of Municipal Corporation.
Traffic Police	To mitigate traffic congestion in the city, Chandigarh Traffic Police has recommended synchronization of traffic lights from Fun Republic Light point to Transport Light Point as well as synchronisation of traffic lights from Fun Republic Light Point to PGI Chowk on Madhya Marg to the Engineering Department, Chandigarh
Municipal Corporation, Chandigarh	Municipal Corporation has proposed that a special task force for regular checking and control of burning of municipal solid waste will be .
	No garbage and dry leaves will be burnt in open, under any circumstances. The Sanitary inspectors will be further ordered to conduct the IEC activities to educate Safai Karamchari/ Residence as to iff effects of open burning
Food & Supply Department	State Level Coordinator (Oil Industry) has informed that PNG supply network is being laid in Sector 48,49,50 & 51 through DRS installed at Sector 49 network which will be available to cater about 12000 DU's (Dwelling Units) out of which 1350 DU's have been registered for PNG.
CPCC & Department of Industries	Industries will be given directions to shift to more cleaner fuels to reduce the emissions levels.
Engineering Department	Municipal Corporation Chandigarh has installed a few water sprinkling systems along the roads at Sector 31.
State Transport Authority	Chandigarh has already ban the 15 years old commercial vehicles in Chandigarh.
Chandigarh Transport Undertaken (CTU)	CTU is already operating 20 Nos. of buses within Chandigarh providing 40 trips (up/down) for school students and teachers.

By 2050, 6 million people will die per year due to air pollution.

RESPONSES

A. Legislative & Policy Responses:

1. The entire Union Territory has been declared as 'air pollution control area' vide notification no. G.S.R. 71(E) [NO.Q-14012/87-CPA] dated 1st February, 1988 with the aim of exercising the powers conferred by sub-section(1) of section 19 of the Air (Prevention and Control of Pollution) Act, 1981, to reduce air pollution.
2. The Central Pollution Control Board (CPCB) was monitoring the Air Quality in Chandigarh from 1989 to 1991 and Chandigarh Pollution Control Committee (CPCC) was set up thereafter. The ambient air quality is currently being monitored by CPCC at six points.
3. The Environment (Protection) Act, 1986 & The Motor Vehicles Act, 1988 and rules notified there under and all other legislation of the central government are being implemented in the UT.
4. Directions have been issued u/s 5 of The Environment (Protection) Act, 1986 to the Municipal Corporation, as well as, other concerned institutions for doing organic composting to prevent burning of leaves and to prevent air pollution.

B. Infrastructural Responses

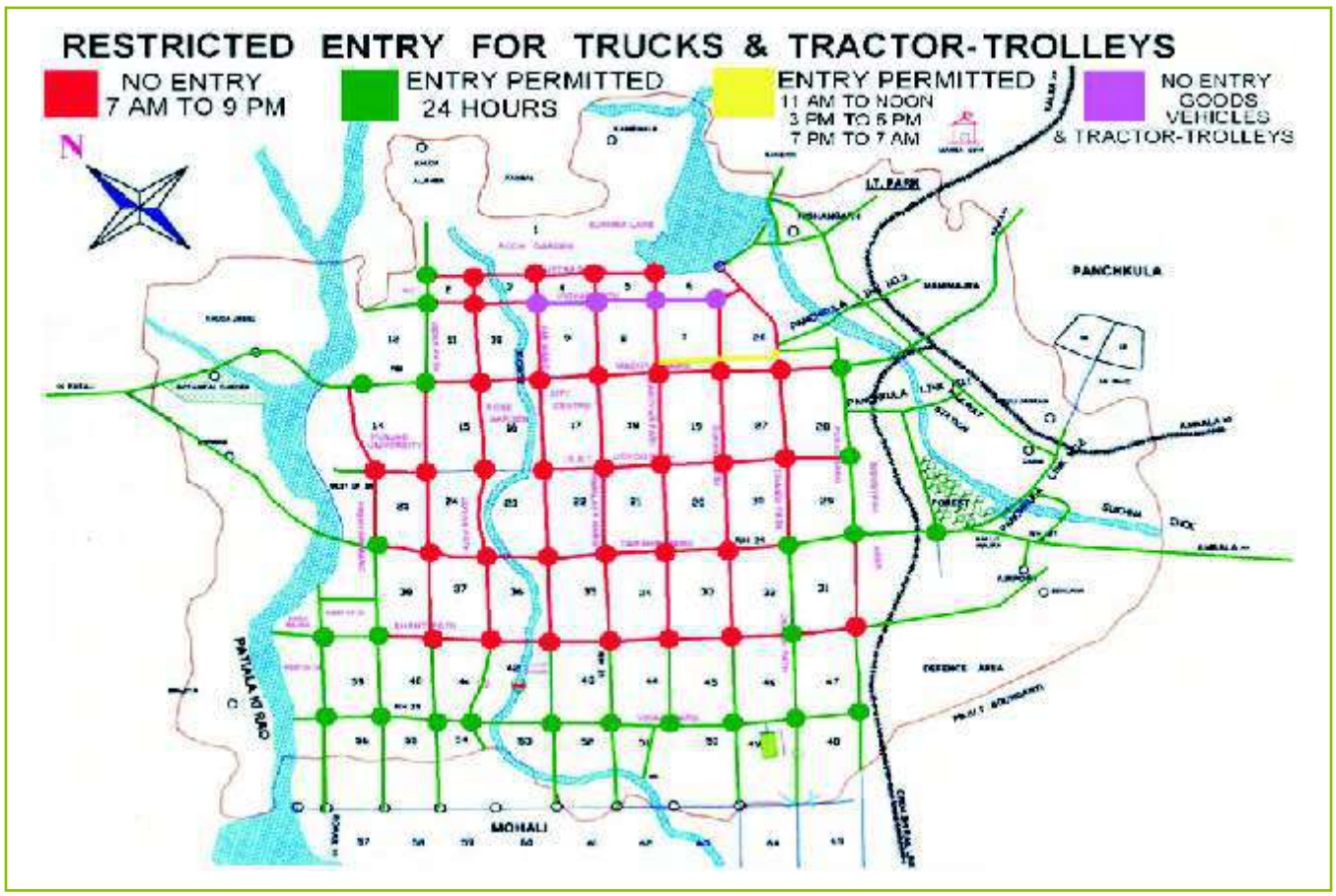
A. Industrial Pollution Control:

1. The industrial zone is situated towards Southeast of the city in the leeward direction. Green rows and columns of mango trees separate it from the rest of the city. It is located ideally near the railway station for easy transportation of raw materials and goods. The IT Park of the city is located in a pollution free environment near the foothills of the mountains.
2. All the air polluting industries in the Union Territory have installed air pollution control equipments.
3. No air polluting industry is allowed to operate in non confirming areas (outside Industrial area).

Indoor air pollution is 2-5 times worse than the air outdoors.

C. Vehicular Pollution Control:

1. Compulsory 'Pollution Under Control' (PUC) certificates for vehicles has been introduced by Chandigarh Traffic Police. Pollution monitoring facilities are available at most of the Petrol Pumps & Vehicle Repair Maintenance units in the city. As per data provided by the State Transport Authority, Chandigarh, 44 authorized stations are operative for issuing 'Pollution Under Control' certificates (PUC).
2. Lead free petrol was introduced in Chandigarh in early 2000. This is expected to reduce lead pollution in air. Other clean fuels like LPG are also introduced in city. Chandigarh Administration has taken steps to promote battery operated vehicles which do not pollute while running on roads.
3. Many roundabouts which were facing traffic congestion problems especially during peak hours have been converted into traffic light points with timers and slip roads to ensure easy flow of vehicles. Moving one step further to grid based movements of traffic, Administration has closed rotaries connecting sector in the middle.
4. Cycle tracks have been developed along all major Margs and important Paths in Chandigarh. The Chandigarh Traffic Police has also started compulsory segregation of slow moving vehicles in separate lanes especially during peak hours.



Air pollution is the third highest cause of death among all health risks, ranking just above smoking in India.

5. Routes of HTV and interstate buses in the city are specified.
6. Chandigarh Traffic Police has also taken measures to ensure smooth moving of the traffic, reducing jams, and hence, minimizing wastage of fuel.
7. To reduce incoming inter state buses within the city center, a new ISBT was set up in Sector 43 in 2002 which has started functioning to its capacity in year 2008. Thus, buses coming from other states do not interfere the local traffic.
8. The scooter repair market was shifted from sector 21 in the city center to sector 43 & 48 at the outskirts.

c) Air Pollution control from Municipal & Commercial Sources:

1. To assess the pollution caused by gensets in Chandigarh, a survey was conducted by CPCC. Notices were issued and remedial actions taken.
2. Burning of leaves has been banned by the Municipal Corporation. Composting is being promoted instead.
3. Burning has also been banned at the Chandigarh land fill site and regular compaction is carried out.
4. Smoking has also been banned in Chandigarh