

# POLLUTION EFFECTS ON ENVIRONMENT OF URBAN CITIES: GUJARAT SCENARIO

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## **Abstract**

*In India the environmental conditions of cities have progressively deteriorated due to urbanization, industrial development, lack of awareness, poor maintenance of motor vehicles and poor road conditions. Various cities of Gujarat are also underwent this industrialization and urbanization. As a result of which the environment in city and around it has started to affect human health, plants and animals. Through this paper, I have discussed the scenarios and different survey studies conducted in various cities of Gujarat. Among these cities Vapi and Ankleshwar are facing alarming environment problems. The amount of particulate matter and harmful suspended solids in city environment has already crossed their permissible limits in few cities. In a survey by CPCB around our country, these two cities of Gujarat are found in ten most polluted cities. GIDC should take some serious step regarding these critical problems otherwise it will be too late. Other cities like Ahmedabad, Vadodara, Surat are also on the verge of these adverse effects of pollution. It is certain that these alarming values will have adverse effects on climate, environment and health, and both personal and social wealth of the dwellers of the cities. So, a strict implementation of adequate abatement measures and environmental regulations are needed urgently to stop our cities to convert into pollution jar.*

**Keywords:** *Pollution, Environment, Industrialization, Urbanization, Effects of Pollution, Gujarat Pollution*

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## **INTRODUCTION**

Gujarat has experienced impressive industrial development since its formation as a state in India 1960. As per Annual Survey of Industry (ASI), carried out by the Central Statistical Organization (CSO), under Ministry of Statistics, The industrial sector at present comprises of over 1200 large industries and over 3, 12,000 micro, small and medium industries. It has more than 90,000 industries. About 8,000 are involved in polluting environment. In Gujarat major industries creating pollution are located in the Vadodra Petrochemical Complex, Nandesari, Ankleshwar, Vapi, Vatava and Hazira near Surat. Apart from these there are few other places also.

India has been ranked among the top ten worst climate polluters in our world. While India holds 7th position, US and China hold the 2nd and 3rd positions respectively. It should be noted that the hazardous impacts from environmental pollution are regularly reported and monitored. Out of the different kinds of pollution, the air pollution is most dangerous in respect of environmental regulations since the environmental damage due to air pollution mostly affects human well-being directly by way of adverse health effects on the population exposed to it. In this paper, I have discussed the scenarios of various pollutions in different places in Gujarat due to industrialization & Urbanization.

## **Types of Pollution Prevalent In Gujarat**

a) Air Pollution

The air we breathe is an essential ingredient for our survival and a healthy life. Industrialization and urbanization have resulted in a major cause of deterioration of Gujarat's Environmental Air quality. Apart from rapid industrialization, there is a lack in urbanization which has resulted in the emergence of industrial centers without a corresponding growth in civic amenities and pollution control mechanisms. Polluted air in our environment contains one, or more, hazardous substance, pollutant, or contaminant that is responsible for hazard to general health. The main constituents of pollution found in the air we breathe include, particulate matter, PAHs, lead, ground-level ozone, heavy metals, sulphur dioxide, benzene, carbon monoxide and nitrogen dioxide. Air pollution in cities causes shorter lifespan for city dwellers and animals. Air pollution is caused of ill health and death by natural and man-made sources, major man-made sources of ambient air pollution includes tobacco smoke, combustion of solid fuels for heating, cooking cleaning agents, insecticides, pesticides, automobiles, power generation, and poor environmental regulation, less efficient technology of production, congested roads. The natural sources include incinerators and waste disposals, forest and agricultural fires.

#### b) Waste and Water Pollution

The water we drink is one of the important ingredients for our wellbeing and a healthy life. Water pollution has many sources. Effluent consists of Industrial discharged effluents, sewage water, and rain water pollution and polluted by agricultural or households/domestic activities cause damage to human health or the environment. The most poisonous of them are the city sewage and industrial waste effluent into the rivers. The treatments used to treat waste water are not adequate in any city all over India. Currently, only about 10% of the waste water generated is treated; and the remaining is discharged into our water bodies. Due to this, pollutants infiltrate groundwater, rivers, and other water bodies. Such water, which ultimately ends up in our domestic use, is often highly contaminated and carries disease-causing microbes.

#### c) Noise Pollution

Mainly the noise pollution has two sources, i.e. industrial and non- industrial. The industrial sources include the noise from various industries and big machines working at a very high momentum and high noise intensity. Source of noise excluding industrial include the noise produced by transport/vehicular traffic and the neighborhood noise generated by various noise pollution activities. Most of the noise pollution sources will fall into the following categories: roads traffic, aircraft, railroads, construction, industry, noise in buildings, and consumer productize Pollution.

#### d) Land/ Solid waste Pollution

Improper management of solid waste is one of the major factor which is responsible for environmental pollution. Land/Soil pollution is one of the major forms of environmental issues our world is facing today. Heavy metal industries have generated wastes that are disposed into landfills without special precautions.

### **Effect of Pollution on Citizens**

Over exploitation of the country's resources be it land or water and the industrialization/urbanization process has resulted in environmental degradation. Environmental pollution is one of the most serious problems faced by humanity and other life forms on our earth today. With India's population at 1.3 billion people and counting, plus other internal economic migration to urban areas from the countryside, the cities are bursting at the seams.

A Comprehensive environmental assessment of industrial clusters in India, undertaken by IIT Delhi and the CPCB, found that the environmental pollution levels in 10 major industrial areas had reached a "very

alarmingly high” level. This list includes Ankleshwar and Vapi from Gujarat.

The air above us is looking empty without any birds; almost all the land is dead now. The air pollution has led to the empty/dead air above us, soil/water pollution has led to the dead land/soil without living creatures, there are unwanted sound everywhere due to noise pollution, plastics (wastes) are seen even in the National Parks and Wild Life Sanctuaries. Emissions of CO, CO<sub>2</sub>, SO<sub>x</sub>, NO<sub>x</sub> etc. are polluting agents from the vehicular/industrial emission are leading various human health problems like eye irritation, lung cancer, health related disease etc. and also creating disturbance in ecosystem. The high the increase the cholesterol level in blood, high blood a pressure and problems in listening abilities. Plastic, paper excreta of animal and organic- inorganic wastes and other wastes contaminate the water and causes water borne diseases.

Simultaneously, with environmental pollution, it is important to be worry about human insensitivity of nature, polluted psychology and responsibility less society. This has led to physical and psychological diseases as well as pulling down interpersonal relationship in society.

### Scenario in Gujarat Vapi

Vapi is one of the largest industrial complexes in Gujrat, developed by Gujarat Industrial Development Corporation (GIDC). Spread over 11.4 km<sup>2</sup>, it is home to over 1500 industries. About 70% of the industries in Vapi are engaged in the manufacturing of chemicals, dyes & dye intermediates, pigments, pesticides, and pharmaceuticals. Out of these, 600 units are manufacturing a wide range of chemicals for industrial and agriculture sectors. It represents an investment of Rs 2000 crore and exports goods worth Rs 200 crore per annum. Vapi together with Daman, Sarigam and Silvassa form the largest cluster of SMEs in Asia.

Vapi GIDC was established in 1967, and other chemical/pulp-paper mills in the district. There are about 832 industries out of which around 759 are the polluting ones. Of these 653 are in the red-category list of Central Pollution Control Board (CPCB). The Vapi chemical cluster manufactures a variety of chemical products like pesticides, dyes, dye intermediaries, paints, organic & inorganic pigments and textile chemicals. Now the district is well known for its industrial development, heavy pollution and diminishing agricultural produce. The air pollution wakes up people from their sleep at night and the trains are routinely delayed during the evenings/nights due to low visibility.

Due to the pollution activities in Kolak and Daman Ganga rivers, the riverine and estuarine fish have been vanished severely affecting the income of the poorest of the fishing community. These fishing communities mainly reside in Kolak and Daman villages. The officials of Vapi and Valsad chapter of Indian Medical Association also had a meeting with the expert’s panel. They concluded that over half of all patients coming to the doctors in Vapi were there for respiratory diseases and incidence of other illnesses like skin diseases, etc. were very high.

Recent knowledge about air pollution depicts that there are no real safe limits for air pollution. The air in Vapi city and around many industries in Valsad is so polluted that productivity of fruits has gone down by over 50%. Some of the measures suggested to mitigate the situation include:

- Involving affected populations (farmers, fishing community) in monitoring and regulation.
- Moratorium on expansion of these estates/industries.
- Modernization in technologies to achieve zero effluent and solid waste.

- Assessment should be done for regional environmental impacts instead of individual industrial impacts.
- Pollution cess and banning of certain products/chemicals are required.

Physico-chemical analysis of industrial effluents has shown that EC, TDS, Chlorides, Sulphates, BOD, COD, Sodium and Calcium are in very high concentration as compared to the standards prescribed by WHO. Such effluent should not be permitted to be discharged in the nearby water bodies or soil without treatment. They are unfit for agriculture/irrigation. The high level of pollution of the industrial effluents causes environmental problems which will affect whole ecosystem.

### **Ankaleshwar**

Ankaleshwar the city also known as “Golden Corridor” has hundreds of small and medium factories manufacturing chemicals, dyes, paints, fertilizer, plastics, pulp and paper; spew untreated waste into the air and waters. Ankaleshwar town has a population around 78,000 whereas the slum-like colonies here sprouted on the periphery of the industrial estate. Around 25,000 people living without basic amenities such as water, sanitation, health set-up etc. Around 60,000-70,000 people get their daily bread by working in the estate. A cursory look at Ankaleshwar would leave one in doubt whether any environmental regulations exist in this state or not. Industries here generate over 40,000 tonnes of hazardous waste and discharge more than 32 million liters of toxic effluent through open channels into river Narmada. Not only the surface water is highly polluted but the contamination of ground water is even more serious problem. A preliminary survey of a part of the slum colonies showed that 55 out of 65 hand pumps and bore wells had yellow to red coloured water and some of which were either acidic or smelt of unknown chemicals.

Hazardous solid waste has been dumped on open spaces, around water bodies without any treatment or any concern about their impact on the local water soil or living organisms. There has been no known investigation for traces of toxic residues in agricultural produce or in the milk of cattle grazing in the area.

The solutions given by industries, such as Common Effluent Treatment Plant (CETP) or hazardous waste landfill either hide or transfer the problem but didn't eliminate it. In any case they are not effective solutions, e.g. CETPs only deal with only the barest basic parameters whereas the chemical composition of effluents is highly complex. Or the landfills' stated life is at the most a couple of decades whereas the toxicity of chemicals can persist much longer.

### **Suggested measures-**

- There should be a moratorium on new hazardous industries and further expansion.
- The regulatory board should be strong enough and better equipped to deal with the myriad problems created by such industries.
- There should greater transparency in the working of the regulatory bodies, information made available to public and forming of citizens' watchdog committees.
- Immediate steps to stop degradation of environment including punitive action should be taken.
- Detailed surveys & studies on the impacts of environmental pollution on land, water, air, flora and fauna need to be initiated immediately.

## Vadodara

Vadodara formerly known as (Baroda) is the 3rd largest city in the Western Indian State of Gujarat, after Ahmedabad and Surat. It is located on the bank of the Vishwamitri River. The river frequently dries up in the summer season, leaving only a small stream of water. Over the period of years, there has been a continuous increase in human population, road transportation, vehicular traffic and industrial growth in Vadodara which has resulted in rapid increase in the concentration of gaseous and particulate.

In Vadodara various large-scale industries such as Indian Oil Corporation (IOCL), Gujarat State Fertilizers & Chemicals (GSFC), Indian Petrochemicals Corporation Limited (IPCL, now owned by Reliance Industries Limited) and Gujarat Alkalis and Chemicals Limited (GACL) have emerged in the vicinity of Gujarat Refinery and all of them are dependent on it for their fuel and feedstock. Other large-scale public sector units are Heavy Water Project, Gujarat Industries Power Company Limited (GIPCL), Oil and Natural Gas Corporation (ONGC) & Gas Authority of India Limited (GAIL). In our environment, Plants exhibit many physiological changes in response to pollution. Plants can be used effectively by planners/engineers and green belt developers in controlling the urban air pollution.

A study has been conducted for identifying tolerance level of plants by calculating the Air pollution tolerance index (APTI) based on 4 parameters. The 4 parameters are: Chlorophyll, Ascorbic acid, pH, and Relative water content (RWC). The aim of this study is therefore to calculating the seasonal APTI values of commonly growing plant species in the heavily trafficked area of Vadodara city, Gujarat. And recommend most suitable plants for afforestation.

GIDC area and Nandesari are dominated with industrial activities in city while, other sites like Alkapuri, Dandia Bazaar Nyay Mandir, Mandvi, Railway Station, Fatehgunj, Raopura are mainly commercial areas and are exposed to heavy traffic. Leaf samples of selected plant species were collected from all the sites around city.

Since bio monitoring is a crucial tool to evaluate the effect of air pollution on plants, *Peltophorum pterocarpum*, *Acacia arabica* is a solution as bio monitors of vehicular pollution stress. Among the other plant species, *Polyalthia longifolia*, *Azadirachta indica*, *Mangifera indica* have shown high APTI value compare to other species, hence these species work as sink of air pollutants.

## Anand

Anand popularly known as the “Milk Capital” of India. It has become famous for Amul dairy and its milk revolution in our country. It hosts the Head Office of Gujarat Cooperative Milk Marketing Federation Ltd (AMUL), National Dairy Development Board of India. It lies between Ahmedabad and Vadodara on the Western Railways. Economy of the city is very vibrant which ranges from agriculture, farming to big scale industries. Many famous big industries including Elecon Engineering, Vulcan Industrial Engineering Co. Ltd, Warm Steam, The Charotar Iron Factory (est.1938), Milcent and Atlanta Electrics are located in this industrial belt.

During last few years this city had gone through rapid urbanization as well as industrialization. As a result of which both private and mass transportation vehicles are also increasing day by day. It also APTI values are calculated for plants. Its calculation is based on four parameters viz. chlorophyll, Ascorbic acid, pH, Relative water content.

Apart from the survey site 10 sampling locations were chosen on the basis that the sampling stations were in the vicinity of free atmosphere that is without interferences from stagnant spaces and large buildings.

For APTI different leaf samples were collected from three common plant species existing in all the sampling sites viz. *Polyalthia longifolia*, *Peltophorum pterocarpum*, and *Azadirachta indica*. The calculated APTI for the 3 species studied was found comparatively higher in most of the studied sites than standards. High value of APTI was observed in *Polyalthia longifolia* (6.57- 10.22), which was followed by *Peltophorum pterocarpum* (6.81-8.43) and *Azadirachta indica* (6.01-7.59).

SPM values were found high in all the sites approx. value of 100  $\mu\text{g}/\text{m}^3$ . Low relative humidity and semiarid climate is also another reason for high SPM load. All the plant species behaved as sensitive towards air pollution.

## Conclusion

Anything when it crosses its tolerance limits it causes a negative impact. If we do not wakeup today, it would be very late tomorrow. As a result it will be very much difficult to sustain against the pollution. High values of Sulphate indicate increased decomposing of plant and animal material done by autotrophic plants and incorporated into amino acids. During summer season temperature was very high so, DO values were low in summer because oxygen holding capacity of plants was decreased at high temperature. But, alkalinity was found high that was generally due to the presence of carbonate, bicarbonate and hydroxide. It is certain that these increasing values will make adverse effects on climate, environment and health, and both personal and social wealth of the citizens. So, it can be concluded that a strict implementation of adequate abatement measures and environmental regulations is urgently necessary.

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