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Research Paper

Air Quality Status in Gwalior Region, Madhya Pradesh: a Review

Environmental Science

KEYWORDS : Air quality, Air Pollution, Human health.

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ABSTRACT

Gwalior in Madhya Pradesh is among top most four cities of the world with the dirtiest air, according to a World Health Organization (WHO) study. Out of 20 cities in the world with dirtiest air, 13 are from India. Gwalior has three times more, the acceptable particulate matter levels in air. Automobiles are the major contributors in air pollution, rather than rapid industrialization; urbanization has resulted in the emergence of industrial centres without a corresponding growth in civic utility and pollution control mechanism. Poor air quality has both drastic and persistent effects on human health. In all metro cities like Gwalior has an air pollution level exceed according to World Health Organization (WHO).

Introduction

Air pollution is a serious and worldwide problem which affects the human health. Madhya Pradesh particularly in Gwalior faces severe air pollution problems, with rapidly increased suspended particulates matter (SPM) at approximate 2 times as high as the WHO standards in metro cities.

Among air pollutants, particulate matter (PM) is a ubiquitous and it's especially a major problem due to its adverse health effect, Visibility reduction and soiling of buildings, consequently possibility of premature deaths of owing to high levels of air pollution.

Air pollution in Madhya Pradesh is mainly caused by Automobiles, rapid urbanization, and industrialization and by other resources. The adverse effects of air pollution have been associated with three major sources: sulphur dioxide and solid particulates from fossil fuels; photochemical oxidants and carbon monoxide from motor vehicles and miscellaneous pollutants such as hydrogen sulphide, lead and cadmium emitted by smelters, refineries, manufacturing plants and vehicles.

The 1972 Stockholm Declaration declared that man has the fundamental right to freedom, equality, and adequate condition of life in an environment of quality that permits a life of dignity and well-being. In 1976, the Constitution empowers the Parliament to make laws for implementing the international obligations of the country as well as any decision taken at an international conference, association or other body.

The Central Pollution Control Board's data, which puts Gwalior at the very top of India's eleven most polluted cities in terms of particulate matter, has caught the Madhya Pradesh government on the wrong foot.

The 2013-14 data of the state's pollution control board substantiates WHO's report. Madhya Pradesh Pollution Control Board (MPPCB), which monitored vehicles across the state, found Gwalior leading other cities in MP with 23% diesel and 6.9% petrol vehicles emitting pollutants above permissible limits. Official records of MPPCB show that around 25,000 vehicles were monitored in last fiscal of which nearly 1,500 were violating norms by emitting pollutants above permissible limits.

Some Fact about Pollution and Cleanliness in Gwalior

S.No.	Pollution in Gwalior	Levels
	Air Pollution	95.00 Very High
	Drinking Water Pollution and Inaccessibility	50.00 Moderate
	Dissatisfaction with Garbage Disposal	100.00 Very High
	Dirty and Untidy	62.50 High
	Noise and Light Pollution	75.00 High
	Water Pollution	87.50 Very High
	Dissatisfaction to Spend Time in the City	91.67 Very High
	Dissatisfaction with Green and Parks in the City	62.50 High

Purity and Cleanliness in Gwalior, India

Air quality	5.00 Very Low
Drinking Water Quality and Accessibility	50.00 Moderate
Garbage Disposal Satisfaction	0.00 Very Low
Clean and Tidy	37.50 Low
Quiet and No Problem with Night Lights	25.00 Low
Water Quality	12.50 Very Low
Comfortable to Spend Time in the City	8.33 Very Low
Quality of Green and Parks	37.50 Low

Major Pollutants Present in Air

In Madhya Pradesh Particular in Gwalior the problem of air pollution has assumed serious proportions, which depends on fossil fuels, private motor vehicles for transport, inefficient use of energy in buildings, and use of biomass for cooking and heating are factors believed to have contributed to this alarming increase in pollution levels. Sulphur dioxides (SO_2) produced from Industrial resources. Nitrogen oxides (NO_x) are formed mainly by the burning of fossil fuels and Ozone (O_3) increased by transportation mainly. It may cause serious heart and lungs diseases. This is the indication of risk about human health and respiratory system also.

Air Quality Standard in Gwalior

The Gwalior has the highest particulate matter in India at 329 micrograms per cubic metre was based on Central Pollution Control Board (CPCB) 2012 report on 'national ambient air quality status and trends'. But since then there has been a huge improvement in the scenario. The recent figures show that the particulate matter in the city stands at 141 micrograms per cubic metre. Earlier this year, the CPCB data revealed Gwalior topped the list of polluted Indian cities in terms of particulate matter. The data showed that against the permissible limit of 60 micrograms per cubic metre, particulate matter in Gwalior was 329 micrograms per cubic metre over five times the permissible limit. Only 12% of people living in cities that report air quality comply with WHO guideline levels.

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The primary aim of the air quality standards is to provide a basis for protecting public health from the adverse effects of air pollution and for eliminating, or reducing to a minimum, those air contaminants that are known or likely to be hazardous to human health and well-being.

Causes of Air Pollution

There are various types of factors which contribute to air pollution, some of them are.

1. Vehicular Pollution: This is the major factor towards pollution. The transport vehicles population is increased day by day in the city and they emit dangerous pollutants like nitrogen oxide, carbon mono oxide sulphur dioxide etc. Most of our transportation system is powered by fossil fuels. The result is that transportation is one of the largest sources of air pollutants. As most of these emissions happen close to where we live and work, they can have a significant impact on our health.

2. Industrialization: Industrialization is also responsible to maintain the air quality standard in the city. Most of the industry is around the city so the emissions of industries affect the air mostly. In few years there is a rapid increase in industrialization so that the air quality standard also gets poor.

3. Fuel quality: The poor fuel quality is also responsible for air pollution. Fuel of poor quality such as coal, gasoline, diesel, fuel oil is used in Madhya Pradesh. Although various measures have been taken to improve the quality of fuel such as reduction of sulphur in diesel, unleaded petrol etc.

4. Government Policy: No pollution preventive steps were taken during the early stage of industrialization, population growth of vehicles, which resulted in high levels of air pollutants.

How Vehicles Emissions Affect Us

Vehicle emissions contribute to the formation of smog. Nitrogen oxides (NOx) and volatile organic compounds (VOCs) in vehicle emissions can react to form ground level ozone and other secondary pollutants during the spring and summer months. During the winter months, vehicle emissions can be trapped near the ground by temperature inversions. This can lead to high levels of primary pollutants including nitrogen dioxide (NO_2), carbon monoxide (CO) and particulate matter (PM2.5). Smog link to a variety of respiratory and cardiovascular symptoms and illnesses.

A number of studies have shown that pollutant exposures near major roadways are greater than for other areas in city. This increased exposure link to an increased prevalence of a wide variety of illnesses including asthma, chronic bronchitis, emphysema, pneumonia and heart disease.

Pollutant Wise Health Effects

Pollutants	Effects
Carbon monoxide (CO)	Affects the cardio vascular system, vision and judgment, creating nausea and Headaches, reducing productivity and increasing discomfort, nervous system impairing Physical coordination.
Sulfur Dioxide (SO_x)	Affects lung function adversely.
Nitrogen Oxide (NO_x)	Impairment of lung function and eye, nose and throat irritations, Causes susceptibility of infection pulmonary diseases.
Suspended particulate Matter (SPM)	Fine particulate matter may be toxic itself or may carry toxic trace Substance and can alter the immune system. Fine particulates Penetrate deep into the respiratory system irritating lung tissue and causing long term disorders.
Hydrocarbon (HC)	Potential to cause cancer.

What We Do to Reduce Vehicle Emissions

1. Consider alternatives to travelling, such as video-conferencing and telecommuting.
2. Consider using public transportation, walking, or biking rather than private automobile. Most forms of public transportation have lower pollutant emissions per passenger than private vehicles.
3. If you must drive, consider carpooling.
4. Keep your vehicle well-maintained as that will minimize emissions.
5. Drive at steady speed and avoid rapid acceleration, which increases fuel consumption and pollutant emissions.
6. Avoid idling for long periods.
7. If purchasing a new car choose a fuel-efficient model.

Measures to control air pollution

1. Pollution Control Technology

For petrol vehicles there are three ways catalysts, precise engine, fuel controls and evaporative emission control have been quite successful. More advanced versions of these technologies can rduce smog-forming emissions from new vehicles by a factor of 10. For diesel vehicles 'Two way' catalysts and engine controls have been able to reduce hydrocarbons and Carbon Mono oxide (CO) emissions but Nitrogen oxide (NOx) and toxic particulate matter emission remain very high.

2. Cleaner fuel quality

Petrol and diesel contain significant amount of sulphur and other compounds that make it harder for existing control technology to keep vehicles clean. Fuel quality specification have been laid down by Bureau of India standards (BIS) for gasoline and diesel for the period 2000-2005 and beyond 2005 for the country, it becomes necessary to reduce its sulphur content. Alternative fuels such as natural gas, biodiesel, and ethanol can deliver benefits to the environment while helping to move the world away from dependence on oil. All these fuels inherently burn cleaner than diesel and petrol and have lower carbon content resulting in less CO_2. The Indian auto industry is working with the authorities to facilitate for introduction of the alternate fuels. India has also set up a task force for preparing the hydrogen road map. LPG has been introduced as an auto fuel and the oil industry has drawn up plans setting up auto LPG dispensing stations in major cities.

3. Inspection and Maintenance

The most important step towards emission is the formulation of an inspection and maintenance system. It is possible to reduce 30%-40% pollution generated by vehicles through proper periodical inspection and maintenance of vehicles. Inspection and Maintenance measures for in use vehicle are an essential contingent to emission standards for new vehicles.

4. Other measures

- Clean fuel filters, air filters and oil filters regularly.
- Testing for all vehicles at regular intervals should be made mandatory.
- Availability of improved and efficient public transport facilities.
- Adopt and popularize car-pooling.
- Avoid congested road and rush hours to the extent possible.
- Awareness campaigns to help public awareness from the Public level.
- Replacement of all pre- 1995 autos and taxis with new vehicles, which use clean fuels.
- Removal of 15 year old buses from the road unless they use CNG or some other clean flues.
- Ban the commercial vehicles, which are more than 10 to 20 years old.

Conclusion

We found that the air standard in Gwalior is worst by the world health organization (WHO) report. The major factor towards this is vehicular pollution but we can't ignore the participation of industry, urbanization and rough roads in the air quality status of Madhya Pradesh particularly in Gwalior.

In Madhya Pradesh need to generate an action plan for air quality management besides Madhya Pradesh whole India faces similar problems of poor air quality are being experienced. Crop production is also affected by the environmental conditions among which air quality plays a leading role. Air pollutants cause inimical effects on physiology and metabolism of plants due to their oxidizing potential.

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