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# Impact of Industrial Waste on the Environment in Dewas

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*Abstract:* **Dewas, a major industrial town in Madhya Pradesh, is home to industries such as leather, textiles, agro, chemical, and pharmaceuticals. Industrial waste in Dewas, India, significantly affects environmental quality, contributing to soil, water, and air pollution. Improper waste disposal contaminates local ecosystems, endangers public health, and disrupts biodiversity. The discharge of untreated industrial waste into the environment has led to severe pollution of water, soil, and air, posing significant threats to human health and biodiversity. This research examines the environmental impact of industrial waste in Dewas, focusing on heavy metal contamination and its correlation with public health hazards. It assesses ecological damage and emphasizes sustainable waste management practices to mitigate long-term environmental and health impacts. The study also evaluates existing pollution control measures and suggests sustainable solutions for mitigating the adverse effects of industrial pollution.**

## 1. INTRODUCTION

Dewas, a prominent industrial city in Madhya Pradesh, India, hosts a diverse range of manufacturing units, including pharmaceuticals, textiles, and engineering industries. While these industries contribute significantly to economic growth, they also generate substantial amounts of waste. Improper management and disposal of industrial waste have led to severe environmental challenges, such as water contamination, soil degradation, and air pollution. Pollutants from factories seep into local water bodies and agricultural land, posing threats to biodiversity and public health. This introduction explores the scale, causes, and consequences of industrial waste in Dewas, highlighting the urgent need for sustainable waste management solutions. Dewas has witnessed rapid industrialization, contributing to economic growth but at the cost of environmental sustainability [1]. The industries discharge toxic effluents containing heavy metals such as lead, mercury, cadmium, chromium, and arsenic into the Nagdhaman drain, which ultimately flows into the holy river Kshipra. This has resulted in soil degradation, water pollution, and air contamination, affecting the health of over 2000 residents living near the drain. This paper aims to analyze the extent of industrial pollution, assesses ecological damage, and emphasizes sustainable waste management practices to mitigate long-term environmental and its impact on human health and the ecosystem.

## 2. ENVIRONMENTAL IMPACT OF INDUSTRIAL WASTE

### 2.1 Water Pollution

Industrial waste containing harmful chemicals, dyes, and heavy metals significantly pollutes local water bodies. Untreated effluents from factories are often discharged directly into rivers, streams, and drains, leading to severe contamination. This pollution affects aquatic life by reducing fish populations and biodiversity, while also posing serious health risks to residents who rely on these water sources for drinking and domestic purposes. Chemical pollutants alter water pH and oxygen levels, making it unsuitable for life. Agricultural lands irrigated with contaminated water experience reduced productivity, and toxic elements such as lead, chromium, and arsenic accumulate in the food chain. Groundwater reserves are also becoming increasingly unsafe for human consumption, causing long-term ecological damage. To address this growing crisis, strict monitoring and the implementation of advanced wastewater treatment systems are urgently needed [2].

The industrial effluents, containing heavy metals and toxic chemicals, contaminate local water bodies and groundwater. Lead, cadmium, and chromium have been detected in drinking water sources, causing health risks such as neurological disorders, kidney damage, and cancer. Pollution also affects aquatic life by reducing biodiversity in the Kshipra River [3].

Fig1-2: Kshipra River

**2.2 Soil Contamination**

Industrial waste dumped in open areas leads to heavy metal accumulation in the soil, reducing fertility and affecting crop yields. Contaminated soil results in the uptake of toxic metals by plants, which then enter the food chain, increasing the risk of chronic illnesses in humans.

**2.3 Air Pollution**

Industrial emissions release sulfur dioxide ($SO_2$), nitrogen oxides ($NO_x$), and particulate matter, contributing to respiratory diseases like asthma and chronic obstructive pulmonary disease (COPD) [4]. Workers in industries and residents near the industrial zone are more vulnerable to these health effects.

## 3. PUBLIC HEALTH IMPACT

The prevalence of tuberculosis, amebiasis, and hepatitis B and C is higher in populations exposed to industrial pollutants. Lead exposure has been linked to neurological disorders, particularly in children, while cadmium exposure affects kidney function and bone health. Chromium, used in tanning and textile industries, is a known carcinogen and is associated with skin diseases and respiratory disorders [5].

Fig 3-4: industrial area near by people affected by various disease.

## 4. EXISTING POLLUTION CONTROL MEASURES

Effluent Treatment Plants (ETPs) and Sewage Treatment Plants (STPs) have been established to manage industrial waste, but their effectiveness is compromised due to improper maintenance and regulatory non-compliance [6]. Environmental laws such as the Water (Prevention and Control of Pollution) Act (1974) and the Air (Prevention and Control of Pollution) Act (1981) exist but lack strict enforcement. The Madhya Pradesh Pollution Control Board (MPPCB) mandates that industries install Effluent Treatment Plants (ETPs) to treat wastewater before discharge and comply with permissible pollutant limits. Periodic inspections and water quality monitoring are conducted to identify violations, and penalties are imposed on non-compliant units. Common Effluent Treatment Plants (CETPs) have also been established in certain industrial clusters to handle waste from smaller units lacking individual treatment facilities. Additionally, awareness programs and training workshops are organized to encourage industries to adopt cleaner production techniques and reduce waste generation at the source. Despite these efforts, enforcement gaps, irregular monitoring, and limited adoption of advanced treatment technologies reduce the overall impact of these measures, highlighting the need for stronger and more integrated approaches [6].

## 5. CHALLENGES IN POLLUTION CONTROL

Industries often bypass regulations due to high treatment costs and weak enforcement mechanisms. Lack of awareness among residents and inadequate monitoring of industrial waste disposal further exacerbate pollution levels. Small-scale industries struggle to adopt clean technologies due to financial constraints [7]. Controlling pollution in Dewas faces numerous challenges due to the city's rapid industrialization and inadequate environmental infrastructure. Many industries lack proper waste treatment facilities or operate them inefficiently to reduce operational costs, leading to the direct discharge of untreated effluents into water bodies and open land. Regulatory agencies often struggle with limited resources, insufficient manpower, and outdated monitoring equipment, making consistent enforcement difficult. Corruption, lack of transparency, and industrial non-compliance further weaken the effectiveness of pollution control measures [7]. Additionally, public awareness about the environmental and health impacts of industrial waste remains low, resulting in limited community participation in monitoring and advocacy efforts. The absence of advanced waste management technologies, coupled with overlapping or poorly enforced regulations, exacerbates the problem [8]. These factors collectively hinder the implementation of sustainable solutions, making pollution control in Dewas a complex and ongoing challenge.

## 6. SUSTAINABLE SOLUTIONS FOR MITIGATING INDUSTRIAL POLLUTION

### 6.1 Adoption of Cleaner Technologies

Industries should invest in zero-liquid discharge (ZLD) systems, advanced wastewater treatment, and energy-efficient machinery to minimize pollution.

### 6.2 Strengthening Regulatory Frameworks

Stricter enforcement of environmental laws and regular audits of industries can help control pollution. Industries violating norms should face strict penalties.

### 6.3 Community Participation and Awareness

Public awareness campaigns and community-led monitoring initiatives can hold industries accountable for their waste management practices.

### 6.4 Waste Recycling and Management

Industries should adopt circular economic principles by recycling industrial waste, treating effluents efficiently, and reducing reliance on hazardous chemicals.

## 7. CONCLUSION

The industrial waste problem in Dewas poses serious environmental and health risks. While efforts have been made to curb pollution, regulatory weaknesses and industrial non-compliance hinder progress. A comprehensive approach involving government authorities, industries, and local communities is essential to mitigate pollution and promote sustainable industrial development. By enforcing stringent regulations, adopting cleaner technologies, and increasing public awareness, Dewas can achieve a balance between industrial growth and environmental

conservation.

The industrial waste problem also affects the long-term sustainability of the region. The rapid growth of industries such as pharmaceuticals, textiles, and engineering has resulted in large volumes of hazardous waste, much of which is disposed of improperly, contaminating water bodies, degrading soil quality, and polluting the air. Although various measures have been introduced to control pollution, including environmental regulations and periodic inspections, their impact has been limited due to regulatory loopholes, lack of strict enforcement, and persistent industrial non-compliance [8]. Many factories either bypass treatment systems or operate them inefficiently to cut costs, worsening the situation. Addressing this issue requires a comprehensive, multi-stakeholder approach that actively involves government authorities, industries, environmental agencies, and local communities. This collaboration should focus on enforcing stringent environmental regulations, mandating the use of advanced waste treatment and cleaner production technologies, and implementing regular monitoring mechanisms to ensure compliance. Furthermore, raising public awareness about the hazards of industrial waste and promoting community-led initiatives can foster accountability and participation. By combining strong governance, technological innovation, and community engagement, Dewas can work toward achieving a sustainable balance between industrial expansion and environmental conservation, ensuring the well-being of both present and future generations.

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