Industrial Pollution

Mains Syllabus: GS III - Environmental pollution and degradation

Why in the News?

Residents in various parts of Chennai have raised concerns over the rising industrial pollution in their neighbourhoods.

What are the types of industrial pollution?

- Industrial pollution refers to environmental contamination arising directly from industrial activities and facilities, impacting air, water, and soil.
- **Air Pollution** - Industrial emissions like smoke, chemicals, and gases from steel plants, cement factories, oil refineries, and more contribute to air pollution.
- **Water Pollution** - Industrial wastewater and discharges containing toxic chemicals, heavy metals, and other contaminants pollute water bodies, harming aquatic life and potentially contaminating human water supplies.
- **Soil Pollution** - Industrial waste, including toxic chemicals, is dumped onto the soil, contaminating it and affecting the health of organisms living in it.
- **Noise Pollution** - Industrial machinery and operations can produce excessive noise levels, impacting human health and well-being.

Industrial Pollution	
Energy Industry	Fossil fuels used for electricity and heat produce 75% of global greenhouse gas emissions, making the energy sector the biggest polluter.
Chemical Industry	The chemical industry releases harmful VOCs, NOx, SO_2, and PM, leading to acid rain, smog, and serious health risks.
Mining Operations	Mining activities can lead to significant water pollution, including acid mine drainage.
Power Generation	Power plants, especially those using fossil fuels, generate wastewater and release pollutants into the air.
Food Processing	Industries like meat packing and dairy production generate organic waste and wastewater.
Textile Industry	The textile industry uses a variety of chemicals and dyes, many of which are hazardous to the environment.
Pulp and Paper Industry	This industry uses a large amount of water and generates wastewater containing chemicals and organic matter.

What are the impacts of industrial pollution?

- **Human Health** - Industrial pollution can cause various health problems, including respiratory illnesses, cancer, and cardiovascular diseases.
- Toxic substances like heavy metals (lead, mercury, arsenic), volatile organic compounds (VOCs), and gases (sulfur dioxide, nitrogen oxides) can infiltrate air, water, and soil, posing significant risks especially to children and the elderly.
- **Environmental Damage** - Pollution from industries harms ecosystems, reduces biodiversity, and affects the quality of air, water, and soil.
- Water pollution from industrial waste-often containing heavy metals, toxic chemicals, and organic sludge-can render water sources unusable for humans and animals, and disrupt agricultural productivity.
- **Food Chain Contamination** - Soil contamination from heavy metals and persistent organic pollutants (POPs) makes it difficult for plant and animal life to thrive, and can lead to food chain contamination.

- **Climate Change** - The release of greenhouse gases (such as carbon dioxide and methane) from burning fossil fuels in industrial processes is a major driver of global warming and climate change
- **Economic Costs** - Industrial pollution can lead to significant economic costs related to healthcare, environmental cleanup, and lost productivity.
- **Social Impacts** - Industrial pollution imposes substantial costs on society, including healthcare expenses, loss of productivity, and property devaluation in affected communities
- **Deterioration of Infrastructure and Cultural Heritage** - Pollutants can corrode buildings, monuments, and vital infrastructure, leading to costly repairs and loss of cultural heritage.

What can be done to address industrial pollution?

- **Source Control** - This approach focuses on preventing or reducing pollution at its source.
- It involves modifying industrial processes, technologies, or raw materials to minimize pollutant generation.
- Examples include using cleaner production techniques, optimizing combustion processes, or substituting hazardous substances with less harmful alternatives.
- **Pollution Prevention** - This control strategy aims to eliminate or minimize the generation of pollutants.
- It involves implementing efficient waste management practices, recycling and reusing materials, and adopting sustainable production methods to minimize waste and emissions.
- **Treatment Systems** - Industrial wastewater treatment and air pollution control systems are vital for reducing the impact of pollution.
- These systems employ various techniques such as physical, chemical, and biological processes to remove or neutralize pollutants before their release into the environment.
- **Energy Efficiency** - Enhancing energy efficiency in industrial processes reduces the overall environmental impact.
- By optimizing energy use, industries can lower greenhouse gas emissions and decrease the demand for fossil fuels, thus mitigating air pollution and climate change.
- **Environmental Monitoring** - Regular monitoring and assessment of industrial operations help identify potential pollution sources and evaluate the effectiveness of control measures.
- Real-time monitoring systems can detect anomalies and trigger corrective actions promptly.

Central Pollution Control Board (CPCB) Regulations on Industrial Pollution	
Categorization of Industries	The CPCB has categorized industries based on their Pollution Index (PI) into four main categories. • Red (highly polluting) • Orange (moderately polluting) • Green (less polluting) • White (non-polluting) • Blue (Essential environmental services)

Emission and Effluent Standards	• The standards prescribe the permissible limits for various pollutants in industrial emissions (gases and particulate matter released into the air) and effluents (liquid waste discharged into water bodies or land). • These standards are legally binding and are specified under Schedule-I of the Environment (Protection) Rules, 1986. • They cover a wide range of industries, including chemical, pharmaceutical, textile, and power plants.
National Ambient Air Quality Standards (NAAQS)	• These are benchmarks set by the Central Pollution Control Board (CPCB) to regulate and monitor air quality across India.
Consent Mechanism	• Industries are required to obtain Consent to Establish (CTE) before setting up a new unit and Consent to Operate (CTO) before commencing production. • These consents are granted by the respective State Pollution Control Boards (SPCBs) or Pollution Control Committees (PCCs) in Union Territories.
Online Continuous Effluent/Emission Monitoring Systems (OCEMS)	• These are automated systems that continuously monitor and analyze the quality of effluent wastewater or emissions from industrial processes in real-time.

Reference

The Hindu | Industrial Pollution