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Environmental Conditions in the Present Context: Water Pollution—Causes and Solutions: A Study

Dr. Pareshkumar Narendrabhai Vaghela
Assistant professor, Department of Philosophy, Samaldas Arts College, Bhavnagar
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Abstract- At present, the environment is becoming increasingly distressed. The impact of environmental pollution is clearly visible on humans as well as on all living organisms. New factories and industries are being established every day due to unchecked development and the commercialization of technical knowledge. Nature has been exploited not only to fulfill basic human needs but also to satisfy unnecessary desires. This excessive exploitation has disturbed environmental balance and has resulted in various forms of pollution. Consequently, humanity is facing serious challenges such as ecological imbalance, health hazards, and the threat to survival. Although environmental protection laws are being enacted worldwide and international organizations are working toward conservation, the desired results have not been achieved. This may be due to excessive dependence on scientific solutions while neglecting social and ethical responsibilities (Kumar, Hari, and Verma 275).

I. INTRODUCTION

The universe cannot be conceived apart from nature and human beings. The relationship between the human body and the universe is inseparable, and any change in the natural environment directly affects human life. Earth is the only known planet that provides oxygen, water, food, and gravitational stability essential for survival. All living beings exist within an environment composed of physical and inorganic elements. When human intervention disrupts this natural balance, the resulting condition is termed environmental pollution.

Pollution affects air, water, and sound, ultimately harming human health. According to Eugene P. Odum, pollution is an undesirable change in the physical, chemical, or biological characteristics of air, land, or water that adversely affects human life, living conditions, and natural resources (Odum qtd. in Satyanarayana et al.). Pollution is primarily caused by residues generated through human activities and their improper disposal.

Since ancient times, nature has maintained ecological balance through natural recycling processes. However, modern industrial society has disrupted this balance, depriving future generations of a healthy environment (Kumar, Hari, and Verma 276).

II. POPULATION GROWTH AND ENVIRONMENTAL DEGRADATION

In the contemporary world, environmental degradation is largely the result of human negligence. One of the major causes of pollution is population growth. Increasing population has led to housing shortages, indiscriminate deforestation, and excessive industrialization. Melting glaciers, irregular rainfall, and rising global temperatures are direct consequences of environmental imbalance.

Industrial waste has increased dramatically, releasing toxic substances into air and water bodies. Human overconsumption has further aggravated ecological destruction. Despite being aware of these dangers, society continues to prioritize short-term gains over environmental well-being (Satyanarayana et al.).

Historical incidents such as the mass death of fish in Lake Erie due to phosphate and nitrate pollution highlight the severity of water pollution. Similarly, the river Ganga—considered sacred in India—has become heavily polluted due to the dumping of industrial waste, sewage, and religious offerings. Reports have revealed the presence of arsenic in Ganga water, which causes severe health disorders upon consumption (Madhurima).

III. WATER POLLUTION IN THE INDIAN CONTEXT: GANGA AND YAMUNA

The Government of India launched the Ganga Swachhata Abhiyan under Prime Minister Rajiv Gandhi, yet the outcomes were largely unsatisfactory. Despite being declared a national river in 2009, pollution of the Ganga continues due to urban waste, industrial effluents, and human negligence (Mishra, Bharat Mein Paryavaran Samasyaye).

Industrial hubs such as Kanpur discharge millions of liters of untreated waste into the Ganga daily. Cities like Patna also contribute sewage and chemical waste, severely degrading water quality. During summer, the river shrinks into a canal-like structure, exposing the depth of pollution.

Similarly, the Yamuna River, revered in Hindu scriptures, has become one of the most polluted rivers in India. The river carries agricultural runoff containing pesticides such as DDT, aldrin, and benzene hexachloride even before entering Delhi. Industrial effluents and sewage from Delhi further contaminate the river, particularly in the 22-kilometer stretch between Wazirabad and Okhla Barrages (Niti et al.).

Pollution levels worsen in Mathura and Agra, where benzene hexachloride concentration is more than six times higher than in Delhi. Reduced water flow due to dams and canals has intensified pollution (Niti et al.).

IV. CHEMICAL AND MARINE POLLUTION

Industrial wastes contain harmful chemicals such as chlorides, sulfides, nitrates, ammoniacal nitrogen, and heavy metals including mercury, lead, zinc, and copper. These pollutants block sunlight penetration, disrupt photosynthesis, and destroy aquatic life (Satyanarayana et al.).

Oil spills form surface layers on seawater, preventing oxygen exchange and leading to mass marine deaths. Coastal pollution along Mumbai illustrates the devastating impact of plastic waste and petroleum discharge on marine ecosystems (Kumar, Hari, and Verma 278).

According to the Comptroller and Auditor General of India, water quality assessments conducted by the Environmental Research Laboratory, Lucknow, revealed that Ganga and Yamuna waters are unfit for drinking and bathing due to untreated industrial and municipal waste (Madhurima).

V. HEALTH AND ECOLOGICAL IMPACTS OF WATER POLLUTION

Water pollution causes irreparable damage to plants, animals, and humans. Polluted water spreads infectious diseases such as cholera, tuberculosis, jaundice, diarrhea, and typhoid fever. Consumption of mercury-contaminated water leads to Minamata disease (Kumar, Hari, and Verma 277).

Agricultural irrigation using polluted water reduces soil fertility and destroys beneficial microorganisms. Increased nutrient concentration leads to eutrophication, while toxic chemicals destroy aquatic biodiversity, causing ecological collapse (Satyanarayana et al.).

VI. MEASURES TO PREVENT WATER POLLUTION

1. Industrial waste must be treated before discharge into water bodies.
2. Organic manure should replace chemical fertilizers.
3. Neem-based pesticides should be promoted.
4. Public sanitation facilities must be expanded.
5. Soil erosion should be controlled through vegetation.
6. Efficient sewage and drainage systems are essential.
7. Integrated wastewater treatment models should be adopted.
8. Rural employment opportunities should be strengthened.
9. Pollution Control Boards must be accountable.
10. Environmental laws must be strictly enforced.
11. Community participation is essential.
12. Public awareness programs should be intensified.
13. Proper waste disposal habits must be encouraged.
14. Industrial pollution should be monitored rigorously.
15. Sewage treatment plants must be installed.
16. Effective environmental laws should be formulated.
17. Strict penalties must be imposed on violators.
18. All stakeholders must comply with regulations.
19. Overextraction of groundwater must be controlled (Mishra, Ayurved Mein Paryavaran Aur Samaj).

VII. CONSUMERISM AND ETHICAL RESPONSIBILITY

Modern development is rooted in consumerism, leading to increased exploitation and environmental degradation. Mechanical comforts have weakened human resilience, increasing dependence on artificial remedies. Mahatma Gandhi rightly stated that nature fulfills needs but not greed. The principle of Vasudhaiva Kutumbakam emphasizes collective responsibility toward the planet (Mishra, Bharat Mein Paryavaran Samasyaye).

VIII. CONCLUSION

Humanity has progressed technologically, even exploring space, yet it has failed to protect its own planet. Environmental pollution threatens life on Earth, making ecological conservation a global responsibility. Protecting the environment is essential for sustaining life, dignity, and future generations. Environmental balance must be restored through ethical living, social awareness, and collective action.

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