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Pollution of Air, Water, and Soil: Causes, Control, and Legal Measures

ABSTRACT

There are many types of pollution like Air pollution, Water pollution, Soil pollution, Noise pollution, Light pollution, Thermal pollution & Radioactive pollution. Climate change has been recognized as the environmental problem of today's life and has become a subject of serious concern. Pollution in cities has become a very serious concern affecting the city. As the cities are rapidly developing and the population is also increasing day by day it has a large effect on pollution in cities. These effects the natural ecosystem and also effects the health of the residence of such cities. The ill effects we are facing nowadays because of pollution it is caused none other than us we know the solution but we are not implementing it. Pollution has a various set of consequences on our environment like it does effect on air quality, Health issues and it does effect ecosystem. In this research paper, we are going to focus mainly on these three types of pollution Air pollution, Water pollution & Soil pollution. In this paper we are including Causes of pollution, consequences and their solution. The Government has implemented different laws of pollution for the protection of the environment. This study provides vital information about the pollution and their certain Laws related to it.

KEYWORDS

Air pollution, water pollution, soil pollution, causes, solutions and laws.

INTRODUCTION

Pollution is one of the most challenging problems which is increasing rapidly. As the days are passing the impact of pollution is getting more adverse and is threat to existence of life. The most important thing that we need to survive that is good air, good water and good food, nowadays the air quality is getting poor, water is getting contaminated by waste and when we talk about food the soil pollution is increasing. Contamination means the presence of unwanted or harmful substances in something that should be clean or pure. It usually makes the thing unsafe, dirty, or unsuitable to use.

- **Air pollution** is the contamination of the atmosphere by gases, particles, and biological matter that exceeds the capacity of the atmosphere to clean itself and thus causes harmful effects on humans, animals, plants, and the environment. Air pollution may be outdoor or indoor. The pollutants include particulate matter (PM2.5 and PM10), carbon monoxide, nitrogen oxides, sulfur dioxide, ozone, and volatile organic compounds.
- **Water pollution** mostly occurs when harmful substances like chemical, microorganisms or plastic contaminate a stream, river, lake, ocean or other bodies of water. Although water pollution was historically a problem mostly limited to congested urban areas, the rapid spread of industrialization and the growth of the human population to unprecedented levels in modern times have created a nearly universal problem.
- **Soil pollution** occurs when some chemical or other pollutants that can be harmful, not only to humans and animals but also to plants. It happens when people dump garbage, plastic, industrial waste, or use too many chemical fertilizers and pesticides in farming. These harmful substances mix with the soil and reduce its quality and fertility.

When there is some problem there is also solutions. Problems which we face nowadays are all manmade.

AIR POLLUTION

➤ Causes and their Solutions

1. **Vehicles** are one of the biggest factors for Air pollution. In the world of Glamor every one among us wants private vehicle for transportation. Cars, buses, trucks, and motorcycles burn fuels such as petrol and diesel to run their engines. Petrol and diesel releases very harmful gases like carbon monoxide, nitrogen oxides, and carbon dioxide.

Solution: One can use electric cars which do not pollute air or use CNG gas which in compare to petrol and diesel produce less pollution. We can use public transport which reduce the number of vehicles on road, like trains, buses and metro.

2. **Industrial activities** which leaves the harmful chemicals and gases in air causes Air pollution. Factories release gases such as carbon dioxide, sulfur dioxide, nitrogen oxides, and toxic chemicals into the air. These gases are harmful for health and also pollute the atmosphere. Industrial emissions can lead to air pollution, acid rain, and

climate change. They also harm human health by causing breathing problems, asthma, lung diseases, and eye irritation. People who live near industrial areas are often more affected.

Solution: Government should give proper Guidelines to the factors. There should be proper filters in factories which should filter the air which is polluted and then release it in open. Factories should plant more trees in surrounding which absorb carbon dioxide and improve the quality of air. Industries should regularly check and control the gases released from their factories.

- 3. Construction** is a big cause of Air pollution it generally pollutes Air through Dust and the equipment which they use mainly when the machines are working on diesel or petrol. When they demolish, break walls or digging, small particles of dust is generated. Measurement of this dust is done by their sizes like PM 2.5 and the smaller and dangerous PM 1.0. These particles stay suspended, travel with wind, drops the visibility and are harmful of lungs.

Solutions: whenever they demolish something they must spray water on them so that 30 to 40% particle can stay down only. They should cover the trucks which brings sand or other materials.

- 4. Agriculture** also causes Air pollution. Often After harvesting crops like rice or wheat, farmers burn the leftover husks in the field to clear the land quickly. This burning creates a lot of smoke and harmful gases. The smoke spreads in the air and makes the air dirty and unhealthy to breathe. They also use chemical fertilizer for crops to grow the crops faster but some fertilizers release harmful gases into air which can pollute air. Sometimes pesticides and chemicals are used to kill insects and pests can also release harmful substances into the air.

Solutions: Farmers should stop burning their crops, government should help them with new technologies and should provide them knowledge about the things they should do and what should not.

- 5. Deforestation** means cutting down large Numbers of trees. Deforestation is done by humans for their needs like for construction of new building, for new industries also for mining. Because of climate change sometimes forest fire also occurs where in few minutes huge damage is done to the forest ecosystem. Trees are very important because they clean the air, give us oxygen, provide homes for animals, and help keep the Earth's temperature balanced.

Solutions: If someone is cutting tree they should plant trees also. Places which are empty or is of not use we should plant a tree. One should protect trees as it is one of the important parts of living world.

WATER POLLUTION

➤ Causes and Solution

- 1) **Industrial activities** are the very big cause for water pollution as it affects water in large amount. Some factories dump their waste in lakes or rivers, this pollutes water and makes it Toxic. Some industries release waste without proper treatment due to high costs or lack of regulation enforcement and This directly pollutes rivers and lakes. Accidental leaks and spills during industrial processes can contaminate large amounts of water in a short time. This affects the food chain and can kill the fishes which live in that polluted water. It is also harmful for humans as it can cause skin infection or even cancer

Solutions: Treating water before it enters the waterway system is probably the most efficient way of reducing water pollution. Hazardous waste should be safely stored, treated, and disposed of instead of being dumped into water bodies. When any factory does so there should be strict punishment given. In India there are laws but unfortunately some don't follow it.

- 2) **Sewage and domestic waste** are major contributors to water pollution because they contain harmful substances. Sewage and domestic waste are major sources of water pollution, as they include wastewater from homes, offices, and hospitals containing organic matter, chemicals, and harmful microorganisms. Waste also carries bacteria and viruses that spread many types of diseases. Nutrients such as nitrogen and phosphorus present in sewage can also cause large amount of growth the algae. If algae are in large number in a water body then it can reduce the oxygen because it blocks the sunlight, kills the underwater plants. When the algae are rotten it smells very bad, it messes up beaches and drinking water.

Solutions: Proper treatment and management of sewage and domestic waste are very important to prevent water pollution and protect water resources. Setting up sewage treatment plants helps in cleaning waste water before it goes in any rivers or lakes, removing harmful substances and microorganisms. Using proper sanitation systems like toilets and drainage networks can prevents open discharge of waste into the environment. Reducing the use of harsh chemicals, detergents, and cleaning agents can also lower the level of harmful pollutants in wastewater.

- 3) **Plastic** dumping is a major cause of water pollution. Plastic takes many years to decompose, it takes more than 100 year. Due to plastic marine species are at higher risk of ingesting plastic, suffocating, or becoming entangled in plastic pollution. This build large amount of plastic in water bodies, it pollutes them and affect the water bodies. Aquatic animals such as fish, turtles, and seabirds often in mistake eats plastic as they feel it is there food, which can cause choking, internal injuries, and even death. This pollution not only harms marine life but also impacts human activities like fishing, tourism, and drinking water supply.

Solutions: Plastic pollution in water is a serious environmental problem, but it can be controlled through effective solutions and responsible behaviour. We should reduce the use of plastic bags, bottles, and straws is the most important step. We should switch to reusable alternatives such as cloth bags, metal bottles, and glass containers. Proper waste segregation and disposal help prevent plastic from reaching water bodies. Recycling of plastic materials can also reduce the amount of waste entering water bodies. Governments can implement strict rules and bans on plastic usage and promote eco-friendly products. We should organize clean-up drives for rivers, lakes, and beaches which will help us to remove existing plastic waste in the water Public awareness campaigns can educate people about the harmful effects of plastic pollution.

- 4) **Oil spills** are one of the most serious causes of water pollution. It happens when crude oil or petroleum products are accidentally or intentionally released into Water bodies. These spills often happen due to tanker accidents, pipeline leaks, offshore drilling failures, or operational discharges from ships. When oil enters the water, it spreads rapidly across the surface and it forms a thin layer known as an oil slick. This thin layer blocks sunlight from entering the water, which affects photosynthesis in aquatic plants and disrupts the food chain. Oil also reduces the oxygen exchange between air and water, and it leads to low oxygen level in the water bodies which can harm or kill fish and other marine organisms. It is very difficult to clean up oil spills as they are very time consuming and expensive.

Solutions: oil spills are very hard to clean. Government should be strict with such incidence. Companies which are supplying oil or which produce oil should take care of oil spills by there side, if it happens fast action should be taken upon it rather than just leaving it.

SOIL POLLUTION

➤ Causes and Solution

1. **Industrial activities** are the major cause of soil pollution. The consequence of this phenomenon has been an increase in mining and manufacturing activities. Through mining they get iron ore and coal, if they are not disposed off properly it can harm land as it contains heavy metals and toxic compounds. When it rains there are more chance that they might go in the soil and it can reduce the fertility of the soil.

Solutions: proper use of iron ore and coal is very important. If we are using it or even if we are not using it proper dispose is important. Industries are the major cause of pollution they should take care of the environment.

2. **Acid rain** is another reason of soil pollution. Acid rain is caused mainly by the release of certain gases into the atmosphere that react with water vapor to form acids. Acid rain mostly made of sulphur dioxide and Nitrogen oxides. When these two chemical meets soil it cause soil pollution. When sulphur dioxide and Nitrogen oxide is aborted by soil it dissolves away some of the essential nutrients found in the soil and change the structure of the soil.

Solutions: Acid rain is indirectly cause by industries, vehicles etc. once we stop or control air pollution acid rain can reduce or can stop.

LAWS RELATED TO AIR POLLUTION, WATER POLLUTION AND SOIL POLLUTION

- ***The Air (Prevention and Control of Pollution)1 Act, 1981 (Act No. 14 of 1981) [29 March, 1981]***

Act to provide for the prevention, control and abatement of air pollution, for the establishment, with a view to carrying out the aforesaid purposes, of Boards, for conferring on and assigning to such Boards powers and functions relating thereto and for matters connecting therewith.

- ***The Water (Prevention and Control Of Pollution) Act, 1974 (Act No.6 of 1974) [23rd March, 1974]***

An Act to provide for prevention and control of water pollution and the maintaining or restoring of wholesomeness of water, for the establishment, with a view to carrying out the purposes aforesaid, of Boards for the prevention and control of water pollution, for conferring on and assigning to such Boards powers and functions relating thereto and for matters connected therewith.

- ***The Environment (Protection) Act, 1986 (No. 29 OF 1986) [23rd May, 1986.]***

An Act to provide for the protection and improvement of environment and for matters connected there with:

WHEREAS the decisions were taken at the United Nations Conference on the Human Environment held at Stockholm in June, 1972, in which India participated, to take appropriate steps for the protection and improvement of human environment;

AND WHEREAS it is considered necessary further to implement the decisions aforesaid in so far as they relate to the protection and improvement of environment and the prevention of hazards to human beings, other living creatures, plants and property;

- ***The National Green Tribunal Act, 2010 (No. 19 OF 2010) [2nd June, 2010.]***

An Act to provide for the establishment of a National Green Tribunal for the effective and expeditious disposal of cases relating to environmental protection and conservation of forests and other natural resources including enforcement of any legal right relating to environment and giving relief and compensation for damages to persons and property and for matters connected therewith or incidental thereto.

MINISTRY OF ENVIRONMENT, FOREST AND CLIMATE CHANGE NOTIFICATION

- **The Hazardous and Other Wastes (Management And Transboundary Movement) Rules, 2016 New Delhi, The 04th April, 2016 G.S.R No. 395 (E).** - Whereas the draft rules, namely the Hazardous And Other Wastes (Management and Transboundary Movement) Rules, 2015, were published by the Government of India in the Ministry of Environment, Forest and Climate Change vide number G.S.R. 582(E), dated the 24th July, 2015 in the Gazette of India, Extraordinary Part II, section 3, sub-section (ii) inviting objections and suggestions from all persons likely to be affected thereby, before the expiry of the period of sixty days from the date on which copies of the Gazette containing the said notification were made available to the public;

AND WHEREAS the copies of the said Gazette containing the said notification were made available to the public on the 24th day of July, 2015;

- **Solid Waste Management Rules, 2016 New Delhi, the 8th April, 2016 S.O. 1357(E).**—Whereas the draft of the Solid Waste Management Rules, 2015 were published under the notification of the Government of India in the Ministry of Environment, Forest and Climate Change number G.S.R. 451 (E), dated the 3rd June, 2015 in the Gazette of India, part II, Section 3, sub-section (i) of the same date inviting objections or suggestions from the persons likely to be affected thereby, before the expiry of the period of sixty days from the publication of the said notification on the Solid Waste

Management Rules, 2015 in supersession of the Municipal Solid Waste (Management and Handling) Rules, 2000;

AND WHEREAS, copies of the said Gazette were made available to the public on the 3rd June, 2015;

- **Plastic Waste Management Rules, 2016** New Delhi, the 18th March, 2016

*G.S.R 320(E). – Whereas the Plastic Waste (Management and Handling) Rules, 2011 published vide notification number S.O 249 (E), dated 4th February, 2011 by the Government of India in the erstwhile Ministry of Environment and Forests, as amended from time to time, provided a regulatory frame work for management of plastic waste generated in the country;

And whereas, to implement these rules more effectively and to give thrust on plastic waste minimization, source segregation, recycling, involving waste pickers, recyclers and waste processors in collection of plastic waste fraction either from households or any other source of its generation or intermediate material recovery facility and adopt polluter's pay principle for the sustainability of the waste management system, the Central Government reviewed the existing rules;

And whereas, in exercise of the powers conferred by sections 6, 8 and 25 of the Environment (Protection) Act, 1986 (29 of 1986), the draft rules, namely, the Plastic Waste Management, Rules, 2015 were published by the Government of India in the Ministry of Environment, Forest and Climate Change vide number G.S.R. 423(E), dated the 25th May, 2015 in the Gazette of India, inviting objections and suggestions from all persons likely to be affected thereby, before the expiry of a period of sixty days from the date on which copies of the Gazette containing the said notification were made available to the public; And Whereas copies of the said Gazette were made available to the public on the 25th May, 2015;

CONCLUSION

Air, water, and soil pollution aren't three separate issues. They're the same mess showing up in different places. The smoke from factories ends up in our lungs, then rain pulls it down into rivers, and that same water feeds the crops grown in soil that's already been poisoned by waste and chemicals. It all loops back on us. We feel it directly. Dirty air makes it hard to breathe. Polluted water makes people sick. Damaged soil means food that isn't safe or land that won't grow anything. Beyond us, animals lose their homes, fish die off, and whole ecosystems start to unravel. And it hits our wallets too: more hospital bills, failed harvests, and billions spent just trying to clean up what we didn't protect in the first place.

But this isn't hopeless. We already know what works. Cleaner energy and better public transport cut air pollution. Treating sewage and cutting back on plastic protects water. Smarter farming and proper

waste disposal keep soil alive. The hard part isn't the science; it's actually doing it. Laws mean nothing if nobody enforces them, and big changes don't stick unless regular people are part of it.

So, this comes down to all of us: governments setting rules and sticking to them, industries cleaning up their act, and people making different choices each day. If we keep going like this, the damage won't just be someone else's problem, it'll be permanent. If we act now, we can still turn it around. That window is closing, but it's still open.

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