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ENVIRONMENTAL PROTECTION AND WASTE MANAGEMENT

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I. ABSTRACT

This paper focuses upon the issue of environmental problem and waste management. Human beings and other living organisms form part of environment and are directly or indirectly connected to each other. Environment pollution drastically effect lives on the earth. With the rapid growth of industrialisation, significant rise in environmental pollution simultaneously seen. Although, its existence is as old as human civilization but today it has become major area of concern. Trans boundary pollution is emerging area of concern which occurs due contamination of water or air in one country floated or mix with the water as well air of another country. So, it would not be correct to say that insufficient waste management creates problem only to waste generating country but it also has transboundary effect. It brings serious threat to survival of mankind. This paper further highlights the procedure of waste management and its influence on the environment. The persistent environmental problems resulted in lack of natural resources, extinction of flora and fauna species and raise problems in global ecosystem as well.

II. KEYWORDS

Environment, environmental pollution, waste management, natural resources, ecosystem, flora and fauna.

III. INTRODUCTION

Earth is the only planet where life exists, and this is because of the atmosphere, which makes human lives survive. Other than the atmosphere, various other elements are also there, making life possible on earth. For example, air, water, soil, etc., are fundamental for the survival of living beings. With passing time, these elements kept

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on being polluted, which started deteriorating human lives to a greater extent. As its repercussions, we often witness an increase in numerous health issues that turn out to be life threatening one.² Environmental pollution always remains one of the biggest threats to health and humanity. It is not a new phenomenon, pollution has become more prominent with the advent of industrialisation and the impacts of such pollution are still being witnessed by us. Anthropogenic activities have polluted our environment to this extent, which occurs due to the pollutants released into the air, water, soil, etc.³ There, the pollutants originate from a source, are then transmitted either by air or water, and are dumped into the soil by human beings.

The rise of urbanisation, industrialisation, technological advancement etc., has no doubt benefitted to human being, but together what it brought are industrial air and water pollution, degradation of soil, uncontrolled deforestation, destruction of the ozone layer, global warming, climate change as well as eradication of certain plants and animal species, are only few examples of anthropogenic activities of human beings which, however, seriously endangered his own survival.⁴ Because of these contradictions, environment protection is now become a great concern at international, national as well as at local level. One of the major causes of environment pollution is production of huge amount of waste materials all across the globe and problem of disposing such waste materials openly in the environment creating landfills more numerous. This situation poses a threat to human health, for both to present and future generations. The persisting problem of waste management is because of disposing of in landfills rather than being processed and led to represent a dangerous pollutant to air, water and land.

IV. ENVIRONMENTAL POLLUTION

² Misra, V, Pandey, S.D “Hazardous waste, impact on health and environment for development of better waste management strategies in future in India”. *Environment International*, (2005), pp. 417-435, <https://doi.org/10.1016/j.envint.2004.08.005>

³ Rhind SM. Anthropogenic pollutants: a threat to ecosystem sustainability? *Philos Trans R Soc Lond B Biol Sci*. 2009 Nov 27;364(1534):3391-401. doi: 10.1098/rstb.2009.0122. PMID: 19833650; PMCID: PMC2781844.

⁴ Fazzo, L, Minichilli, F, Santoro, M, Ceccarini, A, Della Seta, M, Bianchi, F, Combo P, & Martuzzi, M, “Hazardous waste and health impact: a systematic review of scientific literature”, *Environmental Health*, 2017, 16 DOI 10.1186/S12940-017-0311-8

Environmental pollution is the degradation of the ecological system, which adversely impacts lives of every living organisms on the earth. Any unnatural and damaging transformations in all the dimensions (like physical, chemical, and biological factors of any constituent of the ecosystem) which can cause dangerous effects on mixed forms of life and belongings are called environmental pollution. Environmental pollution is one of the severe concerns of life as it drastically effects our ecosystem including all living organisms present having its adverse impact on them and arises the possibility of becoming extinct to those species which are already in the vulnerable criteria. Therefore, environmental pollution is considered as one of the biggest threats to life.

Before examining the root causes of environmental pollution. Firstly, it is very important to understand the meaning of environmental pollution provided under various Indian legislations. The term “pollution” means excessive accumulation of pollutants which causes undesirable change in physical, chemical and biological characteristics of air, water or land. According to section 2 (c)⁵ “environmental pollution” means presence of any environmental pollutants in the environment. Further, section 2 (b)⁶ defines “environmental pollutants” as presence of any solid, liquid or gaseous substance in such concentration which tends to be injurious to environment. It is evident that if such severity continuous for long time, enormous impact on lives of human, animal and plants will be there. The drastically changing environment creates a problem population break down. Therefore, to understand the factors that affects the rates of dispersal and degradation of pollutants. We need to understand the probable causes which are responsible for environmental pollution. The determination of causes of environmental pollution is very necessary as it helps in combating further happenings of environmental pollution and helpful in restoring damaged ecosystem, reducing ozone depletion, climatic change, and other pollution related issues.

⁵ The Environment Protection Act, 1986, No. 29, Acts of Parliament, 1949, (India).

⁶ *Id.* at 2

There are various types of pollution. The four major types of pollution namely air pollution, water pollution, land pollution and noise pollution. It may be originated naturally or anthropogenically. The harmful effect of pollution, their effect is manifested in anatomical and morphological structure, metabolism, growth process, at all levels of cellular organization, from the molecular to cellular level, through individual and population to ecosystem.⁷ Environmental protection has now gained international concern, different nations across the globe come forward to deal with the problem by way of formulating various international conventions and treaties. International environment law is carved by the decision made by the International Court of Justice. Despite of efforts made at international level, harmful effects of environmental pollution still increasing at alarming rate. Global warming, greenhouse effect, ozone depletion, accumulation of pollutants in atmosphere and hydrosphere etc., are result of increasing environmental pollution day by day. Other prevalent factors such as rapid increase in human population, urbanization, industrialization, some agricultural activities like excessive use of fertilizers and pesticides, etc, led to environment pollution and it is problematic because causes behind environmental pollution are related extensively with our day to day activities that it become very difficult to work upon and reduce it.⁸ It is not possible only by the way of convention and treaties to deal with environment related issues, but each individual should work and contribute in the protection of environment. If every individual takes his/her job seriously then only the concept of sustainable development will prevail. And we will able to see future of controlled pollutant free environment.

V. WASTE MANAGEMENT

Waste is outcome of various by- product of human activities. The rise of industrialisation and living standards have led to increase in quantity of waste and complexity of waste disposal, further expanded health-care facilities and economic development have significantly added high quantity of hazardous waste and

⁷ Bećirović, Suad & Ibro, Skenderovic & Kalač, Bećir, "Environmental pollution and waste management", *Balkan Journal of Health Science*, Vol. 3, Issue 1, (2015), pp. 2-4

⁸ Jeevan Rao K, "Environmental issues in developing countries", *Environment & People*, Vol. 6 (1), pp. 21-23.

biochemical waste which have severe impact on environmental and health consequences.⁹ When we move back during middle ages, food waste was dumped openly on street, which led to insects transmitted higher number of infectious diseases. This situation arose because of the problem of waste management. Today, too waste management is significant issue and contributes in raising environmental pollution. This section discusses the treatment, generation, disposal and management of the growing volume of waste as it creates significant challenge to every nation all across the globe.

The waste management basically involve the activities of transporting, collecting, disposal, recycling, sorting, tracking and monitoring of waste. Recycling of waste could involve high costing when significant procedure performed manually and also the collection of waste for recycle is another problem in case where garbage needs to be differentiated according to their categories for example PET bottles cannot be recycled with PVC containers, these are required to recycle separately. It also creates responsibility on our part where by avoiding the use of non- biodegradable products and products which are toxic into environment, helps in restoring degrading condition of environment from harmful pollutants to certain extend. According to the Basel Convention, there about 400,000,000 tons of hazardous waste created annually across the world.¹⁰ It is evident that with the increasing population, pollution also increases. Other wastes like military waste, agricultural waste, waste water, radiochemical waste etc, creates around 3.5 kg of waste per capita a day.¹¹ The oceans are now full of millions of plastic bottles and bag. Lost and discarded fishing nets, nylon and other float on seas and oceans.¹²

A. Solid Waste Management -

⁹ Wentz Charles, "Hazardous Waste Management", McGraw Hill International Editions, Chemical Engineering Series, McGraw Hill Inc., 2nd Edition, Singapore.

¹⁰ Pamela Chasek, "Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal", <https://enb.iisd.org/articles/basel-convention> (Last visited Mar, 29, 2024)

¹¹ Bećirović, Suad & Ibro, Skenderovic & Kalač, Bećir, *supra* Note 5 at 5

¹² Scribd, <http://www.scribd.com/doc/46336370/New-Microsoft-Word-Document>, (last visited Feb, 10, 2024).

Such wastes which are in solid or semi solid form and are non-soluble in nature are called as solid waste. Solid waste includes agricultural waste, industrial waste, mining residues, municipal garbage, hazardous wastes etc., such waste could be either biodegradable waste or non- biodegradable waste where bio-degradable wastes can be degraded but non- biodegradable wastes cannot be degraded. Therefore, such waste which are non- biodegradable one, significantly harmful for the environment and health of human beings. There is report highlighting the increase in waste generation around 5% annually. Today, India produces 42 million tons of municipal solid waste annually¹³. And out of which only 11.9 million, or 22-28%, are treated. The other 31 million tonnes of waste are left untreated and are disposed of in landfills ¹⁴. The various methods have been adopted for the disposal of solid waste by the way of landfills, source reduction, composting, recycling and incineration.¹⁵ In India most of municipal solid waste disposed of in landfills. This method has been used for the long time and is considerably becoming source of groundwater pollution. Secondly, the method of incarnation is use for the disposal of solid waste, many incinerators produces foul odour and gritty smoke because of which it should be eliminated to be used at larger scale. Thirdly, the method of composting is used to transform organic material into compost where waste stored in a container till it converted into compost.¹⁶ Fourthly, recycling method is also used to decompose waste materials into usable form. Although, it is not a solution to managing every kind of waste material, materials like plastic bags, plastic cups, etc are non- recyclable material, but it is cost effective and reduces pollution to certain extent. Also, it encourages individual awareness and responsibility.

¹³ Ministry of Housing and Urban Affairs, "GUIDELINES FOR PREPARATION OF DETAILED PROJECT REPORTS AND SELECTION OF TECHNOLOGIES FOR PROCESSING AND FINAL DISPOSAL OF MUNICIPAL SOLID WASTE USING 12TH FINANCE COMMISSION GRANTS", <https://mohua.gov.in/upload/uploadfiles/files/93.pdf>, (Last visited Mar,31,2024).

¹⁴ Anish Bhatia, "Top 10 Things To Know About India's Waste Management Woes", <https://swachhindia.ndtv.com/top-10-things-know-indias-waste-management-woes-6374/>, (Last visited Mar,31, 2024)

¹⁵ Ismaila Rimi Abubakar, Khandoker M. Maniruzzaman, Umar Lawal Dano, Faez S. AlShihri, Maher S. AlShammari, Sayed Mohammed S. Ahmed, Wadee Ahmed Ghanem Al-Gehlani, and Tareq I. Alrawaf, "Environmental Sustainability Impacts of Solid Waste Management Practices in the Global South", *Int J Environ Res Public Health*, Published online 2022 Oct 5. doi: 10.3390/ijerph191912717

¹⁶ Amosu, Engr. Cyril, "Waste Management and Environmental Conservation: An Overview", *Indian Journal of Environment Engineering*, Vol.3, Issue 1, May (2023).

B. Industrial Waste Management

With the advent of technological advancement whereon one side world is moving towards tech- lives where almost 70% of our works depends upon technology. It has huge involvement in our lives. Although, there is upliftment and development of nations with technological advancement but at the same time, a huge number of wastes created by these technical activities.¹⁷ The waste created should be processed in a manner they can be use as new products and production of these items should done in a manner so that they can be re-use easily without being disposed of as haphazard waste. By reusing or recycling industrial waste, it reduces the requirement to produce new raw material which will put less strain over the Earth's resources. Therefore, it is very important to reuse industrial waste to reduce the creation of haphazard waste.

C. Hazardous Waste Management

Hazardous waste as its name suggest is hazardous to our environment and health. In brief, hazardous waste is such substance which has dangerous or potential threats on human health or environment. The United States Agency for Environmental Protection defined hazardous waste as any such waste that is explosive, radioactive, infectious, corrosive, flammable, reactive or toxic. The rise of industrialization gave world a new turn and proved to blessing for humanity. But also, industries are one of the major sources of creation of hazardous waste material all across the world. Where, chemical industry creates around 60% of hazardous waste and other industries like metal, pharmaceutical, clinical centres, households, as well as small business are sources of hazardous waste materials. The waste created from various industrial and domestic activities can have serious health as well as environment hazards.

D. Procedure for Management of Hazardous Waste

¹⁷ Bhoyar R.V, S.K Titus, A.D Bhide and P. Khanna, "Municipal and Industrial Solid waste management" Journal IAEM, Vol. 23 (1996), pp. 53-64.

The management of hazardous waste is very dangerous as beginning from handling till disposal every step require caution¹⁸. Firstly, handling of hazardous waste to be done with very care. The people who handling hazardous waste have to wear protective cloths and advised to remain cautious throughout the procedure. Secondly, transportation of hazardous waste to a certain site for an approved treatment, storage, or disposal facility. This done because there are potential threats to public safety and environment. And then, disposal is the final stage where different waste disposal methods are used.

E. Hazardous Waste Management in India

According to a report of Organization of Economic Development, in India around 4.4 million tonnes waste generated per annum. There is major concern for disposal of hazardous waste across world because it is not done properly, severe pollution of land, ground water and surface will occur. And with rapid industrialization the concern of hazardous waste management is increasing. The management procedure involved in disposing of hazardous waste is very dangerous and it is the policy concern of government of every state to ensure the safely disposal of hazardous waste across the country. The storage as well as the disposal of hazardous waste is required to be done properly and safe disposal of such hazardous materials is need of the hour. There should be certain criteria specified for the selection of sites and these criteria may be differ from country to country. Till 1997, there were no proper secured landfill facility available in India to dispose of hazardous waste in India. Certain guidelines have been formulated by the government of India to identify the suitable sites for disposal of hazardous waste. In absence of guidelines not clearly specified, unsuitable sites may be projected as suitable sites. Selection of unsuitable sites for disposal of hazardous waste will create dangerous consequences on human health and environment.¹⁹ Minimization of hazardous waste could other possible treatment for the reduction of hazardous waste and its disposal related problems. This is done with

¹⁸ Guidelines (1991). Guidelines for Hazardous wastes (Management & Handling) Rules, Ministry of Environment and Forests, India.

¹⁹ Babu, B.V. and V. Ramakrishna, "Mathematical modelling of Site sensitivity indices in the site selection criteria for hazardous waste treatment, storage and disposal facility", Journal of the Institute of Public Health Engineers India. Vol. 2000 (1), pp 54-70.

the help of recycling activity which involve either the reduction of total volume of hazardous waste or the reduction of hazardous waste characterisation like toxicity, corrosiveness, flammability, reactivity etc., which in all helps in minimizing the present and future threat to human health and the environment. Further, for proper hazardous waste management, the recruitment under the jobs of hazardous waste management chemists is required where use of skills found in analytical chemistry to determine the chemical make-up of an object that is deemed to be hazardous. The main job of these hazardous waste management chemists, researching and developing new products that clean up hazardous wastes.

VI. CONCLUSION

With the advent of industrialisation and urbanisation, the quantity of waste being generated increasing rapidly, creates problem related to waste management and raises various health as well as environmental issues. In developing countries like India where about, 4.4 million tonnes of waste being generated per annum is result of lacking in allocation of proper funding for management of wastes and lagging behind of new techniques to be involved in this field as still old methods of disposing of waste are prevalent here. There is requirement for improvement in existing legislations and control mechanisms. Also, there is need for establishment of individual responsibility and provide time to time certain pollution awareness campaigns where they could be made aware about the environmental pollution and its harmful implications. If people are not aware of waste management, it eventually leads to serious environmental issues related to air, water and soil. In Japan, since 1971, all enterprises therein required to appoint a pollution prevention officer and pollution enquiry centers are provided by the local government of Japan to provide advice on pollution control. Such initiatives could be taken into consideration by government of India while formulating legislations in regard to the environment protection. Also, things are required to be done in action rather only writing it out on papers. In similar way, public opinion as well as media pressure should provide persuasion for action on pollution in developing countries. The proper implementation and enforcement of laws and establishment of strong regulatory system could play significant role while reducing the environmental pollutions at national as well as international level. Also,

individuals as being a responsible citizen should adopt strategic way for disposal of solid wastes created at their ends in order to effectively mitigate their impact and make valuable contributions towards a more sustainable future.