JETIR.ORG ISSN: 2349-5162 | ESTD Year : 2014 | Monthly Issue
JOURNAL OF EMERGING TECHNOLOGIES AND INNOVATIVE RESEARCH (JETIR)
An International Scholarly Open Access, Peer-reviewed, Refereed Journal

Uncontrolled Dumping of E-Waste into Water Resources and its impact on Human Environment – An Urgent need for set in Stone Laws

-Dr. M. Sunil Gladson[1]

[1] Assistant Professor, School of Excellence in Law, The Tamil Nadu Dr. Ambedkar Law University, Chennai

Introduction

The UN defines E-waste as any discarded products with a battery or plug, and features toxic and hazardous substances such as mercury, that can pose serious risk to human and environmental health.[2].

E-waste is mostly created by discarded electronic devices such as PCs, tablets, hard drives, printers, and so on. Electronic devices are intended to make our lives easier and happier, but because they contain harmful compounds, their disposal and recycling becomes a health hazard. It has permeated every area of our lives, and most of us don't consider what happens to these devices when we discard or replace them. Electronic device use has increased dramatically in recent decades. The average life of a central processing unit (CPU) has decreased from 4-6 years in 1997 to 2 years in 2005 [3]. Over the last two decades, the global market for electrical and electronic equipment (EEE) has grown tremendously. Predictably, the global number of electrical devices will continue to grow, and microprocessors will be used in an increasing number of everyday products. EEE manufacturing is one of the world's fastest expanding manufacturing activities. Rapid economic expansion, combined with urbanization and rising consumer demand, has expanded both use and production of EEE[4].

[1] Assistant Professor, School of Excellence in Law, The Tamil Nadu Dr. Ambedkar Law University, Chennai
[2]Geneva Environment Network https://www.genevaenvironmentnetwork.org/resources/updates/the-growing-environmental-risks-of-e-waste/ last visited on 25.11.22.
[3]Culver J. The life cycle of a CPU. 2005. http://www.cpushack.net/life-cycle-of-cpu.html. Last visited on 27.11.22

[4]CPCB. Draft Guidelines for Environmentally Sound Management of Electronic Waste. 2007. pp. 10–25. http://ewasteguide.info/newsandevents/new-dr. last visited on 27.11.22

This new type of waste is causing significant disposal and recycling challenges for both industrialized and developing countries.The composition of E-waste is quite complex and varies between product categories. It contains almost 1000 distinct compounds classified as 'dangerous' or 'non-hazardous.' It consists primarily of ferrous and nonferrous metals[5], plastics, glass, wood and plywood, printed circuit boards (PCB), concrete and ceramics, rubber, and other materials. Iron and steel account for over half of all E-waste, followed by plastics (21%), nonferrous metals (13%), and other elements. The presence of hazardous waste elements such as lead, mercury, arsenic, cadmium, selenium, and hexavalent chromium, as well as flame retardants, in excess of threshold quantities of E-waste [6]

These toxic compounds found in E-waste can permeate into water resources from dump sites. This unpleasant liquid is referred to as 'leachate'. This very hazardous leachate waste begins to percolate through the porous soil and eventually mixes with groundwater, polluting it. Groundwater contamination is more likely in areas near landfills since leachate output is higher in those areas. According to a recent study on groundwater contamination in Gazipur, Delhi, the leachate created. This contamination can be reduced by employing severally measures that prevent leachate from percolating into aquifers.[7] Thus, this research work makes an attempt to deeply discuss the impact of uncontrolled dumping of E-Waste into water resources and existing laws.

Major E-Waste Contributors

According to a global E-waste statistics, America generated 11.3 Mt of E-waste in 2016. The top three E-waste producing countries in America are the United States, Brazil, and Mexico. However, because the United States refuses to ratify the 1989 Basel Convention on International Trade in Hazardous Wastes, it exports the majority of its hazardous E-waste to numerous Asian and African countries. However, the United States is not immune to the threat of groundwater contamination. The national priority list for the treatment of polluted water in the United States includes 1200 sites. Heavy metal contamination (such as cadmium, copper, lead, mercury, nickel, and zinc) was discovered in approximately 63% of the sites, posing a significant hazard for groundwater and food supplements. The US Environmental Protection Agency considers these heavy metals to be the most dangerous pollutants (EPA) .According to global figures, Canada produced 724 kt of total E-waste in 2016. Every year, approximately 140 kt of E-waste is disposed of in Canadian landfills.

---

[5] Nonferrous metals include copper (Cu), aluminium (Al), and precious metals such as silver (Ag), gold (Au), platinum, palladium, and others

[6] Santhanam Needhidasan, Melvin Samuel,and Ramalingam Chidambaram, Electronic waste – an emerging threat to the environment of urban India,https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3908467/#B11 last visited on 27.11.22

[7] N. Gupta and M. Nath, Groundwater Contamination By E-Waste And Its Remedial Measure - A Literature Review https://iopscience.iop.org/article/10.1088/1742-6596/1531/1/012023/meta last visited on 30.11.22

China, the world's largest manufacturer and consumer of electronic items, is causing E-waste to be the fastest growing garbage, with an annual growth rate of 13-15%. The percolation of leachate from this massive amount of E-waste into water resources can pose a significant environmental risk.[8] In assessing ground water, found 96 different types of groundwater pollutants in their assessment of groundwater quality near landfills, including 12 inorganic salts, 5 metal ions, 15 heavy metals, 2 bacteriological pollutants, and 62 xenobiotic organic chemicals. These contaminants may leak from the landfill and contaminate groundwater, causing it to be of "extremely poor" quality.

The growing role of Information Communication Technology (ICT) has transformed Africa as a heaven of E-waste overlooking the Basel Convention that was intended to reduce the movements of hazardous waste from developed to developing countries. Up to 75% of imported electronics are garbage and irreparable, and they are thrown in landfills in an uncontrolled manner, degrading groundwater quality. V Nevondo[9] demonstrated that groundwater in the surrounding areas of the Thohoyandou dump site in South Africa is heavily contaminated by mercury, which can have negative impacts on human health and the ecosystem. Agbogbloshie, a slum in Ghana, is regarded as the world's largest dumpsite [10].

Global E-waste situation:

In 1994, E-waste was estimated that over 20 million PCs, or approximately 7 million tonnes, had become obsolete. In 2010, this figure had risen to more than 150 million PCs. Over the last two decades, the global market for EEE has grown tremendously, while the lifespan of those items has shrunk. In the United States (US) market, less than 80 million communication devices were sold in 2003, 152 million by 2008, an increase of more than 90% in 5 years, In the European Union (EU), more than 3.8 billion electronic gadgets were sold in 2009, including 265 million computers, around 245 million in home consumer electronics, and 197 million consumer appliances. In China, around 20 million refrigerators and over 48 million televisions were sold in 2001, with nearly 40 million PCs sold in 2009. The quick turnover of technological devices exacerbates the dilemma. Because of the rapid evolution of technology, most devices have a useful life of only 2 to 3 years. Every day, Apple sells more than 300,000 new phones in the global market, while more than 150,000 new Blackberries are sold and 700,000 new Android phones are activated. The majority of the phones that are replaced by these new devices end discarded in a landfill or in a draw.

Electronic garbage has sparked concerns because many of its components are hazardous and non-biodegradable. Many European governments prohibited E-waste from landfills long before the 1990s, based

[8]N. Gupta and M. Nath, Groundwater Contamination By E-Waste And Its Remedial Measure - A Literature Review https://iopscience.iop.org/article/10.1088/1742-6596/1531/1/012023/meta last visited on 25.11.22

[9] Ibid

[10]C.Stein, Inside Ghana's Electronic Wasteland 2013 Available online: http://www.aljazeera.com/indepth/features/2013/10/inside-ghana-electronicwasteland201310301285258028 8.html.last visited on 01.12.22

on these concerns. Alarming levels of dioxin compounds, associated to cancer, developmental abnormalities, and other health concerns, have been found in breast milk, placenta, and hair samples, and these compounds have been connected to inappropriate electronic equipment disposal. Furthermore, surveys have revealed that much of the exported E-waste is disposed of in an unsafe manner in developing countries, posing an environmental and health risk in these areas. The effects of these countries, particularly those in Asia, have already been reported. Meanwhile, E-waste recycling and disposal are expanding outside of Asia, particularly in several African countries. As a result of today's disposable electronics paradigm, we are now at the forefront of a growing environmental catastrophe.[11]

E-waste and its environmental impact:

Electronic gadgets are a complicated mixture of hundreds of tiny components, many of which contain lethal toxins. These substances have an adverse impact on both human health and the environment. Most electronic devices contain lead, cadmium, mercury, polyvinyl chloride (PVC), brominated flame retardants (BFRs), chromium, beryllium, and other heavy metals. Long-term exposure to these substances can harm the nervous system, kidneys, and bones, as well as the reproductive and endocrine systems, and some of them are carcinogenic. When inappropriately disposed of (incinerated/landfilled instead of recycling) with residential waste without any controls, these E-wastes can contaminate the soil, water, and air. It can have major consequences for those who live near areas where E-waste is recycled or burned. In general, electronic goods/gadgets are divided into three categories:

• White goods: Appliances for the home

• Brown goods: televisions, camcorders, and cameras

• Computers, printers, fax machines, scanners, and other such items.

These E-wastes are deposited in landfills near companies where there is plenty of space. Because most industries are located near water sources, harmful E-waste is percolated into the water, contaminating the water in deep aquifers. This water is unfit for drinking or other uses. Pollutant concentrations are higher near landfills and decrease as the distance between the waste and the aquifer increases.

According to the UN, in 2021, each individual on the earth would generate 7.6 kg of E-waste, resulting in a staggering 57.4 million tonnes being generated globally. Only 17.4% of this electronic garbage, which contains a combination of hazardous compounds and valuable components, will be appropriately collected, processed, and recycled. Many programmes are being launched to address this raising problem, but none of them will be entirely effective unless consumers play an active role and are well educated.[12]

[11] Ibid

[12] Ibid

Recycling Deficiencies

Global recycling rates are very poor. Even in the EU, which is the world leader in E-waste recycling, only 35% of E-waste is officially recognised as collected and recycled. The global average is 20%, the remaining 80% is undocumented, with much of it buried for millennia as trash. Electronic garbage is not biodegradable. The global electronic sector suffers from a shortage of recycling, and as gadgets become more numerous, smaller, and more complex, the problem worsens. Recycling some types of E-waste and recovering materials and metals is currently an expensive procedure. The remaining mass of E-waste, primarily plastics laced with metals and chemicals, presents a more difficult challenge.

International Response on E-waste:

a, Basel Convention

The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal's overall goal is to protect human health and the environment from the harmful impacts of hazardous wastes. According to the Basel Convention, E-waste is classified as hazardous waste due to the presence of harmful elements such as mercury, lead, and brominated flame retardants. Furthermore, transboundary movements of hazardous and other wastes, including E-waste that ends up in landfills, are considered illicit commerce under Basel Convention Article 9.

b, **Ozone Depleting Substances Montreal Protocol (1989)**

In order to protect human health and the environment from potential harm, the Rotterdam Convention encourages shared responsibility in the international commerce of certain hazardous substances. It also requires hazardous chemical exporters to use correct labelling, give safe handling instructions, and notify consumers of any known limitations or bans.

c, **THE 2008 Durbun Declration**

In addition to international entities, the declaration advocated for an African regional platform/forum on E-waste. The declaration requires governments to assess existing legislation, enhance compliance with legislation, and alter existing legislation regarding E-waste management.

The Partnership for Action on Computing Equipment (PACE) was launched as part of the Basel Convention at the ninth meeting of the Conference of the Parties to the Basel Convention on June 23-27, 2008. PACE is a multi-stakeholder partnership for governments, industry leaders, non-governmental organizations, and academia to address the environmentally sound management, refurbishment, recycling, and disposal of used and end-of-life computing equipment, while also taking social responsibility and the concept of sustainable development into account and promoting information sharing on life cycle thinking.

Furthermore, in 2002, the Mobile Phone Partnership Initiative (MPPI) on the environmentally sound management of end-of-life mobile phones was launched.

Five technical guidelines were developed as part of the MPPI (awareness raising - design considerations, collection of used and end-of-life mobile phones, transboundary movement of collected mobile phones, refurbishment of used mobile phones, and material recovery/recycling of end-of-life mobile phones).

Parties and other stakeholders have also been working on a set of global policies on specific challenges related to the trade of WEEE and used equipment under the Basel Convention, through the technical guidelines on transboundary movements of electrical and electronic waste and used electrical and electronic equipment, in particular regarding the distinction between waste and non-waste, which were adopted by the Conference of the Parties to the Basel Convention, on an indefinite basis. The rules are intended to clarify issues concerning transboundary transfers of E-waste-waste and old equipment that may or may not be rubbish.

Moreso , at the World Summit on the Information Society (WSIS) Forum on March 21, 2018, seven United Nations agencies signed a Letter of Intent paving the way for deeper collaboration in the area of e-waste management in the development of a UN E-Waste Coalition. Its goals include signatories' pledge to strengthen collaboration, establish partnerships, and support Member States in addressing the global WEEE crisis. In addition, three more UN entities signed the Letter of Intent at the 2019 WSIS Forum.

d, **The International Telecommunication Union (ITU)**

The International Telecommunication Union (ITU), founded in 1865 to improve international connectivity in communications networks, is the United Nations specialised body for information and communication technologies - ICTs. The International Telecommunication Union's Development Bureau (ITU-D) has been tasked with "assisting developing countries in undertaking proper assessment of the size of E-waste and in initiating pilot projects to achieve environmentally sound E-waste management through E-waste collection, dismantling, refurbishing, and recycling." (WTDC Resolution No. 66) To that aim, the ITU-D is establishing E-waste recommendations to assist countries in determining the optimal policies. It is also working on an electronic waste management initiative and has just formed a new cooperation to improve global E-waste data...

e, **The World Health Organization (WHO)**

A WHO report on E-waste and child health, Children and Digital Dumpsites, due out in June 2021, calls for immediate, effective, and binding action to protect the millions of children, adolescents, and expectant mothers around the world whose health is jeopardized by the informal processing of discarded electrical or electronic devices.

As many as 12.9 million women work in the informal trash sector, where they may be exposed to harmful e-waste and endanger themselves and their unborn children.

Meanwhile, over 18 million children and adolescents, some as young as five years old, work in the informal industrial sector, of which trash processing is a sub-sector. Parents or caretakers frequently involve children in e-waste recycling since their small hands are defter than adults'. Other youngsters live, attend to school, and play near e-waste recycling centres, where harmful substances, primarily lead and mercury, might harm their cognitive ability.

Children are especially vulnerable to the harmful substances included in e-waste due to their smaller size, less developed organs, and quick rate of growth and development. They absorb more contaminants in proportion to their size and have a lower ability to digest and eliminate hazardous substances from their systems.

Adverse Effects on Water:

Heavy metals from E-Waste, such as mercury, lithium, lead, and barium, leach through the earth after soil contamination and enter groundwater. When heavy metals enter groundwater, they eventually end up in ponds, streams, rivers, and lakes. Acidification and toxification are formed in the water as a result of these pathways, making it unhealthy for animals, plants, and communities even if they are kilometres away from a recycling site. Finding safe drinking water is becoming increasingly difficult.

Metals and metalloids from landfills can immediately infiltrate into soils and groundwater via chemical or biological seepage as a result of natural processes or inadequate recycling efforts, contaminating soils, agricultural crops, and drinking water resources. As rainwater runs into landfills, dumpsites, and open dumps, or ash and cinnamon from open burning processes, dangerous compounds escape into the soil and water bodies, causing dangers to human health and the environment. Significant amounts of lead ions, such as the cone glass in cathode ray tubes, are dissolved from shattered lead-containing glass, mixed with acid water, and exist naturally in landfills.

Ground water is utilized for domestic and other purposes such as irrigation, industrial, and so on. As a result, its contamination is a major health and environmental concern. Different physio-chemical characteristics, such as pH, electrical conductivity, total dissolved solids, total hardness, calcium, magnesium, sodium, potassium, bicarbonate, sulphate, and chloride, are used to determine the quality and acceptability of groundwater contamination. These are then compared to the allowable limit established by the World Health Organization (WHO)[13] and the Bureau of Indian Standards (BIS)[14]. These parameters are briefly explained in this section.

[13] World Health Organization 2011, Guidelines for Drinking-water Quality, fourth edition

[14] Indian Standard drinking water — specification 2012 (Second Revision), IS 10500.

Water hardness is a measurement of water's ability to react with soap. The primary cause of groundwater hardness is metallic ions such as calcium, magnesium, and others. According to WHO and BIS, the optimum limit of hardness is 200 mg/l, whereas the allowed maximum is 500 mg/l and 600 mg/l, respectively.

The Harmful Effects on Humans

As previously stated, toxic components in electronic trash, such as mercury, lead, cadmium, polybrominated flame retardants, barium, and lithium, are hazardous to human health. Toxins' harmful health impacts on humans include damage to the brain, heart, liver, kidneys, and skeletal system. It can also have a significant impact on the neurological and reproductive systems of the human body, resulting in sickness and birth abnormalities. Improper e-waste disposal is extremely hazardous to the global ecosystem, which is why it is critical to raise awareness about this rising problem and its potentially disastrous consequences. To reduce the hazardous impacts of e-waste, it is critical to e-cycle goods effectively so that they can be recycled, refurbished, resold, or repurposed. The growing stream of e-waste will only worsen if not educated on the correct measures of disposal.

The evidence of E-Waste exposure and health impacts in children and adults was examined by a team lead by researchers from the WHO Collaborating Center for Children's Health and the Environment at the University of Queensland in Australia. They discovered a reasonable link between e-waste exposure and thyroid malfunction, adverse birth outcomes, behavioral abnormalities, lower lung function, and harmful cellular alterations. While the assessment indicated that e-waste exposure is damaging to human health, the authors, who included experts of WHO's Department of Public Health and the Environment, emphasized the need for more research, especially in children and pregnant women. The WHO recently established a programme, in conjunction with the NIEHS and other partners, to raise awareness and expand research on this rising health hazard, with a focus on how E-waste affects children's health. Coordination activities will bring together the researchers, data, resources, and infrastructure required to build and advance an international e-waste and children's health research agenda through the NIEHS-WHO Collaborating Center.

Toxic consequences on human health, particularly the kidneys, are irreversible. Backlight bulbs or lamps, relays and switches, and printed circuit boards made of mercury causes Brain injury. Fish bioaccumulation causes respiratory and skin problems. Batteries made of nickel, computer housing, cathode ray tubes, and printed circuit boards can result in allergic reactions, bronchitis, decreased lung function, and lung cancer. Arsenic Gallium arsenide is a material that is utilized in light-emitting diodes has long-term impacts that cause skin disease, lung cancer, and nerve signaling impairment. Beryllium Motherboards and power supply units causes Carcinogenic (lung cancer) .Fume and dust inhalation Causes chronic beryllium illness, often known as beryllicosis. Warts are a type of skin disease. Antimony, a melting agent used in CRT glass, plastic computer housings, and cabling solder alloy. It has been identified as a carcinogen. Inhalation of it causes stomach pain, vomiting, diarrhea, and stomach ulcers. PVC Cabling and computer housing are examples of plastics. Dioxin is produced during combustion. It interferes with reproduction and development. Toxins produced and leached from e-waste, particularly if kept and burned in the open air, can cause acute and chronic health problems through occupational and public exposure cause skin and eye irritation, respiratory diseases (such as coughing, choking, pneumonitis and lung cancer, tuberculosis, and asthma), mental disorders, and central nervous system diseases (tremors, convulsions, and cancer).[15]

Management of E-Waste:

It is the world's fastest growing waste stream. According to one study, more than 44.7 million tonnes of e-waste were generated globally in 2016, averaging 6.1 kg/capita, up from 5.8 kg/capita in 2014. It is believed that 75% of electronic gadgets are kept due to ambiguity about how to dispose of them. The majority of it is most likely illegally discarded, but it is more likely that the majority of it is trafficked worldwide and headed for "recycling" in underdeveloped nations where manual labour is less expensive and environmental and labour protection standards are inadequate. The impending environmental calamity caused by e-waste migration into developing countries will be exacerbated not only by the massive amount of e-waste, but also by ineffective treatment procedures. All EU countries have a unified waste management policy and rules for reducing waste's environmental impact. It's known as the "waste management hierarchy". The waste management hierarchy serves as a strategy or guiding principle for manufacturers, government organizations, consumers, and other societal actors in determining how to prioritize waste management options in order to reduce environmental consequences and increase circularity. Despite the fact that India generates a considerable amount of e-waste, there is no systematized or formal system in place for dealing with e-waste in a scientific and environmentally beneficial manner. A large percentage of e-waste is handled and disposed of as municipal solid garbage. Although awareness and preparedness to implement changes are increasing, the key barriers to safely and efficiently handling e wastes remain as it is. These include a lack of trustworthy data, which makes it difficult for policymakers to develop an e-waste management strategy, as well as a lack of a safe e-waste recycling infrastructure.[16]

Sustainable Recycling

Many discarded devices have salvageable parts that can be kept and reassembled to form a working device with other existing equipment. It takes a lot of time and effort to separate, inspect, analyze, and reassemble components into fully functional machines. Institutional facilities, including e-waste creation, transport, care,

[15]Syed Rouhullah Ali* and Mahrukh College of Agricultural Engineering and Technology, Sher-e-Kashmir University of Agricultural Sciences and Technology of Kashmir 190025, J&K, India, Impacts of e-wastes on water resources and their management https://www.researchgate.net/publication/348277079_In_Advances_in_Environmental_Pollution_Management_Wastewater_Impacts_and_Treatment_Technologies_Impacts_of_e-wastes_on_water_resources_and_their_managementlast visited on 30.11.22

[16]Ibid

storage, recycling, and disposal, must be built at the national and/or regional levels for environmentally sustainable e-waste management. E-waste recycling is ecologically friendly, but it necessitates sophisticated equipment and methods that are not only expensive, but also necessitate specialized knowledge and preparation for the activity. For fugitive and point source emissions, adequate air pollution control equipment is also necessary. The EXIGO recycling process is currently the most successful and scientific way of e-waste management.

E-Waste Management Regulations 2016 in India

The Ministry of Environment, Forests, and Climate Change (MoEFCC) issued the E-Waste Management Rules, 2016, which replaced the E-Waste (Management and Handling) Rules, 2011 in addition to Environmental Protection Act and Water Act.

• The rule applied to over 21 different products (Schedule-I). It includes Compact Fluorescent Lights (CFLs) and other mercury-containing lamps, as well as other equipment of the same type.

• For the first time, the rules imposed Extended Producer Responsibility (EPR) on producers, along with targets. Producers have been made responsible for the collection and exchange of E-waste. • Different producers can create their own Producer Responsibility Organization (PRO) to ensure the collection and disposal of E-waste in an environmentally sound manner.

•The Deposit Refund Scheme has been introduced as an additional economic instrument in which the producer charges an additional amount as a deposit when selling electrical and electronic equipment and returns it to the consumer along with interest when the end-of-life electrical and electronic equipment is returned.

• The duty of state governments in ensuring the safety, health, and skill development of workers involved in dismantling and recycling activities has also been added.

• A mechanism for a punishment for rule violations has also been added.

• Urban Local Bodies (Municipal Committee/Council/Corporation) have been tasked with collecting orphan products and directing them to authorized dismantlers or recyclers.

• Providing adequate space to existing and future industrial units for e-waste dismantling and recycling.

The above rules are in fact not adequate enough to settle this crucial issues. It is evident that many developing countries, like India, face significant challenges in managing E-Waste. This is rapidly becoming a major public health issue, and it is just getting worse day by day. Promoting environmentally acceptable e-waste management programmes requires increased information campaigns, capacity building, and awareness.[17]

[17] Ibid

As a result, harmful compounds from E-Wastes enter the "soil-crop-food pathway," which is one of the most important routes for heavy metal exposure to humans. These compounds are not biodegradable, and they remain in the environment for lengthy periods of time, increasing the risk of exposure.[18]

Conclusion

E-waste is a major issue on both a local and global basis. E-waste issues first emerged in industrialized countries and have since extended to other countries throughout the world. E-waste is made up of a variety of components, some of which include a variety of harmful compounds that, if discarded, pose a threat to the environment.

In the twenty-first century, the everyday growth of technology drives the generation of massive amounts of E-Waste. These E-wastes contain toxic heavy metals that, when disposed of in landfills, can leach into groundwater.The majority of the E-wastes discovered consisted of used mobile phones, laptops, desktops, and household electrical gadgets containing dangerous compounds. The high level of toxicity in groundwater makes it unfit for drinking, irrigation, and other uses. Groundwater contamination is a severe problem not only in India, but around the world. As a result, many countries, including India, are focusing on E-waste management. Many groups believe that increasing depths and distance from waste sites enhances groundwater quality.

Future efforts to reduce illegal dumping will almost certainly require a combination of tough regulation, new technology solutions, and increasing public awareness via E-waste education. Chemical and biological leaching each have advantages and disadvantages, and there may be technical, economic, and environmental reasons to prefer one procedure over the other. The potential for hybrid technology to address the challenges connected with chemical and biological extraction strategies for metals present in E- trash is exciting. This method may give a new and emerging area of metallurgy that may aid in the extraction of metals present in trace amounts from their ores. As a result, we should be aware of the methods and means of disposing of waste using existing or new technologies for a convincing betterment of our environment. The disposal and recycling of E-waste has become a major global environmental issue due to the potential discharge of harmful heavy metals and organic compounds into the workplace environment, neighboring soils, and watercourses. Heavy metals are among the most significant groundwater contaminants caused by manufacturing activity. E-waste pollutants may enter aquatic systems via leaching from dumpsites where processed or unprocessed e-wastes may have been stored. Similarly, acid discharge by hydrometallurgical procedures used in metal recovery into water or soil, as well as the breakdown or settling of airborne pollutants during open fire can frequently result in aquatic contamination. As a result, there is an urgent need for the necessary authorities to

[18] Lucy McAllister is a Ph.D. candidate in environmental studies at the University of Colorado Boulder,The human and environmental effects of e- waste,
, https://www.prb.org/resources/the-human-and-environmental-effects-of-e-waste/ last visited on 27.11.22

work together to address the environmental and health risks caused by E-waste exposure. The policy makers should bring new and stringent laws to avoid, control and prevent E-wastes and dumping itself should be declared as an offence.