FORUM:	Environment Commission
ISSUE:	Measures for Addressing Improper Disposal of Industrial Waste in Developed and Developing Countries
STUDENT OFFICER:	Na Ye Kim
POSITION:	Deputy President of Environment Commission

Introduction

Industrial Waste being disposed

Through the rapid changes in technology and manufacturing, humanity has gained access to enhanced productivity and ensured convenience in life. However, the consequences of this advanced lifestyle have indubitably resulted in severe environmental threats. One of the prominent factors contributing to this global catastrophe is the improper disposal of industrial waste. Left unproductive after the manufacturing process, many countries fail to take proper responsibility for disposing it, ultimately causing pollution to surge. Currently, two billion tons of industrial waste are annually generated, accounting for approximately half of the waste worldwide. As a result, endemic environmental pollution occurs, continuing as a never-ending cycle. This issue is more critical in developing countries where the infrastructure for proper waste management is not sufficiently buttressed. Furthermore, the problem is extended to global waste trade, polluting developing countries with waste exported from more developed countries. Altogether, the Environment Commission needs to develop feasible yet effective solutions that can mitigate the effects of improper disposal of industrial waste in both developed and developing countries to support every member state and its environment.

Background

The industrial waste crisis dates back to the Industrial Revolution, during the late 18th century to mid-19th century. Due to the rapid yet tremendous growth in productivity and economy, people had nominal consideration for the environmental impact. In the preceding eras, disposals of industrial waste were unregulated and albeit released deleterious waste back into the environment without sanctions. It was in the middle of the 20th century when the influence industrial waste has on the environment finally gained public attraction. This resulted in the legislation of several laws involving the proper disposal and minimization of industrial waste.

Bar Graph of Global Industrial Waste Management Market Growth in 2022-2032

Nowadays, industrial waste refers to byproducts and discarded materials that emerged from a multitude of industrial processes and manufacturing activities. It is in the form of solid, semi-solid, or liquid and further classified as hazardous or non-hazardous considering its ignitability, corrosivity, reactivity, and toxicity. Types of industrial waste include dirt and gravel, masonry and concrete, scrap metal, oil, solvents, chemicals, scrap lumber, and more. At the end of the day, all waste generated should be collected and disposed of properly.

It is common for power plants and factories, such as electric power plants, paper factories, and pulp factories to be located in close proximity to large bodies of water, in order to make use of the water for cooling equipment or as a cooling medium during manufacturing. Many developing countries do not have the resources to dispose of waste without imposing risk on the environment, prompting factories to prioritize convenience when clearing waste away – flowing it back into the nearest body of water. Much of the waste is not properly treated through sustainable methods such as recycling but is directly dumped into landfills, causing cataclysmic pollutions to both land and water. The ultimate problem is that this not only damages the environment but also poses a menace to public health of the citizens.

Problems Raised

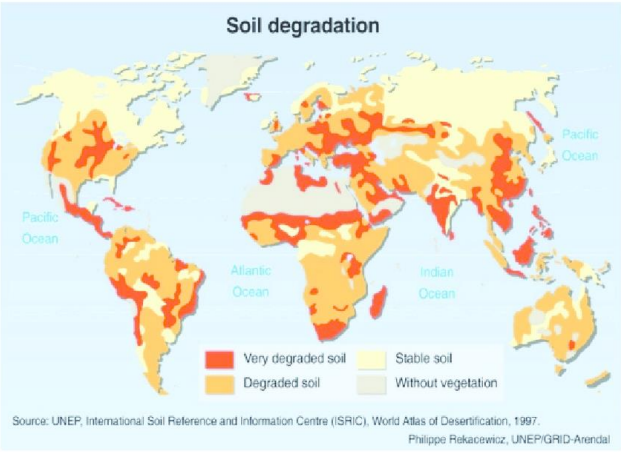
Water Pollution

Having leaked into the ocean without adequate treatment, the wastewater introduces various pollutants such as heavy metals, toxic chemicals, oils, and suspended solids into the water. Other solid industrial waste, including sludge and slag, can also reach the groundwater through heavy rainfall. Additionally, air pollutants emitted by industrial activities can be deposited onto the surface of water, contributing to a significant number of pollutants dissolved in water.

Hindering aquatic ecosystems, the wastewater disturbs the balance of aquatic life including fish, plants, and other organisms. Significantly, the pollutants can accumulate in the food chain, ultimately inducing to potential human exposure. When exposed, they can pose a significant health risk to humans, such as skin irritation, respiratory problems, and more. By reducing the quality of water, the amount of water resource available is decreased. This results in serious economic implications such as increased costs to purify water and damage to fisheries and aquaculture industries. Additionally, it raises societal concerns over such as public health issues and conflicts arising from access to clean water. Besides wastewater, industrial waste also generates other types of water pollution such as eutrophication – excessive amount of plant and algal growth in water due to the increase availability of one or more limiting growth factors required for photosynthesis and thermal pollution – a rapid change in temperature in a natural body of water due to power plants and human activities.

Polluted wastewater being disposed to natural body of water

Land Pollution



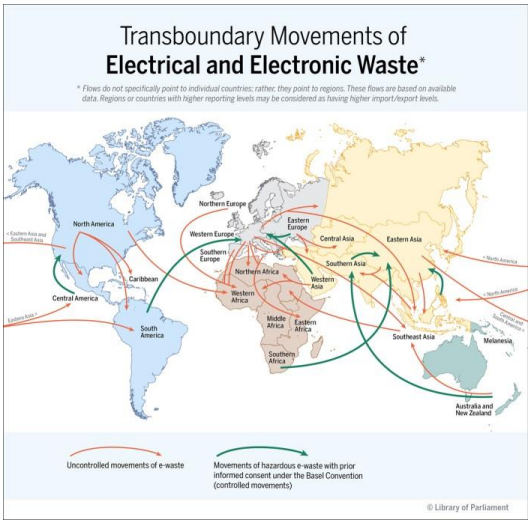
Estimates of the level of soil degradation at a global level

Land pollution occurs due to the disposal of solid or liquid waste materials on the surface or underground that can potentially contaminate soil and groundwater. Where the waste is placed, soil involves a mixture of unconsolidated minerals and rock fragments. The rock fragments in the soil are porous and permeable, allowing water to easily flow through them. When leachate, highly contaminated water, forms from the deposition of garbage and precipitation, it reaches the groundwater. As permeability increases, the risk also rises, resulting in threats to public health such as lung cancer, respiratory disease, heart disease and brain damage. It also reduces the quality of the environment by damaging the ecosystem and food chain. Furthermore, methane gas, a poisonous and explosive gas, flows through the soil as a byproduct of anaerobic decomposition and putrescible solid waste. By releasing a

type of greenhouse gas, methane gas contributes to global warming. It is estimated that due to land pollution, over 75% of the Earth's land area is now considered degraded, with predictions in prospect suggesting this could increase up to 95% by 2050, considering the current rate.

Global Waste Trade

Global Waste Trade refers to the international transaction of waste. While its ostensible purpose is to achieve a circular economy by reducing waste in landfills, it often serves the aim of "dumping" the waste in developing countries through paying them. By doing so, developed nations can dispose of their waste in a more economically affordable way and also reduce the number of landfills within their territory. Some of the top producers of waste include the European Union (EU) and the United States of America. The countries associated with the EU, including Germany, the United Kingdom, and France, have been trying to cut down their carbon emission due to the required circular economy practices in the EU. By exporting waste to developing countries such as Turkey and Vietnam and incinerating it there, less waste needs to be handled in their own countries. From importing waste, developing countries often fail in their capacity to manage the waste in an environmentally friendly manner. Since they are inundated with the amount of waste being imported, it is not properly disposed and left in landfills, or burned, again underscoring the issue of improper disposal of industrial waste.



Transboundary movements of electrical and electronic waste

International Actions

Basel Convention of 1989

Followed by increased public resistance to the disposal of hazardous waste, the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal was adopted on March 22nd, 1989, by the Conference of Plenipotentiaries in Basel, Switzerland. The convention was created to combat the "toxic trade" of hazardous waste and went into force in 1992. Its overall concept relies on protecting public health and the environment from hazardous waste. It includes a wide range of waste, classified either as hazardous or other waste: household waste and incinerator ash. It requires states to observe the fundamental principle of managing waste well and, at the same time, allows them to make bilateral or multilateral agreements with other parties if it is indicated to be "no less environmentally sound." During this agreement, the secretariat is required to supportively manage the cooperation and, if

illicit actions are taken, has a duty to ensure safe disposal. Furthermore, it suggests the establishment of centers to facilitate technology transfers regarding the management of hazardous waste, and fourteen of them have been built so far. The treaty now consists of 188 parties, with the United States having signed but not ratified.

EU's Circular Economy

Ever since 2015, the European Union (EU) has been trying to move away from the structure of a linear economy of "take, make, use, and dispose" and transition to an eco-friendly circular economy. It aims to consume resources within planetary boundaries. Its major objectives are economic growth from efficient resource use, protecting the state's resources, and sustainable growth. In terms of waste management, this concept focuses on extracting high-quality resources from waste through means such as recycling, improving the proper management of waste, conducting innovative recycling processes to use and limit landfills. The EU now has constructive and specific waste streams such as construction and demolition waste, landfill waste, sewage waste, WEEE, and more. By abiding by the guidelines for each waste stream, the member states of the EU must report to the European Commission on implementing EU laws regularly. By doing so, the EU has taken the lead in the world's circular economy.

Circulatory Economy Infographic
Provided by European Parliament

Key Players

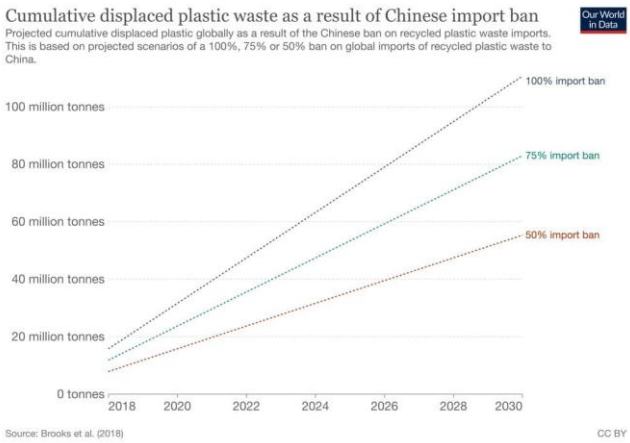
The United Nations Environment Programme (UNEP)

The United Nations Environment Programme is a leading global authority on the environment. It emphasizes inspiring, informing, and enabling nations and people to improve their quality of life. Working with governments, society, and UN entities, it addresses humanitarian environmental challenges. Currently having 193 member states joined, it takes a joint approach that demonstrates economic, environmental, and health benefits. The United Nations Environment Programme International Environmental Technology Center (UNEP-IETC) was specially established in Osaka in 1992 to tackle waste and chemical issues. With a wide range of partners such as national and local governments, academia, civil society, and the private sector, the center provides scientific and technical knowledge and tools to support the circular economy and environmentally friendly waste management. Moreover, it promotes waste segregation, landfill regulation, and gender-equitable waste management systems.

Basel Action Network (BAN)

The Basel Action Network (BAN) is a non-profit organization that aims to champion environmental health and justice by ending toxic trade, catalyzing a toxic-free future, and ensuring everyone's right to a clean environment. Inspired by the Basel Convention of 1989, the organization advocates for the convention by making amendments and regularly attending conferences. Majorly focusing on three toxic waste streams – e-waste, end-of-life ships, and plastic pollution – the organization works to prevent pollution dumping in the developing countries of our world. Considering the concerns about the disposal of industrial waste, BAN emphasizes values such as incorporating social responsibility, halting toxic waste dumping through trading, promoting domestic sufficiency in hazardous waste management, and preventing waste. Moreover, it currently regulates projects such as the Plastic Waste Transparency Project to minimize global trade in plastic. To do so, it organizes global campaigns and analyzes data to transparently show the amount of trash being traded, ultimately reducing the unsustainable and often illegal trafficking of plastic pollution.

People's Republic of China



Circulatory Economy Infographic Provided by European Parliament

The People's Republic of China is currently the world's largest producer and consumer of plastic and has monopolized import of plastic for the last two decades. While 60 million tons of plastic are generated, only 30% is being properly recycled. Waste trading in China started during the 1980s and 1990s when they used industrial waste, especially plastic, as a source of raw material and manufacture. It eventually led to rapid economic growth due to access to high-quality resources. Nonetheless, as the country experienced change, the prosperous waste-recycling business has been transformed into a low-profit and low-value enterprise. Furthermore, it has caused severe pollution on the lands of China, necessitating a drastic reduction in emissions to meet carbon neutrality by 2060. Thus, in 2017, the government of China imposed an import ban on solid waste such as plastic and recyclable waste, starting on January 1st, 2018. Due to the continuous adoption of strict regulations, the nation has banned all imports of solid waste as well as dumping, stacking, and disposal of waste products from abroad by the end of 2019. This act has influenced other countries, particularly those in Southeast Asia, to follow China's strategy due to the overwhelming amount of waste being imported after their ban.

Sweden

Sweden is the world's pioneer in managing waste in an environment-friendly manner. This was constructed through effectively adopting Waste-to-Energy (WtE) technology, utilizing trash as a source of electricity for homes and businesses. The key to Sweden's success was quickly identifying the significance of resource scarcity and climate change. Thus, they could embrace the WtE plan from the mid-20th century, resulting in 2.2 million carbon emissions reduced. Furthermore, among all trash being collected in Sweden, only 1% is sent to landfill while 52% becomes energy and 47% is properly recycled. Sweden has also contributed to the EU's strict regulation on chemical waste by providing more data and proposals, pushing towards more strengthened legislation. In turn, they have restricted the usage of substances that cause pollution such as plastic microbeads, and regulated the use of mercury, bisphenol A, cadmium, etc. To achieve this success, Sweden has employed several successful strategies. The first is educating children from an early age about the concept of recycling publicly, leading teachers to undergo special training to engage children in practical activities such as implementing trash policies in schools. Another successful strategy was accessible recycling stations and providing incentives through discount vouchers to citizens as a reward. This is exemplified in Stockholm, the capital, where waste chutes are designated to transform trash into energy directly. Overall, Sweden is an exceptional example of a developed country that disposes of waste efficiently.

Possible Solutions

Investment on Waste-to-Energy (WtE) technology

One potential solution for mitigating the effects of improper disposal of industrial waste is investing in sustainable energy. By doing so, further investment can be utilized for the development of Waste-to-Energy (WtE) technology. This technology generates energy from industrial waste streams by incinerating the waste. When the incineration produces heat, it is converted to electricity by either a steam or gas turbine generator. Whether sent to the local power grid, used on-site, or provided to off-takers, the energy is also used for generating heat during manufacturing processes such as drying and heating. One of the main risks of this technology is that it may release harmful pollutants into the atmosphere during the incineration process. Hence, feasible solutions to mitigate this impact of this technology is critical to make better use of it. In order to utilize this technology effectively, it is beneficial to develop public-private partnerships between municipal authorities and private companies to provide

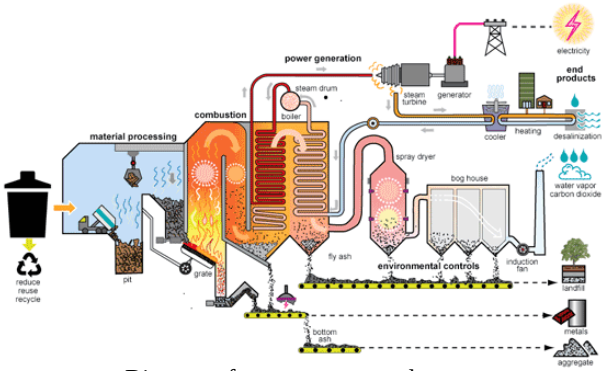


Diagram of waste to energy plant

financial support. Through partnership and investment, both developed and developing countries can gain access to it.

Transitioning to Circular Economy

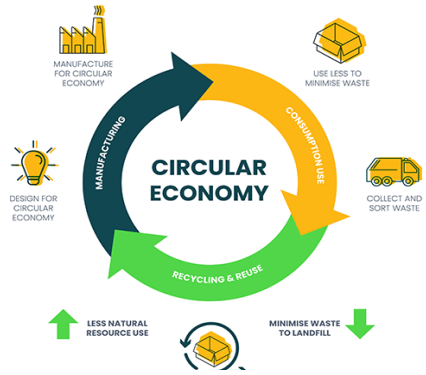


Diagram of circular economy

To minimize the amount of waste being produced, it is crucial to end the damaging nature of the linear economy and transition to a sustainable circular economy. Currently, numerous nations, including the EU, China, and the Netherlands, are moving towards a circular economy, actively utilizing action plans. Through this structure, countries will be able to better conserve non-renewable resources such as fossil fuels. By using recycled resources, they will reduce carbon emissions while protecting public health and the environment. Furthermore, it will expand the economy and create various job opportunities. However, as developing countries are especially vulnerable in terms of financially supporting a circular economy, they could seek assistance from non-governmental organizations (NGOs) or even from other developed member states.

Implementing Public-Private Partnerships (PPPs)

For developing countries that lack resources and the economic ability to have sufficient infrastructure to dispose of waste properly, public-private partnerships (PPPs) are a preeminent option. PPPs refers to collaboration between government agencies and private sector companies to finance, build, and operate projects. For instance, if the city government is too indebted and thus unable to undertake arduous project, private enterprise can aid with designing, completing, implementing, and funding the project. This type of partnership is advantageous for both sides as the private side can improve operational efficiency. Additionally, the public can enhance economic diversification, facilitating an infrastructure base and boosting associated construction, equipment, support services, and other businesses. Through partnerships, the government, especially one from developing country, can intensify its financial resources and technical expertise, engendering long-term, reliable waste management services for the citizens.

Glossary

Hazardous Waste

Hazardous waste refers to waste with potentials that make it deleterious or capable of having harmful effect on human health or the environment. It can be generated from myriads of sources including industrial manufacturing process waste and ranges in forms such as liquid, solids, gases, and sludges.

Non-hazardous Waste

Non-hazardous waste refers to any kind of waste that results in no harm to human or environmental health. It is often generated in the industrial manufacturing process such as in aluminum and zinc industry. Although it does not immediately pose threat, it can cause significant environmental effect in long term. Thus, governments often regulate the disposal of non-hazardous waste.

Municipal Waste

Municipal waste refers to waste collected and treated by municipalities, a city or town which has own local governments. It includes waste from households such as bulky waste, yard and garden waste, street sweepings, contents from litter containers and market cleansing waste. However, it excludes waste from municipal sewage networks and treatment and also waste from construction and demolition activities.

Eutrophication

Eutrophication refers to excessive plant and algal growth due to the increased availability of one or more limiting growth factors required for photosynthesis including sunlight, carbon dioxide and nutrient fertilizers. This occurs due to human activities, especially from industrial manufactures dumping nitrogen and phosphorous, resulting into reduced water clarity and quality.

Thermal Pollution

Thermal pollution is a rapid change in temperature in a natural water. Often caused by heated discharge from proximate industrial facility or human activity, it engenders disruption in natural systems and stress, disease or ultimately death for the affected organisms.

Circular Economy

Circular economy refers to a form of economy where the waste and pollution are eliminated, products and materials are used for extended time period and the natural system could regenerate. It is not only about repairing environmental challenges but also triggers positive impacts for industries, sectors and bring big opportunities. It is directly opposed to linear economy where resources are directly thrown away after being used, increasing waste and decreasing productivity.

Developed countries

Developed countries refers to a nation which has a mature and sophisticated economy measured through using gross domestic product (GDP) or average income per resident. These countries have

developed technological infrastructure and various industrial and service sectors. Citizens of developed countries are likely to have access to quality health care and higher education.

Developing countries

A developing country has a lower gross domestic product (GDP) compared to developed countries while having less mature and sophisticated economy. Moreover, average income per resident is also low and citizens tend to have low rate of access towards healthcare and education.

Sources

"About the United Nations Environment Programme." *UNEP*, www.unep.org/who-we-are/about-us. Accessed 21 July 2024.

About Us: BAN. *Basel Action Network*, Basel Action Network (BAN), www.ban.org/about-us. Accessed 24 July 2024.

Bar Graph of Global Industrial Waste Management Market Growth in 2022-2032. Linkedin, www.linkedin.com/pulse/industrial-waste-management-market-share-trustworthy-data-duffy. Accessed 25 July 2024.

Benson, Emily, and Sarah Mortensen. "The Basel Convention: From Hazardous Waste to Plastic Pollution." *Center for Stategic & International Studies*, 7 Oct. 2021, www.csis.org/analysis/basel-convention-hazardous-waste-plastic-pollution. Accessed 24 July 2024.

Bromokusomo, Leonard Patrick. "Global Waste Trade: What is it? Why does it happen and How to solve it." *Modern Diplomacy*, 17 Dec. 2020, moderndiplomacy.eu/2022/12/17/global-waste-trade-what-is-it-why-does-it-happen-and-how-to-solve-it/. Accessed 23 July 2024.

Chislock, Michael, et al. "Eutrophication: Causes, Consequences, and Controls in Aquatic Ecosystems." Nature, Nature Education, www.nature.com/scitable/knowledge/library/ eutrophication-causes-consequences-and-controls-in-aquatic-102364466/. Accessed 2 Aug. 2024.

"Circular Economy." *European Commission*, environment.ec.europa.eu/topics/circular-economy_en. Accessed 20 July 2024.

Cumulative Displaced Plastic Waste as a Result of Chinese Import Ban. *Earth.Org*, earth.org/chinas-import-ban/. Accessed 25 July 2024.

DeVroom, Dawn. "Non-Hazardous Waste Definition." *IDR Environmental Services*, 20 Apr. 2022, blog.idrenvironmental.com/non-hazardous-waste-definition. Accessed 19 July 2024.

Diagram of Waste to Energy Plant. *U.S Energy Information Administration*, www.eia.gov/energyexplained/biomass/waste-to-energy-in-depth.php. Accessed 25 July 2024.

Estimates of the level of soil degradation at a global level. *Research Gate*, www.researchgate.net/figure/Estimates-of-the-level-of-soil-degradation-at-a-global-level-source-72-public-domain_fig1_298791231. Accessed 25 July 2024.

Igini, Martina. "What Are the Consequences of China's Import Ban on Global Plastic Waste?" *Earth.Org*, 7 Apr. 2022, earth.org/chinas-import-ban/. Accessed 22 July 2024.

Image of Industrial Waste. *Institute for Local Self-Reliance*, ilsr.org/fighting-monopoly-power/recycling-waste/. Accessed 25 July 2024.

"Implementation of the Waste Framework Directive." *European Commission*, environment.ec.europa.eu/topics/waste-and-recycling/implementation-waste-framework-directive_en. Accessed 20 July 2024.

"Industrial Waste Facts." *Business Waste*, www.businesswaste.co.uk/your-waste/industrial-waste-disposal/industrial-waste-facts/#:~:text=Every%20year%209.2%20billion%20tonnes,product%20with%20no%20further%20use. Accessed 20 July 2024.

"Industrial Waste-to-Energy - a Step towards Reduced Carbon Footprint." *Woima*, woimacorporation.com/industrial-waste-to-energy-a-step-towards-reduced-carbon-footprint/. Accessed 23 July 2024.

Infographic Explaining the Circular Economy Model. *European Parliament*, www.europarl.europa.eu/topics/en/article/20151201STO05603/circular-economy-definition-importance-and-benefits. Accessed 25 July 2024.

Karlsson, Therese, et al. "Plastic Waste Trade." *IPEN*, Mar. 2023, ipen.org/sites/default/files/documents/ipen_plastic_waste_trade_report-final-3digital.pdf. Accessed 21 July 2024.

Kim, Chan, and Renée Mauborgne. "Turning Waste to Energy: Sweden's Recycling Revolution." Blue Ocean, www.blueoceanstrategy.com/blog/ turning-waste-energy-sweden-recycling-revolution/. Accessed 5 Aug. 2024.

"Land Pollution." *Byju's*, byjus.com/chemistry/land-pollution/#:~:text=Land%20Pollution%20Effects&text=Toxic%20waste%20and%20contaminants%20can,all%20long%2Dterm%20health%20consequences. Accessed 22 July 2024.

"Learn the Basics of Hazardous Waste." *United States Environmental Protection Agency*, 11 Apr. 2024, www.epa.gov/hw/learn-basics-hazardous-waste. Accessed 19 July 2024.

McGinty, David B. "5 Opportunities of a Circular Economy." *World Resources Institute*, 3 Feb. 2021, www.wri.org/insights/5-opportunities-circular-economy. Accessed 21 July 2024.

"Mission." *Basel Action Network*, Basel Action Network (BAN), www.ban.org/mission. Accessed 24 July 2024.

"Municipal Waste." *OECD*, www.oecd.org/en/data/indicators/municipal-waste.html. Accessed 22 July 2024.

Nathanson, Jerry A.. "land pollution." Encyclopedia Britannica, 15 Oct. 2023, https://www.britannica.com/science/land-pollution. Accessed 24 July 2024.

Overview of Basel Convention. *Basel Convention*, Secretariat of the Basel Convention, www.basel.int/TheConvention/Overview/tabid/1271/Default.aspx. Accessed 22 July 2024.

Peacock, Chris. "The Impacts of Industrial Waste." *Aquaread*, Post navigation IC Component Shortages and Water Quality Monitoring Equipment, 13 July 2022, www.aquaread.com/blog/impacts-of-industrial-waste/. Accessed 21 July 2024.

"Plastic Waste Trade Data." *Basel Action Network*, Basel Action Network (BAN), www.ban.org/plastic-waste-transparency-project-hub/trade-data. Accessed 24 July 2024.

Polluted waste water being disposed to natural body of water. *Genesis Water Technology*, genesiswatertech.com/blog-post/decoding-principles-of-industrial-wastewater-treatment/. Accessed 25 July 2024.

"Public-Private Partnerships (PPPs): Definition, How They Work, and Examples." Investopia, 6 June 2024, www.investopedia.com/terms/p/ public-private-partnerships.asp. Accessed 3 Aug. 2024.

Spanne, Autumn. "What Is Thermal Pollution? Causes, Impact, and Mitigation." *Treehugger*, 6 July 2022, www.treehugger.com/what-is-thermal-pollution-5219795. Accessed 22 July 2024.

"Sweden-a Pioneer on Sound Chemical and Waste Management." UNEP, 24 June 2019, www.unep.org/news-and-stories/story/ sweden-pioneer-sound-chemical-and-waste-management. Accessed 7 Aug. 2024.

"Towards a Zero Waste Society." *UNEP*, www.unep.org/ietc/30thanniversary/towards-zero-waste-society. Accessed 24 July 2024.

Transboundary Movements of Electrical and Electronic Waste. *Library of Parliament*, hillnotes.ca/2023/06/05/electrical-and-electronic-equipment-waste-continued-environmental-considerations-and-transboundary-movements/. Accessed 25 July 2024.

Ukpanah, Inemesit. "How Detrimental is Land Pollution for the Environment? Statistical Fact." *Green Match*, 26 Apr. 2024, www.greenmatch.co.uk/blog/land-pollution-environmental-impact. Accessed 21 July 2024.