

Technological Development and Industrialization in Contemporary Era- A Threat to Environment at National and International Strata: Challenges and Remedies

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Abstract

There is a constant tussle between technological advancements and environment, and how to optimally achieve the former without harming the latter in the late 20th and early 21st century. As governments of primarily developing countries underline the importance of rapid industrialization, it is vital that affected communities use the tools of law to monitor compliance with environmental norms and also prevent and counter the damage caused by technological development and industrialization. The past century has borne witness to unprecedented advances in science, technology and prosperity. While these advances have indubitably improved the lives of many, they have also left in their wake an ever-expanding web of patterns of natural resource use and abuse from which few people in either the developed or developing world are untouched. Unless these patterns of resource use and abuse are checked, the burden placed on generations to follow will be both incalculable and unconscionable. As these concerns began to trouble the consciences of sovereign powers, global environmental issues began to feature in the international discourse. From the 1970s, when these issues first made their appearance on the international stage, international law relating to the environment has developed in leaps and bounds. Over the past four decades there has been a rapid expansion in the use of International law in the service of the environment. In a world of unequal states that differ widely both in their contributions to global environmental degradation and in their capacities to respond to it, such widespread resort to international law has proved possible primarily owing to the tailored use in multilateral environmental agreements of differential treatment in favour of developing countries. This article will discuss the aspects of technological developments and industrialization which have jeopardized the environment and how the international communities have reacted to it.

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Technology and Environment- An Introduction

We have seen that scientifically explained concepts can be found in every definition of International Environmental Law (IEL) and thus scientific determinations lie at the very crux of this branch of international law. Technology is the application of science for the accomplishment of certain objectives with the inherent purpose of making lives better and easier. Suffice to say, the human impact on the environment is felt because of the never-ending development of new technologies that human beings are capable of. Therefore, like other issues, environmental ones are addressed through the development of new, novel and sometimes better, technologies. In this context, international law is used for regulating a technology and providing the incentive to develop a new one. The “depraved” nature consists of the fact that a certain technology is too often the reason why another technology has to be developed.

Ever since time immemorial, human beings have always searched for scientific answers to its problems. Very often, when there was scientific consensus about these answers, they were translated into legal norms and thus acquired legal respectability. As environmental issues, unlike other problems addressed by international law, have a dimension that can be understood only with the help of science, IEL always looks for answers from science.¹ Through scientific findings we came to witness that human activities pollute the environment in every possible way.

In order for such findings to be delivered, a constant flow of information is needed. This is why a system aimed at collecting and accumulating data and information on the environment so as better to prevent possible damage to the environment has been put into place² and why most treaties in this field include an obligation to cooperate, to share/transfer scientific knowledge. With all this information, the power of science is immense. Sometimes States, confronted with scientific evidence regarding the environmental damage, as it happened in the case of the Soviet Cosmos 954 nuclear powered satellite, simply agree to cough up compensations, even if they do not admit responsibility.³

The logical assumption is that law cannot but react to science and therefore, IEL has devised many international instruments and covenants to address this issues of pollution, e.g., the 1973

¹ D. Bodansky, J. Brunnee, E. Hey, *International Environmental Law, Mapping the Field*, in D. Bodansky, J. Brunnee, E. Hey (eds.), *Oxford Handbook of International Environmental Law*, Oxford, Oxford University Press (2007) p. 7.

² A. Cassese, *International Law*, Oxford, Oxford University Press (2005) 496.

³ *Claim against the Union of Soviet Socialist Republics for Damage caused by Soviet Cosmos 954*, 18 ILM, (1979) 899-930.

International Convention for the Prevention of Pollution from Ships (MARPOL Convention).⁴ The Convention, which includes regulations aimed at preventing and minimizing pollution from ships - both accidental pollution and that from routine operations, is designed, together with its 1978 Protocol⁵ to keep up with the latest developments of science. Moreover, such is the power of scientific truth that its proponents want environmental regulations to be adopted only where there is compelling scientific evidence that action is required to prevent environmental damage.⁶ One of the most striking examples of the uncertainties of science in IEL can be found in significant adverse transboundary impacts of the Danube-Black Sea navigation route at the border of Romania and Ukraine, presented by the Inquiry Commission created under the 1991 Espoo Convention on Environmental Impact Assessment in a Transboundary Context. In its report, the Commission cautioned that predictions are difficult, especially in the biotic world and when the effects of a human activity create other supplementary effects. It also referred to an “undefined uncertainty” in passing a judgment.⁷

In the face of such scientific uncertainties, one can understand why, currently, scientific proof of harm is no longer considered as the singular determining factor if and when to act. Science has confronted us with its own limitations as well as the restrictions in technological development.⁸ For example, when dealing with nuclear energy for civil purposes, the world was confident that in the developing of technologies every measure had been taken to guarantee its safety. With the Chernobyl and Three Mile Island it proved not to be the case, and an international instrument, the 1986 Convention on Early Notification of a Nuclear Accident,⁹ was adopted which required States to notify the other parties of every possible nuclear accident. In this case the scientific assessment of such accident is demoted. The activity of the Inquiry Commission mentioned above is significant in underlining the effects of the uncertainties of science have on the IEL from yet another point of view. As it can be seen from the documents presented to this Commission,¹⁰ parties involved in a dispute may use the uncertainties of science to support their own claims. Thus, each international environmental lawyer can use only the scientific data he considers as being more useful for his case. Before concluding this

⁴ MARPOLConvention<[https://www.imo.org/en/About/Conventions/Pages/International-Convention-for-the-Prevention-of-Pollution-fromShips-\(MARPOL\).aspx](https://www.imo.org/en/About/Conventions/Pages/International-Convention-for-the-Prevention-of-Pollution-fromShips-(MARPOL).aspx) > last accessed 20 December 2020.

⁵ Protocol of 1978 relating to the International Convention for the Prevention of Pollution from Ships.

⁶ P. Sands, *Principles of International Environmental Law*, Cambridge, Cambridge University Press (2005) 6.

⁷ Bogdan Aurescu; Felix Zaharia, *Science, Technology and International Environmental Law* (Acta Universitatis Lucian Blaga, 2011) 203.

⁸E. Hey, *The Protection of Marine Ecosystems, Science, Technology and International Law* in *Hague Yearbook of International Law*, Hague (Martinus Nijhoff Publishers, 1997) pg. 72-73.

⁹ Bogdan Aurescu (n 7) 203.

¹⁰ *Id.*

section, one must not forget that scientific material has always a rather provisional nature, “*so that yesterday’s truth is today’s error*”.¹¹

The Precautionary Principle

Principle 15 of the Rio Declaration states,

*“In order to protect the environment, where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.”*¹²

Though its scope and application are still uncertain and it has not yet been endorsed as such by an international court or tribunal,¹³ though, especially in Europe, there is far-reaching application of the precautionary principle, as it provides a basis for action to be taken even in the face of substantial scientific uncertainty and in the absence of an international consensus on the existence of environmental harm.¹⁴ One of the consequences of this principle is the “*principle of continuing environmental impact assessment*” which was advocated in his separate or dissenting opinions by judge Weeramantry.¹⁵

From the very beginnings, humankind sought to control and take charge of the environment. Though the first technologies to be used were humble, eventually, through technological development, the man’s robust footprint on the planet became more visible. Today, through the means of technology, man seeks to dominate and control the environment, to satisfy his economic and selfish needs. However, as it was said “*using science and technology in an unrestricted way [causes] serious risks and actual damage both to nature and to human beings*”.¹⁶ In recent times a number of elements have increasingly brought about considerable damage, at an increasing and alarming pace, to the global environment, such as the use of chlorofluorocarbons (CFCs), deforestation, the growing need of fossil fuels and mineral resources, etc.

¹¹P. Brett, *The Implications of Science for the Law*, McGill Law Journal (vol. 18), 1972, 184.

¹²The Rio Declaration on Environment and Development, 31 ILM (1992) p. 876-880.

¹³A. Aust, *Handbook of International Law*, Cambridge, (Cambridge University Press, 2006) 331.

¹⁴P. Sands, *Principles of International Environmental Law*, Cambridge, (Cambridge University Press, 2005) 6.

¹⁵Request for an Examination of the Situation in Accordance with Paragraph 63 of the Court Judgment of 20 December 1974 in the Nuclear Tests (New Zealand v. France) Case, International Court of Justice (ICJ) Reports, 1995, p. 344; Case concerning the Gabčíkovo-Nagymaros Project, ICJ Reports (1996) 11.

¹⁶M. Lachs, *Views from the Bench, Thoughts on Science, Technology and World Law*, American Journal of International Law, 1992, p. 691.

The damage brought to nature required an international normative intervention through the rules of IEL, which was done, in the case of CFCs for example, through the provisions of the 1995 Vienna Convention for the Protection of the Ozone Layer¹⁷ and especially its 1987 Montreal Protocol on Substances that Deplete the Ozone Layer¹⁸ that requires the parties to reduce, and ultimately eliminate, the production and consumption of certain ozone-depleting substance according to a timetable. Though this Protocol has been largely successful,¹⁹ the substances employed to replace the CFCs contribute now massively towards global warming.

Excerpts on Environmental Technology as Written in the Paris Agreement²⁰

Dating back to the 1992 Earth Summit held in Rio de Janeiro, Brazil where many countries initially joined the international treaty called the United Nations Framework Convention on Climate Change. The need to strengthen emission reductions, many member countries adopted the Kyoto Protocols. That protocol legally made countries to reduce target emission. This agreement widely believed to be ineffective as the world's top two carbon emitting countries, China and United States, chose not to participate.

In the Paris Meeting, the UN tasked countries to submit plans on how they have envisioned to decrease and navigate through greenhouse gas emissions. These plans were technically referred to countries to measure and limit their greenhouse gas emissions by 2025-2030. After 2 weeks of difficult negotiations that lasted through tough nights, French Foreign Minister, Laurent Fabius, who presided over these conversations, announced to adopt the Paris Climate Agreement. The agreement specified no additional funding targets but noted that developed countries should provide assistance to help with the mission by 2020 with a COP16 commitment of 100 billion dollars per year.

Technology was compared with a remedial drug. We would prefer to have a drug without serious side effects, but we nevertheless rather have a drug with side effects than no drug at all.²¹ At the same time, the process of creating an array of environmental rules and regulations to address the problems that arise from new technologies can be compared with the process of

¹⁷ Bogdan Aurescu (n 7).

¹⁸ *Id.*

¹⁹ A. Aust, (n 13) 331.

²⁰ Paris Agreement <<https://www.britannica.com/topic/Paris-Agreement-2015>> last accessed 21 March 2021.

²¹ P. Brett (n 11) 184.

embanking a river. Like the river that continues to flow downstream regardless of its embanking so are the new technologies that continue to appear.²²

Invasion of Digital Revolution, Manipulation and Dislodged Communication²³

The dividends of the digital economy are unevenly shared and only a relatively small number of countries including The United States of America [35%], China [13%], Japan [8%] and European Union [25%] are bringing in benefits of the global digital economy. Similarly, a lot of firms – The big conglomerates and companies have achieved a governing yet commanding market position and account for nearly 90% of all revenue and profits. To make matters even grave, the digital economy is causing severe negative externalities, which includes, increasing danger of climate changes. The efforts taken by these tech firms, involve cleaning up their act, they are still considered to be unsustainable and environmentally damaging in the world. In order to meet the demand for ravenous acts.

Countries that lack strong digital presence and market resilience are falling behind. Ensuring a more equitable global digital economy will require drafting an agile government regulation, creating universal broadband, upskilling workers and the introduction of social protections to fairly distribute the gains and minimize the losses. Governments and firms will have to provide a sustainable digital transformation not only to thrive, but to survive the 21st century in a more sustainable fashion.

With the right mix match of incentives, overview and investments, the digital economy could play a prime role in economic recovery from COVID-19, as well as potentially help in the increase of entrepreneurs and small and medium businesses in lower-income countries. This will require big spends in – and greater redistribution of – the critical infrastructure that powers the services and applications driving the digital economy. Digital resilience is no longer optional.

²² Bogdan Aurescu (n 7).

²³ Robert Muggah, Rafal Rohozinski & Ian Goldin, “The Dark Side of Digitalization – And how to fix It” We Forum (2020) <<https://www.weforum.org/agenda/2020/09/dark-side-digitalization/>> last accessed 03 March 2021.

The Remedy

In today's world, humankind faces two conflicting requirements:

- i. the dramatic urgency to put a stop to the deterioration of the environment besides forestalling new damages
- ii. The necessity realistically to take into account the huge economic and social costs involved.²⁴

This is why technology needs to become part of the solution. In the case of pollution by ships at sea, besides the relatively easy procedure to react to new discoveries in the field of science, the 1973 MARPOL Convention²⁵ and its 1978 Protocol allow for new developments in shipbuilding technologies and ship design to be added to the regulatory framework they provide. From the example above it is evident that the development of technology has also affected the law-making process by facilitating it. Moreover, it has helped give birth to different forms of nonbinding and binding instruments.²⁶

One of the ways, we are changing the way we live is technology. The way that is helping us forge ahead with one another to the external world is technology. More than ever, the advent of technology and innovation has the caliber to transform environmental protection. The need for smarter ways to support our development has always been a key driver of technological advancement.

Presently, civilization faces a new unprecedented challenge as technology is playing a role in decoupling the environment. No human technology can replace the functioning of nature's technology. In order to lead a productive, diverse natural world, we need to address the fundamental issue of technological revolutions that has overtaken our healthy natural systems for granted rather than adding value to our resources and ecosystem.

The truth of our global diversity continues to show us a downward sloping curve, the health and functioning of crucial ecosystems like forest, rivers and wetlands will be affected. We have

²⁴ A. Cassese, *International Law*, Oxford, Oxford University Press, 2005, 487.

²⁵ Marpol Convention, 1973.

²⁶ M. Lachs, *Views from the Bench, Thoughts on Science, Technology and World Law* (American Journal of International Law 1992) 695.

a critical window of opportunity now to reverse our actions and we need stringent policies to protect our forests, oceans, wildlife and freshwater resources.

Amidst this global and domestic scenario, the Ministry of External Affairs (MEA) announced the establishment under its wing of the New, Emerging and Strategic Technologies (NEST) division that will involve ‘tech diplomacy’. The NEST division is tasked to provide policy guidance on how India can shape international rules related to emerging technologies, navigate competition over strategic supply chains to capture a larger share of global technology flows, and align India’s as yet discordant domestic technology policies with international regimes that are straining under complex geopolitical and institutional pressures.

Industrialization and the Environment

As industrialization progressed, the primary polluters (and therefore actors) shifted from individuals to corporations, and criminal sanctions in the form of fines were often enforced for corporate violation of pollution control legislations.²⁷

The development of modern environmental law has been interconnected to the economic development of society. As the amount of economic activity increases, there is a greater inclination to damage the environment. Because the environment is the primary resource for most industrial activity, the increase in economic activities often results in greater natural resource consumption, environmental stress, and pollution.

For example, in the United States, the development of industry and science greatly improved the economic and social lives of the country’s citizens, but this development came so fast that few prophesied its environmental side effects, the harm caused to human health and the environment.²⁸ As policymakers realized the level of environmental damage caused by economic development, laws had to be developed to regulate and curb the misconduct of the industries.²⁹ This was also the beginning of an understanding that individual actions required collective oversight at the state level. One of the most compelling justifications for state

²⁷ Arnold W. Reitze, Jr., *Air Pollution Control Law: Compliance and Enforcement* (2001) 567-570.

²⁸ Edward E. Shea, *Environmental Law and Compliance Methods*, (2002) 631.

²⁹*Id.*

intervention has been that the state is accountable for addressing the externalities³⁰ of human actions.³¹

In the early twentieth century, states sought to mitigate the impact of individuals and domestic corporations by enacting environmental legislation that forced the primary actors to recognize externalities. By the early 1970s, it was clear that the developments which began in the late stages of the twentieth century had gained momentum, resulting in the widespread recognition that the state had to take a more active role in the control of pollution and protection of its environment.³²

Throughout the evolution of environmental law, the international community has endeavoured to find international norms capable of solving these global environmental problems. In the “age of frameworks,” international regimes (whether sufficiently effective or not) were institutionalized to address the global nature of environmental problems. In the twenty-first century, the focus was the actual implementation of these international regimes as the evolution of environmental law entered the “age of compliance.” For environmental law to remain relevant and effective, it must target the primary actor in globalization, the multinational corporation (MNC).

The significance of engaging these corporations cannot be underestimated. Arguably, MNCs can assert more influence on an environmental issue than can a treaty.³³ States are more likely to comply with the demands of corporations because corporations are necessary components to the economic development of the states. Similarly, MNCs can also make environmentally friendly processes mandatory in their overseas production lines, thereby creating a beneficial global effect on environmental issues.

Sadly, the reverse is also true. If these corporations adopt environmentally unfriendly practices, global harm will occur. Furthermore, if developing countries are dependent on MNCs for their economic development, the states are likely to be reluctant to apply pressure on the corporations

³⁰ Tom Conway, *Taking Stock of the Traditional Regulatory Approach in Getting it Green: Case Studies in Canadian Environmental Regulation* 25, 28 (G. Bruce Doern ed., 1990) (“This means that the public cannot adjust for these costs and hazards in their calculations about wages, consumption, location of residence, and lifestyle. Moreover, most people are not able to adjust to these costs and hazards even when they possess information, because they lack the power and resources with which to respond. A government response in the common good is, therefore, necessary.”)

³¹ Stuart Bell & Donald McGillivray, *Environmental Law* (2007) 24.

³² *Id.*

³³ Simon S.C. Tay, *South East Asian Fires: The Challenge to International Law and Sustainable Development*, 11 *Geo. Int'l Envtl. L. Rev.* 241, 297 (1999) (“Private individuals and organizations can help foster and enforce compliance within the relevant industries in Indonesia.”).

to improve their practices. Hence, if extrinsic factors were to influence these MNCs to incorporate sustainable development into their practices, this could have a greater effect than merely applying state-to-state pressure. Furthermore, engagement of the MNCs with the project of environmental protection could provide a possible solution to the problem that some developing countries face. Many developing countries are unable to comply with some treaty requirements, not because of a lack of political will but because of the shortages of financial and technological resources.³⁴

The environmental law of the twenty-first century must adopt a legally holistic approach to influence MNCs. Environmental law and the global agreements combating environmental problems are inadequate and ineffective if they operate in isolation. Today, there are international agreements to control pollution in all aspects of the environment, to “conserve habitats, protect global commons, such as the high-level ozone layer, and protect resources located within countries that are of concern to the international community.”³⁵ Similarly, the “duties of the parties to these agreements have also become more comprehensive: from undertaking research and monitoring to preventing pollution and reducing certain pollutants to specified levels.”³⁶ The development of environmental law has been geared towards the creation of a global framework to address environmental problems.

Dumping of Hazardous Waste in Developing Countries

Dumping of hazardous waste presents challenges to societies regardless of their sustainability awareness and technological advancement.³⁷ However, it seems particularly troubling in developing countries given the lack of basic facilities to handle waste in Environmentally

³⁴ Hilary French, *Partnership for the Planet: An Environmental Agenda for the United Nations* 24 (1995); see also Marc A. Levy et al., *Improving the Effectiveness of International Environmental Institutions*, in *Institutions For the earth* 397, 404-05 (Peter M. Haas et al. eds., 1993) (“Leaders of weakly institutionalized states may genuinely want to conform to international norms and principles and comply with regime rules, but may lack the political legitimacy, or the loyalty of competent and honest bureaucracies, necessary to develop and implement domestic initiatives.”).

³⁵ Edith Brown Weiss, *International Environmental Law: Contemporary Issues and the Emergence of a New World Order*, 81 *Geo. L.J.* 675, 679 (1993).

³⁶ *Id.* 680

³⁷ L. Guerreco, G. Maas and W. Hogland, “Solid Waste Management Challenges for Cities in Developing Countries” (2013) 33(1) *Journal of Waste Management* 220-232; L. Giusti, “A Review of Waste Management Practices and their Impact on Human Health” (2009) 29(8) *Waste Management* 2227-2239.

Sound Manner (ESM). By far, the human and environmental consequences of such activities in developing world outweigh its economic benefits.³⁸

Dumping of hazardous waste gained global attention in 1986 and precisely in Koko, Nigeria, when an Italian national working in the country got a product import license and replaced the shipment of several thousand tons of polychlorinated biphenyls, highly toxic and radioactive wastes which are both carcinogenic and toxic.³⁹ Even with the removal of wastes, the land within a 500-metre radius of the dump site was declared unsafe and the surface and ground water remained largely contaminated.⁴⁰ Similarly, a recent highly publicized dumping scandal that shocked the global community began in 2006, when a Dutch company called Trafigura left chemical waste in about a dozen sites around the poorest parts of Abidjan, Côte d'Ivoire.⁴¹

Sadly, waste dumping has not met the same justice in the developing world whether in the environment or otherwise, and do not receive any attention until horrifying health concerns and other environmental issues begin to surface *en masse*.⁴² For instance, it appears that the infamous piracy and terrorism now plaguing the Somali coasts in the horn of Africa began as

³⁸ R. Marshall and K. Farahbakhsh, "System Approaches to integrated Solid Waste Management in Developing Countries" (2013) 33(4) *Journal of Waste Management* 988-1003; Oteng-Ababio, J. Arguello and O. Gabbay, "Solid Waste Management in African Cities: Sorting the Facts from the Fads in Accra, Ghana" (2013) 39 *Habitat International* 96-104.

³⁹It was estimated that more than 3,800 tonnes of this waste was stored on a site at Koko. Workers packing containers for their reshipment back to Italy suffered severe chemical burns. See C.U. Gwam, "Human Rights Implications of Illicit Toxic Waste Dumping from Developing Countries Including the USA, Especially Texas to Africa, in Particular, Nigeria" (2012) 38 *T. Marshall Law Review* 241; F. Adeola, "Environmental Injustice and Human Rights Abuse: The States, MNCs, and Repression of Minority Groups in the World System" (2001) 8(1) *Human Ecology Review* 39, 50; A. Vir, "Toxic Trade With Africa" (1989) 23 *Environmental, Science and Technology Journal* 24, 25

⁴⁰ Similarly, Guinea-Bissau was offered a \$600-million-dollar contract which was four times its gross national product to dispose of 15 million tonnes of toxic waste over five years. Research in Asia revealed that Australia has been dumping lead batteries and other lead-related hazardous wastes in the Philippines, Thailand and India for purported recycling. It is estimated that between 1995 and 2000, more than 5.4 million metric tons of hazardous wastes were shipped to Bangladesh, China, Hong Kong and the Korean peninsula for recycling and disposal. See generally J. Baggs, "International Trade in Hazardous Waste" (2009) 17(1) *Review of International Economics* 1-16; H. J. Marbury, "Hazardous Waste Exportation: The Global Manifestation of Environmental Racism" (1995) 28 *Vanderbilt Journal of Transnational Law* 251, 291; Greenpeace, *Lead Astray: "The Poisonous Lead Battery Wastes Trade"* *Greenpeace Report* 1994 p. 4; Greenpeace Media Release: "Australia the Mucky Country-Hazardous Waste Trade Continues", *Green Report* (1997) 1.

⁴¹ G. Cox, "Trafigura Case and the System of Prior Informed Consent under the Basel Convention: A Broken System" (2010) 6 *Law Environment and Development Journal* 263; O. Fagbohun, "The Regulation of Transboundary Shipments of Hazardous Waste: A Case Study of the Dumping of the Toxic Waste in Abidjan, Cote D'Ivoire" (2007) 37 *Hong Kong Law Journal* 831; L. Polgreen, and M. Simons, "Global Sludge Ends in Tragedy in Ivory Coast" *New York Times* (2 October 2006) 10. Available at: www.bbc.co.uk/news/world-africa197061663 (last accessed 12 June 2016).

⁴² J. Gaba, "Exporting Waste: Regulation of the Export of Hazardous Wastes from the United States" (2012) 36 *William & Mary Environmental Law and Policy Review* 405.

retaliation against foreign companies polluting the Somali's fishing waters.⁴³ Continuous foreign toxic dumping has exacerbated an already bad socio-political environment for the Somali people that never had a central authority for many decades.⁴⁴ It is disheartening that foreign companies would clandestinely trade weapons for foreign waste, fuelling civil conflict. It seems that the European and other industrialized countries' companies have been taking advantage of Somalia's strife, and its waters, for many years.⁴⁵

Another huge factor throughout the continent of Africa is the problem of e-waste or electronic pollution. This occurs when developed countries send their leftover used electronics to developing countries. About a third of the materials that reach electronics markets in these countries are already damaged or broken beyond repair. Meanwhile, women and children search the scraps from the dump sites for whatever pieces they can find that may be valuable, amid all kinds of fumes from burning heavy metals and plastics.⁴⁶ The problem of dumping e-waste in Africa only exacerbates the insecurity brought on by conflict related to the extraction of minerals that feed into the initial production of the same electronics.⁴⁷ Given that consumerism in more industrialized countries has created destructive loopholes for the exploitation of African continent, it is not surprising that the continuous search for revenue to balance the trade deficits could facilitate such dumping of e-wastes.

Justifications for Hazardous Wastes Trade

The economic argument seems to be the rationale behind the transboundary movements of hazardous wastes given the strict environmental regulations in developed countries. For instance, the logic of waste export paradigm was given an impetus by the Former World Bank Chief Economist, Lawrence Summer when he issued a memo that "*health-impairing pollution*

⁴³ It was estimated that more than 3,800 tonnes of this waste was stored on a site at Koko. Workers packing containers for their reshipment back to Italy suffered severe chemical burns. See C.U. Gwam, "Human Rights Implications of Illicit Toxic Waste Dumping from Developing Countries Including the USA, Especially Texas to Africa, in Particular, Nigeria" (2012) 38 *T. Marshall Law Review* 241; F. Adeola, "Environmental Injustice and Human Rights Abuse: The States, MNCs, and Repression of Minority Groups in the World System" (2001) 8(1) *Human Ecology Review* 39, 50; A. Vir, "Toxic Trade With Africa" (1989) 23 *Environmental, Science and Technology Journal* 24, 25.

⁴⁴ *Id.*

⁴⁵ Debora Mackenzie, "Toxic Waste adds to Somalia's woes". *New Scientist* (1992) <<https://www.newscientist.com/article/mg13518390-400-toxic-waste-adds-to-somalias-woes/>> (last accessed 20 January 2021).

⁴⁶ D. N. Perkins, M. N. Drisse, T. Nxele and P.D. Sly, *E-waste: A Global Hazard* (2014) 80(4) *Annals of Global Health* 286-295.

⁴⁷ L. Bradley, *E-Waste in Developing Countries Endangers Environment, Local* (2014) <<https://www.usnews.com/news/articles/2014/08/01/e-waste-in-developing-countries-endangers-environment-locals>> last accessed 20 March 2021.

*should be dumped in the country with the lowest wages.*⁴⁸ While Summer and the World Bank might have recanted from this seemingly weak and uninspiring statement, the economic argument is still undeniably inferable.⁴⁹ For example, a research conducted in the 1980s and the 1990s revealed that the average disposal costs for one tonne of hazardous wastes in Africa were between \$2.50 and \$50, while in developed countries it ranged between US \$200-\$3,000.⁵⁰ Undoubtedly, the lower cost of disposal in developing nations clearly reflects the high rate of poverty, poor environmental legislations and enforcement. There is also lack of political will and public oppositions owing to inadequate information and access to justice concerning the inherent dangers involved in hazardous trade.⁵¹ In what follows, the article examines the regulation of transboundary waste through the lens of international and regional frameworks.

Climate change⁵² is caused by releasing carbon dioxide into the atmosphere. What if, instead, we made a plan and took it out? The idea of pumping out carbon dioxide directly out of the air has been running around climate change policy in circles for a period of 10 years now, but it has picked the pace in the past few years infused with technology as – direct air capture or DAC, which has been tested in the real world.

The base problem of climate change is that we are removing too much carbon from the geosphere that is under ground and putting it into the active biosphere that is above ground where it serves to increase the surface temp. From a climate change mitigative aim, there are two distinct ways of dealing with CO₂ emissions. The street-smart way that is affordable is to not emit them in the first place. Reduction in consumption, using current technologies more effectively and shifting to low carbon technology and practices, if it is possible and viable in the long run. Another way is to remove CO₂ from the biosphere and put it back into the geosphere, where it will not cook the planet. Much of this clustered thought around DAC arises from the fact that it can play either role- it can either prevent CO₂ emissions or draw down CO₂ drastically.

⁴⁸ J. Jay, G. Pecquet and L. Taylor, “Potential Gains from Trade in Dirty Industries: Revisiting Lawrence Summers’ Memo” (2007) 27(3) Cato Journal (Cato Institute) 10-21.

⁴⁹ N. Pellow, *Resisting Global Toxics: Transnational Movements for Environmental Justice* (MIT Press, 2007) 9.

⁵⁰ Kenneth I. Ajibo, *Transboundary hazardous wastes and environmental justice: implications for economically developing countries* (2016), *Environmental Law Review*.

⁵¹ A. Webster-Main, “Keeping Africa Out Of the Global Backyard: A Comparative Study of the Basel and Bamako Conventions” (2002) 26(1) *Environs: Environmental Law and Policy* 63, 68.

⁵² David Roberts, *Sucking Carbon Out of Air*, (2016) <<https://www.vox.com/energy-and-environment/2018/6/14/17445622/direct-aircapture-air-to-fuels-carbon-dioxide-engineering>> last accessed 20 March 2021.

The first option is bioenergy with carbon capture and sequestration [BECCS], which involves burning biomass [plants and bio-waste] in a thermal power plant, capturing CO₂ from the exhaust stream, and burying the carbon dioxide. Biomass is from the biosphere, so this really does involve transferring carbon from the biosphere to the geosphere – reducing net atmospheric carbon.

Why are the Commercial DAC Plants not burying their Emissions?

First, it's like putting money on fire. CO₂ used for greenhouses has fiscal co-benefits. Same with CO₂ used to make fuels, or for enhanced oil recovery, or as an industrial feedstock. In contrast, cleansing CO₂ has nil fiscal co-benefits.

The sole way to make any profit off sequestration is if a government is directly subsidizing or if there's an extremely high carbon price.

“The US has some new tax incentives for CCS, but nothing of the scale and stability that's needed to encourage large, long-term infrastructure investments. And there's no carbon price anywhere in the world big enough to make sequestration pay off. Carbon is around \$18 a ton in Europe right now, which is pretty far below \$94”⁵³

Second, even if there were a market for sequestration, that market is not concerned where the buried carbon came from. It would pay for any CCS, anywhere. That would put DAC in direct competition with carbon capture at thermal power plants, and it is always going to be easier to pull CO₂ out of an exhaust stream, where it is concentrated (roughly 1 molecule out of every 10), than out of the air, where it is highly dispersed.

What does the International scenario look like?

Promises made by Rio

The city of Rio hosted the United Nations Conference on Environment and Development twice. In 1992 when it was famously called as the “Earth Summit” and in 2012, it was called

⁵³ David Roberts, Sucking carbon out of the air won't solve climate change, The Vox (July 16, 2018) <https://www.vox.com/platform/amp/energy-and-environment/2018/6/14/17445622/direct-air-capture-air-to-fuels-carbon-dioxide-engineering>.

“Rio+20.” The International Olympic Committee (IOC) increased its rhetorical vows to environmental sustainability, although they themselves were follow routinely lacking.

In recent times, several Olympic “legacy” projects scream green. The Rio 2016 Games set a green example. To gather public support, organizers declared more than 25% legacies: about half either directly addressed environmental issues.

U.S. Leadership towards Environment and Technology⁵⁴

For policy-makers and American officials, the World Bank records that in the aftermath of the pandemic, one of the prime focuses will be on balancing the world and its economy in the long-term. Leaders are committing to the wellness and wellbeing of the planet beyond their own home.

In the past years, Business and investor support for environmental sustainability measures has taken an upward curve. It’s more vital that companies show their commitment to goals that are larger than the scope of their own business, but critical for the long-term health of the planet.

For business leaders, the bridge between COVID-19 and environmental degradation requires to be a call to action⁵⁵ to support sustainability measures. There are many opportunities than ever for companies to commit their resources to helping the planet - such as the effort to plant 1 trillion trees⁵⁶ to mitigate environmental losses. Business leaders now have an opportunity to integrate these experiences and work in union to enact strategies — within their own operations, and in concert with related people at large — to ensure that we emerge from this crisis with a plan for sustainability.

⁵⁴ Neal Myrick, Environmental leadership will be more in demand than ever after COVID-19 (2020), <<https://www.weforum.org/agenda/2020/06/environmental-leadership-will-be-more-in-demand-than-ever-after-covid-19/>> (last accessed 15 March 2021).

⁵⁵ Sandrine Dixson-Declève, et al, Could COVID-19 give rise to a greener global future? (2020), <https://www.weforum.org/agenda/2020/03/a-green-reboot-after-the-pandemic/> (last accessed 20 February 2021).

⁵⁶ Robin Pomeroy, One trillion trees - World Economic Forum launches plan to help nature and the climate (2020) <<https://www.weforum.org/agenda/2020/01/one-trillion-trees-world-economic-forum-launches-plan-to-help-nature-and-the-climate/>> (last accessed 24 February 2021).

The Kyoto Protocol⁵⁷

The Kyoto Protocol, adopted on 11 December 1997 owes a complex establishment process when it entered into force on 16 February 2005. There are 192 Parties to the Kyoto Protocol. The Kyoto Protocol aids to operate the UN and other global organizations in the Framework Convention on Climate Change by promising industrialized countries and economies in transition to limit and decrease greenhouse gases (GHG) emissions on par with agreed subjective aims. It only binds developed countries, and places a heavier accountability on them under the principle of “*common but differentiated responsibility and respective capabilities*”⁵⁸, because it understands that they are largely responsible for the recent high levels of GHG emissions in the atmosphere.

Montreal Protocol on Substances that deplete the Ozone Layer

The Montreal Protocol is widely and openly touted as the most victorious environment protection contract. Its compulsory timetable for the phase out of ozone depleting substances is explained in a crisp manner. This timetable has been reviewed at regular intervals that are accelerated in accordance with scientific understanding and technological advances.

The Montreal Protocol sets progressive discontinuation obligations for developed and developing countries for all the major ozone depleting substances. The Montreal Protocol aims at 96 ozone depleting chemicals in thousands of applications across more than 240 industrial sectors. In 2016 the Montreal Protocol also became answerable for building binding progressive phase down obligations for the 18 main hydrofluorocarbons (HFCs).

The Montreal Protocol has been further reinforced itself through six Amendments, which have brought forward phase out schedules and added new substances to the list of substances controlled under the Montreal Protocol. The Amendments are:

- London 1990
- Copenhagen 1992

⁵⁷Deena Robinson, What is the Kyoto Protocol? Earth.org (2021) <<https://earth.org/the-kyoto-protocol/>> (last accessed 24 February 2021).

⁵⁸ Introduction to Climate Finance, United Nations Climate Change (last accessed Oct 18, 2022) <https://unfccc.int/topics/climate-finance/the-big-picture/introduction-to-climate-finance/introduction-to-climate-finance>

- Vienna 1995
- Montreal 1997
- Beijing 1999
- Kigali 2016

In addition to aiding protection and restore the ozone layer, the Montreal Protocol has also produced other historic environmental benefits.

Convention on International Trade in Endangered Species

CITES was born as a result of a resolution adopted in 1963 at a meeting of members of IUCN (The World Conservation Union). The convention was agreed at a meeting of representatives of 80 countries in Washington, D.C., United States of America, on 3 March 1973, and on 1 July 1975 CITES entered in force.

Every year, international wildlife trade is estimated to be worth billions of dollars. The trade is seen in manifolds. Levels of exploitation of animal and plant species are high and the trade in them, together with other factors, such as habitat loss, is capable of heavily depleting their populations and even bringing some species close to extinction. Many wildlife species in trade are not threatened, but the existence of a protocol to ensure the sustainability of the trade is pivotal in order to protect these resources for the future. Once in every 2-3 years, CITES parties meet at what's called the Conference of the Parties (or "CoP") to evaluate how the convention is being enforced. The purpose of this two-week meeting is to go through new proposals for listing or removing species from appendices, to review decisions and resolutions about the execution of rules, and to review conservation progress.

Paris Climate Deal

The Paris Agreement is the first-ever comprehensive, legally binding global climate change agreement, adopted at the Paris climate conference (COP21) in December 2015.

“The EU and its Member States are among the close to 190 Parties to the Paris Agreement. The EU formally ratified the agreement on 5 October 2016, thus enabling its entry into force

*on 4 November 2016. For the agreement to enter into force, at least 55 countries representing at least 55% of global emissions had to deposit their instruments of ratification”.*⁵⁹

The Paris Agreement is a bridge between current policies and climate-neutrality before the end of the era. The primary aims of the Paris Climate Deal are as under:

Mitigation: Reducing Emissions

Governments agreed:

- A futuristic goal of maintaining the increase in global average temperature to well below 2°C above pre-industrial levels;
- The goal is to limit the increase to 1.5°C, as it would drastically reduce risks and the footprint of climate change;
- In accordance with the finest possible science, so achieve a balance between emissions and removals in the second half of the century.

Transparency and Global Stocktake

Governments agreed to:

- Every 5 years to assess the unified progress for the long-term goals and help parties in updating and enhancing their nationally determined contributions, countries to come together.
- Report to the public and other member nations on how they are implementing climate action;
- Track upgrades towards their promises under the agreement through a robust transparency and accountability system.
- Deepen societies' capacity to deal with the repercussions of climate change;
- Provide consistent and holistic global backing for adaptation to developing countries.

⁵⁹ Paris Agreement - Status of Ratification, <https://unfccc.int/process/the-paris-agreement/status-of-ratification> (last accessed 19 August 2022).

Loss and Damage

The agreement also includes:

- Understanding the importance of averting, reducing and addressing loss and damage related with the dire effects of climate change;
- Acknowledging the need to come together and improve the understanding, action and support in different areas such as early warning systems, emergency preparedness and risk insurance.

Support

- The EU and other developed countries will support climate action to reduce emissions and create a resilience to climate change impacts in developing countries.
- Developed countries intend to continue their existing collective goal to mobilize USD 100 billion per year by 2020 and extend this until 2025.

Current Scenario

Currently in order to curb the environmental degradation caused by industrialization worldwide, many agencies and governments have stepped forward to reduce the carbon footprints and live in an eco-friendly way. Many steps taken worldwide presently are:

- **Controlling the source:** adopting a new technology, educating and efficiently training the employees for safe use and development of better technology for waste disposal. Along with waste disposal being more conscientious about the use of raw material also help reduce the pollution sources.
- **Recycling:** This method has turned out to be the most effective and efficient method globally. Recycling as much polluted water in the industries as much it is possible to increase the recycling efforts and to reduce the industrial pollution caused.
- **Cleaning of resources:** Organic methods are opted worldwide to clean the water and soil such as using microbes that use heavy metals and waste as natural feeds. Cooling rooms and bins are developed that allows the industries to recycle the water that is

required by the industry instead of pushing it back into the natural water source it came from.

- **Industry site selection:** Another relevant change is to duly consider the location of the sites and the potential impact on the surrounding environment, can help reduce the harmful consequences on the surroundings.
- **Proper treatment of Industrial waste:** Development and implementation of adequate treatment facilities for handling industrial waste and proper habits reduce pollution.
- **Afforestation and rebuilding habitats:** The initiative for planting more trees has been taken up globally and plants can give wildlife back their homes and the trees can help purify the air enough with oxygen and act as a buffer against the environment.
- **Stringent laws and enforcement:** The Environmental Protection Agency (EPA) works diligently to rectify the damage caused from the industrial pollution. There are stringent rules enacted to take action against the companies who do not follow proper protocols and more significant rewards for the companies who operate properly. Policies have been created to prevent misuse of land.
- **Regular Environmental Impact Assessments:** Responsible companies and industries are regularly conduct environmental impact assessments that are reported for evaluation. If any harmful impacts are discovered during the review, necessary actions are taken to correct the impact.

Conclusion

Quite a few environmental concerns are evident, and if these concerns are not met with responsive solutions, they can be of significant risk under large-scale deployment. In any other industrial or agriculture enterprise, once they are evident, such risks can be managed by standards or regulations so that the industry is required to decrease effects to understandable levels. The main market potential that contributes towards the world in mitigating negative environmental consequences are the water quality concerns associated with commercial-scale production of algal biofuels, if sufficient culture waters are let into the natural environments, including eutrophication of waters, contamination of groundwater and salinization of water sources.

The rapid economic growth experienced throughout the globe is resulting in adverse and harmful environmental conditions that are affecting people. This is further exacerbated by the high population density and growth rates. The existing environmental laws, although cover a wide spectrum of environmental concerns, they seem to be ineffective due to lack of enforcement, the lack of resources, and technical challenges faced by a large number of companies, especially in developing countries.

Sustainable development, that is, both a prosperous economy and a healthy environment that in many respects is the goal of diverse interest in the area of environmental issues, is the key for the future of the world. Sustainable development implies managing the diverse interests of a prosperous economy and simultaneously maintaining a healthy environment. Based on an extensive literature search, we recommend that counties undertake a new approach in the fight against environmental pollution. The key element of this new initiative is the shared and cooperative participation of the people, the government, the industrial sector, and NGOs. The growing awareness of international environmental issues and recognition of a common interest in the world community to address these issues effectively have created a favourable climate for the expeditious development of international environmental law.

Therefore, it is imperative that international lawyers and scholars work closely with their counterparts in the scientific community to provide decision-makers with policy alternatives and, equally important, to fashion an appropriate international legal framework that is responsive to the critical needs of our time. Trends are challenging international environmental lawyers to anticipate and be creative.