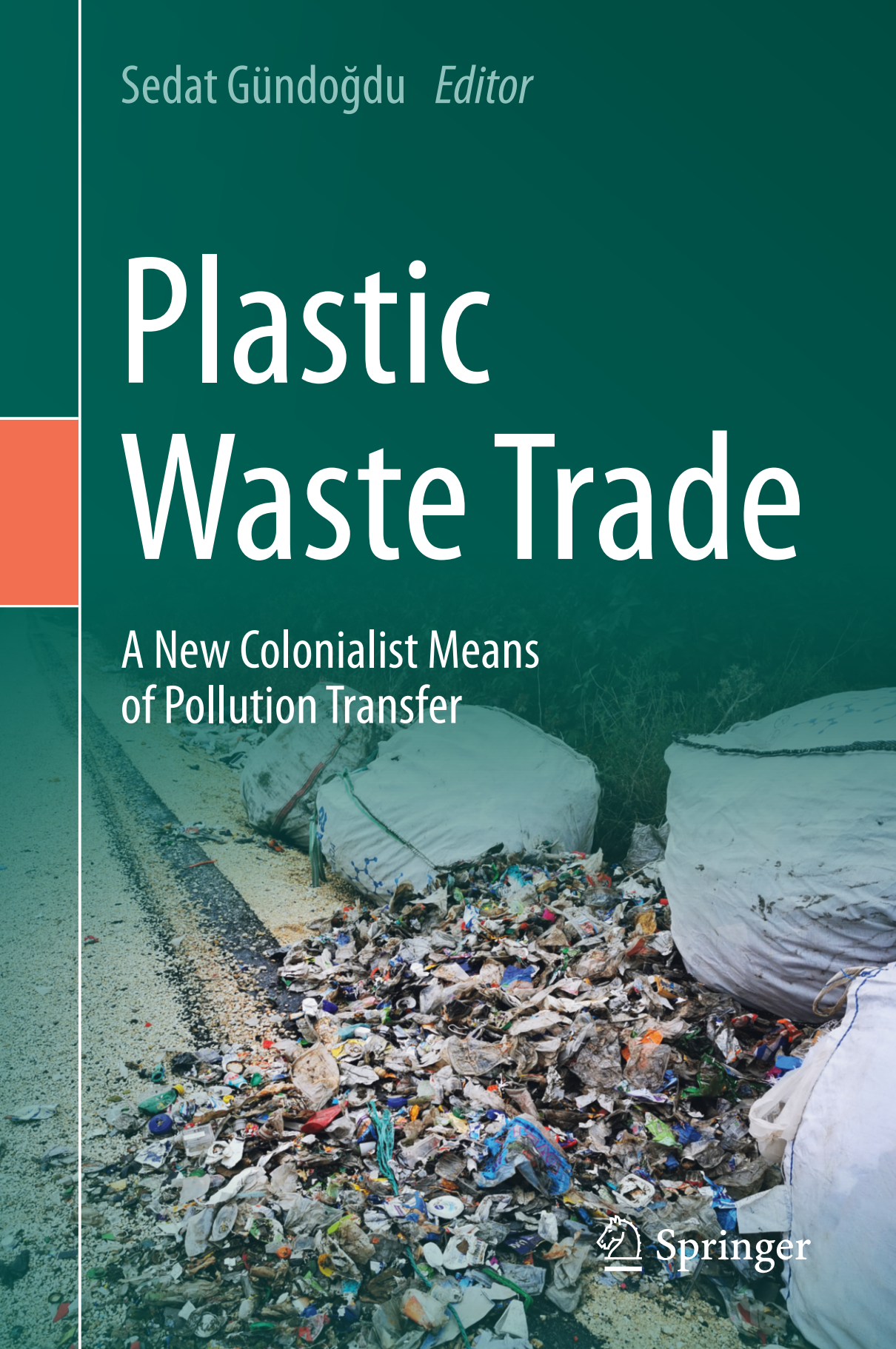
Sedat Gündoğdu *Editor*

Plastic Waste Trade

A New Colonialist Means of Pollution Transfer



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Foreword

Trade refers to the exchange of goods between states, companies, or individuals. Although the term implies a transaction between two parties, its impact can directly or indirectly affect multiple other parties. One of the "other parties" is the environment. Hence, commercial activities inevitably entail environmental costs.

Despite the benefits, the production and transportation of goods derived from the exploitation of nature has also an environmental impact. In other words, the production and transportation of commodities from point A to point B has a significant environmental impact due to accidents, losses, and operational issues, leading to greenhouse gas emissions. Hence, it is evident that the trade of essential commodities has negative consequences for the environment, indicating that the nature of trade has the potential to cause environmental harm. So, how do we set the framework in the case where the commodities being traded are in the form of waste? It is important to consider that waste materials, such as packaging for milk, cheese, and fruit and vegetables consumed in your kitchen, can suddenly become "profitable" objects. What perspective should we take when discussing this "dirty trade", which goes far beyond the traditional understanding of trade? Similarly, how should we approach the commercial aspect of exchanging unwanted waste from nuclear or thermal power plants? To answer these questions, it is imperative to understand the underlying reasons behind waste transfer in pursuit of generating value. Trading of a commodity that poses a threat to both the environment and human health necessitates careful examination in relation to public health concerns. The generation and transportation of waste present significant hazards and may be intertwined with other potentially illicit activities. It is clear that waste trafficking is often linked to other types of potentially illicit trafficking. Hence, waste cannot be assessed in the same way as trade in commodities.

This book provides a comprehensive overview of the waste trade, specifically emphasising plastic waste in connection to the aforementioned subject matter. Beginning with a historical viewpoint rooted in the colonialist framework of the

plastic waste trade, it also addresses the transboundary movement of waste and its resulting environmental pollution. Consequently, readers of this book will understand how the waste trade has become a colonialist pollution transfer.

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Preface

"Western" colonialism commenced in the 1500s when European countries conquered and exploited vast territories worldwide. Even though colonialism appears to have ended as a phenomenon in contemporary times, it continues to be deeply ingrained into our economy. The most apparent illustration of this is the plastic waste industry. The phrase "waste colonialism", established in 1989, refers to one set of people dominating another in their homeland through waste and pollution. The shipping lanes utilised by the Global North to import coffee, tea and spices are now being used to transport toxic waste to the Global South. Despite gaining independence, formerly colonised nations are still held under the weight of colonial forces.

Modern-day colonialism is no longer based on direct colonisation, as in its historical context, but has taken on a toxic form by reversing the old ways of exploitation of toxic commodities, including plastic wastes. The harmful wastes of the civilisation that developed with the wealth obtained from the formerly colonised countries have now become the new form of exploitation. In the fieldwork I conducted in Adana to investigate the illegal dumping of imported plastic waste, farmer İzzettin summarised this situation as follows: "We send them vitamins, they send us toxic waste". It is essential to understand all the contextual factors of the flow of toxic plastic waste in order to decolonise the fertile lands that have been polluted as a result of this situation that İzzettin summarised.

The book provides a historical perspective on the pollution generated by the transfer of plastic waste from the global north to the global south. It offers concrete examples and data to support its arguments. The book strives to convey a comprehensive understanding of all aspects of the plastic waste trade and is perhaps the first of its kind to do so.

Adana, Türkiye — Sedat Gündoğdu

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Plastic Waste Colonialism: A Typology of Global Toxicity

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Introduction

This chapter will construct a brief typology of plastic waste colonialism, beginning with the broader term "classical waste colonialism," which characterized the formal colonial empire periods. The production and deliberate spread of waste was a core component, alongside structural racism, attempts at cultural annihilation, and extreme labor exploitation, of the spread of empire as well as global capitalism. The chapter then describes "waste neocolonialism," the direct export of toxic waste into former colonial states (and other areas of the economic periphery); this is the more common definition of the term "waste colonialism," first articulated at a meeting related to the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal in 1989 (at the time, it was less plastic, more other hazardous wastes and a burgeoning supply of electronic wastes that prompted the assertion).

These colonialisms are not contingent on state-state relations, since the core economy (where most industrial production takes place and most key political decisions are made) and the affected periphery (where most resource extraction and waste disposal takes place and the least key political power is located) are often coterminous, found within the same territorial borders imposed on geography and natural ecosystems by the evolution of the international legal order. And so are efforts to overcome this iniquitous reality, which are themselves transnational in nature: waste colonialism has, arguably, become a central feature of the broader concept of environmental justice (as has plastic justice), but it has also become a source of employment for millions of people living on the periphery of peripheral (low-income) economies.

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I will also describe two other categories of waste relations that are in my view highly relevant to any discussion of transnational plastic waste today: indirect waste accumulation, or "incidental" waste that arrives on the shores of islands and other areas as part of the broader global capitalist system of production; and the criminal waste trade – illegal, hidden, unreported waste exports/imports – which are often quite systemic in nature. Both of these are ongoing sources of harm to vulnerable communities, many of which are also engaged in resistance and occur within the broader context of the colonial relations that have shaped the present international system.

I then briefly discuss the concept of waste decolonization, which is intimately tied to environmental justice – and which may involve moving beyond the waste exporter-importer relationship but will ultimately demand de-plasticization and the acceptance of limits to industrial growth, a far-off horizon at this stage despite the strong rhetoric and limited policy advances pertaining to the United Nations Sustainable Development Goals (SDGs – see Elliff et al., 2021).

Waste Colonialism and Imperialism

The inseparability of pollution from colonialism has been explored at length in the North American context of settler colonialism; readers are especially encouraged to see Max Liboiron's engaging work (Liboiron, 2021). I will present a less nuanced perspective here, but it is informed by the knowledge that the spread of colonialism as an exercise in controlling new territory is central to the historical arc of public waste.

Broadly, colonialism refers to the regularized exploitation of one community by another. This may be accompanied by elaborate coercive governance mechanisms, or it can be much less formal or organized. While we are accustomed to imagining colonialism as a political relationship between an imperial power and "its" colonies, clearly the term is used to convey less formal relationships where a dominant entity has a disproportionate impact on the life of another and the processes, often genocidal, of land acquisition, cultural destruction, religious indoctrination, racialized oppression, and other forms of violence (Wolfe, 2006). Though there are many types of colonialism, most of the authors in this text are referring to North-South relations with colonial precedent, and thus the colonization that accompanied imperialism and capital accumulation is perhaps the most relevant here.

From the beginning of this form of classical colonialism, arguably, there has always been a product life cycle that involves social relations formed coercively to extract natural and human resources, and this evolved to include the process of primitive capital accumulation and the creation of captive marketplaces. What is often overlooked, in terms of both formal colonial relations and informal structural inequity, is the waste aspect of that product life cycle. This has taken many forms over the centuries and remains relatively underexplored by historians and sociologists alike.

However, it is a significant aspect of the toxic colonial legacy. Indeed, one could argue that in terms of harm to present and future generations, it has been among the most impactful – next, perhaps, to the human extraction that characterized the slave trade, and outright land-use change and other permanent ecological transformations. Resource industries produce copious waste at the site of extraction, and then again when the resources are utilized in productive processes, agriculture, commodification, and other enterprises. Then, there are the waste products associated with transporting the extracted resources and/or products back to the colonizing country/center of empire (or, as intra-colonialism is quite common, other parts of the same country). Today, this transport waste is most commonly measured as the greenhouse gas emissions involved in moving extracted resources, though even these have largely escaped the limitations imposed by climate policy (Bullock et al., 2022). Then, some of the products made using the extracted material (timber, oil and gas, minerals) are exported back to captive or semi-captive markets organized in the country or region of origin, resulting in even more waste associated with transportation and ultimately the discarding of end products.

Plastic production flows neatly enough into this narrative. Much of the oil extracted from countries such as Nigeria contributes to plastic production elsewhere. While a small segment of fossil fuel production today (around 4%) goes to plastic production, it's been predicted that under present scenarios it could be nearly 20% by 2040 (UNDP, 2022). Plastic products are made largely in industrialized countries and many of them are shipped back to the countries from whence the oil and gas originated; much of this is single-use plastic such as bottles containing soft drinks; these are then necessarily discarded in the host country. The plastic lifecycle runs from natural resource extraction right through to the disposal of finished products, and there are waste components at each stage of the cycle, and much of both of the extractive and the end-product waste stages take place in what can be termed the economic periphery. This has been widely recognized by the international community, which is currently engaged in the process of establishing an international treaty to control the global plastic pollution problem.

The Resolution adopted by the fifth UN Environment Assembly on March 2, 2022 (UNEP/EA.5/L.23/Rev.1.), suggested that a muscular approach was accepted by member states that will cover the full lifecycle of plastic: design, production, consumption, and disposal; this should, presumably, also cover the fossil fuel extraction phase where it is involved. Elsewhere I've described the waste (including massive accidental spills) associated with fossil fuel extraction as a form of ecoviolence (Stoett & Omrow, 2021). Quite often, indigenous peoples and local communities are most vulnerable to pollution resulting directly from both resource extraction and the distribution of end-of-life products. Some have even suggested that waste flows are a more accurate way of gaging the global, epochal influence of humankind – Armiero suggests the term "wastocene" to replace the more popular conception of the "anthropocene" today (Armiero, 2021). The important point here, however, is that colonialism served as the foundational relationship that enabled subsequent patterns. That much of this occurred through outright violence and, even, genocidal policy, should not surprise us.

Neocolonial Waste Relations

Viewed from this angle, waste disposal has always been an integral part of structured colonial exploitation. Yet in the neocolonial era, which largely followed the upheavals of the Second World War, a new form of "waste colonialism" emerged. This was by any measured view a continuation of the past pattern of extraction of raw materials from the global south, the production of commodities in the industrialized north, and the return of commodities and related waste products to the global south. The added element was the deliberate, direct, transboundary dumping of waste along distributive lines previously established by colonial relations, though in many cases there was no formal colonial relationship between sender and recipient. There was, and remains, a wide variety of waste products involved, reflecting trends in industrial production and consumption in the broader northern industrialized economies. As Liboiron (2018) succinctly describes it, in its

> Most common usage, usually by actors in formal governments and NGOs, the term waste colonialism is used to describe the transboundary disposal of a variety of hazardous and toxic wastes, including electronic-waste, persistent organic pollutants (POPs), industrial waste, decommissioned ships, municipal solid waste, radioactive waste, and other toxic waste. In these uses of the term, waste colonialism, as well as its sister terms garbage imperialism, toxic colonialism, nuclear colonialism, and toxic terrorism, among others, are almost always about the transboundary movement of waste from areas of privilege and affluence to areas with lower economic status and influence, and discussions tend to focus on legislative solutions and channels.

This continues in the classic colonial tradition, with the main difference being that the final product would not even be primarily intended for sale or use (though much of it is in fact sold and used) in peripheral states (note that in the neocolonial era, previous colonies had been christened as "states"). Indeed, the "product" is waste itself. The transportive technology helping to drive globalization leads directly to waste distancing (the physical distance between production, consumption and dumping; see Clapp, 2002), and the uneven governance of plastic has relocated large amounts of waste away from well-off consumers and toward low-income level jurisdictions and the global commons, with resultant social and environmental harm (Dauvergne, 2018). Arguably, this emerges as common practice as early as the 1950s when various forms of toxic waste are exported from industrialized countries, mainly southward and eastward; it is not a coincidence that this takes place with the rise of agribusiness and mass production in core economic countries and regions. But it reached new heights, arguably, with the advent of recycling programs in the northern industrialized states, where concern for the unsightly landfill situation arose in the 1970s and beyond, and as the plastics industry unleashed a sustained publicity campaign aimed at selling recycling as the ultimate solution to the collective action problem of its own waste (see, for example, Sullivan, 2020).

Global flows of trade in plastic waste (ostensibly for recycling) from high-income countries to low-income countries became common practice in the 1990s, providing an "out of sight, out of mind" (Barnes, 2019) model for domestic waste management (Wen et al., 2021). Recipient countries often have inadequate waste

management infrastructures and are unable to cope with the excessive waste load, leading to plastic leakage (Chow, 2015; Barnes, 2019), and the deleterious health impacts of burning plastic waste, which has become a serious facet of air pollution in many areas. Meanwhile, higher-income per capita correlates with lower imports of hazardous waste; this is sometimes referred to as a pollution haven effect (Baggs, 2009). A Tearfund report summarized the human health impacts of the plastic waste trade, which often involves simply dumping or burning:

- It blocks waterways and drains, which causes flooding, resulting in waterborne diseases and death by drowning.
- It creates a breeding ground for disease-carrying flies, mosquitos, and vermin. Mosquitoes spread malaria and dengue. Flies carry and transmit a number of diseases such as typhoid fever and tuberculosis, while rats spread rabies and plague.
- It doubles the incidence of diarrheal disease for people living among mismanaged waste. Diarrheal disease is the second leading cause of death in children under 5 years old.
- It is openly burnt, releasing pollutants that increase the risk of diseases such as heart disease and cancer, respiratory ailments, skin and eye diseases, nausea and headaches, and damage to the reproductive and nervous systems. Outdoor air pollution is responsible for 3.7 million deaths a year, and recent estimates suggest that open burning could be responsible for as much as a fifth of this death toll.
- It poses direct risks to life through large informal dumpsites. In 2017, landslides at waste dumps accounted for more than 150 known deaths.
- It pollutes water and soil and enters the food chain. Much of the plastic in water and on land disintegrates into tiny pieces. Microplastic is entering the food chain and being ingested by humans (Williams et al., 2019).

The North-South pattern of waste colonialism applied to many forms of toxic waste, and plastic exports were common, but the majority of European and American plastic waste exports between 2000 and 2018 were destined for one country: China has acted as the world's main recycling depot. However, an axiomatic decision to launch a policy initiative (defiantly named Operation National Sword) in 2017 changed that. China began to refuse to accept so-called dirty plastic (most of which was unrecyclable anyway, ending up in landfills or fires). This remarkable development has transformed the global recycling industry as other countries have begun accepting imports (both legally and illicitly) and northern exporters have scrambled to cope with the true costs of recycling at home. The ban immediately affected the global structure of plastic waste flows, as China received more than 50% of global exports of postconsumer plastics (7.3 Tg of postconsumer plastics from 43 different countries) in 2016 (Brooks et al., 2018), and reduced its share in the import of plastic waste exported by G7 countries from 60% during the first half of 2017 to less than 10% during the same period a year later (Hook & Reed, 2018). An estimated cumulative 111 million metric tons of plastic waste will be displaced by 2030, an amount equal to nearly half of all the plastic waste that has been imported globally since the first reports in 1988 (Brooks et al., 2018) (Another change of global

proportions accompanied the COVID-19 pandemic: the related increase in plastic production and waste has yet to be accurately measured, but there is no doubt it is tremendous. Indeed, it would have been difficult to predict, back in 2019, that discarded plastic bags and bottles would be challenged for dominance in the plastic pollution inventory by facemasks and rubber gloves – see Hantoko et al., 2021; Prata et al., 2020.).

After the Chinese decision, the global supply chain for plastic waste exports shifted from China to a few Southeast Asian countries, which had preliminary recycling capabilities (Qu et al., 2019), and many recycling programs in Japan, Europe, and the United States have been discontinued because of the additional costs of either redirecting waste exports or assuming the processing burden locally. Malaysia has become a major importer of waste plastics from the UK, with a total import volume of 105,000 tons in 2018, which was 68% higher than in 2017 (Wang et al., 2019). Poland, Indonesia, and the Netherlands followed closely, with imports of plastic wastes increasing by 60,000 tons in 2018. Turkey also became one of the world's primary destinations for the global plastic waste trade (Gündoğdu & Walker, 2021; Brooks et al., 2018; Liu et al., 2018). Between 2017 and 2018, the amount of plastic waste imports in Turkey nearly doubled and kept steadily increasing in 2019 and 2020, resulting in widespread plastic waste mismanagement in Turkey and in indiscriminate sources of plastic marine pollution in the Mediterranean Sea (Gündoğdu & Walker, 2021). In Africa, as Kutoma Wakunuma writes, "Ghana, Uganda, Tanzania, Ethiopia, Senegal and Kenya are finding themselves flooded with plastic waste. This is overwhelmingly affecting poor, socially marginalised people, and women in particular" (Wakunuma, 2021).

Initial hopes that the Chinese ban would prompt high-income countries to find local solutions to plastic pollution instead of exporting plastic waste to other countries with inappropriate management and infrastructure for recycling seem to be dissipating; less optimistically, it is equally possible that vast increases in the illicit international trade are looming, a theme I will return to shortly.

It is also evident that the urge to "go green" is leading to the intensification of some neocolonial activities such as the mining of rare earths, which come complete with their own waste problems. Despite the obvious urgency of the climate crisis, governments and corporations alike need to exercise precaution as they move toward a greener or, in the case of the oceans, a bluer economy.

This is part of a broader pattern. Literature critically linking the plastic pollution crisis in the southern hemisphere to a bland neoliberal approach to resource management has emerged (see Millington and Lawhon, 2019). For example, one study based on plastic recycling in Sekondi-Takoradi, a midsize city in Ghana, suggests that:

> Sustainable development has been embraced by neoliberalism in the form of marketising the environment in a 'green way'. While political economists have considered this movement in terms of the emissions trading scheme and other price based mechanisms posited as solutions to global environmental crises, the particular nature of such discourses at the urban level in Africa is not well understood … the tenets and approaches of sustainable urban development are fundamentally inconsistent with green metropolitan neoliberalism.

> In turn, it is highly unlikely that recycling, a medium of 'marketising the environment to save it', can provide a sustainable solution to the plastic waste glut, engendered by the private provision of urban water. (Obeng-Odoom, 2014:115)

Another dimension of waste neocolonialism involves the redistribution of discarded clothing. While millions of North Americans and Europeans donate their unwanted clothing to thrift shops and charities, it has been estimated that "almost half" of unsold items are shipped to the southern hemisphere, particularly to African destinations (Huang, 2022). This overwhelms local markets, harming domestic textile and clothing industries, and also produces waste in itself, since polymers are so common in contemporary clothing. Indeed, the washing of clothing is a major source of microplastics in water systems around the globe, a problem even more pronounced in countries where there is little water sanitation infrastructure (De Falco et al., 2019). There are other examples, but the pattern remains largely the same: former colonies accepting waste from northern states that adds to the plastic pollution burden in the former. Millions of people are formally or informally employed in processing this waste, so it will be difficult indeed to break firmly from this dependence.

Indirect Transboundary Plastic Waste

It is important to note that there are direct and indirect modes of waste neocolonialism. For example, islands are particularly susceptible to receiving the inflow of plastic waste (see especially Manglou et al., 2022), and "trash seasons" related to tourism (Kerber & Kramm, 2021) are quite common in much of the sunny, sandy southern hemisphere. Their marine geographic position makes islands obvious endpoints for massive amounts of nonpoint source pollution. Tsunamis and storm events can both bring unwanted plastic waste to shorelines. Microplastics are even moving around through atmospheric transmission. As mentioned above, plastic pollution can also carry invasive species and other undesirables. This is not colonialism, in the classic or even neoclassical sense. And the tide is turning, since so much plastic waste is entering global systems today from highly populated Asian and African and Latin American countries themselves.

However, there are discernible shades of the systemic neglect that accompanied colonial relations visible here: even though the delivery of waste onto foreign shores is not intentional, there exists plausible foreknowledge that it will end up there. Indeed, one set of researchers refers to recycling in Europe as a marine pollution "pathway," a term usually reserved for disease pathogens and invasive species (Bishop et al., 2020). Lack of effective waste management in one area, usually a heavily industrialized large-scale market economy, will affect others in a detrimental fashion. This is akin to the arguments over climate justice (those who contribute the least to the problem are suffering the most from it) and other cases where environmental injustice exposes some to more risk than others. Indeed, plastic injustice

has quickly emerged as an animating theme for those engaged in environmental and social justice work (including "blue justice": see Bennett et al., 2021; Zamboni et al., 2021). Corporate efforts to contribute to the solutions available are often dismissed as greenwashing, but the more interesting question may be whether powerful multinational corporations will permit northern governments to force them to contribute to remedial action in far-off pathway/recipient states, including funding local cleanups.

Illicit Trade Along Neocolonial Lines

Much of the plastic waste trade is in fact beyond the purview of the United Nations, World Trade Organization, World Health Organization, and other international agencies, because it takes place illegally, often with the collaborative nod of corrupt government officials. This is why actually regulating the overall global plastic waste trade will be nearly impossible without INTERPOL and other crime detection agencies, local police forces, and even adamant and courageous local citizen groups willing to testify against illegal operatives. The illegal plastic waste trade, which received a quantitative boost from the Chinese decision to ban imports, is so bountiful and regular – and based on core-periphery exploitation patterns – that it might well qualify as a form of neo-colonialism today. INTERPOL reports that the illegal waste trade is growing in Southeast Asia, Africa, Eastern Europe, and Latin America (INTERPOL, 2020).

Efforts to tighten regulatory oversight on plastic waste trade have been sporadic over the years and left largely to exporting and importing countries. A significant move occurred in 2019 at the 14th meeting of the Conference of the Parties of the Basel Convention, a multilateral agreement in force since 1992, to reduce the movements of hazardous waste between nations and specifically to prevent transfer of hazardous waste from developed to less developed countries. A suite of Plastic Waste Amendments was approved. These amendments became effective on January 1, 2021, and filled some of the gaps in previous iterations of the Basel Convention regarding plastic waste, especially on mixed and contaminated plastics, which are most likely to complicate recycling. Plastic waste trade between member and non-member states without a special binational or multilateral agreement was prohibited, and a new partnership on plastic waste with more than 50 multi-stakeholder members was launched to "facilitate information gathering and sharing, undertake pilot projects, and promote the development of policies to minimize plastic waste" (UNEP, 2021b: 47).

However, there is no Basel Convention police force patrolling the seas or railways looking for illegal plastic shipments. This level of complexity in illicit trade is daunting; it involves corrupt officials, shipping companies, brokers of shipping contracts, recipient organized crime groups, local people employed to illegally burn and bury plastic waste, and others.

Waste Decolonization and Post-Plastic Life

China's move – while perfectly understandable from a public health perspective – has created chaos and has no doubt resulted in harm to new receiving communities on the wrong end of the colonial stick. But perhaps it was what was desperately needed. Other countries, such as the Philippines, have rejected northern waste, embarrassing exporting countries such as Canada and causing legal complications. The pertinent fact is that elites in southern countries are less inclined to reject the financial opportunities presented by the waste trade, though this may be changing. The Basel Convention has an illustrious future if states begin to utilize it more forcefully to protect themselves from toxic waste imports, but that will be meaningless if corrupt officials facilitate the illicit trade referred to above.

The disproportionate impact on southern states animated by the plastic waste trade industry has sparked various campaigns calling for global and regional integrated instruments (Agamuthu et al., 2019; Stoll et al., 2020). Meetings between the Group of 7 (G7; 2017) and Group of 20 (G20; 2018) have addressed the issue of marine plastic pollution devising coordinated action plans, and UNEP's Regional Seas Conventions have developed efforts to protect the marine environment from solid waste, encompassing 18 different regions of the world, considering multisectoral approaches and including governments that can directly orchestrate governance parameters on a cross-national scale (Da Costa et al., 2020). As mentioned previously, the 2017 United Nations Environment Assembly (UNEA) meeting in Nairobi, Kenya passed a draft resolution on marine litter and microplastics and recognized multiple challenges addressing marine plastic pollution with the urge to all countries and stakeholders to act (UNEA, 2022). Negotiations toward a global plastics treaty have commenced; industry will no doubt continue with the usual promise that recycling will make everything fine, but this is unlikely to convince southern government representatives who have seen firsthand the deleterious impacts of discarded plastic pollution and other forms of toxic waste. As of late 2023, the negotiation process seems stalled, though another meeting will take place in April in Ottawa.

In contrast, framing plastic pollution as a human rights violation instead of a marketing opportunity for recycling firms is gaining steam. Inspired by living in Gambia, Caroline Schurman-Grenier has done this in a recent monograph, where she argues that plastic pollution "violates Article 24 of the African Charter, which stipulates a healthy environment as a human right" (Schurman-Grenier, 2019:24). Sustainable development is ultimately a manifestation of the pursuit of justice: international, intranational, intergenerational, and intergender. Until the conundrums posed by the plastic justice dilemma are treated openly in international diplomatic circles, constructing a more cohesive global approach to the broader marine pollution problem, those facing the immediate health and development challenges posed by plastic pollution will have their human security compromised.

NGOs are working hard to decolonize and dismantle the extraction-production-waste core-periphery structure – will the new international plastics treaty serve this purpose? What of the millions of waste pickers who are now dependent on the

importation of waste and will need a "just transition" to modify or move away entirely from this precarious source of employment (Adama, 2014; Wittmer, 2021)? Human health concerns have already proven to be lightning rods, igniting women activists in particular in Brazil and elsewhere (see Hanson, 2017; Smith, 2017).

This shouldn't surprise us, since the plastic industry is to some extent based on a colonial model that the global governance superstructure has not managed to overcome either, leaving the hard work to local activists. It is heartening, however, that the international community has listened to the science (Rocha-Santos et al., 2020) and accepted the need for some form of global governance on this issue. Those engaged in the process of forging a new international plastic treaty would do well to read the subsequent chapters in this book, in order to gain a deeper understanding of the historical and current context. The negotiators should be acutely aware of the largely colonial relationship that has structured the global plastics industry since its inception, which itself folds into historical patterns of resource extraction and waste disposal. Then the diplomats will have a better idea of the magnitude of the opportunity to advance decolonization through a justice-oriented treaty, as complicated as that will prove. And they will also, hopefully, recognize that reliance on recycling is decisively not the golden answer: not only has it failed spectacularly in the empirical sense, but it has in many cases deepened the neocolonial structure discussed in this book.

However, waste decolonization is far too important to be left to chemists and diplomats. The interrelated costs to human health, biodiversity, and climate (see Stoett & Vince, 2019, 2021; CIEL, 2019) are far too great and long-lasting, and legal solutions need to be framed within a justice perspective to acquire the necessary public legitimacy in both colonizing and colonized, core and periphery, and countries and regions. Indeed, as part of the broader processes of colonization and neocolonization discussed in this chapter, waste colonialism will never be "over" in the structural sense until the world economy is freed from its reliance on fossil fuels and their byproducts. And even if we managed to make plastic waste exports universally outlawed (and, given that it is, in essence, a collective action problem, such a ban would need to be near-universal in scope), the substantive illicit trade will need to be rooted out in a painstaking manner, challenging governments to face internal corruption and redirect scarce resources toward what has customarily been considered a fringe legal realm. But this is in tune with the broader theme of waste colonialism: once a relatively obscure topic, the global plastic crisis has brought it to the fore, hopefully encouraging the concrete actions necessary to consign it to history.

References

Adama, O. (2014). Marginalisation and integration within the informal urban economy: The case of child waste pickers in Kaduna, Nigeria. *International Development Planning Review, 36*(2), 155–180.

Agamuthu, P., Mehran, S. B., Norkhairah, A., & Norkhairiyah, A. (2019). Marine debris: A review of impacts and global initiatives. *Waste Management & Research, 37*(10), 987–1002. https://doi.org/10.1177/0734242X19845041

Armiero, M. (2021). The case for the Wasteocene. *Environmental History, 26*(3), 425–430. https://doi.org/10.1093/envhis/emab014.003

Baggs, J. (2009). International trade in hazardous waste. *Review of International Economics, 17*(1), 1–16. https://doi.org/10.1111/j.1467-9396.2008.00778.x

Barnes, S. (2019). Out of sight, out of mind: Plastic waste exports, psychological distance and consumer plastic purchasing. *Global Environmental Change, 58*, 101943. https://doi.org/10.1016/j.gloenvcha.2019.101943

Bennett, N. J., Blythe, J., White, C. S., & Campero, C. (2021). Blue growth and blue justice: Ten risks and solutions for the ocean economy. *Marine Policy, 125*, 104387. https://doi.org/10.1016/j.marpol.2020.104387

Bishop, G., Styles, D., & Lens, P. N. (2020). Recycling of European plastic is a pathway for plastic debris in the ocean. *Environment International, 142*, 105893. https://doi.org/10.1016/j.envint.2020.105893

Brooks, A., et al. (2018) "The Chinese import ban and its impact on global plastic waste trade." *Science Advances*, 20 June. https://doi.org/10.1126/sciadv.aat0131

Bullock, S., Mason, J., & Larkin, A. (2022). The urgent case for stronger climate targets for international shipping. *Climate Policy, 22*(3), 301–309. https://doi.org/10.1080/14693062.2021.1991876

Chow, L. (2015, October 15). These 5 countries account for 60% of plastic pollution in oceans. Available at: EcoWatch. https://www.ecowatch.com/these-5-countries-account-for-60-of-plastic-pollution-in-oceans-1882107531.html

CIEL (Center for International Environmental Law). (2019). Plastic & health: The hidden costs of a plastic planet. Available at: https://www.ciel.org/wp-content/uploads/2019/02/Plastic-and-Health-The-Hidden-Costs-of-a-Plastic-Planet-February-2019.pdf

Clapp, J. (2002). The distancing of waste: Overconsumption in a global economy. In T. Princen, M. Maniates, & K. Conca (Eds.), *Confronting consumption* (pp. 155–176). MIT Press.

Dauvergne, P. (2018). Why is the global governance of plastic failing the oceans? *Global Environmental Change, 51*, 22–31. https://doi.org/10.1016/j.gloenvcha.2018.05.002

da Costa, J. P., Mouneyrac, C., Costa, M., Duarte, A. C., & Rocha-Santos, T. (2020). The role of legislation, regulatory initiatives and guidelines on the control of plastic pollution. *Frontiers in Environmental Science, 8*, 104.

De Falco, F., Di Pace, E., Cocca, M., et al. (2019). The contribution of washing processes of synthetic clothes to microplastic pollution. *Scientific Reports, 9*, 6633. https://doi.org/10.1038/s41598-019-43023-x

Elliff, C. I., Mansor, M. T. C., Feodrippe, R., & Turra, A. (2021). Microplastics and the UN sustainable development goals. In T. Rocha-Santos, M. Costa, & C. Mouneyrac (Eds.), *Handbook of microplastics in the environment*. Springer. https://doi.org/10.1007/978-3-030-10618-8_24-1

Gündoğdu, S., & Walker, T. R. (2021). Why Turkey should not import plastic waste pollution from developed countries? *Marine Pollution Bulletin, 171*, 112772.

Hanson, A.-M. (2017). Women's environmental health activism around waste and plastic pollution in the coastal wetlands of Yucatán. *Gender and Development, 25*(2), 221–234. https://doi.org/10.1080/13552074.2017.1335450

Hantoko, D., Li, X., Pariatamby, A., Yoshikawa, K., Horttanainen, M., & Yan, M. (2021). Challenges and practices on waste management and disposal during COVID-19 pandemic. *Journal of Environmental Management, 286*, 112140. https://doi.org/10.1016/j.jenvman.2021.112140

Hook, L., & Reed, J. (2018). "why the World's Recycling System Stopped Working." Financial Times magazine October 25, https://www.ft.com/content/360e2524-d71a-11e8-a854-33d6f82e62f8

Huang, C. (2022, February 9). *What is waste colonization?* Remake. https://remake.world/stories/what-is-waste-colonization/

INTERPOL. (2020). *Strategic analysis report: Emerging criminal trends in the global plastic waste market since January 2018*. INTERPOL.

Liboiron, M. (2018). Waste colonialism. *Discard Studies*. https://discardstudies.com/2018/11/01/waste-colonialism/

Liboiron, M. (2021). *Pollution is colonialism*. Duke University Press.
Liu, Z., Adams, M., & Walker, T. (2018). Are exports of recyclables from developed to developing countries waste pollution transfer or part of the global circular economy? *Resources, Conservation and Recycling, 136*, 22–23. https://doi.org/10.1016/j.resconrec.2018.04.005
Kerber, H., & Kramm, J. (2021). On- and off-stage: encountering entagled waste-tourism relations on the Vietnamese Island of Phu Quebec. *The Geographical Journal, 187*:2, 98–109. https://doi.org/10.1111/geoj.12376
Manglou, M., Rocher, L., & Bahers, J.-B. (2022). Waste colonialism and metabolic flows in Island territories. *Journal of Political Ecology, 29*(1), 1–19. https://doi.org/10.2458/jpe.2836
Millington, N., & Lawhon, M. (2019). Geographies of waste: Conceptual vectors from the Global South. *Progress in Human Geography, 43*(6), 1044–1063. https://doi.org/10.1177/0309132518799911
Obeng-Odoom, F. (2014). Green neoliberalism: Recycling and sustainable urban development in Sekondi-Takoradi. *Habitat International, 41*, 129–134. https://doi.org/10.1016/j.habitatint.2013.07.009
Prata, J., Silva, A., Walker, T., Duarte, A., & Rocha-Santos, T. (2020). COVID-19 pandemic repercussions on the use and management of plastics. *Environmental Science & Technology, 54*(13), 7760–7765. https://doi.org/10.1021/acs.est.0c02178
Qu, S., Guo, Y., Ma, Z., Chen, W. Q., Liu, J., Liu, G., et al. (2019). Implications of China's foreign waste ban on the global circular economy. *Resources, Conservation and Recycling, 144*, 252–255. https://doi.org/10.1016/j.resconrec.2019.01.004
Rocha-Santos, T., Costa, M., & Mouneyrac, C. (Eds.). (2020). *Handbook of microplastics in the environment* (pp. 1–23). Springer. https://doi.org/10.1007/978-3-030-10618-8_26-1
Schurman-Grenier, C. (2019). *Plastic pollution as a violation of the right to a healthy environment in the African Charter of Human and People's Rights*. McGill Centre for Human Rights and Legal Pluralism, Working Paper Series 7:1. https://www.mcgill.ca/humanrights/files/humanrights/ihri_v7_2019_shurman-grenier.pdf
Smith, A. (2017). Micro plastics and their implications for human health: An environmental justice approach. *ENV 334 Environmental Justice*, 3. https://digitalcommons.salve.edu/env334_justice/3
Stoett, P., & Omrow, D. (2021). *Spheres of transnational ecoviolence: Environnmental crime, human secuirty, and justice*. Palgrave Macmillan.
Stoett, P., & Vince, J. (2019). The plastic-climate nexus: Linking science, policy, and justice. In P. Harris (Ed.), *Climate change and ocean governance: Politics and policy for threatened seas* (pp. 345–361). Cambridge University Press.
Stoett, P., & Vince, J. (2021). The marine debris nexus: Plastic, climate change, biodiversity and human health. In B. Siebenhuner & R. Djalante (Eds.), *Adaptiveness: Changing earth system governance* (pp. 83–101). Cambridge University Press.
Sullivan, L. (2020). *How big oil misled the pubic into believing plastic would be recycled*. National Public Radio. https://www.npr.org/2020/09/11/897692090/how-big-oil-misled-the-public-into-believing-plastic-would-be-recycled
UNEP – United Nations Environment Programme. (2009). *Marine Litter: A global challenge*. UNEP.
UNEP – United Nations Environment Programme. (2012). The honolulu strategy: A global framework for prevention and management of marine debris. Available at: https://wedocs.unep.org/handle/20.500.11822/10670
UNEP – United Nations Environment Programme. (2019). *Marine plastic litter in East Asian Seas: Gender, human rights and economic dimensions*. Coordinating Body on the Seas of East Asia, and Stockholm Environment Institute. UNEP.
United Nations Development Programme (UNDP). (2022). What do plastics have to do with climate change? https://stories.undp.org/what-do-plastics-have-to-do-with-climate-change

United Nations Environment Assembly (UNEA). (2022). *Resolution adopted by the United Nations Environment Assembly on 2 March 2022. End plastic pollution: Towards an international legally binding instrument*. UNEP/EA.5/L.23/Rev.1.

United Nations Environment Programme (UNEP). (2021a). Neglected: Environmental justice impacts of marine litter and plastic pollution, Nairobi. https://wedocs.unep.org/bitstream/handle/20.500.11822/35417/EJIPP.pdf

United Nations Environment Programme. (2021b). From pollution to solution: A global assessment of marine litter and plastic pollution, Nairobi. https://wedocs.unep.org/bitstream/handle/20.500.11822/36963/POLSOL.pdf

Wakunuma, K. (2021). Plastic waste is hurting women in developing countries – But there are ways to stop it. *Conversations*. https://theconversation.com/plastic-waste-is-hurting-women-in-developing-countries-but-there-are-ways-to-stop-it-166596

Wang, J., et al. (2019). High levels of microplastic pollution in the sediments and benthic organisms of the South Yellow Sea, China. *Science of the Total Environment, 651*:2, 1661–1669, https://doi.org/10.1016/j.scitotenv.2018.10.007

Wen, Z., Xie, Y., Chen, M., & Dinga, C. D. (2021). China's plastic import ban increases prospects of environmental impact mitigation of plastic waste trade flow worldwide. *Nature Communications, 12*(1), 1–9.

Williams, M., Gower, R., Green, J., Whitebread, E., Lenkiewicz, Z., & Schröder, P. (2019). *No time to waste: Tackling the plastic pollution crisis before it's too late*. Tearfund. https://opendocs.ids.ac.uk/opendocs/bitstream/handle/20.500.12413/14490/J32121_No_time_to_waste_web.pdf?sequence=1&isAllowed=y

Wittmer, J. (2021). "We live and we do this work": Women waste pickers' experiences of well-being in Ahmedabad, India. *World Development, 140*, 105253. https://doi.org/10.1016/j.worlddev.2020.105253

Wolfe, P. (2006). Settler colonialism and the elimination of the native. *Journal of Genocide Research, 8*(4), 387–409.

Yalwaji, B., John-Nwagwu, H. O., & Sogbanmu, T. O. (2022). Plastic pollution in the environment in Nigeria: A rapid systematic review of the sources, distribution, research gaps and policy needs. *Scientific African, 16*, e01220.

Zamboni, N. S., et al. (2021). Unfolding differences in the distribution of coastal marine ecosystem services values among developed and developing countries. *Ecological Economics, 189*, 107151. https://doi.org/10.1016/j.ecolecon.2021.107151

What's in a Name? Is it a Waste or a Resource?

Mapping and Characterising the Waste Trade Regime

Harriet Freeman

Introduction

The concept of waste is intensely familiar to us; it is something we meet every day. Although to define exactly what makes something 'waste' is far from obvious. The transboundary trading of waste has been governed at the global level for three decades – with governance scope increasing by the year. From the outset in the 1980s, the impetus for global waste trade governance has been to significantly restrict and control the export of 'hazardous' waste streams, primarily to developing countries. Yet, this mandate is no longer clear because the normative interpretation of various wastes as 'good' or 'bad' – for us, for the environment – appears to be inconsistent across contemporary transnational governing entities. This is despite these entities all mutually governing under the logics of circular economy and sustainable development. Whether waste is a risk, resource or livelihood is simply not apparent. Thus, whether waste trade is dangerous or advantageous is not apparent either (Barsalou & Picard, 2018; Lepawsky, 2017). Such confusion has escalated at a time when the waste trade regime – as with the climate change, forestry and other environmental regimes – has mushroomed in terms of quantity and diversity of governing actors and instruments at the global institutional level (Kleinschmit et al., 2009). Meanwhile, evidence suggests cross-border waste flows (particularly illegal waste flows) that cause danger to humans and the environment have never been so 'prosperous' (Kellenberg & Levinson, 2014:139; Kellenberg, 2015:111; O'Neill, 2019; Wheeler, 2019). A study understanding the contemporary waste trade regime at the global level thus seems urgent if we are to understand how such activity is continuing in spite of extensive transnational governance. However, although much

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academic energy has been poured into systemically understanding other environmental regimes and their recently accelerated complexity, the waste trade regime has been neglected. This is both puzzling and troubling. As part of this book's attempt to rectify the literature's deficiency, this chapter lays the requisite groundwork for a thorough insight into the contemporary waste trade regime and future research into the 'efficiency' of transnational waste trade governance (De Vos et al., 2013). Following Biermann et al.'s (2009) notable contribution to environmental regime literature, I undertake two research endeavours to understand which public and private treaties, agreements, regulatory standards, operational/financing activities and data collection/sharing bodies constitute the waste trade regime and what kind of relationship these institutional elements have with one another.

Specifically, I ask:

Research Q1 How 'fragmented' is the waste regime structure? In other words, what is the diversity, quantity and intra-regime coordination of a regime's constituting governance bodies?

Research Q2 Is the waste trade regime more synergistic or conflicting in its overall approach to governance?

Respectively, a mapping exercise and a characterisation process are used to answer these questions. Greater regime fragmentation does not necessarily cause greater intra-regime conflict (Young, 2011:19856). Hence, there is a need to follow the first research activity with the latter. Both research activities have been applied to the climate change (Biermann et al., 2009; Abbott, 2012a) and forestry regimes (Fernández-Blanco et al., 2019). I posit these frameworks are sufficiently adaptable to carry out an assessment on a different environmental regime, which has nonetheless been party to the same paradigmatic shift of governance structures at the global level (Abbott, 2012b). The desire to identify and exploit potential gains from better management of decentralised governance entities is an important rationale for mapping and characterising a contemporary environmental regime. To go a step further, I pursue such a study to also shed light on the oft-overlooked yet distinctly political and fractious nature of common-place 'environmentalisms' – such as circular economy and sustainable development (Hajer & Versteeg, 2005:176). By surfacing governing actors' interests and ideas, I show that a lot of normative fragmentation between governance entities lies behind these ostensible 'consensus concepts' (Mert, 2009).

I make the following hypotheses:

1. Contemporary global waste trade governance cannot be fully understood as it stands without a comprehensive account of the regime's structure and an analysis of the interplay of regime elements' ideas and interests.
2. There are sufficient similarities between environmental regimes to deem Abbott's (2012a) transnational regime complex and Fernández-Blanco et al.'s (2019) intra-regime characterisation frameworks suitable for my research on the waste trade regime.

3. Global waste trade governance can be defined as a transnational regime complex with some level of conflict between the many regime elements, giving way to inconsistent waste definitions and waste trade control. Conflict may be hidden by different elements using the same broad environmental narratives.

This research explores each hypothesis in turn, with a conclusion giving reflections on their holding power. The next section gives a short history of the global waste trade, followed by a briefing on the literature this research is building from and adding to, before engaging with my research endeavours.

Waste Trade Motivations and Its Governance: Then and Now

> I think the economic logic behind dumping a load of toxic waste in the lowest-wage country is impeccable and we should face up to that…I've always thought that countries in Africa are vastly under polluted; their air quality is probably vastly inefficiently low compared to Los Angeles… Just between you and me, shouldn't the World Bank be encouraging more migration of the dirty industries to the Least Developed Countries?
>
> Lawrence Summers, confidential World Bank memo, 12/12/1991 (Nixon, 2011:1)

Wastes, born locally, can be separated from their locale of consumption and production and shipped globally. Hence, a local environmental phenomenon becomes a global one; a local pollutant becomes a global pollutant.

Waste flows across borders are relentless and increasing, as developed countries continue their heated scramble for waste management solutions – a pattern beginning in the 1970s (Hurley, 2016). Wealthy nations, in building stricter environmental standards, started inadvertently incentivising waste exports at a time when the cost of and barriers to international transport, communication and trade were declining (O'Neill, 2000:34–36). Wastes that were causing national trouble via profit-friendly management methods (e.g. burying of industrial wastes in the case of Love Canal, New York, 1984: Dorsner, 2018) could now disappear from national borders entirely. Some of these exports, of extremely hazardous nature, travelled to poorer nations' shores, causing a string of much-publicized events. The most famous is the 1986 Khian Sea Incident where the US exported 14,000 tons of ash from waste incinerators initially to the Bahamas. The ash waste ended up dumped in Haiti – labelled as 'fertiliser' – as well as the Atlantic and Indian Ocean, after continued foreign import rejections (Howard, 1990:224).

It was the uproar of civil society organisations (CSOs) in response to Khian Sea and other waste disasters which pressured states and international bodies to form the first and still the most comprehensive international platform for governing the global waste trade: The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (Basel) under UNEP. Basel entered into legal force in 1992 – coinciding with UN's historical Rio Earth Summit. Geared with the principal aim of safeguarding developing countries from hazardous waste imports, North-South dichotomies were firmly entrenched in Basel's DNA. Nonetheless, today the developed world generates over 10 times more waste

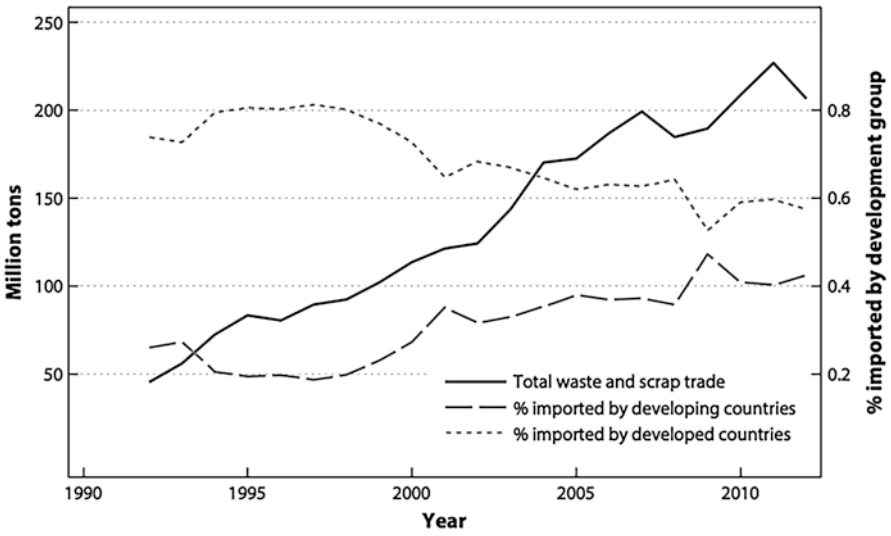


Fig. 1 Annual tons of global waste (for disposal, recycling and reuse) traded internationally (1992–2012) (Kellenberg, 2015:111)

per capita than the developing world (SBC, 2018:7) with much of it still ending up in the global South (Kellenberg & Levinson, 2014:139; Kellenberg, 2015:111; O'Neill, 2019; Wheeler, 2019). Figure 1 below illustrates such.

Interestingly, within multilateral policymaking, hazardous waste is one of the isolated materials that has seen strong emphasis to reduce trade rather than encourage it (Baggs, 2009:1). Yet, more recently, this call for reduced trade has been diluted by many competing interests.

Waste trade and its governance has changed dramatically over the recent years, not least a factor of contemporary patterns of globalisation and urbanisation. The waste trade regime, similar to other environmental regimes, now appears to be a diverse and 'fragmented' nexus of corporate social responsibility initiatives, industry-CSO partnerships and public-private market solutions (O'Neill, 2019). However, a substantial commonality across this nexus appears in the ubiquitous touting of sustainable development (meeting human development goals, sustaining natural systems and growing the economy) and circular economy (CE) logic (designing out waste and pollution by keeping products and materials in use) (Linnér, 2006; Gregson et al., 2015).

At the same time, there is evidence to suggest that a much greater diversity and volume of (legal and illegal) waste trade has been occurring in keeping with higher rates of waste generation. Indeed, a 'new global waste economy' has surfaced (O'Neill, 2019:5). From big multinational companies to small-scale trash pickers, hordes of actors now have direct economic interests in further extending and deepening waste supply chains. Waste Management Inc., one of the largest global companies engaged purely in waste management, generated US$14.8 billion in 2017, ranking 549 in Forbes' Global 2000 list of top public companies in the world

(ibid:58). Used plastics and electronics are no longer seen as destined only for disposal but to secure multiple 'afterlives' in 'circular' productive use – an industry input perhaps, or converted into energy.

Whilst the primary reason for shipping waste abroad has been traditionally rooted in cost efficiency, two other motivations for waste trade are widely cited today: environment-efficient management and resource-efficient management and growth (Sembiring, 2019).

Cost-Efficient Management A large percentage of contemporary waste trade is constituted by mixed (not a single type, e.g. PVC and PE plastics), contaminated (not fully cleaned) and difficult-to-recover waste loads, driven by comparative advantage-led reasoning (Jain, 2020). Such logic is made clear in Summers' 1991 'confidential memo': exporting to foreign nations with lower disposal costs allows parties to profit from regulatory, technical and wage differentials. Yet, under Basel law, such trade is illegal, compounded by a low social legitimacy of such logic (BFFP, 2019). Hence, much of this waste is exported under the guise of 'recyclables' (illegally) to ostensibly maximise environment-efficient management (Jain, 2020).

Environment-Efficient Management As environmentalism has become a well-embedded international norm (Falkner, 2012), a common reason cited for waste trade has been to secure the most 'environmentally sound management' (ESM) solution across regions (BRS, 2011). For example, superior waste management technology may exist in a different region (e.g. Sweden), or countries may band together to create joint management facilities to manage waste streams not large enough to justify independent facilities. However, to find such worked examples of this happening on the ground is rare. It is uncommon to see trade waste occurring driven by environment efficiency over cost efficiency (Puckett, 2020).

Resource-Efficient Management and Growth Developed nations, the core waste exporters (SBC, 2018:7), seek to engage in secondary materials markets (some remarkably prosperous), using waste as an industry to grow one's own economy. To give an indication of the value of waste exports, all raw materials present in the electronic waste (e-waste) stream was circa $55 billion in 2016 (O'Neill, 2019:5). Simultaneously, waste imports are used to grow economies of developing, industrialising nations in providing a source of cheaper scarce raw materials and 'green business' (e.g. recycling, waste-sorting) opportunities. The latter element of this – promoting 'inclusive and sustainable' industrialization whilst reducing international inequality (SDGs 8, 9 & 10) – is often discussed as if it were the primary reason actors engage in waste exports (SBC, 2011; Oswald & Reller, 2011; Lepawsky, 2015).

What is now obvious is that waste does not have a ubiquitous character through space and time (Lepawsky, 2017). Exporting wastes can cause risk for human and environmental health over great distances, offer an additional source of raw materials for industry and provide a livelihood to millions through the collecting, sorting, recycling and selling of valuable waste components.

Scholars and practitioners commonly understand that existing transboundary waste flow governance is (at the very least) 'inadequate', for one reason or another. The evidence cited for this varies, from illustrating resources and market inefficiencies to degraded ecosystems (IPEN, n.d.) and even behaviours understood as Western colonialism (BAN, 2019a). However, there does seem to be a common tacit yet unexplored theory across many of these individuals and groups: waste trade governance is inadequate because the governance structure is fragmented and conflicting, giving way to conflicting classification and control systems for waste (Kummer, 1994; Bontoux & Leone, 1997; O'Neill, 2019). Countering this though, simple intuition – as well as some scholars (Arts & Babili, 2013) – would suggest that with sustainable development and CE now promoted across waste governing bodies, this commonality should reduce intra-regime conflict and promote synergism.

Isolated studies implicitly map the fragmentation of different various waste regimes, employing undeveloped methodology (Dauvergne, 2018: marine plastic waste; Ilankoon et al., 2018 and Lepawsky, 2015: e-waste; O'Neill, 2019: plastic, food and e-waste; Mulinaris, 2020: end-of-life ships). Nonetheless, no comprehensive assessment qualifying the degree of fragmentation nor nature of this fragmentation in the transnational waste regime exists to make a judgment on the above either way.

International and Transnational Regime Literature

When international regimes became a focus in IR in the 1980s, it was Krasner's institutionalist liberal understanding of them that marked the mainstream approach: an international regime is where rational (state) actors' interests converge, understandings are shared, objectives are mutually met and coordination issues are overcome (Krasner, 1983:2) Undermining the realist theoretical premise of a Hobbesian 'state of nature' by which to understand relationships in international fora, a regime was commonly depicted as a voluntary, cooperative arena owning community-esque characteristics.

Much contemporary regime research is still significantly influenced by realist/neorealist premises (Brown, 2001). Yet, literature has since significantly developed responding to the radical transformations which have occurred in global governance structures. Delineating 'government' the institution from 'governance' the process, James Rosenau (mid-1990s, rather precociously) defined the emergence of a new network of authority: 'transnational governance'. This concept is used to depict global-level fora where industry, civil society organisations (CSOs), social movements and epistemic communities govern alongside state entities, where a mixture of legal and non-legal instruments steer behaviour 'in the crazy-quilt nature of modern interdependence' (Rosenau, 1995:15).

IR has since invested much energy in developing a more granulated understanding of the character and consequences of transnational governance regimes, now

readily construed as a collection of social institutions that guide individuals' behaviour affecting a given issue-area (Young & Osherenko, 1993:3). Given how many previously national affairs now constitute the concern of globally operating bodies, much regime literature now tends to focus on which issues are being dealt with in various regimes, delineating a regime's boundaries by topic arena (Levy et al., 1995; Abbott, 2012a). Furthermore, many have dropped assumptions of cooperation, although without starting from neorealist premises that regimes are pure embodiments of interstate power relations (Auld & Green, 2012). Instead, much literature has engaged with exploring the decentralised, non-state-directed construction of regimes as well as the notion that regimes can be sites of conflict.

Hence, analysis of institutional diversity in global governance now dwells upon patterns and symptoms of complexity. A plethora of conceptualisations have arisen in the literature to patch together an understanding of decentralised governance structures.

For example, 'regime clustering' refers to proactive institutional merging (Oberthür, 2002); 'treaty congestion' depicts harm arising from multiple and overlapping agreements (Lukitsch-Hicks, 1999); and 'polycentricity' is used to advocate decision-making and organisation at local scales (Ostrom, 2010). Most relevant to my research are the terms 'fragmentation' – decentralised and diverse institutional structures (ILC, 2006) – and 'regime complex', loosely coupled institutional structures (Raustalia & Victor, 2004).

Environmental Regime Complex Literature

The regime complex framework is well recognised in IPE literature for depicting a regime's level of fragmentation. It supports analysis into how growing interdependence between issues and institutions reshapes the structure and coherence of regimes, particularly environmental regimes (Kleinschmit et al., 2009:309; Keohane & Victor, 2011; Abbott, 2012a).

Raustalia and Victor (2004) introduced the 'regime complex' (RC) concept to describe a regime with significant fragmentation. They saw that rules made by institutions in one regime (e.g. intellectual property rights) were not 'self-contained' and are likely to 'functionally overlap' with rules made by institutions born in another regime (e.g. plant genetic resources). Yet, due to the uncoordinated nature of regimes' inceptions, 'agreements reached in one forum do not automatically extend to, or clearly trump, and agreements developed in other forums' and hierarchical conflict resolution may not exist (ibid:279–280).

Keohane and Victor (2011) embedded the RC framework in mainstream IPE environmental scholarship via its application to the climate change regime. They helpfully elucidate a contemporary environmental regime's diversity of governance scope (e.g. multilateral, bilateral, regional), governance instruments (e.g. scientific assessment, financial/capacity assistance, law, regulatory guidance), issue angles (e.g. technological, financial, social) and diversity of 'overlap' with other regimes

forming the international response to a particular issue (e.g. nuclear, trade, development).

Abbott (2012a) further builds upon these two studies to appropriately emphasise the weighty contribution of non-state actors in regimes. Mirroring Rosenau's (1995) use of the term, Abbott's (2012a) RC framework is prefixed with 'transnational' to highlight the 'messy' nexus of state and non-state governance at the global level. This is a significant given regime literature that 'typically casts nonstate actors as influences on authority rather than as potential or actual authoritative agents' (Conca, 2005:190), e.g. Betsill and Corell (2008).

Along with others (Giessen, 2013; Rayner et al., 2010), Fernández-Blanco et al. (2019) use the RC framework to map forest governance and extend Biermann et al.'s (2009) means of assessing the synergistic vs conflicting nature of an RC. The anticipation of synergies and conflicts arising from environmental regime fragmentation – and their knock-on effects in governance – has led many academics and practitioners in the last 20 years to invest a lot in understanding how to promote the former and eliminate the latter (Medvedieva et al., 2018). References to 'win-win-win' synergism is commonplace in mainstream international institutions (e.g. WTO, UN) in the context of environmental policy (Linnér, 2006:279). Synergies can be understood in a limited, technocratic manner (e.g. cross-organisational savings from sharing administrative and organisational burdens). Much scholarship though – such as Fernández-Blanco et al. (2019) – tends to understand synergies more holistically as complementarities between governance approaches.

Fernández-Blanco et al. (2019) successfully depart from scholarship's tendency to (rather bluntly) assess the overall character of an RC (Biermann et al., 2009) and instead comprehensively characterise each inter-regime relationship within the complex. This micro-lens approach promotes the accuracy and theoretical nuance of synergistic vs conflicting regime evaluations and is novel in the literature (Fernández-Blanco et al., 2019:187). Furthermore, this paper briefly but crucially touches upon how mainstream environmental narratives can shroud true conflict within a regime. However, this study is insufficiently developed to explore the implications of discourse on inter-regime relationships.

Discourses in Environmental Governance Literature

Political ecology, alongside a smattering of constructivist-leaning IPE scholars, does well bringing discourse to the analysis of intra-regime relationships, where discourse is widely understood as the 'ensemble of ideas, concepts and categories through which meaning is given to social and physical phenomena' (Hajer & Versteeg, 2005:175). In Foucauldian style, it is recognised that environmental policy is a site ripe for discourse analysis, given such regimes are 'sites of linguistic contestation', suasion, exclusion and societal 'education' on why an environmental phenomenon is of concern (Gellers, 2015:484–488). Contestation exists around winning the dominant 'framing' of a particular issue, documented extensively in

environmental negotiation literature (Woolcock & Bayne, 2016), because discourse is a powerful precursor to policy prescriptions (Litfin, 1994:37; Hajer & Versteeg, 2005).

Some studies paint an optimistic picture of proliferating 'greening' discourses such as sustainable development, proposing that the widespread institutional adoption of these narratives induces institutional cohesion and synergism (Giessen, 2013:65). Arts and Babili's (2013) assessment of the forest RC adopts this reasoning.

In contrast, Backstrand and Lovbrand (2006) take a more nuanced approach and look beyond 'central narratives'. They illustrate how there are significant 'lines of conflict between discursive framings' amongst transnational institutions governing climate change (ibid:67). They propose that institutions' core interests and ideas are reflected in the specific discursive framings they adopt to problematize a phenomenon. For example, the institutionalised 'Ecological Modernisation' discourse represents interests and ideas focused on 'flexible markets' and cost-effective environmental problem-solving. This characterisation can conflict with 'Civic Environmentalism', which focuses on building participatory and equitable environmental governance structures (ibid:52–57). These authors posit that tracing institutionalised framings that are 'overlapping' (synergistic) and 'competing' (conflicting) gives us a solid illustration of how climate change governing organisations support or undermine one another's approaches (ibid:50).

Theoretical Framework: A Transnational Waste Trade Regime Complex Plus Discourse

Mapping the Waste Trade Regime

Environmental RC complex literature and constructivist insights form the bedrock of my theoretical framework.

For the first part of my research, I use Abbott's (2012a) extended RC framework to map the degree of fragmentation in the waste trade regime.

Abbott's (2012a) classification of a transnational RC is useful in specifying the 'complexity' of a regime's structure by looking at the regime's institutional elements (i.e. the regime's 'building blocks').

Specifically:

- Are governance operations diverse and shared amongst multiple-state and non-state organizations?
- Do a significant number of institutional elements hold their origin in different issue-areas outside that of the regime's?
- Is governance decentralized with little, if any, central coordination?
- These three criteria analytically identifying a transnational RC are broadly recognised in the literature.

Scholars researching whether decentralised environmental regimes are 'efficient' (i.e. impactful) often use RC framework to proxy fragmentation (Hulme, 2010; Cole, 2011; Orts, 2011; Young, 2011). Some advocate that given existing world politics, an environmental issue will be managed most optimally at the global level by a regime exhibiting many (Falkner et al., 2010) if not all (Keohane & Victor, 2011) RC characteristics.

Yet, before drawing inferences about a transnational regime complex and the efficiency of its governance, it is vital to understand the relationships that characterise the regime (Biermann et al., 2009). Fragmentation does not necessarily beget inconsistent and patchy governance (Young, 2011:19856), hence the necessity of the second part of my research.

Characterising the Waste Trade's Intra-regime Relationships

For the second part of my research, I employ aspects of Fernández-Blanco et al.'s (2019) theoretical approach to assessing the regime's character at the micro-level, configuring a measure of synergism vs conflict for each institutional element's relationship to one another. Two limitations of the paper need addressing though.

Firstly, although there is an attempt by the authors to reach beyond the traditional assumption in regime literature that institutions constituting the regime are internally synergistic in terms of their goals, they do not set any social context when identifying institutional elements that internally conflict (ibid:197). This is because the authors do not come from the ontological premise that institutions themselves are multi-actor social settings pregnant with different interests and ideas, causing goals to be continually redefined. Yet, this has been widely shown to be evident and significant (Betsill & Corell, 2008; Mert, 2009:329). Regimes and IEs have a multitude of competing 'script-writers' (Mert, 2009). This may cause elements to become internally self-contradictory in their governance approach, or at least reflect a more ambiguous approach. The determination of an element's relationship to other elements is therefore much less straightforward than is put by Fernández-Blanco et al. (2019).

Secondly, this paper briefly explores how environmental narratives can shroud true conflict within a regime (ibid:199–200). Yet the authors leave such important analysis undeveloped, turning a blind eye to the wealth of discourse analysis in environmental policy research. 'Various studies have shown how distinct actors exercise power through trying to impose a particular frame or discourse… in environmental policy-making' (Hajer & Versteeg, 2005:177). Hence, it is imperative that my research is rooted in the understanding that knowledge is not a way to objectively make our real world comprehensible, as positivists would have it. An actor's framing of waste and the waste trade – whether or how it's an issue – reflects principled and casual beliefs and interests (Goldstein & Keohane, 1993). A frame can be deployed strategically, to garner legitimacy by aligning with contemporary

norms. It also delimits policy options that may go against actors' political and material interests (Humphreys, 2009:319).

For example, defining different waste streams as 'hazardous' or 'non-hazardous' has enormous implications for the value and/or viability of industrial production and (potentially very profitable) international trade flows – as well as the well-being of the millions across the world working in waste management (O'Neill, 2019:2; Puckett, 2020). Thus, waste's institutionalised definition has far-reaching repercussions for broader international equity, economy and environment concerns – the classical IR tension (Young, 2016; Linner). Recognising this, we can see how and why environmental governance 'is not just an issue concerning the relationship between humans and nature but also an issue where people exercise power over other people' (Slaughter, 2005:217).

In sum of the insights above, we can see that by critically observing an IE's governing discourse and how it problematizes waste and the waste trade, we may get a better sense of an IE's broader interests and ideas. It is these broader interests and ideas which form an IEs' governing approach. Hence, following Backstrand and Lovbrand (2006), I posit that by locating an IE's broader interests and ideas, one can locate an IE's governing character and can from there assess how synergistic or conflicting it is with others.

Methodology

Mapping the Waste Trade Regime

To begin mapping the waste trade regime, I seek to identify each institutional element constituting the regime. This is to gauge the regime's fragmentation using Abbott's (2012a) RC framework.

For this identification process, I use a three-step method, to supply rigour and lessen any potential selection bias. The waste trade regime's 'institutional elements' (IEs), which I use as my basic unit of analysis following Fernández-Blanco et al. (2019), I specifically define public and/or private treaties, agreements, regulatory standards, operational activities, and data collection and sharing bodies, which significantly contribute to waste trade governance, operating at multilateral or regional levels. Governance is understood along constructivist lines, where norms and discourse play significant 'steering' roles on 'the governed' – alongside formal law (Appelstrand et al., 2012).

Following Fernández-Blanco et al.'s (2019) attempt to capture the forestry regime in time, July 2020 was established to represent the most contemporary snapshot frame of the waste trade regime. This is to include the regime's developments over 2019 and 2020 such as Basel's amendments (Norwegian Amendment from 4/5/2019, Basel Ban Amendment from 5/12/2019) and actors' responses to such (e.g. EU's 'Delegated Regulation' outlining EU's intention not to fully implement

Norwegian Amendment's new trade controls on difficult-to-recycle plastics within the EU: GAIA, 2020). Such developments are emblematic of contemporary waste trade governance.

To begin with, I review core academic, institutional and media articles discussing waste trade governance entities (e.g. O'Neill, 2019; Kaza et al., 2018; Dauvergne, 2018; Kellenberg & Levinson, 2014; www.ban.org).

Secondly, in order to critically assess secondary-source materials and bring perspectives beyond websites, I then triangulate my findings with semi-structured video interviews through July 2020 with core academic, institutional and media representatives in waste trade governance: Rolph Payet (Seychellois UN Executive Secretary for the Basel, Rotterdam and Stockholm Convention); Jim Puckett (Canadian Founder & Director of BAN); Kate O'Neill (American IR academic; expertise in waste governance); Sedat Gündoğdu (Turkish IR academic; expertise in marine pollution); Angus Crawford (British BBC reporter; investigated UK exports of plastic waste in 2020); Nicola Mulinaris (Italian Communication and Policy Officer; NGO Shipbreaking Platform).

Thirdly, I use Fernández-Blanco et al.'s (2019) method of focusing on the most comprehensive regime element – in the case of waste trade, Basel – and apply a qualitative content analysis of its structural organisation, reports and news, identifying any additionally referenced entities fitting my definition of an IE. This simultaneously allows me to develop an understanding of Basel's relationships and the extent of hierarchy present in the regime.

Importantly, I ensure an openness to institutions which fall outside of how the waste trade regime is typically bounded (O'Neill, 2019) but which still maintain a significant direct or indirect effect on waste trade governance.

Characterising the Waste Trade Institutional Elements

The second half of the research aims to systematically characterise the relationship between each IE of the transnational waste trade regime to understand the extent to which the regime displays synergism or conflict overall. My sources remain the same as in the Mapping the Waste Trade Regime section.

Adopting mainstream scholarship's definitions, I define synergy as the presence of co-supportive normative 'complementarities' between IEs' governance approaches (UNDP, 1997:3). Conflict is the undermining of such (Linnér, 2006:280). To most fully capture IEs' approaches, following Backstrand and Lovbrand (2006), I posit IEs' approaches are most accurately defined by their ideas and interests with respect to global balances of equity, economy and environment. This is in light of the far-reaching implications of transnational waste governance into global society's well-being.

Hence, a thorough understanding of IEs themselves needs to be established before any judgment of their inter-relations can be made. As it stands, the most comprehensive study assessing relationships between governance entities in an

environmental regime, Fernández-Blanco et al. (2019), is inadequate in laying down robust methodology to capture the essence of an IE. These authors only use only an element's self-proclaimed 'goals' to define its governance approach (ibid:192).

Finding this aspect of their methodology vague and insufficient, I identify the following four core areas of an IE to assess:

- Mission statement and strategy
- Governance structure
- Reported activity and governance instruments
- Funding and other partnerships

These areas indicate how and why an element conjures and conducts authority much more fully than 'goals'. Amongst other things, this extended scope will allow the 'where, what and how' of actor interests to be explored more accurately.

Moreover, Table 1 below serves to systematically assess the overall normative character of each IE according to four qualitative indicators with accompanying descriptions made relevant in preliminary analysis. These indicators are an attempt to proxy each elements' general position on 'the classical tension'. I also pay attention to the kind of subjectivities being given to various actors in elements' governance activities to understand where action, responsibility and vulnerability is being dealt.

Crucially, I recognise how familiar and broad environmental frames can serve variegated governance approaches (Gellers, 2015:484–488), between and within IEs. Departing from mainstream regime literature, I recognise there are highly likely to be variations of interests and ideas within IEs; hence, I account for these variations and record the overall 'net' character of elements.

Table 1 An IE characterisation framework

Indicator	Broad clusters of IE's interests and ideas
Primary broad interests leading institution	Maximise economic and political utility Maximise human and environmental health
Belief in the existence of a complementary symbiosis between trade, economic growth, environment, development and human well-being	Free-trade complements environmental and human well-being; CE is a feasible and morally correct way to alleviate current environment and human ills whilst generally maintaining status-quo profit maximisation Lower international trade barriers can undermine environmental and human well-being; CE is not being actioned fast or extensively enough and may distract real ways to alleviate current environment and human ills; business operations need changing
Understanding of the state's primary role in human-environment issues	Provide financial incentives and risk-reduction support for green business Provide participatory multilateral regulation and strong global legal protections for most vulnerable
Understanding of the primary purpose of human-environment governance	Matter of addressing the lack of resource and market efficiency Matter of addressing lack of environmental and social justice

These steps to thoroughly characterise IEs will require undertaking discourse analysis when interpreting my sources. I undertake a Foucauldian approach to such, informed by Hajer and Versteeg (2005), and observe the sources listed in the Mapping the Waste Trade Regime section for textual regularities, techno-scientific language, emotive/exaggerated language, contradictory language and moralising language.

Characterising the Waste Trade's Intra-regime Relationships

Having rigorously assessed the nature of the constitutive elements of the waste trade regime, I can then use these holistic architectures of IEs to accurately translate how compatible their specific governing rules, prescriptions and conduct are with one another. Hence, the data I collected from the Characterising the Waste Trade Institutional Elements section is directly used to make this part's assessment.

Thus, I am measuring both potential and active relationships between elements based on the knowledge and narratives they choose to steer with, almost regardless of which waste domain their governance has an influence on. How a set of wastes is controlled by an institution is one facet of a much greater 'storyline' replete with principled and causal beliefs that set strong normative visions of how the world should work. The Characterising the Waste Trade Institutional Elements section is an attempt to unveil which storyline of 'reality' the IE adheres to.

Loosely following Biermann et al. (2009), Fernández-Blanco et al. (2019) and Abbott's (2012a) methods, I classify an element-element relationship using the terms 'synergistic' and 'conflictive'. The relationships are symmetrically interpreted, meaning A's relationship with B will be the same as B's relationship with A. Departing from previous studies however, I reject binary characterizations of IEs and international regimes – as strictly synergistic or conflictive – and instead use a scale of 1–5 to depict such.

This gives a more nuanced, fine-grained understanding of IE interactions as well as allowing for the 'push and pull' flows between heterogeneous interests and ideas within IEs. IEs do not simply represent one coherent set of interests and ideas; hence, their engagement with other IEs do not represent a black or white, synergistic' or 'conflictive', relationship (Table 2).

Table 2 Interpreting the intra-regime relationship scores

Relationship score	Interpretation of score
1	No areas of synergism; mutually undermining
2	Minimal synergism; mutually undermining
3	Neither synergistic nor undermining
4	Mutual synergism; minimal undermining
5	Very strong mutual synergism; no undermining

Results

Mapping the Transnational Waste Trade Regime Complex

Above, I engage in mapping and characterising the waste trade regime, estimating first the level of fragmentation and secondly the degree of synergism vs conflict present. Here, I lay the results in turn.

My mapping results show that the waste trade regime is constituted from 32 IEs and exhibits a number of structural qualities, which qualify it to be understood as a transnational RC. These results are displayed in Figs. 2 and 3 and Table 3 in Appendix 1.

Figures 2 and 3 represent my identification of all public and private treaties, agreements, regulatory standards, operational activities, and data collection and sharing bodies, which significantly contribute to waste trade governance, operating at multilateral or regional levels. Where a governance entity has more than one relevant specific agreement, guideline or activity governing the waste trade (see column C, Table 3), they are understood as one IE for my analysis. This pragmatic representation follows Fernández-Blanco et al. (2019). For example, the EU has multiple agreements, guidelines and activities, which seek to influence actors' behaviours in waste management, such as the 2006 Waste Shipment Regulation, 2018 EU plastic strategy, 2019 Single Use Plastics Directive and the 2013 EU Ship Recycling Regulation. In aggregate, they sum to the EU's net governance approach to waste management and trade.

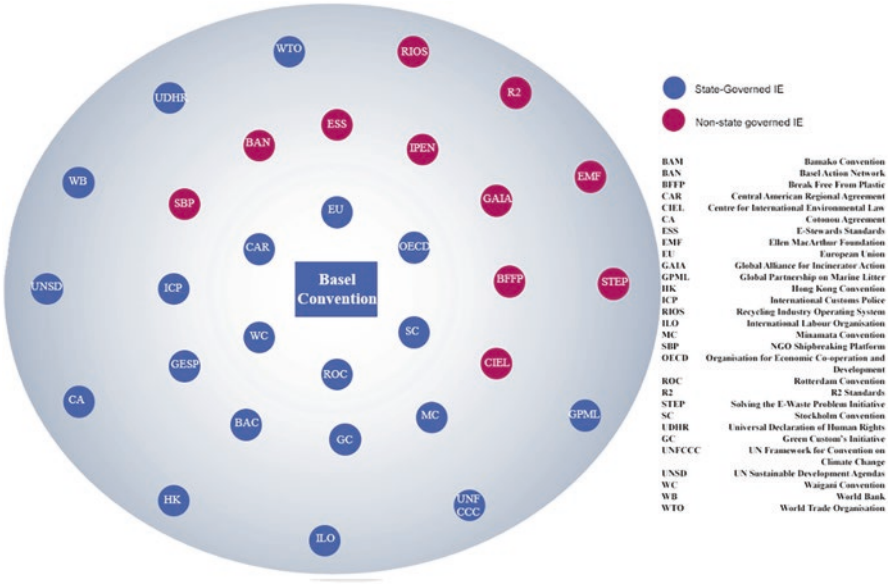


Fig. 2 Mapping the institutional elements in the waste trade regime

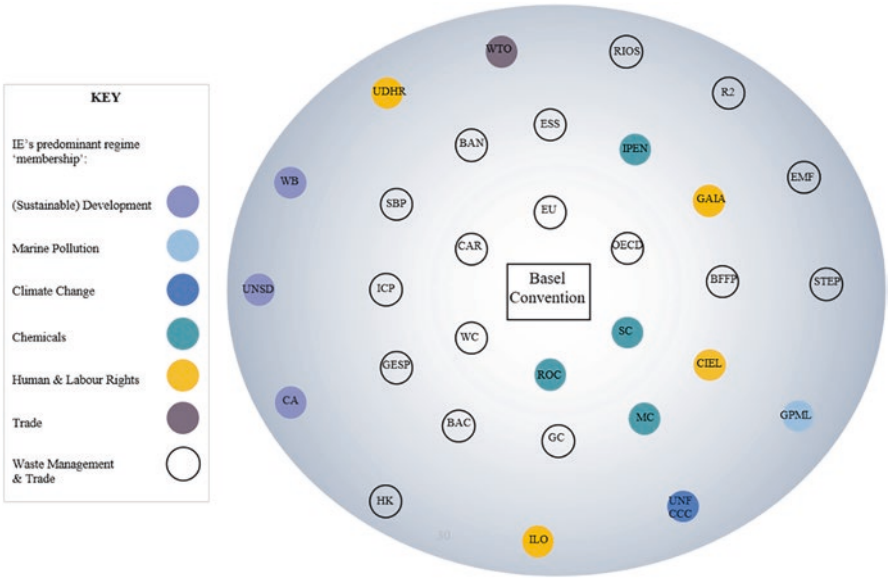


Fig. 3 Mapping the institutional elements in the waste trade regime

To add detail, over one-third of IEs are non-state governed (Fig. 2). Furthermore, 60% of today's governing institutions were created in the last 20 years and 84% in the last 30 years. WTO/GATT is the oldest IE, followed by UDHR at 70+ years. In contrast, EMF has only been operating relevant governing activities for 2 years.

In terms of transboundary waste governance activities, there appear to be a wide variety across the regime, with the exception of legally binding rule making by any non-state actor:

- Creating rules to limit waste trade
- Monitoring policy uptake
- Establishing reuse and recycling facilities of a standard consistent with ESM
- Adjudicating rule contravention (formally or via name-and-shame)
- Providing credible research and insight into waste trade and, more generally, waste management dangers and options (for public, scientists, policymakers)
- Monitoring and measuring global waste trade flows
- Supporting industrial design for CE

In fact, 72% of IEs govern without legal instruments.

In addition, most IEs' governance concerns wastes in general. When there is a particularistic focus, e-waste is subject to the most IE governance, followed by plastic and chemical and lastly end-of-life ships. This pattern mimics the degree of Western-public attention devoted to waste types – not their degree of potential risk. To answer the first criteria for transnational RC identification:

1. Are governance operations shared among multiple state and non-state organizations? **Yes**.

With regard to assessing the diversity of elements that are predominately dedicated to issue fields outside of waste management and waste trade, Fig. 3 clearly shows that 14/32 institutional elements have a more predominant membership in 'separate' regimes: human rights, climate change, marine pollution, trade in general and (sustainable) development. To thus answer the second framework criteria,

2. Do a significant number of institutional elements hold their origin in a variety of different issue-area outside that of the regime? **Yes**.

These governance entities may appear at a distance from waste trade issues. Yet, each has a significant and important bearing on waste management and trade. Looking first at those which originate in the human and labour rights regime – the 1948. UN Universal Declaration on Human Rights (UDHR), the International Labour Organisation (ILO), Global Alliance for Incinerator Alternatives (GAIA) and the Centre for International Environmental Law (CIEL) – these elements are pertinent to the stream of human and labour rights abuses endemic to illegal waste flows and 'dumping' in less-developed countries. UDHR's Article 23 declares the right to 'just and favourable conditions of work…worthy of human dignity', whilst Article 7 declares the right of freedom from discrimination. Both apply strongly to the issue of life-threatening working environments for millions disproportionately located in less-developed countries involved in unregulated waste collection, scrap extraction and recycling industries. Alternatively, the ILO has dedicated specific resources in the last decade to undertaking waste-worker research and creating novel regulation guidelines (e.g. 2012 paper, 'The global impact of e-waste: addressing the challenge') as well as hosting global forums (The Global Dialogue Forum on Decent Work in the Management of Electrical and Electronic Waste, 2019). Additionally, as an anti-incinerator alliance of over 800 grassroots groups from all over the world, GAIA specifically supports recycling workers and waste-picker rights through bottom-up knowledge regulatory guidance dissemination.

Next, the World Bank (WB) and WTO are immensely influential in defining international development and trade objectives, respectively. They directly fuel the debate as to whether reuse and recycling centres in developing countries positively and sizeably (or have the potential to) contribute to local GDP – or stunt a country's human development. The WB nor WTO has engaged significantly in governance specifically tailored to waste trade or waste management, yet their enormous presence and extended genealogy in international policy means that their mere existence has conspicuous repercussions on the global political imagination (Conca, 2000:488). WTO's predecessor, GATT, enshrines the right to erect trade barriers for environmental reasons (Article 20), whilst both overwhelmingly operate to the logic of comparative advantage – where is the cheapest to manage waste? – and the liberal norm of non-interference in market activity. Hence, almost all waste trade is actively condoned and facilitated rather than barred (Slaughter, 2005:210).

Such free-market logic is embedded in the ever-renewing UN agenda on sustainable development (UNSD) similarly prolific in the global policy field. Agenda 21, established at the 1992 UN Conference on Environment and Development, set an overall target in Chapter 20 of 'preventing or minimizing the generation of hazardous wastes as part of an overall integrated cleaner production approach'. This theme is carried through to today's UN SDGs, a number of which seek to meet waste management issues. SDG 12, 'ensure sustainable consumption and production patterns' does not set any target for reducing global waste production though; only a target for increased national recycling rates by 2030 is set (UN, n.d.-a).

The Cotonou Agreement (CA) between EU and African, Caribbean and Pacific Group of States also originates in the (sustainable) development regime. The CA, active since 2003, is 'the most comprehensive partnership agreement between developing countries and the EU' based on development, economic and trade cooperation (EUR-Lex, n.d.-a). Only vaguely nodding to waste management, CA in Article 32 proclaims loyalty to the 'protection and sustainable utilisation and management of natural resources … taking into account issues relating to the transport and disposal of hazardous wastes' (ibid). CA is necessarily of great significance to waste trade patterns, if not directly, given the CA (along with EU policy represented here) institutionalises the way the EU balances equity, economy and environment in their relationship with developing nations. Waste trade data, whilst very hard to collect accurately, suggests a significant proportion of EU waste (e.g. electronic, plastic, ships) flows to ACP and Asian nations (Nordbrand, 2009:7; Lewis, 2010; SBP, n.d.-a; Pratt, 2011; UNU, 2015). The CA has not outlawed such though, whilst the EU's Waste Shipment Regulation has.

Many IEs illustrated here govern with a stated objective to reduce marine pollution (given current media focus on the issue) although the only IE predominantly dedicated to such is UNEP's 2013 Global Partnership on Marine Litter (GPLM). This partnership's governance scope significantly extends to the waste trade and waste management arena by seeking to maximise resource-from-waste efficiency and further spread CE 'knowledge'.

Contrastingly, IEs barely govern with a stated objective to reduce greenhouse gas emissions as part of waste management governance, despite many proclaiming the need for a 'life cycle' governance approach. Waste (e.g. electronic, plastic, ships, chemical) contains high levels of embodied carbon due to the objects' associated resource extraction, production and transportation processes (Cole et al., 2019:417; Lepawsky, 2017). Even the central pillar of transnational climate change governance, the United Nations Framework Convention on Climate Change (UNFCCC), seems to make no apparent connection between greenhouse gas emissions and waste management and trade activities. This lack of governance matters considerably as the UNFCCC is highly influential in framing what is and is not a climate change issue (Abbott, 2012a:581).

Lastly, there are waste trade regime elements originating in chemical governance: the International Pollutants Elimination Network (IPEN) and the trio of UN

chemical conventions which IPEN works to improve – Stockholm (SC), Rotterdam (ROC) and Minamata (MC). Each of the four elements work to improve and control the production, use, disposal and trading of various chemicals – Stockholm dealing specifically with persistent organic pollutants and Minamata with Mercury.

I aim to highlight in both Figs. 2 and 3 that I found the waste trade regime to be very loosely and sporadically structured around Basel as the 'coordinator'. In these figures, the proximity of an element to Basel is roughly mapping the strength of their institutionalised ties to Basel, relative to other elements.

In theory, just as the WTO is seen as hierarchically superior to regional trade agreements, so too could Basel – 'the most comprehensive multilateral environmental agreement on hazardous and other wastes' (SBC, n.d.) – be seen as hierarchically superior to regional implementations of Basel (Abbott, 2012a:581). The core regional implementations are CAC, EU, OECD, WC and BAC. They lift much of Basel's language and principles (e.g. Prior Informed Consent (PIC), ESM) and (on paper) pursue the same broad goals as Basel: reduced waste production and controlled hazardous waste trade. Basel also encourages the creation of alternative multilateral, regional or bilateral governing bodies for the waste trade under the premise that they are at least as ambitious as Basel's rules.

Furthermore, since 2012 Basel, Stockholm and Rotterdam have deliberately 'clustered' (Levy et al., 1995). The Ad Hoc Joint Working Group on enhancing cooperation and coordination between these conventions recognized that the coordinated hosting of Conference of the Parties could help promote a life-cycle approach to the management of chemicals and wastes and strengthen their capacity building efforts.

Yet overall, coordination – especially of the hierarchical nature – remains weak. Most transnational schemes have weak or very weak ties with Basel. Additionally, the regional implementations have substantial flexibility for national/regional interpretations of waste, hazardousness and ESM facilities (Puckett, 2020).

Hence, as is found in the climate change and forestry regimes, 'there is no strong mechanism for ordering the fragmented array of transnational schemes' nor 'resolving any rule inconsistencies' in the waste trade regime (Abbott, 2012a:581; Fernández-Blanco et al., 2019).

Although interestingly, when the flouting of Basel rules has precipitated interstate tensions, free-trade governance entities with international tribunals – something that Basel is sorely lacking – have sometimes handled rule interpretation. For example, it was the WTO that adjudicated the European Commission's contention with Brazil's ban of waste tire imports, with the Commission complaining this was a case of disguised protectionism contravening the founding disciplines of GATT/WTO (CIEL, 2008). Similarly, in 2000, the North American Free Trade Agreement (NAFTA) tribunal was the site to handle a complaint from an Ohio-based toxic waste disposal company against the Canadian government for denying to import hazardous polychlorinated biphenyls. NAFTA ruled in favour of the US company, ordering Canada to pay US$50 million (IATP, 2000).

To see to the third RC criteria:

3. Is governance decentralized with little if any central coordination? **Yes**.

Characterising the Waste Trade Institutional Elements

Here I attempt to capture the overall character of each of the 32 IEs as a prerequisite to analysing the relationships between the regimes' IEs (data displayed in Tables 4, 5 and 6, Appendix 1.)

The chief result is that two broad classifications of IEs arise, according to the patterns of represented ideas and interests identified. Meanwhile, as expected, there is an adherence to the same foundational narratives of CE and sustainable development across all IEs.

The two classifications identified show strong comparability to the type of environmental actors Backstrand and Lovbrand (2006) have identified in environmental policy circles.

Hence, following their typology, one character classification present amidst waste trade IEs could be referred to as 'The Ecological Modernizer'.

This character is motivated to govern by the notion that the common collective good is optimally realised through market competition and protection of individual liberties to pursue self-interest (Humphreys, 2009:320). Capitalist growth can go hand in hand with, and can even promote, environmental safeguarding. Equity and poverty issues are a-politicized.

About 18 IEs appear to belong to this camp (see Table 5).

Their key narratives include the following:

- Maximising synergies
- Resource efficiency
- Redefined growth

The other character, 'The Civic Environmentalist', is motivated to strengthen state regulation for social and environmental justice at local levels. There is a common belief that at least some reduction of industrial production is needed. This camp houses both reform-oriented and revolution-oriented IEs. Respectively, these are IEs focusing on encouraging cross-sectoral cooperation between the market, state and civil society for democratic and equitable governance, and IEs disillusioned with such and challenge contemporary capitalist practice and power structures to stop environmental crises.

About 14 IEs appear to belong to this camp.

Their key narratives include the following:

- North-South equity
- Environmental and social justice
- Toxic colonialism

Characterising the Institutional Elements' Relationships

Accounting for each relationship between the 32 institutional elements which constitute the transnational global waste trade regime, it appears the overall nature of the regime is marginally more synergistic than conflicting. I undertake symmetric relationships assessments of each IE to every other IE and its self, resulting in 1024 assessments overall using a 1–5 measure (1 = strongly conflicting; 5 = strongly synergistic). The result is that the total mean relationship score for the regime is 3.37 (see Tables 7 and 8, Appendix 1), which lies above the synergism threshold of 3. Furthermore, the most common score by far was 4 constituting over 33% of total regime relationships (342/1024).

Fernández-Blanco et al. (2019) produce a similar volume of symmetric intra-regime relationship assessments for the forestry regime, but only a binary 'synergistic' vs 'conflicting' label is given to relationships (as discussed in Part 5 (iii)).

The most conflictive element is the Hong Kong Convention (HK) governing end-of-life ships, with a mean relationship score of 2.53 – more than 2 standard deviations under overall mean – and a mode of 1. Fourteen relationships were deemed as strongly conflicting, including that with itself, given how at odds HK's mission statement of governing to eliminate 'any unnecessary risk to human health and safety and to the environment' is with its ruling stipulations.

Although not (yet) enforced at the interstate level, HK currently operates as a voluntary private governance instrument for businesses to 'prove' their environmental credentials (SBP, n.d.-c).

HK is governed de facto by the shipping industry and appears to be one of the most internationally discredited waste governing entities – by legal experts, developing nations, ILO, SPB, and more (Mulinaris, 2020). It strongly undermined Basel's rulings on recycling end-of-life ships, given the thrust of HK is to continue the cost-efficient movement toxic ships to India, Bangladesh and Pakistan where over 80% of all ships are currently dismantled, by hand (Mulinaris, 2020; TME, 2012). Hence, it is somewhat surprising that even 10 IEs had synergistic relations – where complementarity is found in similar steadfast devotions to the logic of cost-efficient resource movements, e.g. WTO.

The UNFCCC is almost as conflicting, with a score of 2.6. This is because of the UNFCCC has a highly influential role in framing what is and is not a climate change issue (Abbott, 2012a:581) and waste (producing high levels of GHGs at every stage of its life cycle: Lepawsky, 2017) is apparently not included. Furthermore, unfavourable to many 'Civic Environmentalists' (e.g. GAIA), UNFCCC advocates waste-to-energy processing, and, more broadly, voluntary responsibility for environmental action without sufficient protections for the most vulnerable.

Two institutions stand out for scoring particularly highly: UNEP's Green Custom's Initiative (GCI) at a mean of 4.290 and International Customs Police (ICP) at 4.161 – both over 2 standard deviations above overall mean. Often displaying 'functional synergism' with each other, both specifically invest in strengthening nations' customs sectors to block illegal waste trade. This enforcement of

incumbent regulation in turn stymies revenue state revenue loss and waste flows laden with human-environment risk, as well as bolsters the credibility of property rights and legally binding waste bans. It is of little surprise that IEs show synergism with these, except where core IE actors may profit from illegal flows (e.g. shipping industry in HK) and or/undermine the legitimacy of legally binding waste law (e.g. UNFCCC).

Discussion

This section draws out core analytical musings upon this research, prefaced with a discussion on the study's merits and limitations.

In attempt to draw scholarship's attention to the undeniable relevance of waste trade to IPE, this research is seemingly the first attempt to comprehensively map and characterise the contemporary waste trade regime. This study builds from frameworks used frequently to assess climate change and forestry regimes, introducing requisite ontological adaptations (e.g. regime IEs are not necessarily harmonious) and methodological novelty and rigour (e.g. semi-structured interviews which include non-Western actors; expansive IE character assessment; graduated IE relationship assessment).

Such research lays the requisite groundwork for future research into the impact – 'efficiency' – of transnational waste trade governance. Additionally, this study makes no commitment to addressing the causes of waste trade regime fragmentation or synergism/conflict but will hopefully inspire such research endeavours by others to continue the exploration into a strong IPE arena. Additionally, by adopting frameworks well accepted in environmental IPE, comparisons between the waste trade and other environmental regimes can be readily made using my research. Furthermore, given the paucity of environmental regime assessments which locate language as an indicator of actors' governance approaches, this research is valuable in underlining the potential importance of integrating discourse analysis and social context into future study.

It is vital, however, for future research to account for my research limitations, the main ones being:

- Firstly, as interpretivist research, there is a degree of subjectivity in the assessment of my primary and secondary resources. Strict objectivity is impossible, but I remained keenly reflective of the effect of my own interpretation, belief system and experiential biases on the research outcome. To avoid IE selection bias, I create a three-tiered identification methodology and precise IE definition. Furthermore, I remained aware of the danger of exaggerating IE-IE conflict whereby I normatively support the governance approach of one and not another.
- Secondly, and related, an IE's overall interests and ideas cannot be verified, even if I were an 'insider' of each and every IE. My research is highly dependent on the accessibility of necessary material, which in some areas is lacking. Specifically, whilst there is a lot of critical analysis on Basel, RC, SC, HK, R2

and RIOS due to these institutions being the target of CSO attention, there is far less on lower profile or younger IEs (e.g. MC, GESP, GPML). Semi-structured interviews with a diversity of different regime actors (in terms of institutional affiliation, interests, nationality, regime experience, etc.) somewhat balance this skew.

Discrete Conflict

This research importantly draws on insights from other arenas of environmental IPE to regime analysis to highlight that heterogeneity of interests and ideas exists between and within a regime's IEs. This heterogeneity can cause conflict. My research suggests that heterogeneity nor conflict in the waste trade regime may be obvious at first glance.

Let us first observe cases of intra-IE tussles, taking particular recent conflict instances within Basel and Rotterdam respectively. Figure 4 below illustrates such. At Basel's 2019 CO14, no approval was granted for passing the 'Technical Guidelines' on e-waste trade; legislation which would stop companies and states profiting from current 'repairable loopholes' (i.e. control exemptions for e-wastes labelled for repair) in Basel's e-waste rules. This is due to a number of actors influential to Basel's governing decisions (including other waste trade IEs), having differing interests and ideas on how to achieve 'an ethical circular economy' and thus 'acceptable' balances between equity, economy and environment (BAN, 2019b).

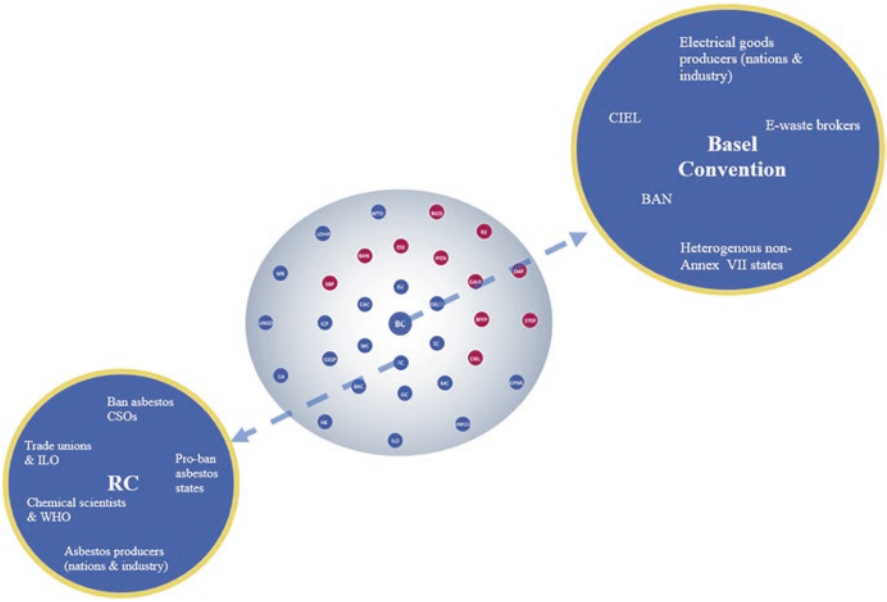


Fig. 4 Mapping intra-element 'tussles' in the waste regime

Similarly, at Rotterdam's 2019 COP9, influential actors diverged in their opinion as to whether chrysotile asbestos (a chemical compound found in end-of-life ships, causing 100,000+ occupational exposure deaths/year: WHO, 2014) should be included from Annex III hazardous chemical list (George & Kazan-Allen, 2019). Rules stipulate listed chemicals require 'PIC' – a mechanism similarly used in Basel which demand parties only export a listed (hazardous) item to another if the importing nation has been fully informed and consents to this trade. Asbestos remains a 'non-hazardous chemical' as voted for by six member states (vs 120 understanding asbestos as hazardous).

Given these internal tussles, Basel and Rotterdam's overall interests, ideas and governing approaches internally pull in different directions and are far from straightforward to determine. However, it can be said that the realisation of progressive impetus is necessarily stunted in both given their 'decision-making by consensus' institutional structure.

Alternatively, conflict between IEs may not be conspicuous given common public declarations to environmentalisms such as CE. Let us observe a few CE 'varieties' between IEs.

Under EMF's governance (where CE reasoning is EMF's raison d'etre), Coca-Cola is a compliant party. Supporting a 'vision' of CE for Coca-Cola equates to integrating recycled plastic into supply chains comprising less than 10% of their total plastic usage (Sauven, 2017 from Dauvergne, 2018:28). BFFP condones such an understanding of CE, instead imbuing the concept with an imperative to reduce waste and engage democratically with waste-workers and communities. Corporate action compliant under BFFP could be a shift to fully biodegradable materials, or rental (not selling) of goods (ZWE, 2016).

R2, as one of the two global voluntary e-waste recycling certificates (alongside ESS) similarly governs via non-legal standard-setting but defines recycling and repair of wastes under CE logic very loosely (SERI, 2016). Open-ended waste definitions reduce bureaucratic friction between transboundary movements which R2 profits from. ESS, BAN and Basel contest this kind of CE definition (BAN, 2016).

For the EU though, CE governance includes legal and non-legal instruments and is overall understood as keeping materials within the EU to reuse and recycle. Waste exports leaving the region is seen as draining the EU market for secondary raw materials and depletes opportunities for green jobs and growth – all the whilst eroding their self-perceived international identity as a global pioneer in environmental action (EC, 2019).

Overall Marginal Synergism

Overall though, there appears to be marginal synergism between waste trade IEs, as shown in the result section (section Characterising the Institutional Elements' Relationships).

The section Characterising the Institutional Elements' Relationships makes sense of this. It shows the waste trade regime to be roughly constituted from two groups of IEs which, within these groups, share a lot a number of similar interests and ideas on societies' equity, economy and environment balances: The Ecological Modernizers ($n = 18$) and The Civic Environmentalists ($n = 14$). Within each group, IE-IE synergism is likely, but IE-IE relationships between groups are likely to be conflictual. Hence, with just over half of all total relationships assessed being within their own groups, overall marginal synergism makes sense.

Conclusion

Addressing my hypotheses of introduction,

1. I show the governance of global waste trade is currently underdeveloped by scholarship, leading to untested assumptions about what is causing continued and severe harm to humans and environment from (legal and illegal) waste exports. As has been shown in much research observing other environmental regimes, drawing a relationship between global governance and human-environment outcomes cannot be made without a comprehensive account of the regime's structure and the cohesion of this structure (i.e. whether it works synergistically or conflictingly).
2. I show that the RC framework, prolific through environmental IPE research, is well suited to mapping the waste trade regime's structure given the waste trade regime has similarly undergone a 'Cambrian explosion' of governing actors and instruments – akin to other environmental regimes (Keohane & Victor, 2011:9). Abbott's (2012a) transnational RC framework is particularly suitable given its rightful emphasis on non-state actors and non-legal instruments. Subsequently, I show that adapting and extending Fernández-Blanco et al.'s (2019) characterisation of institutional elements' relationships grants a thorough and politicised calculation of synergism and conflict in a regime. This is supported by the work of Backstrand and Lovbrand (2006) linking climate change discourses to actors' interests and ideas.
3. I show that global waste trade governance can be defined as a transnational RC, allowing the waste trade regime to be readily comparable to other environmental regimes which the literature has invested energy in exploring (e.g. climate change, forests). Subsequently, I show the regime to be roughly constituted from two approximate sets of interests and ideas by which IEs can be grouped under: 'Ecological Modernizers' and 'Civic Environmentalists'. Whilst much conflict between and within IEs exists, I show the regime to be overall marginally synergistic.

Appendix 1Interviewees

Table 3 The structure of the waste trade regime: Illustrating a transnational regime cdomplex

	Initials	Relevant governance initiatives under umbrella organisation/ agreement	Non-state governed?	Regime of origin	Primary wastes of concern	Legally-binding governance?	Age	Geographical scope
Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal	BC	-	No	Waste management	All (except nuclear)	Yes	28	Global membership except Haiti and US
Solving the E-waste Problem Initiative	STEP	-	Yes	Waste management	Electronic	No	16	Global
Institute of Scrap Recycling Industries's Recycling Industry Operating System	RIOS	-	Yes	Waste management	All mainstream recyclables	No	15	Global
Bamako Convention on the Ban on the Import into Africa and the Control of Transboundary Movement and Management of Hazardous Wastes within Africa	BAC	-	No	Waste management	All (except nuclear)	Yes	22	25 nations in Africa
World Trade Organisation/ General Agreement on Tariffs and Trade	WTO	Many	No	Trade	All	No	74	Almost global membership
Central American Regional Agreement on the Transboundary Movement of Hazardous Wastes	CAR	-	No	Waste management	All (except nuclear)	Yes	25	Costa Rica, El Salvador, Guatemala, Nicaragua, Panama
Organisation for Economic Co-operation and Development Council Decision on the Control of Transfrontier Movements of Wastes Destined for Recovery Operations	OECD	-	No	Waste management	All (except nuclear)	Yes	28	OECD
Basel Action Network	BAN	Green Ship Recycling Program; Plastic Waste Investigation; Basel Law Advocacy Initiative	Yes	Waste management	All	No	23	Global
Break Free From Plastic Pledge	BFFP	-	Yes	Waste management	Plastic	No	4	Global
NGO Shipbreaking Platform's Green Shipping Standard	SBP	-	Yes	Waste management	End-of-Life Ships	No	15	Global
Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade	RC	-	No	Chemicals	Chemicals	Yes	16	Almost global membership
Stockholm Convention on Persistent Organic Pollutants	SC	-	No	Chemicals	Chemicals	Yes	16	Almost global membership
Ellen MacArthur Foundation	EMF	Global Committment, Global Plastics Pact	Yes	Waste management	Plastic	No	2	Global
e-Stewards Standards	ESS	-	Yes	Waste management	Electronic	No	11	Global
R2 Standard	R2	-	Yes	Waste management	Electronic	No	7	Global
United Nations Sustainable Development Agendas	UNSD	Agenda 21; Rio+5; Rio+10; Rio+20; Millenium Development Goals; Sustainable Development Goals	No	(Sustainable) Development	All	No	48	Global
Center for International Environmental Law	CIEL	Climate & Energy Program; Environmental Health Program; People, Land, & Resources Program	Yes	Human and Labour Rights	All	No	31	Global
Cotonou Agreement	CA	-	No	(Sustainable) Development	All	No	20	EU and the Group of African, Caribbean and Pacific States
Waigani Convention	WC	-	No	Waste management	All (except nuclear)	Yes	19	24 nations in South Pacific Region
World Bank	WB	Many	No	(Sustainable) Development	All	No	20	Developing nations
Global E-waste Statistics Partnership	GESP	-	Yes	Waste management	Electronic	No	3	Global
International Labour Organisation's Waste Sector Worker Initiatives	ILO	-	No	Human and Labour Rights	All	No	11	Global
EU waste management law, strategies and regulatory guidance	EU	Many including 2006 Waste Shipment Regulation, 2018 EU plastic strategy, 2019 Single Use Plastics Directive, 2013 EU Ship Recycling Regulation	No	Waste management	All	Yes	50	EU
International Customs Police: World Customs Organisation, INTERPOL & EUROPOL	ICP	WCO Environment Programme; INTERPOL Environmental Crime Programme; EUROPOL Environmental Crime Programme	No	Waste management	All	No	11	Global
Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships	HK	-	No	Waste management	End-of-Life Ships	No	11	Global
United Nation Environmental Programme Green Custom's Initiative	GC	-	No	Waste management	All	No	30	Global
International Pollutants Elimination Network	IPEN	Many	Yes	Chemicals	All	No	22	Global
The Minamata Convention on Mercury	MC	-	No	Chemicals	Chemicals	Yes	3	Almost global membership
Universal Declaration of Human Rights	UDHR	-	No	Human and Labour Rights	All	No	72	Global
United Nations Framework Convention on Climate Change and The Paris Agreement	UNFCCC	Many	No	Climate Change	All	No	28	Almost global membership
Global Alliance for Incinerator Alternatives Action	GAIA	Zero-Waste Initiative; Waste-To-Energy Incineration Block; Waste Worker Rights	Yes	Human and Labour Rights	All	No	20	Global
Global Partnership on Marine Litter	GPML	-	No	Marine Pollution	Plastic	No	8	Global

Table 4 Characterising an institutional element (IE): An illustration of interests and ideas 'net leading' an IE's

Indicator	Score: −2 to −1	Score: 0	Score: 1 to 2
A. Primary broad interests leading institution	Maximise economic and political utility	Differing interests are cancelled out to ambiguous/null effect	Maximise human and environmental health
B. Belief in the existence of a complementary symbiosis between trade, economic growth, environment, development and human well-being	Free-trade complements environmental and human well-being; The CE is a feasible and morally correct way to alleviate current environment and human ills whilst generally maintaining status quo profit maximisation	Differing ideas are cancelled out to ambiguous/null effect	Lower international trade barriers can undermine environmental and human well-being; The CE is not being actioned fast or extensively enough and could be distracting the real ways to alleviate current environment and human ills; Business operations need changing
C. Understanding of the state's primary role in human-environment issues	Provide financial incentives and risk-reduction support for green business	Differing ideas are cancelled out to ambiguous/null effect	Provide participatory multilateral regulation and strong global legal protections for the most vulnerable
D. Understanding of the primary purpose of human-environment governance	A matter of addressing a lack of resource and market efficiency	Differing ideas are cancelled out to ambiguous/null effect	A matter of addressing a lack of environmental and social justice

Table 5 Characterising an institutional element (IE): The ecological moderniser (TEM) and the civic environmentalist (TCE)

	A Primary interests leading institution	B Belief in the existence of a complementary symbiosis between trade, economic growth, environment, development and human well being	C Understanding of the state's primary role in human-environment issues	D Understanding of the primary purpose of human-environment governance	
Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal	0	1	0	1	TEM
Solving the E-waste Problem Initiative	1	1	1	1	TEM
Institute of Scrap Recycling Industries's Recycling Industry Operating System	2	2	2	2	TEM
Bamako Convention on the Ban on the Import into Africa and the Control of Transboundary Movement and Management of Hazardous Wastes within Africa	-2	-2	-2	-2	TCE
World Trade Organisation/ General Agreement on Tariffs and Trade	2	2	2	2	TEM
Central American Regional Agreement on the Transboundary Movement of Hazardous Wastes	-1	1	-1	-1	TCE
Organisation for Economic Co-operation and Development Council Decision on the Control of Transfrontier Movements of Wastes Destined for Recovery Operations	2	2	2	2	TEM
Basel Action Network	-2	-2	-2	-2	TCE
Break Free From Plastic Pledge	-2	-2	-1	-2	TCE
NGO Shipbreaking Platform's Green Shipping Standard	-2	-1	-2	-2	TCE
Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade	0	1	0	0	TEM
Stockholm Convention on Persistent Organic Pollutants	0	1	0	0	TEM
Ellen MacArthur Foundation	2	2	2	2	TEM
e-Stewards Standards	-2	0	0	0	TCE
R2 Standard	2	2	2	2	TEM
United Nations Sustainable Development Agendas	2	2	1	1	TEM
Center for International Environmental Law	-2	-2	-2	-2	TCE
Cotonou Agreement	2	2	2	2	TEM
Waigani Convention	-2	1	-1	-1	TCE
World Bank	2	2	2	2	TEM
Global E-waste Statistics Partnership	2	2	1	2	TEM
International Labour Organisation's Waste Sector Worker Initiatives	2	2	1	2	TEM
EU waste management law, strategies and regulatory guidance	2	2	1	1	TEM
International Customs Police: World Customs Organisation, INTERPOL & EUROPOL	-2	-1	-2	1	TCE
Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships	2	2	2	1	TEM
United Nation Environmental Programme Green Custom's Initiative	-2	-1	-2	1	TCE
International Pollutants Elimination Network	-2	-2	-2	-2	TCE
The Minamata Convention on Mercury	-1	-2	-2	-2	TCE
Universal Declaration of Human Rights	-2	0	-2	-2	TCE
United Nations Framework Convention on Climate Change and The Paris Agreement	2	2	2	1	TEM
Global Alliance for Incinerator Alternatives Action	-2	-2	-2	-2	TCE
Global Partnership on Marine Litter	1	1	1	1	TEM

2 Score %	40.63%	40.63%	28.13%	28.13%
2 and 1 Scores %	46.88%	62.50%	46.88%	56.25%
0 Score %	9.38%	6.25%	12.50%	9.38%
-1 and -2 Score	43.75%	31.25%	40.63%	34.38%
-2 Score	37.50%	21.88%	31.25%	28.13%

Table 6 Correlation between an institutional element's ideas and interests

CORREL (A,B)	0.8916520183
CORREL (A,C)	0.9480882828
CORREL (A,D)	0.8509358703
CORREL (B,C)	0.9073084545
CORREL (B,D)	0.84973813
CORREL (C,D)	0.8575985571

Angus Crawford

- British BBC reporter
- Investigated UK exports of plastic waste in 2020

Jim Puckett

- Canadian Founder; Director of Basel Action Network (BAN)

Kate O'Neill

- American IR academic
- Department of Environmental Science, Policy and Management at UC Berkeley
- Expertise in waste governance

Nicola Mulinaris

- Italian Communication and Policy Officer
- NGO Shipbreaking Platform

Rolph Payet

- Seychellois UN Executive Secretary for the Basel, Rotterdam and Stockholm Convention

Sedat Gündoğdu

- Turkish IR academic

Expertise in marine pollution

Table 7 Characterising IE-IE relationships in the waste trade regime: An illustration of degrees of synergism and conflict between and within IEs

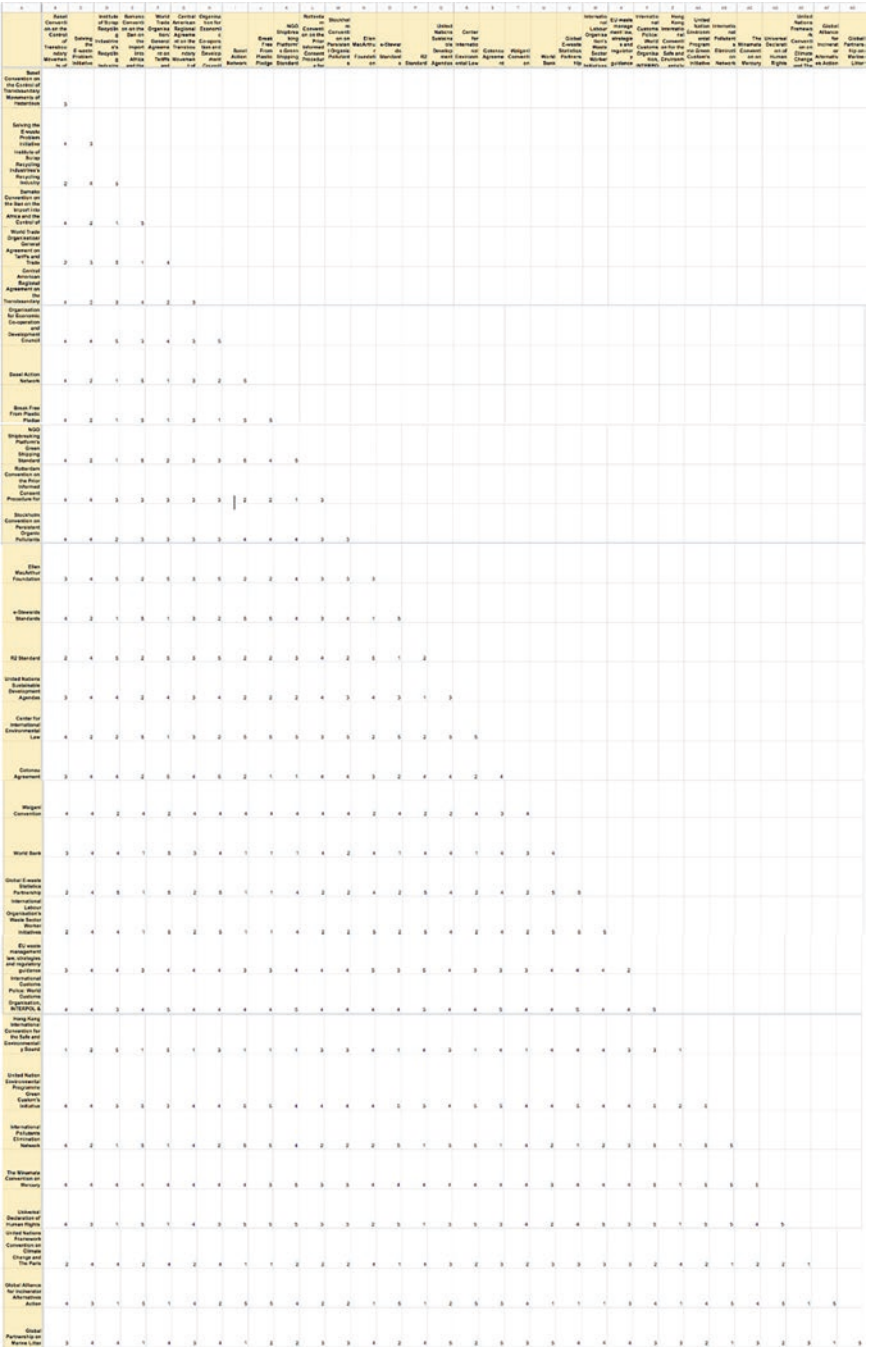
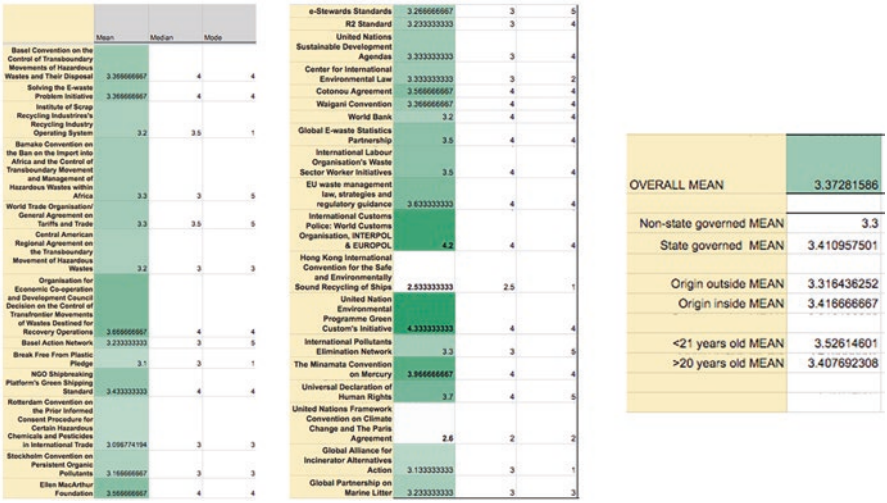


Table 8 Characterising IE-IE relationships in the waste trade regime: Relationship score averages



	Mean	Median	Mode
Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal	3.366666667	4	4
Solving the E-waste Problem Initiative	3.366666667	4	4
Institute of Scrap Recycling Industries's Recycling Industry Operating System	3.2	3.5	1
Bamako Convention on the Ban on the Import into Africa and the Control of Transboundary Movement and Management of Hazardous Wastes within Africa	3.3	3	5
World Trade Organisation/ General Agreement on Tariffs and Trade	3.3	3.5	5
Central American Regional Agreement on the Transboundary Movement of Hazardous Wastes	3.2	3	3
Organisation for Economic Co-operation and Development Council Decision on the Control of Transfrontier Movements of Wastes Destined for Recovery Operations	3.666666667	4	4
Basel Action Network	3.233333333	3	5
Break Free From Plastic Pledge	3.1	3	1
NGO Shipbreaking Platform's Green Shipping Standard	3.433333333	4	4
Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade	3.096774194	3	3
Stockholm Convention on Persistent Organic Pollutants	3.166666667	3	3
Ellen MacArthur Foundation	3.566666667	4	4
e-Stewards Standards	3.266666667	3	5
R2 Standard	3.233333333	3	4
United Nations Sustainable Development Agendas	3.333333333	3	4
Center for International Environmental Law	3.333333333	3	2
Cotonou Agreement	3.566666667	4	4
Waigani Convention	3.366666667	4	4
World Bank	3.2	4	4
Global E-waste Statistics Partnership	3.5	4	4
International Labour Organisation's Waste Sector Worker Initiatives	3.5	4	4
EU waste management law, strategies and regulatory guidance	3.633333333	4	4
International Customs Police: World Customs Organisation, INTERPOL & EUROPOL	4.2	4	4
Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships	2.533333333	2.5	1
United Nation Environmental Programme Green Custom's Initiative	4.333333333	4	4
International Pollutants Elimination Network	3.3	3	5
The Minamata Convention on Mercury	3.966666667	4	4
Universal Declaration of Human Rights	3.7	4	5
United Nations Framework Convention on Climate Change and The Paris Agreement	2.6	2	2
Global Alliance for Incinerator Alternatives	3.133333333	3	1
Global Partnership on Marine Litter	3.233333333	3	3

OVERALL MEAN	3.37281586
Non-state governed MEAN	3.3
State governed MEAN	3.410957501
Origin outside MEAN	3.316436252
Origin inside MEAN	3.416666667
<21 years old MEAN	3.52614601
>20 years old MEAN	3.407692308

References

Abbott, K. (2012a). The transnational regime complex for climate change. *Environment and Planning C: Government and Policy, 30*, 571–590.

Abbott, K. (2012b). Engaging the public and the private in global sustainability governance. *International Affairs, 88*(3), 543–564.

Appelstrand, M., Kleinschmit, D., Pulzl, H., & Visseren-Hamakers, I. (2012). Discourses, actors and instruments in international forest governance. In R. Jeremy (Ed.), *Embracing complexity – Meeting the challenges of international forest governance. Prepared by the Global Forest Expert Panel on the International Forest Regime* (IUFRO World Series) (Vol. 28, pp. 57–74). IUFRO.

Arts, B., & Babili, I. (2013). Global forest governance: Multiple practices of policy performance. In *Forest and nature governance policy: World forests series* (Vol. 14, pp. 111–132). Springer.

Auld, G., & Green, J. (2012). *Unbundling the regime complex: The effects of private authority, comparative research in law & political economy* (Research Report No. 15/2012).

Backstrand, K., & Lovbrand, E. (2006). Planting trees to mitigate climate change: Contested discourses of ecological modernisation, green governmentality and civil environmentalism. *Global Environmental Politics, 6*(1), 50–75.

Baggs, J. (2009). International trade in hazardous waste. *Review of International Economics, 17*(1), 1–16.

Barsalou, O., & Picard, M. H. (2018). International environmental law in an era of globalised waste. *Chinese Journal of International Law, 17*(3), 887–906.

Basel Action Network (BAN). (2016). *R2: Non-compliance by design*. Viewed 22 July 2020, https://wiki.ban.org/images/2/23/R2_Non-Compliance_by_Design.pdf

Basel Action Network (BAN). (2019a). *Global ban on exporting hazardous waste to developing countries becomes law*. Viewed 18 July 2020, https://www.ban.org/news/2019/9/8/global-ban-on-exporting-hazardous-waste-to-developing-countries-becomes-law?rq=colonialism

Basel Action Network (BAN). (2019b). *International e-waste export guideline deemed unready*. Viewed 18 July 2020, https://www.ban.org/news/2019/5/12/international-e-waste-export-guideline-deemed-unready?rq=cop14

Bernstein, S., & Cashore, B. (2012). Complex global governance and domestic policies: Four pathways of influence. *International Affairs, 88*(3), 585–604.

Betsill, M., & Corell, E. (2008). *NGO diplomacy: The influence of nongovernmental organizations in international environmental negotiations*. MIT Press.

Biermann, F., Pattberg, P., Asselt, H., & Zelli, F. (2009). The fragmentation of global governance architectures: A framework for analysis. *Global Environmental Politics, 9*(4), 14–40.

Bontoux, L., & Leone, F. (1997). *The legal definition of waste and its impact on waste management in Europe*. A Report Prepared by IPTS for the Committee for Environment, Public Health and Consumer Protection of the European Parliament (EUR 17716 EN), pp. 1–119.

Break Free From Plastic (BFFP). (2019). *Long awaited global ban on exporting hazardous waste to developing countries becomes law today*. Viewed 20 July 2020, https://www.breakfreefromplastic.org/2019/12/07/global-ban-exporting-hazardous-waste-developing-countries-becomes-law/

Brown, K. (2001). Cut and run? Evolving institutions for global forest governance. *Journal of International Development, 13*(1), 893–905.

BRS. (2011). https://www.brsmeas.org/Decisionmaking/DecisionsandDocuments/Documents/tabid/2833/language/en-US/Default.aspx

Bulkeley, H. (2012). Governing climate change transnationally: Assessing the evidence from a database of sixty initiatives. *Environment and Planning C: Government and Policy, 30*(1), 591–612.

Centre for International Environmental Law (CIEL). (2008). *WTO Brazil Retreaded Tires trade dispute*. Viewed 28 July 2020, https://www.ciel.org/project-update/brazil-retreaded-tires/#:~:text=The%20WTO%20Brazil%2DRetreaded%20Tires,World%20Trade%20Organization%20(WTO).&text=Used%20tires%20and%20tire%20material,for%20example%20by%20tire%20retreading

Cipet, D., & Roberts, T. (2017). Climate change and the transition to neoliberal environmental governance. *Global Environmental Change, 46*(1), 148–156.

Clapp, J. (1998). The privatization of global environmental governance: ISO 14000 and the developing world. *Global Governance, 4*(3), 295–316.

Clapp, J. (2001). *Toxic exports: The transfer of hazardous wastes from rich to poor countries*. Cornell University Press.

Cole, D. (2011). *From global to polycentric climate governance* (EUI Working Papers, No. 2011/30).

Cole, C., Gnanapragasam, A., Cooper, T., & Singhac, J. (2019). An assessment of achievements of the WEEE directive in promoting movement up the waste hierarchy: Experiences in the UK. *Waste Management, 87*, 417–427.

Colgan, J., Keohane, R., & Van de Graaf, T. (2012). Punctuated equilibrium in the energy regime complex. *The Review of International Organizations, 7*(1), 117–143.

Conca, K. (2000). The WTO and the undermining of global environmental governance. *Review of International Political Economy, 7*(3), 484–494.

Conca, K. (2005). Old states in new bottles? The hybridization of authority in global environmental governance. In R. Eckersley & J. Barry (Eds.), *The state and the global ecological crisis*. MIT Press.

Crang, M., Hughes, A., Gregson, N., Norris, L., & Ahmed, F. (2013). Rethinking governance and value in commodity chains through global recycling networks. *Transactions of the Institute of British Geographers, 38*(1), 12–24.

Cullen, J. (2013). Circular economy: Theoretical benchmark or perpetual motion machine? *Journal of Industrial Ecology, 21*(3), 483–486.

Dauvergne, P. (2016). *Environmentalism of the rich*. MIT Press.

Dauvergne, P. (2018). Why is the global governance of plastic failing the ocean? *Global Environmental Change, 51*, 22–31.

De Vos, M., Janssen, P., Kok, M., Frantzi, S., Dellas, E., Pattberg, P., Peterson, A., & Biermann, F. (2013). Formalizing knowledge on international environmental regimes: A first step towards integrating political science in integrated assessments of global environmental change. *Environmental Modelling & Software, 44*(1), 101–112.

Dorsner, K. (2018). *6.5 Case study: The Love Canal disaster, in environment and sustainability*. Viewed 20 July 2020, https://openoregon.pressbooks.pub/envirobiology/chapter/6-4-case-study-the-love-canal-disaster/

Down to Earth (DTE). (2019). *Basel final day: Rich nations can't dump toxic waste on poor nations*. Viewed 18 July 2020, https://www.downtoearth.org.in/indepth/basel-final-day-rich-nations-cant-dump-toxic-waste-on-poor-nations%2D%2D34313

Ellen MacArthur Foundation (EMF). (n.d.). *Concept: Circular economy*. Viewed 25 July 2020, https://www.ellenmacarthurfoundation.org/circular-economy/concept

EUR-Lex. (n.d.-a). *Cotonou Agreement*. Viewed 20 July 2020, https://eur-lex.europa.eu/legal-content/en/TXT/?uri=LEGISSUM:r12101

EUR-Lex. (n.d.-b). *Communication from the commission to the European parliament, the council, the European economic and social committee and the committee of the regions: Closing the loop – An EU action plan for the circular economy*. Viewed 20 July 2020, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52015DC0614

European Commission (EC). (2019). *Communication from the commission to the European parliament, the European council, the council, the European economic and social committee and the committee of the regions: The European Green Deal*. Viewed 23 July 2020, https://ec.europa.eu/info/sites/info/files/european-green-deal-communication_en.pdf

Falkner, R. (2008). *Business power and conflict in international environmental politics*. Palgrave Macmillan.

Falkner, R. (2012). Global environmentalism and the greening of international society. *International Affairs, 88*(3), 503–522.

Falkner, R., Stephan, H., & Vogler, J. (2010). International climate policy after Copenhagen: Towards a 'building blocks' approach. *Global Policy, 1*(3), 252–262.

Fernández-Blanco, C. R., Burns, S. L., & Giessen, L. (2019). Mapping the fragmentation of the international forest regime complex: Institutional elements, conflicts and synergies. *International Environmental Agreements, 19*, 187–205.

GAIA. (2020). *EU promotes greater global responsibility on plastic waste – But not for internal market!*. Viewed 20 July 2020, https://www.no-burn.org/eu-promotes-greater-global-responsibility-on-plastic-waste-but-not-for-internal-market/

Gellers, J. (2015). Greening critical discourse analysis. *Critical Discourse Studies, 12*(4), 482–493.

George, O., & Kazan-Allen, L. (2019). *The Rotterdam convention 2019*. International Ban Asbestos Secretariat. Viewed 23 July 2020, http://ibasecretariat.org/og-lka-the-rotterdam-convention-2019.php

Giessen, L. (2013). Reviewing the main characteristics of the international forest regime complex and partial explanations for its fragmentation. *International Forestry Review, 15*(1), 60–70.

Goldstein, J., & Keohane, R. (1993). *Ideas and foreign policy: Beliefs, institutions and political change*. Cornell University Press.

Gregson, N., Crang, M., Fuller, S., & Holmes, H. (2015). Interrogating the circular economy: The moral economy of resource recovery in the EU. *Economy and Society, 44*(2), 218–243.

Hajer, M., & Versteeg, W. (2005). A decade of discourse analysis of environmental politics: Achievements, challenges, perspectives. *Journal of Environmental Policy & Planning, 7*(3), 175–184.

Howard, K. (1990). The basel convention: Control of transboundary movements of hazardous wastes and their disposal. *Hastings International and Comparative Law Review, 1*(14), 223–246.

Hoornweg, D., & Bhada-Tata, P. (2012). *What a waste: A global review of solid waste management* (Urban Development Series: Knowledge papers no. 15). World Bank Group.

http://www.wcoomd.org/en/about-us/what-is-the-wco/annual-reports.aspx

https://www.who.int/ipcs/assessment/public_health/chrysotile_asbestos_summary.pdf?ua=1

Hulme, M. (2010). Moving beyond climate change. *Environment: Science and Policy for Sustainable Development, 52*(3), 15–19.
Humphreys, D. (2009). Discourse as ideology: Neoliberalism and the limits of international forest policy. *Forest Policy and Economics, 11*(1), 319–325.
Hurley, A. (2016). From factory town to metropolitan junkyard: Postindustrial transitions on the urban periphery. *Environmental History, 21*(1), 3–29.
Ilankoon, I. M. S. K., Ghorbani, Y., Chong, M. N., Herath, G., Moyo, T., & Peterson, J. (2018). E-waste in the international context – A review of trade flows, regulations, hazards, waste management strategies and technologies for value recovery. *Waste Management, 82*, 258–275.
Institute for Agriculture & Trade Policy (IATP). (2000). *NAFTA flouts global toxic waste dumping treaty*. Viewed 27 July 2020, https://www.iatp.org/news/nafta-flouts-global-toxic-waste-dumping-treaty
International Institute for Sustainable Development (IISD). (2018). *UNFCCC technical paper highlights mitigation benefits of circular economy*. Viewed 23 July 2020, https://sdg.iisd.org/news/unfccc-technical-paper-highlights-mitigation-benefits-of-circular-economy/
International Labour Organisation (ILO). (2018). *Circular economy a source of job creation and re-creation*. Viewed 20 July 2020, https://www.ilo.org/brussels/information-resources/news/WCMS_619122/lang%2D%2Den/index.htm
International Law Commission (ILC). (2006). *Fragmentation of international law: Difficulties arising from the diversification and expansion of international law*. Viewed 24 July 2020, https://legal.un.org/ilc/documentation/english/a_cn4_l682.pdf
International Maritime Organisation (IMO). (n.d.). *Recycling of ships: The development of the Hong Kong Convention*. Viewed 25 July, http://www.imo.org/en/OurWork/Environment/ShipRecycling/Pages/Default.aspx
International Pollutants Elimination Network (IPEN). (n.d.). *About IPEN*. Viewed 20 July 2020, https://ipen.org/about
International Solid Waste Association (ISWA). (2018). *ISWA position paper on the proposal to amend the Basel Convention regarding the international movement of plastics waste*. Viewed 11 July 2020, https://www.iswa.org/home/news/news-detail/article/iswa-position-paper-on-the-proposal-to-amend-the-basel-convention/109/
Jain, A. (2020). *Trash trade wars: Southeast Asia's problem with the world's waste*. Council on Foreign Relations. Viewed 22 July 2020, https://www.cfr.org/in-brief/trash-trade-wars-southeast-asias-problem-worlds-waste
Jasanoff, S. (2004). *States of knowledge: The co-production of science and social order*. Routledge.
Kaza, S., Yao, L., Bhada-Tata, P., & Van Woerden, F. (2018). *What a waste 2.0: A global snapshot of solid waste management to 2050* (Urban Development). World Bank Group.
Keeley, J. (1990). Toward a Foucauldian analysis of international regimes. *International Organization, 44*(1), 83–105.
Kellenberg, D. (2015). The economics of the international trade of waste. *Annual Review of Resource Economics, 7*(1), 109–125.
Kellenberg, D., & Levinson, A. (2014). Waste of effort? International environmental agreements. *Journal of the Association of Environmental and Resource Economists, 1*(1), 135–169.
Keohane, R., & Victor, D. (2011). *The regime complex for climate change* (Discussion Paper 10-33). Belfer Centre, Harvard Project on International Climate.
Khan, S. A. (2014). *Solving the E-Waste Problem (StEP) Green Paper: Differentiating EEE products and wastes*. United Nations University/StEP Initiative.
Kleinschmit, D., Bocher, M., & Giessen, L. (2009). Discourse and expertise in forest and environmental governance – An overview. *Forest Policy and Economics, 11*(1), 309–312.
Kobayashi-Soloman, E. (2019). You wouldn't believe what country is becoming a sustainability leader. *Forbes*. Viewed 11 July 2020, https://www.forbes.com/sites/erikkobayashisolomon/2019/08/21/you-wouldnt-believe-what-country-is-becoming-a-sustainability-leader/#adf72fe1f994
Krasner, S. (1983). *International regimes*. Cornell University Press.

Kummer, K. (1994). *Transboundary movements of hazardous wastes at the interface of environment and trade* (UNEP's Environment and Trade Series) (pp. 1–104). UNEP.
Lepawsky, J. (2015). The changing geography of global trade in electronic discards: Time to rethink the e-waste problem. *The Geographical Journal, 181*(2), 147–159.
Lepawsky, J. (2017). *Reassembling rubbish & worlding electronic waste*. Viewed 10 August 2020, https://www.youtube.com/watch?v=Yr0MwogZdkA&t=1146s
Levy, M., Young, O., & Zürn, M. (1995). The study of international regimes. *European Journal of International Relations, 1*(3), 267–330.
Lewis, A. (2010). Europe exporting electronic waste despite ban. *BBC News*. Viewed 2 August 2020, https://www.bbc.co.uk/news/world-europe-10846395
Li, T. (2007). *The will to improve: Governmentality, development and the practice of politics*. Duke University Press.
Linnér, B.-J. (2006). Authority through synergism: The roles of climate change linkages. *European Environment, 16*, 278–289.
Litfin, K. T. (1994). *Ozone discourses. Science and politics in global environmental cooperation*. Columbia University Press.
Lövbrand, E., Rindefjäll, T., & Nordqvist, J. (2009). Closing the legitimacy gap in global environmental governance? Lessons from the emerging CDM market. *Global Environmental Politics, 9*(2), 74–100.
Lukitsch-Hicks, B. (1999). Treaty congestion in international environmental law: Need for greater international coordination. *University of Richmond Law Review, 32*(5), 1643–1674.
Manners, I. (2002). Normative power Europe: A contradiction in terms? *Journal of Common Market Studies, 40*(2), 235–258.
McElwee, P. (2016). *Forests are gold: Trees, people and environmental rule in Vietnam*. University of Washington Press.
Medvedieva, M., Sopilko, I., Guliev, A., Bilotsky, S., Nevara, L., Lovin, A., & Sirokha, D. (2018). Fragmentation and synergies in international climate change regime. *Journal of Legal, Ethical and Regulatory Issues, 21*(3), 1–14.
Mert, A. (2009). Partnerships for sustainable development as discursive practice: Shifts in discourses of environment and democracy. *Forest Policy and Economics, 11*(5–6), 326–339.
Moncayo, G. (2017). Testing the boundaries between the Basel and MARPOL regimes: Are they complementary or mutually exclusive? *Transportation Research Procedia, 25*, 233–250.
NGO Shipbreaking Platform (SBP). (n.d.-a). *Shipbreaking: A dirty and dangerous industry*. Viewed 11 July 2020, https://www.shipbreakingplatform.org/
NGO Shipbreaking Platform (SBP). (n.d.-b). *Hong Kong convention*. Viewed 11 July 2020, https://www.shipbreakingplatform.org/issues-of-interest/the-law/hkc/
NGO Shipbreaking Platform (SBP). (n.d.-c). *HKC statements of compliance*. Viewed 11 July 2020, https://www.shipbreakingplatform.org/issues-of-interest/the-law/hkc-soc/
Nixon, R. (2011). *Slow violence and the environmentalism of the poor*. Harvard University Press.
Nordbrand, S. (2009). *Out of control: E-waste flows from the EU to developing countries*. SwedWatch. Viewed 20 July 2020, https://www.somo.nl/nl/wp-content/uploads/sites/2/2009/04/Out-of-Control.pdf
O'Neill, K. (2000). *Waste trading among rich nations: Building a new theory of environmental regulation*. MIT Press.
O'Neill, K. (2019). *Waste*. Polity Press.
Oberthür, S. (2002). *Clustering of multilateral environmental agreements: Potentials and limitations*. United Nations University.
Oberthür, S., & Gehring, T. (2006). *Institutional interaction in global environmental governance: Synergy and conflict among international and EU policies*. MIT Press.
Organisation for Economic Co-operation and Development (OECD). (2004). *Addressing the economics of waste*. Viewed 21 July 2020, https://www.oecd-ilibrary.org/environment/addressing-the-economics-of-waste_9789264106192-en

Organisation for Economic Co-operation and Development (OECD). (2008). *OECD Legal Instruments: Decision of the council on the control of transboundary movements of wastes destined for recovery operations*. Viewed 28 July 2020, https://legalinstruments.oecd.org/en/instruments/OECD-LEGAL-0266

Orts, E. (2011). Climate contracts. *Virginia Environmental Law Journal, 29*(1), 1–197.

Ostrom, E. (2010). Beyond markets and states: Polycentric governance of complex economic systems. *The American Economic Review, 100*(3), 641–672.

Oswald, I., & Reller, A. (2011). E-waste: A story of trashing, trading, and valuable resources. *GAIA – Ecological Perspectives for Science and Society, 20*(1), 41–47.

Parajuly, K., & Fitzpatrick, C. (2020). Understanding the impacts of transboundary waste shipment policies: The case of plastic and electronic waste. *Sustainability, 12*, 1–14.

Pratt, L. (2011). Decreasing dirty dumping? A reevaluation of toxic waste colonialism and the global management of transboundary, hazardous waste. *William and Mary Environmental Law and Policy Review, 35*(2), 581–623.

Raustalia, K., & Victor, D. (2004). The regime complex for plant genetic resources. *International Organisation, 58*(2), 277–309.

Rayner, J., Buck, A., & Katila, P. (2010). *Embracing complexity: Meeting the challenges of international forest governance. A global assessment report* (World Series) (Vol. 28). International Union of Forest Research Organisations.

Rosenau, J. (1995). Governance in the twenty-first century. *Global Governance, 1*(1), 13–43.

Schmidt, A. (1992). Transboundary movements of waste under EC law: The emerging regulatory framework. *Journal of Environmental Law, 4*(1), 57–80.

Secretariat of the Basel Convention (SBC). (2011). *Where are WEee in Africa? Findings from the Basel Convention—Waste Africa programme*.

Secretariat of the Basel Convention (SBC). (2014). *Basel Convention text and annexes*. Viewed 20 July 2020, https://www.basel.int/Portals/4/Basel%20Convention/docs/text/BaselConventionText-e.pdf

Secretariat of the Basel Convention (SBC). (2018). *Waste without frontiers II*. Viewed 20 July 2020, http://www.basel.int/Portals/4/Basel%20Convention/docs/pub/WasteWithoutFrontiersII.pdf

Secretariat of the Basel Convention (SBC). (n.d.). *Basel Convention overview*. Viewed 10 July 2020, http://www.basel.int/TheConvention/Overview/tabid/1271/Default.aspx#:~:text=a%20glance...-,The%20Basel%20Convention%20on%20the%20Control%20of%20Transboundary%20Movements%20of,on%20hazardous%20and%20other%20wastes

Sembiring, M. (2019). *Global waste trade chaos: Rising environmentalism or cost-benefit analysis?* (NTS Insight, No. IN19-02).

SERI. (2016). *The R2 Standard and the new circular economy*. Viewed 20 July 2020, https://sustainableelectronics.org/news/2016/05/31/r2-standard-and-new-circular-economy

Slaughter, S. (2005). The republican state: An alternative foundation for global environmental governance. In R. Eckersley & J. Barry (Eds.), *The state and the global ecological crisis*. MIT Press.

Stripple, J. (2008). Beyod the public and private divide: Remapping transnational climate governance in the 21st century. *International Environmental Agreements, 8*(1), 367–388.

Sweeney, V. (2013). *Global partnership on marine litter*. UNEP & Regional Seas Partnership. Viewed 21 July 2020, https://wedocs.unep.org/bitstream/handle/20.500.11822/11004/gpa-fmeb-unep_presentation_on_global_partnership_on_marine_litter_-_vincent_sweeney.pdf?sequence=1&isAllowed=y

The Maritime Executive (TME). (2012). *178 Countries agree to allow the ban on exports of toxic wastes to developing countries to become law*. Viewed 20 July 2020, https://www.maritime--executive.com/article/178-countries-agree-to-allow-the-ban-on-exports-of-toxic-wastes-to-developing-countries-to-become-law

The Recycling Industry Operating Standard. *RIOS Brochure*. Viewed 20 July 2020, http://www.rioscertification.org/docs/default-source/default-document-library/rios-brochure.pdf?sfvrsn=4

Tladi, D. (2000). The quest to ban hazardous waste import into Africa: First Bamako and now Basel. *The Comparative and International Law Journal of Southern Africa, 33*(2), 210–226.

Tromans, S. (2001). EC waste law – A complete mess? *Journal of Environmental Law, 13*(2), 133–156.

United Nations (UN). (n.d.-a). *Global partnership on martine litter*. Viewed 20 July 2020, https://sustainabledevelopment.un.org/partnership/?p=7471

United Nations (UN). (n.d.-b). *Goal 12: Ensure sustainable consumption and production patterns*. Viewed 20 July 2020, https://www.un.org/sustainabledevelopment/sustainable-consumption-production/

United Nations Development Programme (UNDP). (1997). *Synergies in national implementation: The Rio agreements*. Viewed 26 July 2020, https://catalogue.unccd.int/1001_synergies_implem_nat_ConvRio.pdf

United Nations Environmental Programme (UNEP). (n.d.-a). *Bamako convention treaty text*. Viewed 20 July 2020, https://www.informea.org/en/treaties/bamako-convention/text

United Nations Environmental Programme (UNEP). (n.d.-b). *Rotterdam convention text*. Viewed 20 July 2020, http://www.pic.int/TheConvention/Overview/TextoftheConvention/RotterdamConventionText/tabid/1160/language/en-US/Default.aspx

United Nations University (UNU). (2015). *Discarded electronics mismanaged within Europe equals ~10 times the volume of e-waste exported*. Viewed 20 July 2020, https://unu.edu/media-relations/releases/discarded-electronics-mismanaged-in-europe-is-10x-volume-of-e-waste-exports.html#:~:text=The%20study%20estimates%201.3%20million,%3B%20and%2070%25%20functioning%20equipment

Wen, X., Wei-Qiang, C., Daqian, J., Chao, Z., Zijie, M., Yan, R., & Lei, S. (2020). Evolution of the global polyethylene waste trade system. *Ecosystem Health and Sustainability, 6*(1), 1–16.

Wheeler, P. (2019). *Waste Management, Casella announce halt to plastic waste exports to countries with poor waste management*. Greenpeace. Viewed 20 July 2020, https://www.greenpeace.org/usa/news/waste-management-casella-announce-halt-to-plastic-waste-exports-to-countries-with-poor-waste-management/#:~:text=In%202018%20alone%2C%20the%20United,Thailand%2C%20Turkey%2C%20and%20Vietnam

Woolcock, S., & Bayne, N. (2016). *The new economic diplomacy: Decision-making and negotiation in international economic relations*. Routledge.

World Customs Organisation (WCO). (2019). *Annual report 2018–2019*. Viewed 20 July 2020.

World Health Organisation (WHO). (2014). *Chrysotile asbestos*. Viewed 20 July 2020.

World Trade Organisation (WTO). (2017). *Notification from Ministry of Environmental Protection of the People's Republic of China, WTO Committee on Technical Barriers to Trade* (G/TBT/N/CHN/1211). Submitted 18 July 2017, pp. 1–2.

Young, O. (2011). Effectiveness of international environmental regimes: Existing knowledge, cutting-edge themes, and research strategies. *PNAS Perspective, 108*(50), 19853–19860.

Young, O. (2016). *On environmental governance: Sustainability, efficiency, and equity*. Routledge.

Young, O., & Osherenko, G. (1993). *Polar politics: Creating international environmental regimes*. Cornell University Press.

Zero Waste Europe (ZWE). (2016). *My zero waste event zero waste Europe presents 12 actions to start a zero waste process*. Viewed 22 July 2020, https://www.zerowasteeurope.eu/wp-content/uploads/2016/12/Zero-Waste-Events.compressed.pdf

Major Six-Year Trends in Global Plastic Waste Trade

Jan Dell

Introduction

The Basel Plastic Waste Amendments, enacted on January 1, 2021, were designed to reduce the flows of dirty and mixed plastic wastes, in particular to developing countries.

The Basel Action Network's (BAN) Plastic Waste Trade Data website (BAN, 2023) was created in January 2021 to provide much needed transparency on plastic waste trade. The data is sourced from the publicly available government trade customs data published by the United Nations Comtrade database, the United States Trade® Online database, and the United Kingdom (UN Comtrade, 2023; U.S. Trade® Online, 2023; U.K. Trade Info, 2023). BAN's website enables fact-based assessment of global plastic waste trade data.

The data presented on the BAN Plastic Waste Trade Data website was evaluated to determine major trends in plastic waste exports.

Circulating postconsumer plastic waste around the world doesn't create the clean economy needed to protect human health and ecosystems. Actions to find markets for discarded plastic materials collected in high-income countries should not negatively impact communities in other countries.

There are many harmful impacts of exports of plastic wastes from high-income countries to middle- and low-income countries:

- Food chain contamination
- Harm to domestic waste collection and recycling system development in countries that need it most
- Health and safety impacts to workers and communities

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More than 100 investigations and reports have shown serious environmental and social harms in receiving countries (The Last Beach Cleanup, 2023).

Results

The following major trends in plastic waste export were seen between 2017 and 2022:

1. *Global*: Decrease in plastic waste exports seen from almost all major Organization for Economic Co-operation and Development (OECD) countries. However, plastic waste trade to non-OECD countries has plateaued at unacceptably high levels.
2. *United Kingdom* (*UK*): Significant shift of plastic waste exports to Turkey from previous exports to non-OECD Countries.
3. *Japan*: Significant shift of plastic waste exports from going to China to other countries in Asia.
4. *United States* (*USA*): Decrease in plastic waste exports to Asia, but an increase in exports to Latin American countries.
5. *European Union* (*EU*): Increase in exports to Turkey and the Netherlands became the major exporter of plastic waste to countries in Asia. Increase in plastic waste exports to Asia seen in late 2022 as energy costs rose in the EU and EU recyclers shut down.

Global: Decrease in Plastic Waste Exports Seen from Almost All Major OECD Countries (2017–2022)

Figure 1 shows that there has been a significant decrease in total plastic waste exports from major OECD countries from 2017 to 2022. In aggregate, the plastic waste exports from the USA, Japan, EU, UK, Canada, and Australia declined 57% from 6,664,105 tonnes/year in 2017 to 2,835,631 tonnes/year in 2022.

Figure 2 shows that there has been a significant decrease in plastic waste exports from major OECD countries to non-OECD countries from 2017 to 2022. In aggregate, the plastic waste exports from the USA, Japan, EU, UK, Canada, and Australia to non-OECD countries declined 73% from 4,836,935 tonnes/year in 2017 to 1,302,841 tonnes/year in 2022.

While a significant decline in plastic waste exports occurred, the plastic waste exports to non-OECD countries that are not equipped to safely and securely manage even their own plastic waste has plateaued and remains stubbornly high. The export of 1,323,011 tonnes/year in 2022 is equivalent to 682 20-foot shipping containers per day of plastic waste exported to non-OECD countries.

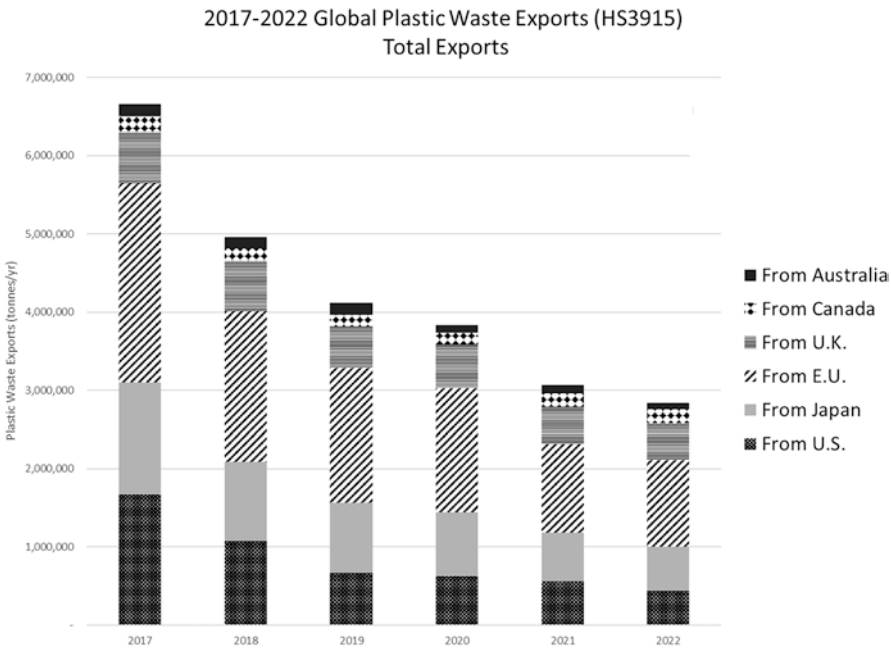

Fig. 1 Plastic waste exports from major OECD countries (2017–2022)

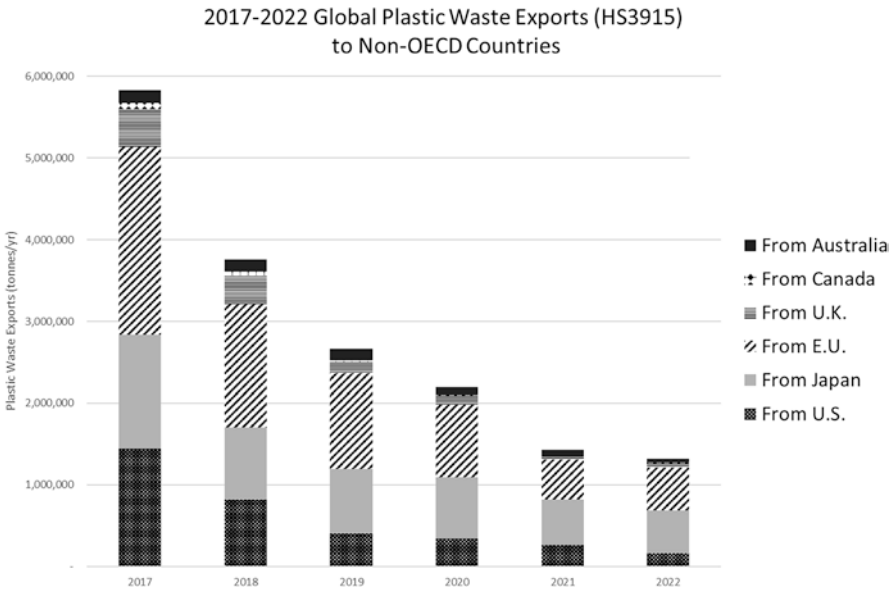

Fig. 2 Plastic waste exports from major OECD countries to non-OECD countries (2017–2022)

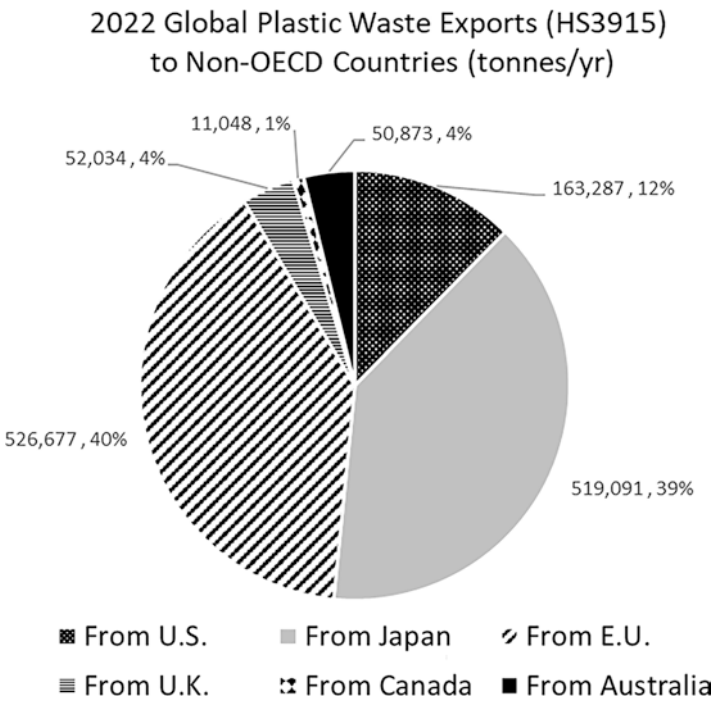

Fig. 3 2022 OECD country exports to non-OECD countries

Table 1 Plastic waste exports from major OECD countries

	2017 (tonnes/year)		2022 (tonnes/year)		% Decline (−) or increase (+)	
	OECD	Non-OECD	OECD	Non-OECD	OECD (%)	Non-OECD (%)
U.S.	228,540	1,443,045	275,176	163,287	+20	−89
Japan	38,457	1,392,990	44,363	519,091	+15	−63
E.U.	246,114	2,299,772	587,064	526,677	+139	−77
U.K.	198,291	459,693	410,159	49,028	+107	−47
Australia	1592	158,469	23,450	50,873	+1373	−68

Figure 3 shows that the EU was the largest plastic waste exporter to non-OECD countries in 2022, with 40% of plastic waste exports (526,677 tonnes/year). Japan was the second largest exporter to non-OECD countries with 39% of plastics waste exports (519,091 tonnes/year).

Table 1 shows that while plastic waste exports to non-OECD countries were reduced from 2017 to 2022, most countries increased exports to OECD countries during the same period. These trends are described in more detail in subsequent sections.

United Kingdom: Significant Shift of Plastic Waste Exports from Non-OECD Countries to Turkey and Netherlands

Figure 4 shows that the UK has largely shifted plastic waste exports from non-OECD countries to Turkey, Netherlands, and other OECD countries. The overall decline of plastic waste exports from the UK to the world was only 30% from 2017 to 2022, much less of an overall reduction than seen from other OECD countries.

The UK increased plastic waste exports to Turkey from 40,934 tonnes/year in 2017 to 112,947 tonnes/year in 2020. When Turkey implemented a ban on plastic waste imports in 2021, the UK shifted to exporting more plastic waste to the Netherlands. Numerous investigations and media reports have shown the harms of UK plastic waste exports to Turkey. In May 2022, the Guardian reported on how UK plastic waste is "dumped abroad by Dutch middlemen" (Gatten, 2023). In section "European Union: Increase in Exports to Turkey and the Netherlands Became the Major Exporter of Plastic Waste to Countries in Asia", Fig. 10 shows the increase in plastic waste exports from the Netherlands to Asia from 2017 through 2022.

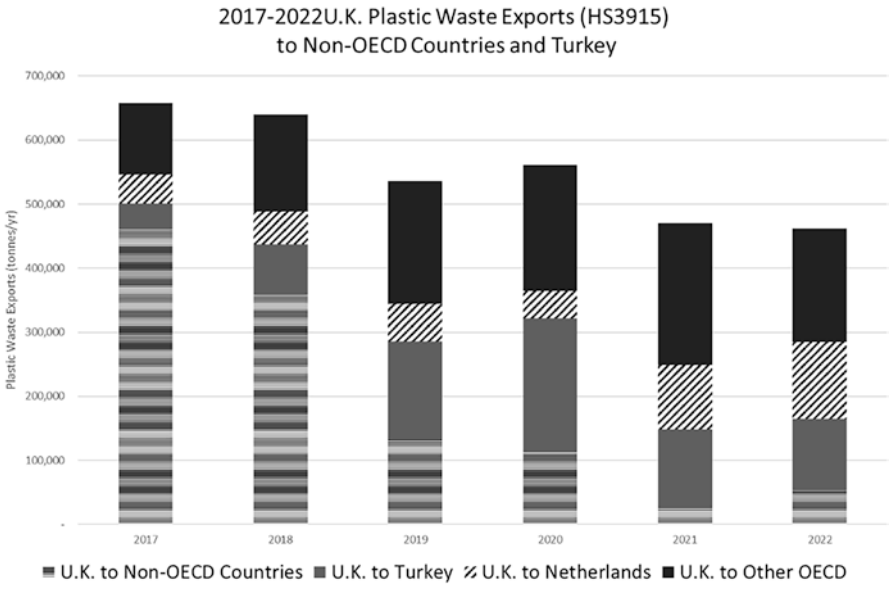

Fig. 4 UK plastic waste exports to from UK to Turkey and non-OECD countries (2017–2022)

Japan: Significant Shift of Plastic Waste Exports from China to Other Countries in Asia

Figure 5 shows how Japan largely shifted plastic waste exports from China and Hong Kong to other non-OECD countries from 2017 to 2022. The non-OECD countries that Japan increased exports to are primarily Asian countries who lack the ability to manage their own plastic waste. As shown in Table 2, Japan significantly increased exports to many Asian countries.

United States: Decrease in Plastic Waste Exports to Asia, But an Increase in Exports to Latin American Countries

During 2017 to 2022, the USA significantly decreased plastic waste exports to Asia, while increasing plastic waste to Latin American countries. Figure 6 shows a 94% decrease to six key Asian countries, from 1,252,308 tonnes/year in 2017 to 80,092 tonnes/year in 2022. Figure 7 shows an increase in US plastic waste exports to Ecuador, El Salvador, Guatemala, Honduras, and most notably Mexico. The US plastic waste exports to Mexico increased 81% from 47,222 tonnes/year in 2017 to 85,515 tonnes/year in 2022.

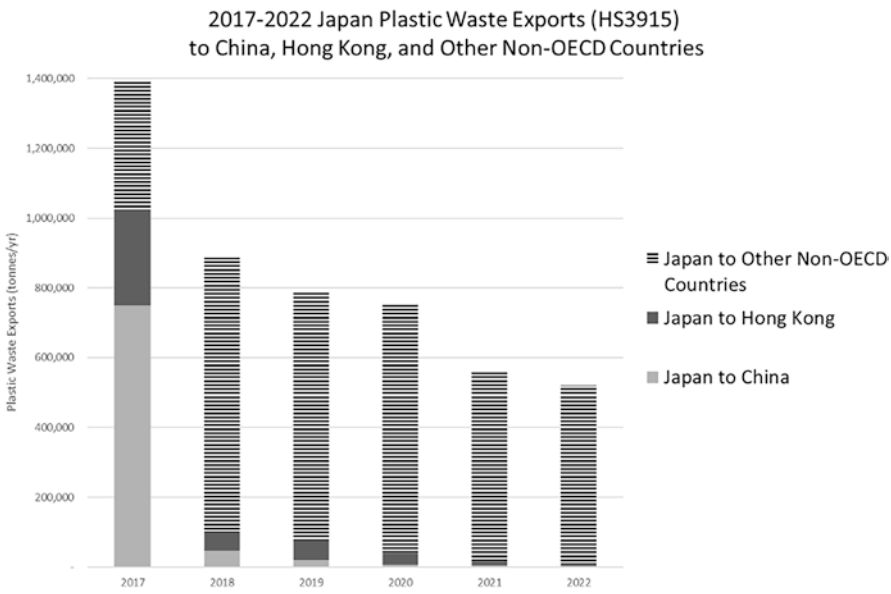

Fig. 5 Japan plastic waste exports to China and other non-OECD countries

Table 2 Japan plastic waste exports to Asian countries (2017–2022)

Country	2017 (tonnes/year)	2022 (tonnes/year)	% Increase (%)
Indonesia	2700	10,670	+295
Malaysia	75,435	178,716	+137
Vietnam	126,219	152,489	+21

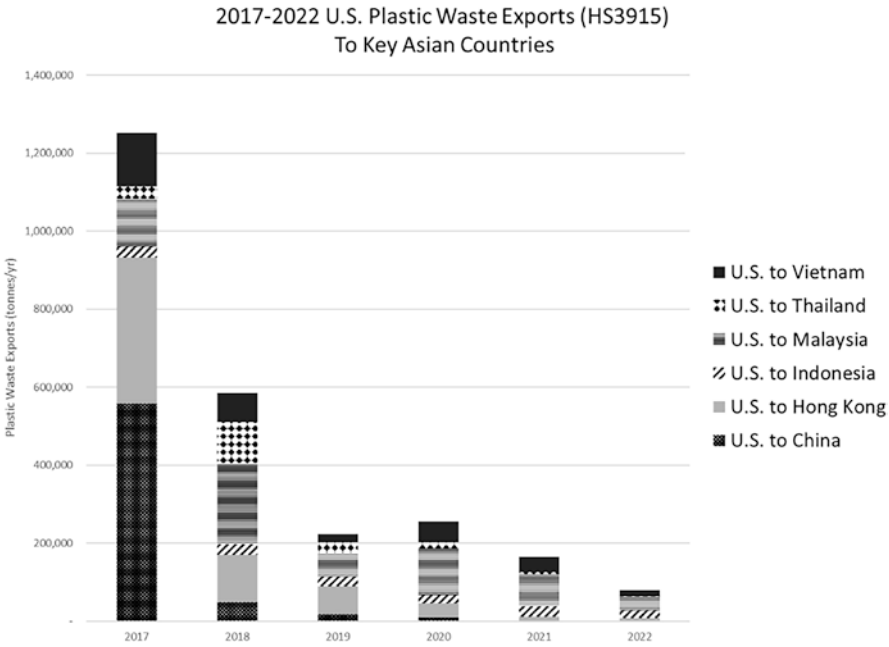

Fig. 6 US plastic waste exports to key Asian countries (2017–2022)

European Union: Increase in Exports to Turkey and the Netherlands Became the Major Exporter of Plastic Waste to Countries in Asia

While the EU reduced plastic waste to non-OECD countries (Fig. 2 and Table 1), the EU significantly increased plastic waste exports to Turkey (Fig. 8). A partial ban on plastic waste imports, implemented by Turkey in 2021, resulted in a slight decline in plastic waste imports from the EU in 2022. Nevertheless, the 2022 EU plastic waste exports of 346,383 tonnes/year is significant as it is equal to 179 truckloads of plastic waste per day shipped from the EU to Turkey.

While the EU initially reduced plastic waste exports to Asia after China's National Sword policy was enacted in 2018 and the Basel Plastic Waste Amendments were enacted in 2021, the EU increased plastic waste exports to Asia in 2022, as shown in Fig. 9. The 2022 EU plastic waste exports of 433,878 tonnes/

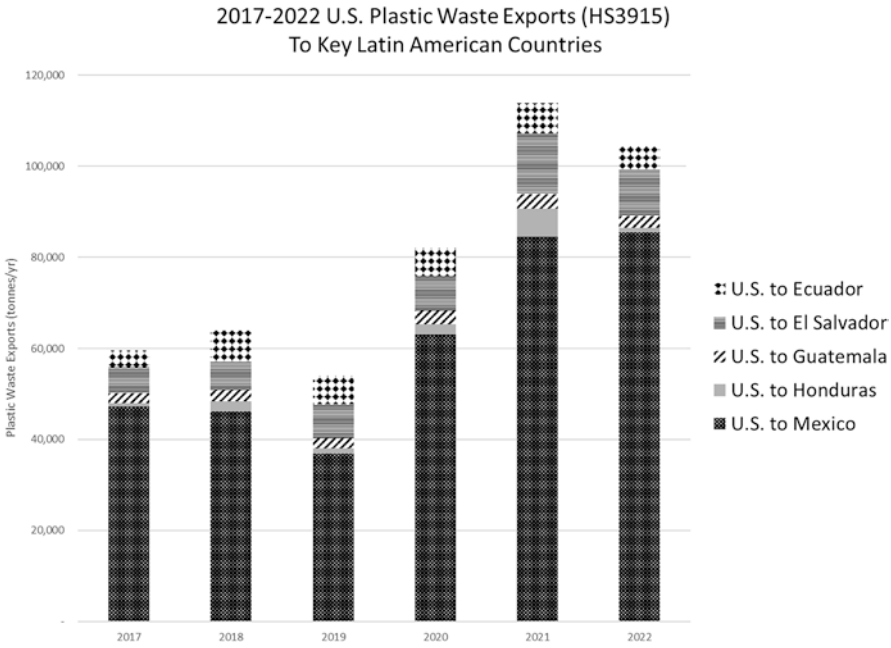

Fig. 7 US plastic waste exports to Latin American countries

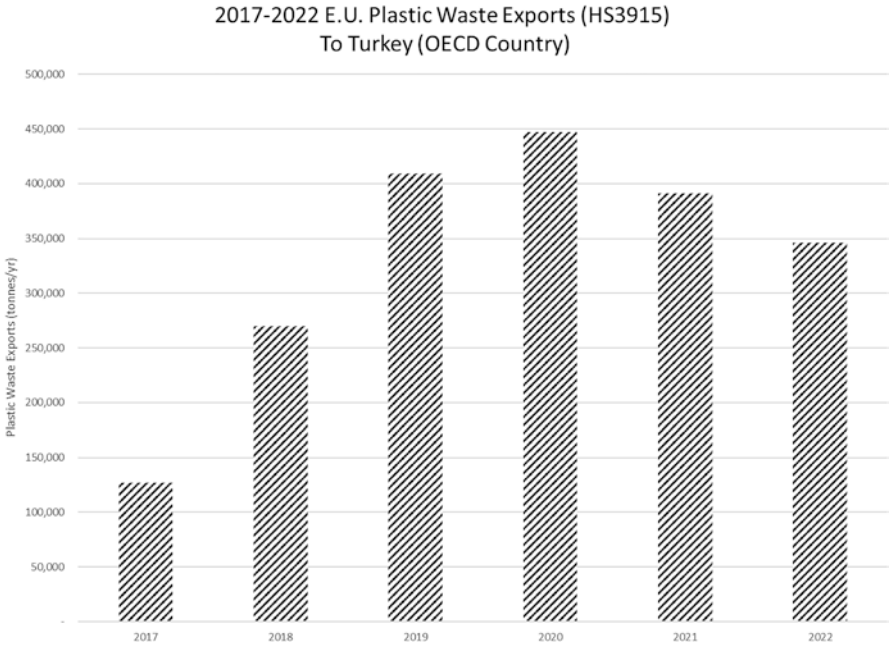

Fig. 8 EU plastic waste exports to Turkey (2017–2022)

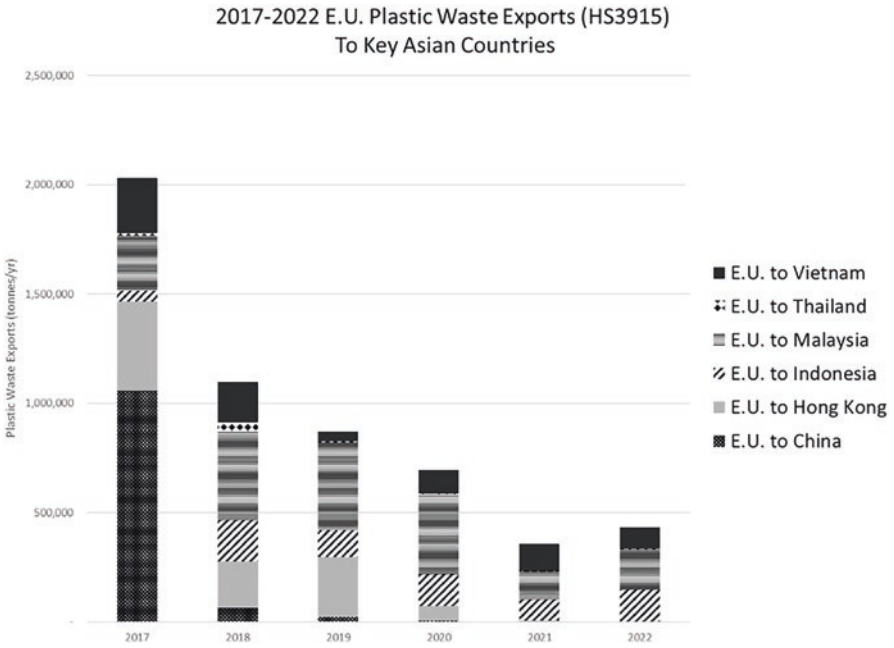

Fig. 9 EU plastic waste exports to Asia (2017–2022)

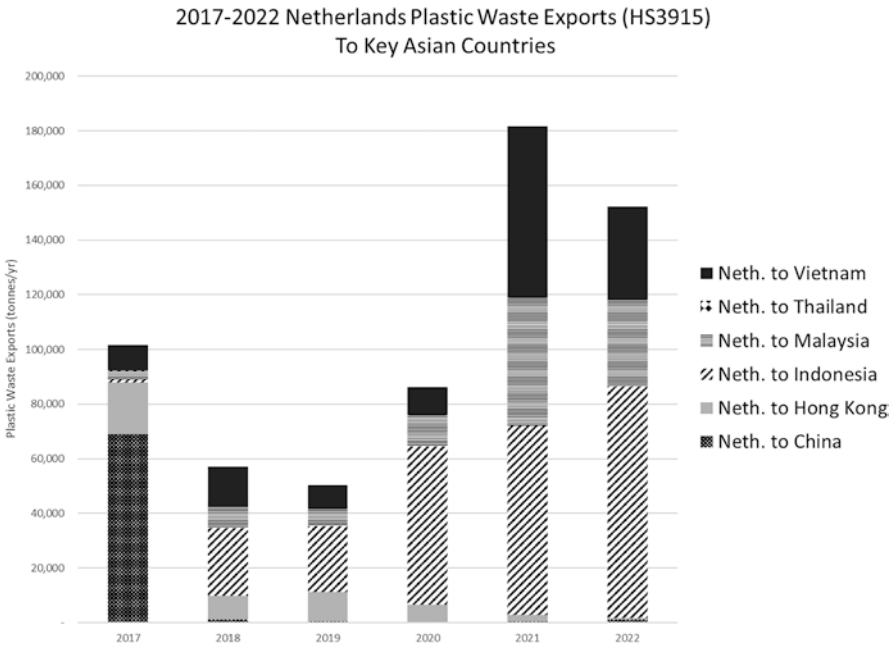

Fig. 10 Netherlands plastic waste exports to Asia (2017–2022)

year to three key countries (Indonesia, Malaysia, and Vietnam) is significant as it is equal to 224 container loads of plastic waste per day shipped from the EU to countries with high plastic pollution rates who are not equipped to manage their domestic plastic waste.

As shown in Fig. 10, the Netherlands has significantly increased plastic waste exports to Asia from 2017 to 2022. As described by the Guardian, it appears that the Netherlands has become a trader of plastic waste for other countries and a transit point for shipments to Asia (Gatten, 2023). In 2022, the Netherlands accounted for 32% of EU plastic waste exports to non-OECD countries. But on a population basis, the Netherlands only has 3.9% of the EU population (Trading Economics, 2023).

Summary and Conclusions

The major six-year trends (2017 through 2022) in the international trade of plastic waste show that while the Basel Plastic Waste Amendments initially reduced the flows of plastic waste from high-income to low- and middle-income countries, a high level of plastic waste trade remains. This analysis supports the conclusion stated in IPEN's Plastic Waste Trade: The Hidden Numbers report (IPEN, 2023), "Countries that are major producers of plastic wastes must take responsibility for their own plastic waste and stop exporting all plastic wastes to other countries, and especially to countries that lack the capacity to manage their own plastic wastes in an environmentally sound manner."

Now that the harms of plastic waste exports have been exposed, the responsible response is to stop plastic waste exports. While exporting may help high-income countries meet "diversion goals" and avoid the problem and cost of disposing their plastic waste to landfill or incineration in their own countries, there's no denying that rich countries are offshoring the problem, harming other countries and making a carbon-intensive, long-distance contribution to the plastic pollution to the ocean.

Bans on exports of plastic waste from high-income countries are urgently needed as the predicted future increases in plastic production are likely to increase plastic waste exports from high-income countries to low- and middle-income countries.

References

Basel Action Network. (2023). Plastic waste trade data. https://www.ban.org/plastic-waste-transparency-project-hub/trade-data. Accessed 12 May 2023.

Gatten. (2023, May 16). UK plastic recycling 'dumped abroad by Dutch middlemen'. *The Guardian*. https://www.telegraph.co.uk/news/2023/05/16/uk-plastic-recycling-dumped-abroad-netherlands/

IPEN. (2023). Plastic waste trade: The hidden numbers. https://ipen.org/documents/plastic-waste-trade-hidden-numbers#:~:text=Estimates%20show%20we%20will%20produce,non%2Dhigh%2Dincome%20countries

The Last Beach Cleanup. (2023). Harms of plastic waste exports. https://www.lastbeachcleanup.org/plastic-waste-exports
Trading Economics. https://tradingeconomics.com/netherlands/population-as-a-percent-of-eu-population-eurostat-data.html#:~:text=Netherlands%20%2D%20Population%20as%20a%20%25%20of%20EU%20population%20was%203.90%25,EUROSTAT%20on%20May%20of%202023. Accessed on 19 May 2023.
United Kingdom (U.K.) Trade Info. https://www.uktradeinfo.com/trade-data/ots-custom-table/. Accessed 12 May 2023.
United Nations (U.N.) Comtrade Database. https://comtradeplus.un.org/. Accessed 12 May 2023.
United States Trade® Online. https://usatrade.census.gov/. Accessed 12 May 2023.

Global and National Instruments to Stop the Export and Dumping of Plastic Wastes

Jim Puckett

Introduction

Waste on the Move: A History

In the last half century the discovery of devastating impacts from hazardous and other wastes generated by by large, medium and small industries in North America and Europe spawned sweeping legislation to better control industrial activity. In the period between 1975 and 1990, new laws to strictly regulate the generation, treatment, storage, transport, disposal, and export of wastes were passed and implemented in most developed countries. The legislative effort in the United States resulted in the Resource Conservation and Recovery Act (RCRA, 1976) regulating the treatment, storage, and disposal of hazardous wastes, as well as the groundbreaking Comprehensive Environmental Response, Compensation and Liability Act (CERCLA, 1980). The latter, known commonly as "superfund" made generators of wastes strictly liable for the impact and cleanup of their wastes and thus provided funding for the cleanup and remediation of growing discoveries of contaminated sites. In Europe, things got off the ground with the Waste Framework Directive (1975) followed by numerous new laws governing best practices for hazardous waste management and control, as well as a classification system for wastes known as the European Waste Catalogue (Decision 94/3/EC of 20 December 1993).

The increased concern and legislation to mitigate the impacts of improperly disposed hazardous waste in the developed world resulted generally in a welcome internalization of costs onto the ledgers of waste generators. In other words, polluters began to have to pay far more in waste management and reduction costs to assure

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the public of new obligations to achieve proper, safe, and nonpolluting waste management. The game changing policy of internalizing real costs came to be known popularly as "the polluter pays" principle.

But such a principle will only function in fact, if there are no escape routes or loopholes that might move wastes outside of one's accounting. While stricter rules made at the national level increased the cost of pollution (costs internalized), so too did they increase incentives to avoid such costs completely (costs externalized). Sadly, avoidance was all too easy, given the norms of free trade and the efficiencies and convenience of intermodal transport. The most obvious strategy to avoid national obligations and the higher costs of meeting them was to sweep the hazardous wastes out the global backdoor via international shipping, usually finding their way on board container ships, moving from rich, industrialized countries of the "Global North" to the poorer, less industrialized countries of the "Global South." There, the opportunities to avoid costs and exploit weaker economies and their concurrent lack of environmental and labor protections, awareness, community, and labor rights, as well as infrastructure to manage the new threats of imported pollution were greatest.

Sometimes the recipients of these wastes did not fully understand the harm they represented. At other times, they did not really care, seeking only to profit in the short term from the waste trade deals offered. Such deals ignored long-term impacts of the wastes and thus, in effect, externalized the real costs to future generations in the importing country.

"Recycling," the word coined by the "green movement," in the late 1960s, was ironically almost always invoked and played a critical role as justification for the waste shipments with varying degrees of legitimacy. At the end of the scale, the word "recycling" served as merely a pretext for blatant dumping, but increasingly the exports did involve some form of recycling, at least in part. Nevertheless, despite some recycling taking place, it could be very partial with many fractions dumped and burned, and very often the operations themselves were highly polluting and harmful. Most importers were complicit in the deal made with the exporters, each receiving value. The importers resold some of the recycled materials, while the exporters received value by avoiding the greater costs of proper waste management in the home country. This was often made possible by being able to dump or burn residual materials with little cost. In this way, recycling in developing countries could in fact be far worse for human health and the environment than would have been the case had the wastes simply been placed in a landfill in the exporting country.

It is this externalization of pollution costs that makes waste move in the first place. This principle is as true to this day as it was in the early days of the waste trade. Trade in wastes will continue to flourish as long as it can serve as a convenient escape route to avoid the better solution of appropriate product design to foster longevity, ease of recycling and proper end-of-life management of products.

The international waste trade then was born of efforts to internalize waste management costs domestically, while failing to prevent the escape avenue of export. By the early 1980s, this new waste trade phenomenon – the search for pathways of

greatest opportunities for exploitation via cost externalization – became epidemic when the first wave of ships laden with the toxic effluent of the affluent began plying the waters of Latin America, Africa, and Asia, looking for willing importers, corrupt officials, and unsuspecting recipients.

The first organization to examine and attack the global trade in wastes was Greenpeace, which waged a campaign against it from 1989 to 1997. In 1990, Greenpeace published their fifth and last version of The International Trade in Wastes: A Greenpeace Inventory. It contained hundreds of catalogued waste trade schemes around the globe. Greenpeace's media and investigative campaigning publicized and, at times, helped abort hundreds of dirty waste trade deals. Some of the cases made beaches and ships infamous, including the names Karin B, the Khian Sea, Jolly Rosso, Koko Beach, and the Islip Garbage Barge. The headline grabbing dumping schemes at times became known too by the corporate identities involved in examples of dirty and sham recycling. These included Thor Chemicals in South Africa, Formosa Plastics in Cambodia, and Bharat Zinc in India.

As early as 1987, enough cases had been recorded and headlined in the media of dumping cases in Africa that the issue got the attention of the Organization of African Unity (OAU) and the Economic Community of Waste African States (ECOWAS). Soon thereafter, the Organization for Economic Cooperation and Development (OECD) took the first legally binding decisions to better control waste trade with a notification procedure that came to be known as prior informed consent (PIC). This was seen by the OECD as being the more reasonable substitute to banning the waste trade, particularly where recycling was involved. But increasingly, and framed by a very effective and vocal Greenpeace campaign (Fig. 1), a call was

Fig. 1 Logo of the Greenpeace Waste Trade campaign, created by graffiti artist Keith Haring

heard to ban waste trade, or at least ban the export of hazardous wastes moving from rich to poorer countries.

It was not too long after the journey of the vessel Khian Sea (1986), carrying Philadelphia incinerator ash across the globe looking for dumping grounds (Müller, 2023), that the United Nations Environment Program (UNEP), headed up by Egyptian Executive Director Mostafa Tolba, took decisive action. He declared that due to the transboundary and criminal nature of the waste trade that a global treaty was wanted. On June 17, 1987, the UNEP Governing Council decided to authorize the Executive Director to convene a working group of legal and technical experts to organize a global convention on the control of transboundary movements of hazardous wastes (UNEP, 1989). The treaty became known as the Basel Convention after the Swiss chemical industry reeling from the horrific 1986 fire and spill of toxic chemicals into the Rhine River, agreed to bankroll the initial negotiations and the Secretariat of the Convention in Geneva, if the Convention could be named after the city of Basel where the disaster occurred.

The initial negotiations of the Basel Convention were characterized by an incensed developing world, led by the African Group, seeking to ban waste trade especially from rich to poorer countries on the one hand, and the "JUSCANZ" group, an international negotiating bloc made up principally of Japan, the United States, South Korea, Canada, Australia, and New Zealand, on the other. International law, which relies at the outset on achieving consensus, meant that in this important negotiation, the United States acted as that lowest common denominator and worked with the rest of the JUSCANZ to insist that trade bans be avoided in the final text.

After all efforts by developing country delegates to achieve some kind of waste trade ban were rejected by the JUSCANZ group, it was at last proposed that at least language to the effect that it would be unlawful for any country to export wastes to countries with lesser environmental standards and rigor than their own, the United States State Department representative Mr. Andy Sens took the floor. He complained that "Such a prohibition would be very prejudicial to my country as we have the highest standards in the world and thus would be unable to export our wastes to any other country" (Puckett, 1989). Following this cynical statement, the notion of banning waste trade, at least in the original 1989 treaty text, was lost. It would not be until 2019, 30 years later, would the envisaged ban become a reality.

The resulting text adopted at the final meeting of the Plenipotentiaries in March of 1989 in Basel, Switzerland, failed to include a ban on exports of hazardous wastes to developing countries, even though it was the expressed wish of the vast majority of assembled countries. The only ban included was a ban on hazardous waste exports to Antarctica.

While being a key detractor of global environmental justice, it must be noted that the United States did play a strong role in providing the current definitions of hazardous waste and the concept of prior informed consent (PIC) based in large part on the work of Harvey Yakowitz of the US Environmental Protection Agency. These definitions and policy advances were pioneered in the US RCRA legislation and also via his work at the OECD which, from 1986 to 1990 created a series of decisions to define and control waste trade. It was OECD Decision-Recommendation

C(86)64(final) that became the precursor document of the Basel Convention with the H and Y codes later found in Basel's Annexes I and III derived from the initials of Harvey Yakowitz's first and last name.

The resulting treaty agreed at Basel in 1989, absent as it was of the anxiously anticipated ban, was considered a disappointment by most participating countries. The African group walked out of the meeting without signing the agreement, vowing to create their own regional agreement which would ban the import of hazardous and other wastes into the continent of Africa. This would later become the Bamako Convention (Fig. 2) signed in Mali in 1991.

Nevertheless, as time would tell, the Convention did provide the basis for more rigorous things to come, and the decision to achieve a legally binding ban on the exports of hazardous wastes was adopted in 1994 followed by a decision to amend

U.N. Conference Unanimously Backs Treaty Curbing Export of Hazardous Wastes

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Basel Convention on the Control of Transboundary Movements of Hazardous Waste and Their Disposal. By a unanimous vote this afternoon, the conference adopted the treaty language to be submitted to the nations for signing.

Canada, France, Spain, Norway, Saudi Arabia, Mexico, Venezuela, and the Philippines were among the countries that signed the treaty.

Andrew D. Sens, director of the State Department's office of environmental protection, said that before Washington decided whether or not to sign, the treaty must go through an inter-agency review. Mr. Sens said Washington's decision not to sign the treaty today in no way meant that the United States was repudiating the accord.

Hailing 'Consensus in Poison'

"It's a convention with many useful features in protecting human health and the environment," Mr. Sens said, noting particularly the requirement that exporters notify and receive permission from the country that is to import toxic waste.

Mustafa K. Tolba, the Egyptian executive director of the United Nations Environment Program, said the task of the international community was now to ratify the treaty as soon as possible.

"Our agreement has not halted the commerce in poison," he said. "But it has signaled the international resolve to eliminate the menace hazardous wastes pose to the welfare of our shared environment and to the health of all the world's peoples."

According to the Organization for Economic Cooperation and Develop-

Developing nations say the pact will be hard to enforce.

shipments of toxic wastes, amounting to 2.5 million metric tons, originate each year in Western Europe alone. Of those, 80 percent are sent to other Western European countries, 15 percent to Eastern Europe and 5 percent to the third world.

The treaty calls for signing nations to "take the appropriate measures" to insure that hazardous-waste generation and export are reduced to a minimum. The treaty also says parties to the treaty shall prohibit shipments of hazardous waste to nations that have banned waste imports.

In addition, the accord calls on each signing nation to require that all cross-borders' waste shipments be packaged and labeled properly and that all companies transporting or disposing of hazardous wastes be authorized to handle wastes.

"The convention contains many strong statements, but the importance of the convention will be in how it is applied," said Brice Lalonde, France's Minister of the Environment.

There was a dispute over whether to include radioactive waste within the treaty's scope. Partly because of American pressure, such waste will instead be subject to an accord to be negotiated under the auspices of the In-

The convention says that among the waste to be considered hazardous are clinical wastes from hospitals, wastes from pharmaceutical factories, polychlorinated biphenyls, compounds containing mercury or lead, and wastes from the production or use of dyes, paints and wood-preserving chemicals.

Several African officials said they were worried that the industrialized nations would not do enough to apply the treaty partly because the treaty gives nations receiving hazardous waste little in the way of enforcement mechanisms. The developing nations said it would be hard for them to force a nation that exports waste to adhere to the treaty provisions.

"We are unhappy because the treaty has been watered down," said Ahmed Mohammed Taylor-Kamara, Sierra Leone's Minister of the Environment.

Environmentalists Displeased

Mr. Taylor-Kamara said several industrial nations had moved in recent days to weaken the treaty. At one point, the treaty called for signatories to prohibit exporters from shipping hazardous waste to countries that have less strict waste-disposal policies.

African officials and environmental group officials here said that clause would have stopped waste traffic from the industrialized world to impoverished third-world nations desperate for hard currency. But the provision was stricken, African officials said, mainly because of American and West German pressures.

None of the 29 African nations represented here signed the treaty. They will decide what approach to take at an Organization of African Unity meeting to be held in Mali in June.

unhappy that the treaty was not stronger. "This treaty takes a half step forward, at a time when the increased pressures to export waste are taking us 100 years back," said Allen Hershkowitz, senior scientist for the Natural Resources Defense Council.

Loopholes and Vague Language

Officials with the environmentalist organization Greenpeace, which favors a total ban on exporting hazardous waste, said the treaty was worse than nothing. They said the treaty had so many loopholes and such vague language that widespread abuses could continue in the movement of hazardous wastes.

"This treaty puts an international stamp of approval on a horrible business," said James Puckett, a toxic-waste expert with Greenpeace. In front of the convention center where the meeting was held, Greenpeace activists put up a banner that said, "Danger, Basel Convention Legalizes Toxic Terror."

But the treaty's supporters said it was a needed first step to regulate a complex area and that that step will be built on by other conferences.

When disposed of improperly, hazardous waste, such as dioxins and PCB's, can foul the air, water or soil, and cause cancer, birth defects or diseases.

U.N. Conference Supports Curbs On Exporting of Hazardous Waste

34 Nations Sign Pact and U.S. Plans to Review It

By STEVEN GREENHOUSE

Special to The New York Times

BASEL, Switzerland, March 22 — More than 100 countries unanimously adopted a treaty today restricting shipments of hazardous waste across borders, an often shady activity that has alarmed industrial and developing nations alike.

The treaty, which was immediately signed by 34 nations, is aimed at preventing the exportation of hazardous waste to unsafe, inadequate sites by requiring waste exporters to notify and receive consent from receiving countries before shipping the waste. In addition, the treaty requires countries exporting waste and those receiving it to insure that the waste is ultimately discarded in an environmentally sound manner.

A total of 117 nations sent representatives to the three-day United Nations-sponsored conference, which was dominated by debates between the industrialized nations and developing nations. By adopting the treaty, the participants signaled their countries' intention to sign it.

Most of the nations, including the United States, declined to sign the treaty today because officials said they wanted to study the document further or had to show it to environmental officials in their countries.

The treaty will become effective 90 days after 20 nations have formally ratified it. Officials of the United Nations Environment Program expressed hope that by the middle of next year, at least 20 signatory nations will ratify the treaty.

'Important Point of Departure'

Many signatories hailed the treaty as an important step toward creating order in a field where chaos prevails, while the treaty's critics, for the most part developing nations, asserted that it does not go far enough to control hazardous-waste exports.

"We consider this an important point of departure," said Giorgio Ruffolo, Italy's Minister of the Environment. "It's the first serious international effort to regulate hazardous waste. We think it should allow us to control this type of traffic."

Calls for an international agreement to control hazardous-waste exports have increased in recent months after incidents like an Italian company's shipment of 8,000 leaking drums of highly toxic waste early last year to a Nigerian farm near a school yard. Increasing concern have been many scandals involving unscrupulous European waste-disposal companies that have bribed African officials to gain permission to dump waste at unsafe sites.

Delegates to the conference argued late into the night Tuesday over several amendments before completing the treaty, which is officially called the

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P.L.O. TURNS DOWN A HALT TO UPRISING

After Meeting With U.S., It Rejects Baker Suggestion

By JAMES M. MARKHAM

Special to The New York Times

TUNIS, March 22 — After its first formal contact with the Bush Administration, the Palestine Liberation Organization today rejected a halt in the violent uprising in the Israeli-occupied territories to encourage peace negotiations.

The move was a rebuff to the approach to the Arab-Israeli conflict outlined by Secretary of State James A. Baker 3d, who has sought to encourage reduction of violence and tension and bring about direct negotiations between Israelis and Palestinians.

But after a four-hour meeting outside Tunis with American officials, Yasir

Fig. 2 Copy of the *New York Times*, March 22, 1989. Photographed by the author who was quoted as denouncing the treaty as being too weak because it did not include a ban on the export of hazardous waste to developing countries

the Convention accordingly in 1995. The long-sought Basel Ban forbidding the export from developed to developing countries of hazardous wastes finally came into force in 2019 (Basel Action Network [BAN] and International Pollutants Elimination Network [IPEN], 2019) and, that same year, new listings to begin to control the trade in plastic wastes were adopted for the first time.

As the Basel Convention lies at the heart of efforts to stem the tide of problematic waste trade and control that which remains legally acceptable, it is important to begin our journey with a comprehensive understanding of the Basel Convention, how it works, and how it applies to the trade in plastic waste.

The Basel Convention

While the Basel Convention was considered a disappointment by most developing countries in its original iteration, it has now, after more than 30 years, realized much of its promise. It now provides the legal framework to control and provide transparency for most hazardous wastes. It now bans the most egregious forms of cost externalization and injustice caused by the transboundary movement of wastes. Indeed the Convention can now be declared as the most significant instrument for global environmental justice in existence and considered as providing the basic rules of the road for those that might confuse the "circular economy" with a circulation of global waste. What does it do and how does it work?

Soft Law: General Obligations

After laying out definitions and scope in Articles 1–3, Article 4 of the Basel Convention lays down its vital general obligations. Parties are bound to honor these principles but as they are "general obligations" for the Parties, it is unlikely anybody will be prosecuted directly for ignoring them. Nevertheless, they form the basis for the Convention's reason for being and help shape national policy and legislation for what are, as of this writing, 191 Parties. The most important of these obligations on Parties are summarized as follows:

1. The generation of hazardous and other wastes shall be reduced to a minimum (Art. 4, 2, a).
2. Parties shall seek to ensure that they each can manage their own wastes (national self-sufficiency principle) (Art. 4, 2, b).
3. Parties shall minimize transboundary movements of wastes (Art. 4, 2, d).
4. Parties will maintain and ensure environmentally sound management of wastes at all times (Art. 4, 2, c, d, e, and g).

Environmentally sound management (ESM) is defined as "taking all practicable steps to ensure that hazardous and other wastes are managed in a manner which will protect human health and the environment against the adverse effects which may result from such wastes."

Hard Law: Scope and Trade Controls

The Convention also provides for what must happen if waste trade can not be minimized and must occur under its strict trade rules – the violation of which for persons within the jurisdiction of Parties is considered illegal traffic and a criminal act. These rules first define "hazardous" and "other wastes," which together comprise the full scope of what materials are controlled under the Convention. Hazardous waste is defined by being on Annex I unless it can be demonstrated that the materials do not possess an Annex III characteristic (Article 1, 1, a). Alternatively, they can be defined nationally by any Party declaring an additional waste as hazardous (Article 1, 1, b). "Other" waste is a term of art and are "wastes requiring special consideration," which may or may not be hazardous but are all listed in Annex II (Article 1, 2).

"Hazardous and other wastes" alone are subject to strict controls on their transboundary movement and management. Any wastes that are not hazardous or other wastes are considered nonhazardous wastes and are not subject to Basel control. The controls mentioned place trade and management obligations on all Basel Parties and persons within their jurisdiction. These obligations range from strictly adhering to the prior informed consent (PIC) notification scheme (Article 6) to full trade prohibitions. The key hard law obligations of the Basel Convention are noted as follows along with the indicated primary trade control measure imposed (in bold):

- No Export to Parties banning Import: Parties shall not permit the export of controlled wastes to Parties that have prohibited their import (Art. 4, 1, a and b). **(Ban**)
- No Export without Prior Consent: Parties shall not permit the export of controlled wastes to Parties that have not first consented to their import (Art. 4, 1, c) by the prior informed consent mechanism described in Article 6. **(PIC)**
- Party to non-Party Ban: Parties shall not permit the export of controlled wastes or import controlled wastes to or from a non-Party except through a valid Article 11 agreement (Art. 4, 5). **(Ban)**
- No ESM Ban: Parties shall not permit the export or import of controlled wastes if there is reason to believe it will not be managed in an environmentally sound manner (Art. 4, 2, e and g). **(Ban)**
- No export without shared information and proper packaging: Information as to the nature of the controlled waste and its proposed management will be shared before any transboundary movement can take place (Art. 4, 2, f and Art. 4, 7). **(Ban)**
- Additional controls respected: Parties may impose additional controls, and these must be respected by other trading Parties (Art. 4, 11). **(other)**
- No export to Antarctica: Parties must not export controlled wastes to Antarctica (Art. 4, 6). **(Ban)**
- Basel Ban Amendment: Parties that have ratified the Basel Ban Amendment or became Parties to the Convention after the amendment entered into force, which are listed in Annex VII (OECD, EU, and Liechtenstein), shall prohibit all

transboundary movements of hazardous wastes for operations listed in Annex IVa (final disposal) and for wastes referred to in Article 1(1)(a) for operations listed in Annex IVb, (recovery operations) to States not listed in Annex VII (e.g. developing countries).

Below we further highlight and elaborate on two of the aforementioned bans and discuss the related matter of Article 11 agreements.

Party to Non-Party Ban and the Case of the United States

As noted above, Parties are not allowed to trade hazardous or other wastes with non-Parties to the Convention unless a valid bilateral or multilateral Article 11 agreement is in place. As further explained below, to be valid, the Article 11 agreements must provide an equivalent level of control to that of the Basel Convention.

Many of the current problems in global governance of waste trade stem from the fact that the United States, the world's most wasteful country per capita, is not Party to the world's only global waste treaty – the Basel Convention. The United States is the only developed country that has failed to ratify the Convention and is only one of two signatories (those that signed the final act in 1989 indicating intent to ratify) that have failed to ratify it. The other is Haiti. Among all nations, there are only a handful of UN countries in the world that have failed to ratify Basel. As of June 2023, there are 191 Parties with but 5 UN member states that remain as non-Parties. The remaining non-Parties include East Timor, Fiji, Haiti, South Sudan, and the United States.

As the United States is a major generator and trader of Basel-listed wastes, and so much of the rest of the world are Parties, the Party to non-Party trade ban means that in the absence of a special agreement described by Article 11 of the Convention, the 191 Basel Parties cannot trade (export or import) controlled wastes with the United States. This creates significant incoherence as there is nothing in the law, national or international, that prohibits the actors in the United States from exporting Basel-controlled wastes to Basel Party countries, even while those waste exports, once on the high seas and heading toward a Basel Party, must be considered illegal traffic under the terms of the Convention as any importer will violate the Party to non-Party ban.

Illegal traffic is a criminal act according to Basel (Article 4, 3), but due to the United States not being a Party, such perpetrators can only be prosecuted in the Basel Party state – not in the exporting state – the United States. In practice, this is problematic as the best and most efficient place to enforce trade controls is in the exporting state where the criminal traffic can be prevented in the first place. Few countries in the world have the capacity to monitor their ports sufficiently enough to discover all incoming illegal traffic, and of course, by then, such discoveries are too late to be able to properly prosecute and require repatriation, compensation and the application of extraterritorial accountability or enforcement.

As a result, far too many private operators in the United States regularly export controlled plastic and other wastes with impunity, and the US government will not act to ensure that activities of their citizens will not aid and abet the violation of the laws of the 191 Basel Parties in the global neighborhood of the United States.

The Basel Ban Amendment (Article 4a)

In December of 2019, the Ban Amendment, which was adopted first as a decision in 1994 (Decision II/12) (Puckett & Fogel, 1994) and 1 year later as an amendment proposal in 1995 (Decision III/1), finally entered into force and is now part of the Convention text (Article 4a). The Ban Amendment is the ban most of the Parties originally wanted back in 1989 when the treaty was first negotiated. It is a full ban on the export of hazardous wastes for both final disposal and for recycling, from those Parties listed in Annex VII that have ratified the amendment to all Parties not listed in Annex VII. Annex VII consists of member states of the OECD, the EU, and Liechtenstein. The Ban Amendment also logically applies to trade from Annex VII countries that have not ratified the Amendment to those Annex VII countries that have ratified it (BAN & IPEN, 2019). The Basel Ban Amendment had a significant effect on the global waste market even before its entry-into-force, due largely to the fact that the European Union implemented it in their waste shipment regulation in 1997. Currently 103 Parties out of 191 total Basel Parties have ratified Decision III/1 – new Article 4a.

Further, and of great importance to plastic wastes, the 27 member states of the European Union have implemented the Basel Ban in a manner that also adds Basel Annex II wastes. This then includes a prohibition on exporting not only hazardous plastic wastes but Y48 Annex II plastic wastes as well (see below).

The Basel Convention and Plastic Waste

Prior to 2019, most Parties of the Basel Convention never considered plastic waste to be "hazardous" or regarded as "other" waste and thus subject to Basel controls. If a Party had ever considered that plastics, in fact, might be hazardous by virtue of its Annex I and Annex III materials and characteristics (e.g., due to its containing hazardous additives), this could have been declared but, in practice, was not.

Greenpeace, in the mid 1990s, pressed for polyvinyl chloride (PVC) scrap to be considered hazardous waste due to it being listed on Annex I as Y45 (organohalogen compounds) and possessing certain hazardous characteristics such as H13 (e.g., when burned to create dioxins or by off-gassing vinyl chloride after landfilling). However, in response to this proposal, the plastics industry entered the Convention meetings in force and lobbied Parties heavily against the listing proposal. The resulting impasse led the Convention, which was at the time formulating the A (Annex VIII) and B (Annex IX) lists corresponding to hazardous and nonhazardous wastes, respectively, to punt on the decision by placing PVC as the sole entry on a new "C" list which was characterized as an "undecided, pending further investigation" list. This C list, which only had PVC on it for a short time, has been long forgotten today.

Annex II wastes, while including "wastes collected from households" (Y46), might have been used to control plastic waste with the argument that significant

amounts of plastics are collected from households as wastes, but to our knowledge, this listing has never been used to control plastic waste. Likewise, the enigmatic listing Y13, "wastes from the production, formulation, and use of resins, latex, plasticizers, glues, and adhesives," might describe plastic wastes, however indirectly, but it too was, to the best of our knowledge, never used in controlling trade in plastic waste.

The Basel Plastic Waste Amendments: Impetus

This plastics gap within the Convention's implementation all changed at the 14th Conference of the Parties held in Geneva in May of 2019. In advance of this meeting, Norway floated a proposal for three new listings for plastic wastes. One of which, for the first time, would place a large set of commonly generated plastic waste types under the Basel control procedure whether hazardous or not. This became the now-famous new "other" waste listing on Annex II – Y48 which describes most of the traded plastic wastes today. Norway found great support for these amendments for two reasons.

First, there was a growing concern over plastic pollution in the marine environment (Fig. 3). By now, most of us have heard of the plastic gyres in the oceans and have imagined our oceans becoming host to massive swirling floating swamps of

Fig. 3 Greenpeace together with the Break Free From Plastic coalition conducted a beach cleanup activity and plastics brand audit on Freedom Island, Philippines, in 2017. (© Daniel Müller/Greenpeace)

plastic debris. How many of us have not bemoaned plastic wastes that we see washing up in our favorite local or holiday beach destinations? How many of us have not heard the statistic that by 2050 there will be more plastic than fish in the sea? Plastic waste is currently estimated to make up 80% of all marine pollution, with about 8–10 million metric tons of plastic finding their way to our oceans each year (Wearden, 2016).

The second driver for the new amendments arose from the increasingly common, yet ugly images of imported plastic wastes piled high and too often burning in Southeast Asian or Turkish fields outside of hastily erected recycling factories (Global Alliance for Incinerator Alternatives [GAIA], 2019). Up to this point, the developed world had largely been finding refuge for most of its plastic refuse arisings in China – the destination for mixed wastes derived either from municipal waste processing facilities known as MRFs (materials recycling facilities) or business waste arisings such as packaging waste, manufacturing off-spec production wastes or factory cut-aways. For decades China had accepted most of the industrialized world's plastic wastes in massive amounts. It is estimated that prior to the Chinese ban, about 429 large-size shipping containers arrived each day in China from the United States alone (Rapoza, 2020). Even more containers, each day, arrived also from Europe, Canada, Australia, Japan, and New Zealand.

The recycling that occurred in the many plastic waste villages in China was rudimentary and partial – with operations that resulted in severe pollution and public health impacts. Such concerns were documented for the first time in the independent Chinse film "Plastic China" (Zhao, 2017; Fig. 4). Shortly after the Chinese airing of the film, it was banned and erased from the Internet. Then, very shortly thereafter, China suddenly decided to ban all imports of plastic waste/scrap unless the shipments achieved levels of 99.5% purity – considered tantamount to a full ban in commercial terms. In March 2018, this new policy under the name of "National Sword at the Gate" or more commonly "National Sword" was adopted (Watson, 2018). And importantly, prior to implementing the National Sword policy, China

Fig. 4 Promotional still from the film "Plastic China," official website of Plastic China. Link: https://www.cnex.tw/plasticchina

had created a veritable army of customs agents to enforce it, making the decree far more than a typical paper tiger. China customs has a total of 580 customs houses or offices and nearly 4000 customs clearance control stations and total agents numbering 50,000 persons (GACC, n.d.). The sudden regulatory wall erected by China, unlike the weak e-waste bans initiated in earlier years, was "a solid one" and worked to create a massive disruption in the global waste market, which in effect resulted in a tidal wave of plastic waste "bouncing" off this wall, rebounding in new final resting places.

The new global dumping grounds for the developed world's waste following the Chinese rejection were hard to hide and soon became visible and well-known. As the Chinese brokers and businessmen got shut down by governmental edict, they simply picked up their plastic waste recycling businesses and shifted them to Thailand, Vietnam, Malaysia, and Indonesia. Chinese operators cut deals with local governments in South and Southeast Asian to buy, lease and permit land for the recycling of plastics, electronic wastes, or both. Small factories with large enclosures began springing up all over rural, agrarian areas of these countries or in so-called free-trade zones. The new facilities were largely a replication of the old ones in China, fraught with the same problems of pollution from the dumping, burning, and melting of plastics (GAIA, 2019). Many of these were not properly permitted by the national government and fell under the radar of national authorities (Wong, 2021). Meanwhile a similar phenomenon occurred in Eastern Europe and Turkey for European plastic wastes.

Media reports of the new plastic waste destinations following National Sword created a new wave of controversy and shame and led to numerous media stories, with on-again, off-again crackdowns in Malaysia, Thailand, Turkey, and Poland. Images of European, North American, and Australian labels on plastic packaging waste hastily and impartially sorted, dumped, and burned in these new dumping grounds projected an image of an out-of-control plastic waste market and grabbed the attention of governments and citizens around the world. It was this reporting, combined with the tragedy of plastics in the marine environment, that helped create the desire to do something globally significant and as a matter of urgency on the plastic waste crisis.

Serious discussions soon got underway in numerous international fora, in particular at the United Nations Environmental Assembly (UNEA), where a call for a global treaty on plastic waste began to emerge. By the UNEA 4 meeting in March of 2019, there was considerable momentum, but that meeting failed to find a critical mass of countries willing to seize the opportunity to address plastic pollution with a new legally binding instrument (Break Free From Plastic, 2019).

Norway, among other countries, realized that while a global treaty would be a good idea, it would, in any case take a long time and until then, a lot could be done with existing instruments – especially via the Basel Convention, the world's only global treaty specifically addressing wastes, their trade, and management. In Basel, the global community of nations had a treaty already in force, with excellent global coverage (191 Parties as of this writing) and with the possibility of rapid adoption

of amendments to annexes (where the waste listings are found) achievable by a tacit consent and not a full-fledged, time-consuming textual ratification process.

Norway seized the opportunity. In consultation and support from key Parties such as the EU, China, Japan, and many developing countries, they proposed a new package of three amendments to the Basel Convention waste lists in Annexes II, VIII, and IX respectively. At Basel's 14th Conference of the Parties (COP14, September 2019), while the shrill minority of Argentina and the United States, thought to be doing the political bidding of large industrial lobbies, complained vociferously, the amendments, after just some slight weakening of the original proposals, were adopted by consensus in decision BC/14/12.

The Basel Plastic Waste Amendments Explained

The amendments' success, reflected by their rapid adoption, was made possible by a clever tactic on the part of Norway, which allowed the Parties to avoid much of the debate as to whether and which plastic wastes should be determined to be hazardous or not.

Under the Convention, most of the controlled wastes are classified as hazardous wastes, and these are defined by Annexes I and III and elaborated more fully in Annex VIII. These are controlled with the default procedure of prior informed consent (PIC) or are sometimes subject to a ban. However, there is a lesser known group of wastes, the "other wastes," found in a stand-alone Annex II. The title of Annex II is "Categories of Wastes Requiring Special Consideration," and these are also subject to the PIC procedure under the Convention. Historically, the Annex was created because the United States, during the original treaty negotiations, could not abide by the hazardous waste designation supported by the rest of the delegations, for certain waste streams that were not so defined under US national law. They all agreed, nevertheless, that they could or should be controlled under the PIC procedure as long as they were not referred to as hazardous. Thus, Annex II was created and originally only contained two listings: Y46 (wastes collected from households) and Y47 (residues arising from the incineration of household wastes).

The crux of the Basel plastic amendments lies in the creation of a third Annex II listing – now listed as Y48. This listing is far more complicated than the usual waste listings and could not be reflected in just one line of text as is the norm in the Convention (e.g., Y46 and Y47), but rather, Y48 takes two pages to define in the newly published edition of the Convention.

The placement of the new plastic waste definition in Annex II means that the plastic waste in this category will normally be subject to the same controls as hazardous waste under the Convention (prior informed consent) with the exception that it will not normally be controlled under the Basel Ban Amendment (new Article 4a), which bans the export of hazardous wastes (Annex VIII) from moving from Basel Annex VII countries to non-Annex VII countries – that is, unless countries decide to include Annex II in their implementation of the Basel Ban Amendment as has been done by the European Union.

So, by avoiding a fractious debate experienced years ago over PVC as to whether plastics were hazardous or not, Norway was able to find support to achieve mostly equivalent levels of control as those for hazardous wastes for a large category of problematic plastic wastes under the new Annex II listing Y48 – "wastes requiring special consideration."

Completing the package of the three amendments, which together are meant to encompass all plastic wastes, are the listings for hazardous plastic waste (A3210) and nonhazardous plastic waste (B3011). Below we expound on how in fact the three categories fail to cover all plastic wastes.

A3210: Hazardous Plastic Waste

A3210 reads as follows:

> Plastic waste, including mixtures of such waste, containing, or contaminated with Annex I constituents, to an extent that exhibits an Annex III characteristic (note the related entries Y48 in Annex II and on list B B3011).

Such wastes were actually already covered by the terms of the original Convention, before the Amendments, as the above wording is simply a restating of the blanket (Article 1, 1, a) – global definition of hazardous wastes found in the Convention:

> [a] Wastes that belong to any category contained in Annex I, unless they do not possess any of the characteristics contained in Annex III.

However, despite the fact that the concept of control of hazardous plastic waste has been in the Convention since its inception, this did not mean that Basel Parties had ever controlled it, nor clearly defined which plastic waste streams fell under A3210. Many questions still arise as to whether hazardous additives which are routinely added to polymers will qualify plastic wastes as A3210. That is, while we know the additives are in plastics, the Convention has not provided guidance on when they exhibit hazardous characteristics.

Perhaps the greater question is, in the absence of actual knowledge of what the chemical composition is of a given shipment of collected plastic waste, which is almost always the case, should it not always be considered as presumptively hazardous? After all, the wording of the Convention found in Article 1, 1, a establishes a rebuttable presumption that the waste will be hazardous "unless they do not possess…." Meaning that wastes are presumed hazardous if they appear on Annex I, and can only be considered nonhazardous by being shown to not possess one or more of the hazardous characteristics listed in Annex III. Thus, parties should presume untested or unverified plastic wastes are hazardous. Application of Article 1, 1, a should mean, then, that loads of mixed plastics derived, as they usually are, from a variety of products and sources, all with differing additive ingredients, must be presumed hazardous until proven otherwise. Today, this interpretation is *not* being applied, and mixed plastics are assumed to not be hazardous even when we do not know that to be the case, turning the rebuttable presumption obligation of the Convention on its head.

So far, the little work that has been done to define which traded plastic wastes are A3210 can be found in the newly adopted Basel Plastic Waste Guidelines (United Nations Environment Programme [UNEP], 2023) and in the European Union Correspondent's Guidelines #12 (European Commission, 2021). But while these (shown below) are a good start, they fail to indicate a practical way to assess the hazardous content of shipments of traded plastic wastes.

From EU Correspondent's Guidelines #12:

> 15. It is noted that additives, such as fillers, plasticisers, stabilizers, colorants and flame retardants, are usually part of plastics. The presence of certain additives in plastic waste, such as brominated flame retardants that are persistent organic pollutants or lead or cadmium in PVC, may lead to a classification of the plastic waste in question as hazardous waste and covered by entries A3210 or AC300.

The phrase here "may lead to" is unhelpful. This head-in-the-sand approach is not only found within the province of the EU.

In the Basel Plastic Waste Technical Guidelines, we find the following text:

> 28. The addition of hazardous additives or processing aids has the potential to render plastic waste hazardous, difficult to recycle or not suitable for recycling. A recent analysis of the global governance of plastics indicates that 128 chemicals of concern used in the plastics life cycle are currently regulated by existing multilateral environment agreements, such as additives, processing aids and monomers and non-intentionally-added substances. (BRS, 2023; UNEP, 2023)

Again, the phrase "has the potential to" is lacking in real guidance. With only weak suggestive remarks such as these to embolden them, all Basel Parties remain blissfully, perhaps, but illegally ignorant, to the fact that plastic wastes, even those shipped as a sorted single polymer, are likely to trigger the definition of hazardous waste and shipped as A3210. But the norm is that these plastic wastes are not analyzed or otherwise assessed for the presence of hazardous substances, and thus the presumption of hazardousness is not rebutted, and yet are allowed to be shipped as Y48 or even B3011.

B3011 Nonhazardous Plastic Waste

The second category of the Basel plastic amendments triad is the nonhazardous and non-Annex II plastic wastes. These B3011 plastic wastes are those that the Basel Convention will not control and can be generally, but not absolutely, characterized as nonhazardous, unmixed, uncontaminated, single polymers, cured resins, or condensation products, and are nonhalogenated excluding a finite list of fluoropolymers, all of which must be destined for recycling and not for final disposal or waste-to-energy destinations.

The listing has been drawn in part from the older plastic waste listing (B3010) created in 1998 with some additional refinement. With one exception, the plastic waste must be single nonhalogenated polymers, cured resins, or condensation

products and cannot be mixed. The one mixture allowed as an exception in order to streamline the trade in polyethylene terephthalate (PET) bottles which are typically closed with a polypropylene (PP) cap and wrapped with a polyethylene (PE) label. Thus, the combination of PP, PE, and PET can be considered as an exception to the single compound rule, as long as these three polymers are recycled separately at their final destination. All other mixed plastic types other than a mix of PP, PE, and PET will be considered either A3210 or Y48. Likewise, all contaminated (see below) plastics will also be either A3210 or Y48.

B3011, somewhat illogically, also continues to list some fluorinated polymers from the old listing (while halogenated polymers are pointedly excluded in B3011). But the listing does require that all B3011 plastic waste be recycled via an Annex IV R3 destination (recycling only but not via waste-to-energy), and it must be done so in an environmentally sound manner.

The primary problem with the actual implementation of the B3011 listing, as noted above, is that most shipments of plastics are collected from a variety of sources and without comprehensive chemical analysis. Thus, it is usually not the case that there is knowledge to ensure that the additives and other contaminants in the load of supposed B3011 plastic wastes are nonhazardous or nonhalogenated (e.g., with brominated flame-retardant additives). And such analysis is usually cost-prohibitive. The Basel Convention is meant to be based on the notion of "rebuttable presumption," with wastes presumed to be hazardous if they are listed on Annex I unless you can rebut that presumption by showing that they do not possess a hazardous characteristic on Annex III. But if you cannot rebut due to a lack of information, then the default conclusion should be that the waste in question is presumed to be hazardous. As this situation is far from theoretical, due to the wide range of hazardous additives in use and the lack of transparency as to what these might be in any given shipment, a strong case should be made that most plastic waste shipments should now be considered hazardous. But this is not the case in practice. Exporters rather simply claim that the export is B3011 or Y48 with no supporting documentary proof.

Y48: Halogenated, Mixed, Incinerated, or Contaminated Plastics

Notwithstanding the "hidden and forgotten plastics" noted in the final section of this chapter, Y48 can be considered the catchall of the three listings as it includes all plastic waste that is neither designated as hazardous (A3210) nor as nonhazardous (B3011). Due to the lack of implementation and enforcement of hazardous plastics (A3210) currently and the fact that historically nonhazardous plastics have been given carte blanche (no controls) despite the lack of proof of nonhazardousness, the most significant new regulatory development embodied by the amendments today is the new classification of Y45. Y48 can be broadly characterized as those plastics that, while they may not be hazardous per se, are likely to be poorly recycled or not recycled safely and efficiently and, therefore, are likely to cause harm after transboundary movement. The primary outlined characteristics of Y48 are as follows:

1. Contaminated Plastic Wastes: The Convention did not provide a concentration limit for allowable contamination but has used strong language: "almost free from contamination and other types of wastes," and "almost exclusively consisting of." Parties around the world have since interpreted this language (BAN, 2023b) at a national level. Most significant in this regard is the European Union's level of allowable contamination at 2% or less by weight for exports out of the EU and 6% within (European Commission, 2021).

The contamination levels applied by the EU and others are important because most of the plastic waste currently traded is likely to be contaminated at concentration levels greater even than 6%. In 2016, California conducted a bale study of plastic wastes collected from households and small businesses and separated at materials recovery facilities (MRFs) (CalRecycle, 2016). The study showed contamination levels for PET bottles at 14.1% and colored HDPE bottles at 11.1%.

Another large source of plastic waste is agricultural film. An EU study recently found that the average level of contamination in agricultural film is 30–40% (Hann et al., 2021).

Sources of plastics from postconsumer appliances, electronics, and automobiles which are often shredded prior to attempts at sorting and recycling (such as car shredding and electronic waste shredding operations) are also rife with contamination. This contamination is not only from other plastics which, as noted below, create polymer mixtures but also at times metals, paper, wood and other materials.

2. Mixed Plastic Polymer, Cured Resins, or Condensation Product Wastes (With One Exception): If plastic types are mixed, the shipment qualifies as Y48 with the one exception being the mixture of PET, PE, and PP which is exempt from control if each of these polymers is separated and recycled upon arrival in the importing country. There is reason for concern about whether the required separation and subsequent recycling of all three polymers are currently taking place as the market for PP and PE recyclate is limited and enforcement of the new Basel Amendments is weak in most parts of the world.

But PET bottles aside, wastes collected from households and small businesses in municipalities around the world are mixed at source, primarily from the many types of packaging employed today. While MRFs are designed to try to separate the types of plastic, such separation is far too difficult to accomplish completely for all polymers entering the waste stream.

Further, there are many end-of-life consumer products that generate large volumes of mixed plastic wastes. These include wastes from end-of-life automobiles and electronic appliances and information technology. Taking the case of consumer electronics, about 40% is plastic by weight but utilizing many different types of polymers in the same products. Yet, the e-cycling industry has never been required to separate the heterogenous mixtures of the many different plastics used in electronic equipment. These plastics commonly include high-impact polystyrenes (HIPs) 14%, ABS 17%, polypropylene (PP) 12%, ABS-polycarbonate (PC) blend or PC 12%, plastics with BFRs 9%, ABS with BFRs 3%, polyethylene (PE) 1%,

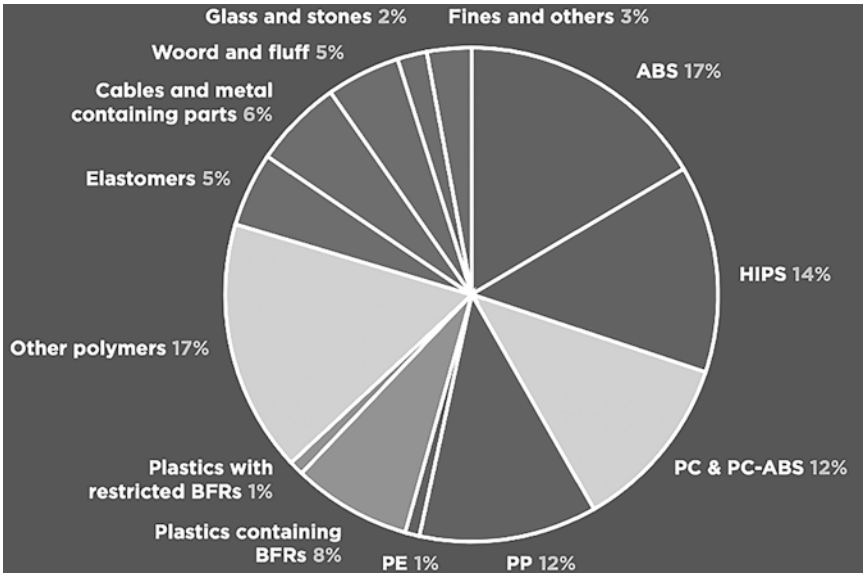

Fig. 5 What is in WEEE (e-waste) plastics

other polymers 17%, and elastomers 5% as noted in Fig. 5 (European Electronics Recyclers Association [EERA], 2022).

The methods for separating these plastics that might be shredded or removed from the electronics by hand, typically involve float-sink technologies utilizing immersion in tanks of saline solutions of differing densities. While these systems if used back-to-back and combined at times with electrostatic separators, theoretically can separate all the polymers found in e-waste, such operations are messy, difficult, and expensive and can only be justified if there is a lucrative market for each of the separations (which currently there are not). This means that much of the e-waste plastic that has been run through multiple float-sink tanks will remain mixed or contaminated and remain classified as Y48. The inability to turn electronic waste plastics into single polymers has created a serious economic market disruption in the United States, where there are few viable plastics separating and recycling industries and the export of Y48 is illegal due to the Party to non-Party (USA) ban in the Basel Convention (discussed previously).

3. Halogenated Polymers (Not already Listed in B3011): Both the Y48 and B3011 (nonhazardous) listings stipulate that plastic polymers must be separated, free from contamination, and nonhalogenated if they are to escape Basel controls as B3011. The exception to this is a specific list of fluorinated polymers consisting of perfluoroethylene/propylene (FEP), perfluoroalkoxy alkanes, tetrafluoroethylene/perfluoroalkyl vinyl ether (PFA), tetrafluoroethylene/perfluoro methyl vinyl ether (MFA), polyvinyl fluoride (PVF), and polyvinylidene fluoride (PVDF).

Halogenated polymers refer to polymers containing halogen elements such as fluorine, chlorine, bromine, and iodine. These elements are often introduced into polymer molecules through substitution or addition reactions. The main purpose of halogenation is to change the properties of a chemical to change and define its performance as a material. And yet they typically introduce toxicological impacts both acute and chronic, due to the few possibilities in nature of forming halogenated hydrocarbons and thus allowing natural species to develop immunities to the compounds. For use in polymers, a well-known example of halogenation by design is the feature of flame retardancy such as in brominated flame retardants (BFRs) that are often added to plastics (BOC Sciences, n.d.).

Other common halogenated polymer wastes also include waste PVC, as well as PFTE or poly-fluorinated tetra-ethylene wastes. PFTE is the chemical behind Teflon, the once popular nonstick product used in cookware that is causing concern globally today as being ever-present and everlasting in the environment. Halogenated plastic polymers are also widely used in making paints, semiconductors, and medical devices and products.

PVC waste is widely traded, often in violation of the newly established controls. And PVC waste trade is more easily tracked than many plastic wastes as it carries its own Harmonized Tariff Schedule (HS) code: HS39153. BAN observes many illegal exports of PVC wastes through scrutiny of Comtrade data or from subscriber-based trade data services (e.g., Panjiva or Datamyne). Examples of these are shown in Figs. 6, 7, and 8 and include shipments of PVC from the United States to Asian countries or to Mexico which should be subject to the prohibition between trade between Parties and non-Parties. BAN has also seen PVC waste exports from the EU which are also illegal as Y48 exports to non-OECD countries are illegal by virtue of Europe's export ban placed in their Waste Shipment Regulation.

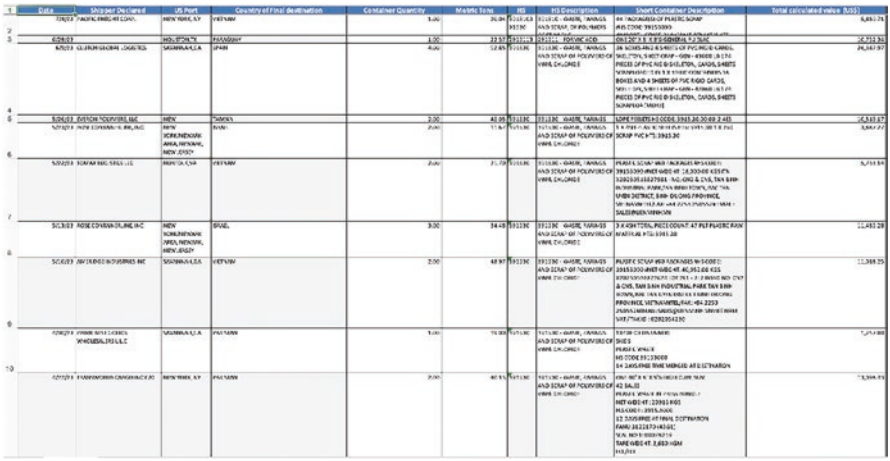

Fig. 6 Exports of Y48 PVC wastes from the United States to Basel Parties all of which are illegal unless destined for Canada. (Source: BAN analysis of shipping data from Datamyne via Material Research L3C)

	Date	Declarant	Country of Destination	HS Code	FOB Value (USD)	Net Weight (Kg.)	Unit Value FOB (USD)	Region of Destination	Full HS Description
1	5/5/23	W.HEARY	UKRAINE	3915.9000	4,891.98	90,244.00	0.05	OUTSIDE EU	PLASTICS AND ARTICLES THEREOF; WASTE, PARINGS AND SCRAP, OF
2									
3	5/5/23	FINLAND	SERBIA	3915.9000	32.60	2.00	16.30	OUTSIDE EU	PLASTICS AND ARTICLES THEREOF;
4	5/5/23	SPAIN	PAKISTAN	3915.9000	4,567.82	46,720.00	0.10	OUTSIDE EU	PLASTICS AND ARTICLES THEREOF; WASTE, PARINGS AND SCRAP, OF PLASTICS; OF POLYMERS OF VINYL CHLORIDE;
5									
6	4/5/23	W.HEARY	UKRAINE	3915.9000	9,183.51	154,662.00	0.06	OUTSIDE EU	PLASTICS AND ARTICLES THEREOF;
	4/5/23	SPAIN	PAKISTAN	3915.9000	9,078.21	93,890.00	0.10	OUTSIDE EU	PLASTICS AND ARTICLES THEREOF; WASTE, PARINGS AND SCRAP, OF PLASTICS; OF POLYMERS OF VINYL CHLORIDE;
7	3/5/23	W.HEARY	UKRAINE	3915.9000	10,701.76	117,770.00	0.09	OUTSIDE EU	PLASTICS AND ARTICLES THEREOF; WASTE, PARINGS AND SCRAP, OF PLASTICS; OF POLYMERS OF VINYL CHLORIDE;
8	3/5/23	FINLAND	SERBIA	3915.9000	21.41	1.00	21.41	OUTSIDE EU	PLASTICS AND ARTICLES THEREOF; WASTE, PARINGS AND SCRAP, OF PLASTICS; OF POLYMERS OF VINYL CHLORIDE;
9	3/5/23	SPAIN	PAKISTAN	3915.9000	4,507.23	46,780.00	0.10	OUTSIDE EU	PLASTICS AND ARTICLES THEREOF; WASTE, PARINGS AND SCRAP, OF PLASTICS; OF POLYMERS OF VINYL CHLORIDE;
10	2/5/23	W.HEARY	UKRAINE	3915.9000	2,691.44	62,841.00	0.04	OUTSIDE EU	PLASTICS AND ARTICLES THEREOF; WASTE, PARINGS AND SCRAP, OF PLASTICS; OF POLYMERS OF VINYL CHLORIDE;
11	2/5/23	SPAIN	PAKISTAN	3915.9000	8,973.81	93,060.00	0.10	OUTSIDE EU	PLASTICS AND ARTICLES THEREOF; WASTE, PARINGS AND SCRAP, OF PLASTICS; OF POLYMERS OF VINYL CHLORIDE;
12	1/5/23	W.HEARY	UKRAINE	3915.9000	12,757.53	253,018.00	0.05	OUTSIDE EU	PLASTICS AND ARTICLES THEREOF; WASTE, PARINGS AND SCRAP, OF PLASTICS; OF POLYMERS OF VINYL CHLORIDE;
13	1/5/23	FINLAND	SERBIA	3915.9000	10.77	1.00	10.77	OUTSIDE EU	PLASTICS AND ARTICLES THEREOF; WASTE, PARINGS AND SCRAP, OF PLASTICS; OF POLYMERS OF VINYL CHLORIDE;
14	12/5/22	W.HEARY	UKRAINE	3915.9000	20,355.23	213,654.00	0.10	OUTSIDE EU	PLASTICS AND ARTICLES THEREOF; WASTE, PARINGS AND SCRAP, OF PLASTICS; OF POLYMERS OF VINYL CHLORIDE;
15	12/5/22	FINLAND	SERBIA	3915.9000	21.18	1.00	21.18	OUTSIDE EU	PLASTICS AND ARTICLES THEREOF; WASTE, PARINGS AND SCRAP, OF PLASTICS; OF POLYMERS OF VINYL CHLORIDE;

Fig. 7 Exports from EU countries to non-OECD countries of Y48 PVC, all of which are illegal. BAN analysis of shipping data from Datamyne via Material Research L3C

	Date	Country of Origin	Customs	Transport Method	HS Code	Quantity	Unit	FOB Value (USD)	HS Description	Full HS Description
1	2/1/23	UNITED STATES	TIJUANA, B.C.	ROAD	3915300100	430,170.87	KILOGRAMS	69,464.84	WASTE, PARINGS AND SCRAP, OF PLASTICS. OF POLYMERS	PLASTICS AND ARTICLES THEREOF; WASTE, PARINGS AND SCRAP, OF
2										
3	2/1/23	UNITED STATES	NUEVO LAREDO,	ROAD	3915300100	347,085.13	KILOGRAMS	89,152.99	WASTE, PARINGS AND SCRAP,	PLASTICS AND ARTICLES THEREOF;
	2/1/23	UNITED STATES	CD. REYNOSA, TAMPS.	ROAD	3915300100	474,749.00	KILOGRAMS	41,039.48	WASTE, PARINGS AND SCRAP, OF PLASTICS. OF POLYMERS OF VINYL CHLORIDE OF POLYMERS OF VINYL CHLORIDE	PLASTICS AND ARTICLES THEREOF; WASTE, PARINGS AND SCRAP, OF PLASTICS.; OF POLYMERS OF VINYL CHLORIDE; OF POLYMERS OF VINYL CHLORIDE
4										
5	2/1/23	UNITED STATES	MATAMOROS,TA	ROAD	3915300100	2,001.00	KILOGRAMS	104.03	WASTE, PARINGS AND SCRAP,	PLASTICS AND ARTICLES THEREOF;
	2/1/23	UNITED STATES	CD. JUAREZ, CHIH.	ROAD	3915300100	39,333.92	KILOGRAMS	2,192.61	WASTE, PARINGS AND SCRAP, OF PLASTICS. OF POLYMERS OF VINYL CHLORIDE OF POLYMERS OF VINYL CHLORIDE	PLASTICS AND ARTICLES THEREOF; WASTE, PARINGS AND SCRAP, OF PLASTICS.; OF POLYMERS OF VINYL CHLORIDE; OF POLYMERS OF VINYL CHLORIDE
6										
	1/1/23	UNITED STATES	VERACRUZ, VER.	MARITIME	3915300100	58,450.89	KILOGRAMS	24,130.83	WASTE, PARINGS AND SCRAP, OF PLASTICS. OF POLYMERS OF VINYL CHLORIDE OF POLYMERS OF VINYL CHLORIDE	PLASTICS AND ARTICLES THEREOF; WASTE, PARINGS AND SCRAP, OF PLASTICS.; OF POLYMERS OF VINYL CHLORIDE; OF POLYMERS OF VINYL CHLORIDE
7										
	1/1/23	UNITED STATES	CD. REYNOSA, TAMPS.	ROAD	3915300100	307,746.28	KILOGRAMS	26,505.11	WASTE, PARINGS AND SCRAP, OF PLASTICS. OF POLYMERS OF VINYL CHLORIDE OF POLYMERS OF VINYL CHLORIDE	PLASTICS AND ARTICLES THEREOF; WASTE, PARINGS AND SCRAP, OF PLASTICS.; OF POLYMERS OF VINYL CHLORIDE; OF POLYMERS OF VINYL CHLORIDE
8										
	1/1/23	UNITED STATES	CD. JUAREZ, CHIH.	ROAD	3915300100	44,948.97	KILOGRAMS	2,583.47	WASTE, PARINGS AND SCRAP, OF PLASTICS. OF POLYMERS OF VINYL CHLORIDE OF POLYMERS OF VINYL CHLORIDE	PLASTICS AND ARTICLES THEREOF; WASTE, PARINGS AND SCRAP, OF PLASTICS.; OF POLYMERS OF VINYL CHLORIDE; OF POLYMERS OF VINYL CHLORIDE
9										
	1/1/23	UNITED STATES	NUEVO LAREDO, TAMPS.	ROAD	3915300100	549,758.67	KILOGRAMS	103,580.41	WASTE, PARINGS AND SCRAP, OF PLASTICS. OF POLYMERS OF VINYL CHLORIDE OF POLYMERS OF VINYL CHLORIDE	PLASTICS AND ARTICLES THEREOF; WASTE, PARINGS AND SCRAP, OF PLASTICS.; OF POLYMERS OF VINYL CHLORIDE; OF POLYMERS OF VINYL CHLORIDE
10										
	1/1/23	UNITED STATES	TIJUANA, B.C.	ROAD	3915300100	248,600.00	KILOGRAMS	40,352.46	WASTE, PARINGS AND SCRAP, OF PLASTICS. OF POLYMERS OF VINYL CHLORIDE OF POLYMERS OF VINYL CHLORIDE	PLASTICS AND ARTICLES THEREOF; WASTE, PARINGS AND SCRAP, OF PLASTICS.; OF POLYMERS OF VINYL CHLORIDE; OF POLYMERS OF VINYL CHLORIDE
11										
	12/1/22	UNITED STATES	CD. JUAREZ, CHIH.	ROAD	3915300100	53,944.21	KILOGRAMS	8,126.52	WASTE, PARINGS AND SCRAP, OF PLASTICS. OF POLYMERS OF VINYL CHLORIDE OF POLYMERS OF VINYL CHLORIDE	PLASTICS AND ARTICLES THEREOF; WASTE, PARINGS AND SCRAP, OF PLASTICS.; OF POLYMERS OF VINYL CHLORIDE; OF POLYMERS OF VINYL CHLORIDE
12										
	12/1/22	UNITED STATES	TIJUANA, B.C.	ROAD	3915300100	400,906.19	KILOGRAMS	63,178.18	WASTE, PARINGS AND SCRAP, OF PLASTICS. OF POLYMERS OF VINYL CHLORIDE OF POLYMERS OF VINYL CHLORIDE	PLASTICS AND ARTICLES THEREOF; WASTE, PARINGS AND SCRAP, OF PLASTICS.; OF POLYMERS OF VINYL CHLORIDE; OF POLYMERS OF VINYL CHLORIDE
13										

Fig. 8 Exports by truck from the United States to Mexico of Y48 PVC, all of which are illegal. BAN analysis of shipping data from Datamyne via Material Research L3C

4. Moving to a Non-R3 (Annex IV) Destination: Y48 cannot include any wastes defined by the B3011 listing (nonhazardous plastic waste), and B3011 must only be bound for Annex IV R3 destinations. Thus, one of the reasons that wastes might be considered Y48 is if they are destined for final disposal (e.g., landfilling (D1) or incineration (D10)) or another form of recovery such as waste-to-energy (R1).

While most plastic waste that is traded is ostensibly moving for mechanical recycling, it is very important to reflect that in actual practice, considerable fractions of what moves to mechanical recycling is sorted away from the actual recycling processes for reasons of contamination or inability to economically process certain polymers. These residues and left-overs end up being dumped or burned. In this way, even otherwise nonhazardous B3011 waste must be considered Y48 if any part of the loads meets a final fate of landfilling, incineration, or open burning. And yet this factor is seldom weighed in the prior informed consent (PIC) process for alleged B3011 waste shipments.

Basel Article 11: Uses and Abuses

As noted earlier there can be exceptions to the Party to non-Party ban, defined in the Basel Convention's Article 11. Article 11 states that notwithstanding Basel Article 4, 5, trade between Parties and non-Parties can take place under bilateral or multilateral accords outside of the Basel Convention "provided that such agreements or arrangements do not derogate from the environmentally sound management of hazardous wastes and other wastes as required by this Convention. These agreements or arrangements shall stipulate provisions that are not less environmentally sound than those provided for by this Convention in particular taking into account the interests of developing countries."

The OECD Council Decision

Perhaps the most well-known and widely used Article 11 agreement now in place is the OECD Council Decision on the Control of Transboundary Movements of Wastes Destined for Recovery Operations which has been in force since 1992 and applies to the 38 member states of the OECD (1992).

One clear effect and purpose of the OECD Decision is to enable other OECD members that are Basel Parties to continue trading in hazardous and other wastes with non-Parties for the purposes of recycling. Today, the United States is the only OECD member state that is a non-Party to the Basel Convention. In addition to allowing trade with the United States, the OECD members also wished to streamline the implementation of the Basel PIC procedure. The OECD streamlining includes allowing pre-consented facilities and imposing tacit (assumed) consent for shipments where no consent is forthcoming within a given length of time.

In 2001, the OECD adopted major revisions to their Council Decision to align itself more closely with the Basel Convention concerning the lists of wastes to be controlled (CIEL, 2009). Today, the OECD Council Decision and its lists of wastes – the controlled (amber listed) and not controlled (green listed) wastes – continue to largely replicate the Basel Convention's listings of wastes controlled (hazardous and other wastes found in Annex VIII and II) and those that are not controlled (Annex IX).

Under the terms of the OECD Council Decision, the default procedure is to automatically accept new Basel classifications into the corresponding list (e.g., amber or green). However, if a member objects to the automatic incorporation of new Basel listings, it is subject to a formal procedural debate and a final decision. This procedure is important for our discussion on plastic waste trade because this is precisely what happened on July 3, 2019, when the United States objected to the new Basel plastic waste listings being adopted in the OECD Council Decision and proposed that the status quo be maintained (CIEL, 2020) – that is, that a free trade in all plastic wastes destined for recovery purposes within the OECD be retained with the exception of hazardous plastic waste (A3210). The new global listings Y48 and B3011 would be ignored for trade in plastic waste for recycling within the OECD bloc.

While the United States argued at the OECD against adopting the new controls on plastic waste, it failed to persuade any other OECD member states to accept this interpretation. The US proposal would have served as largely a denial of the new Basel Amendments but was rebuffed by the rest of the OECD.

As all OECD member states are Basel Parties (other than the US), they knew their Basel obligations could not be legally ignored as an Article 11 agreement (see language above) does not allow for such a major derogation of simply not controlling a new Basel-controlled waste. So in the absence of a consensus to accept the Basel Amendments (as the United States disagreed), the OECD Decision currently does not include the new listings B3011 (nonhazardous plastic waste) nor Y48 (plastic waste for special consideration).

This leaves only "hazardous" plastic waste (A3210) as a legally traded plastic wastes between OECD countries using the OECD Article 11 agreement. All OECD countries must otherwise control such waste (Y48 and B3011) "according to their domestic and international laws," meaning that OECD members other than the US must apply Basel and national controls to the transboundary movement of plastic wastes Y48, and nobody can trade in Y48 at all with the United States other than A3210. In sum, all Basel Parties are prohibited from trading any Y48 plastic wastes with the United States except for Canada which, signed a legally dubious arrangement with the United States (see Canadian Plastic Waste Arrangement below).

Sadly, trade data deposited in the Comtrade datasystem demonstrate that many Basel Parties both OECD and non-OECD are currently accepting Y48 plastic wastes from the United States (see charts). Such trade is defined as illegal traffic under the Convention and a criminal act.

Article 11 Abused to Perpetuate Free Trade in Plastic Waste

Following the adoption of the new plastic amendments, certain OECD member Basel Parties, even after publicly supporting the amendments during the COP14 negotiations in Geneva, moved thereafter to undermine these new controls on

plastic wastes. The avenue they believed was available to them to do this was Article 11. BAN (2023a) published a report on the misuse of Article 11, in which we revealed three cases of illegal Article 11 application. The report's findings are summarized as follows:

While Article 11 was always meant to condone side agreements that were roughly equivalent to Basel controls to ensure that trade with non-Parties could take place, particularly in the years prior to widescale ratification, it was never meant to institutionalize agreements weaker than the Basel Convention. This is very clear from the text of the Article. And yet in the three cases outlined, this requirement has been ignored.

Three cases identified by BAN either provide no control or far less control over the new plastic wastes that is meant to occur under Basel, or they operate as if the OECD accord was in force for all plastic waste trade, when it is not.

The European Union and EEA Double Standard The EU has failed to properly implement the new amendments for that trade between Basel Parties within the European Economic Area (EEA). This is currently the case, and the newly proposed revised waste shipment regulation now readied for adoption following the trilogue procedure, also fails to provide equivalent level of control and continues to allow certain Y48 plastics controlled by the new Basel plastic amendments to be freely traded between the EU-European Free Trade Association (EFTA) member states making up the EEA. Unfortunately, the final text retained the illegal use of Article 11 and allowed the EEA to derogate from the Basel Convention allowing the European states from fully adopting what was agreed at Basel with respect to plastic waste controls.

Canadian Plastic Waste "Arrangement" with the United States Shortly before the entry-into-force of the Basel plastic amendments in late 2020, the United States and Canada declared a "nonlegally binding arrangement" as an Article 11 agreement, which according to the two countries allows Canada to freely trade with a non-Party (United States) those newly controlled plastic wastes under the Convention. This "arrangement" completely ignores the 2019 Basel plastic waste amendments and the most basic Article 11 requirements for equivalent levels of control. If it is allowed to stand, Canada will be able to continue to completely ignore the new plastic amendments in their plastic waste trade with the United States.

Mexico Invokes the OECD Council Decision to Trade Plastic Waste with the Non-Party United States Mexico has recently declared in letters to BAN that they consider that their concurrent membership in the OECD with the United States allows them to trade Basel-controlled plastic wastes (Y48) with the Unites States without following Basel control procedures. However, as noted above, while there is an OECD Decision in place that normally could serve as a valid Article 11 agree-

ment for those wastes that are covered by both the Basel Convention and OECD Council Decision, the OECD Council has not adopted two of the three new plastic waste listings (Y48 and B3011) following the US objection to the new listings being incorporated into the OECD Decision. The OECD Decision can therefore not be considered a valid Article 11 agreement for plastic waste listed under Y48, and trade of such plastic waste between Mexico (a Party to the Basel Convention) and the United States (non-Party to the Basel Convention) violates the legal requirements of the Convention. If this illegal interpretation is allowed to stand, plastic wastes will continue to flow, as they do today, illegally across the US/Mexico border.

In sum, despite the contradiction with the terms of the Basel Convention's Article 11, paragraph 1, Basel Parties (the EU member states, Iceland, Liechtenstein, Norway, as well as Mexico and Canada) continue to assert a claim to legitimate use of Article 11 to ignore, all or in part, the plastic waste amendments. Unfortunately, the Basel Convention does not have a governing body capable of examining the validity of Article 11 agreements and their implementation, nor capacity to prosecute invalid ones, and thus to hold Parties accountable for the above mentioned violations.

All Parties and stakeholders should condemn such invalid interpretations of Article 11 and, as appropriate, self-correct all such revealed noncompliance. Failing to do so creates a dangerous precedent that weakens the Basel Convention and international governance generally. To allow any grouping of two or more countries to self-declare an Article 11 agreement that contradicts Article 11 itself is to allow for illegal reservations (forbidden by Basel's Article 26), by another name, and in time, a complete unraveling of the Convention.

Regional and National Waste Trade Instruments

The European Union Waste Shipment Regulation

The European Union (and formerly the European Community) has long held a leadership role in global governance on waste trade and has maintained legislation on waste trade as early as 1984 (EC/84/631). Historically, it was with the support of Europe, led by Denmark, that added to the call of the G77 developing countries and ensured the passage of the Basel Ban in 1994 and the subsequent decision for a Basel Ban Amendment in 1995. The EU was an early adopter of the Ban Amendment, placing it into EU legislation in 1997, years prior to its global entry-into-force in 2019. Furthermore, they did so by including Basel Annex II wastes in addition to hazardous wastes within the ban's scope.

The current version of the waste shipment regulation (Regulation (EC) No. 1013/2006) is now in the final stages of being recast (see COM/2021/709 final), with the final trilogue negotiations finished. During the negotiations the issue of plastic waste control was central. Igniting the controversy were two issues. First, as noted above, the EU shocked many observers by electing to assert a dubious use of

Article 11 and ignore many of the obligations for controlling plastic wastes inferred by the new Basel plastic amendments for trade among EU and EFTA states. Second, there had been a clarion call among civil society groups for the EU to pass an outright ban on the export of all forms of plastic wastes from the EU/EFTA group. This became a tough battle between NGOs and some in industry. In the end, following the final trilogue negotiation, while a total ban was not achieved for all plastic waste exports, substantial further restrictions on plastic waste trade was achieved to add to the improvements made following the Basel plastics amendments passage in 2019.

The new Waste Shipment Regulation will ban all plastic wastes including B3011 to non-OECD countries by 2026. Five years after that ban has been in force, a very small exception will be allowed for those countries which can prove to the Commission against a slate of very strict criteria, that they can manage such wastes in an environmentally sound manner and in a way that does not harm their own waste management infrastructure. With respect to exports to OECD countries such as Turkey, all plastic wastes will be subject to the prior-informed-consent procedure and will not be allowed to be shipped at all should they be found to be contaminated beyond 2% by weight, After two years of this new OECD rule being operational, the Commission will study these OECD exports to determine whether a full ban should be imposed.

In sum, the EU will be managing plastic waste trade far more strictly than any other waste stream, aiming to control its trade regardless as to whether it is hazardous or not. With respect to exports of plastic wastes to non-OECD countries, a de-facto ban is now in place ending more than 30 years of plastic waste export and dumping in countries such as China, Malaysia, Vietnam, Thailand and Indonesia. Additionally the new Regulation contains serious improvements and new teeth for enforcing the trade rules achieved. Now the emphasis must lie with implementation by EU Member States.

Africa's Bamako Convention

The Bamako Convention on the ban on the Import into Africa and the Control of Transboundary Movement and Management of Hazardous Wastes within Africa, adopted on January 29, 1991, in Bamako, Mali, prohibits the import into Africa of any hazardous, including radioactive, wastes, as well as hazardous substances, including products, which have been banned, cancelled, or withdrawn from registration for environmental or health reasons. The Convention entered into force on April 22, 1998, and now, as of COP3, has 29 Parties (UNEP, 2020).

The Bamako Convention defines hazardous wastes differently than the Basel Convention in that it explicitly includes radioactive wastes, and it allows for either a hazardous constituent (Annex I) or a hazardous characteristic (Annex II) to define a waste as hazardous (controlled). The Basel Convention bases its definition of hazardous wastes controlled by it being listed on Annex I unless it does not possess a hazardous characteristic listed on Annex III. Further, the older Basel Annex II

listings are found in Bamako's Annex I as Y18 wastes collected from households, including sewage and sewage sludges, and Y47 residues arising from the incineration of household wastes.

Bamako's Y18 should include many plastic wastes (e.g., municipal derived plastic fractions), and likewise Y45 (organohalogen compounds other than substances referred to in this Annex) would include all fluorinated polymers as well as PVC and many other chlorinated and brominated compounds. This means that presently Bamako Parties should control waste PVC, fluorinated polymers, and plastics with brominated flame retardants. All of the plastic wastes then which might be included in Y18 and Y45, should be forbidden entry into the continent of Africa by the 29 Bamako Parties today.

The special definition for additional hazardous wastes that includes "hazardous substances which have been banned, cancelled or refused registration by government regulatory action, or voluntarily withdrawn from registration in the country of manufacture, for human health or environmental reasons" (Article 2, 1, d) is particularly interesting as this could very well include plastic products that have been banned from the marketplace in some country in the world, due to for example their being single-use plastics. The debate could arise as to whether a single-use plastic bag or soda straw would be considered a "hazardous substance" or not, but a case can certainly be made that due to the ubiquitous presence of hazardous additives they could meet the definition of hazardous substances that have been banned.

Further, now that Basel has added new Annex II listings, it is likely that Bamako Parties will add the new listings of Y48 (halogenated, mixed, and contaminated plastics; see above) and Y49 (nonhazardous electronic waste adopted at COP16). If these are added, Bamako Parties will be obliged to ban their import into the continent of Africa.

The last Bamako Conference of Parties (COP3) was held in Brazzaville, Congo, in February 12–14, 2020. A decision on plastic waste (CB-3/8) (see Bamako Text) was adopted there that called inter alia for the following:

> Urges, Parties and other African states that have not already done so, to enhance or supplement existing legislation to prevent illegal and unwanted traffic in plastic waste from entering their territory and the African Continent;
>
> Further Urges, the Parties to take steps to add all forms of plastic wastes to Annex I of the Bamako Convention at the earliest opportunity, bearing in mind the procedures to be followed under Article 18, to ensure that traders do not make the African continent a target for foreign plastic waste.

Certainly, if the Bamako Convention were amended as described in the second operative paragraph above, then a full ban on plastic waste trade into the continent of Africa would become the law and norm of the continent.

The South Pacific's Waigani Convention

The Convention to Ban the Importation into Forum Island Countries of Hazardous and Radioactive Wastes and to Control the Transboundary Movement and Management of Hazardous Wastes within the South Pacific Region, commonly

known as the Waigani Convention, was adopted on September 16, 1995, in Waigani, Papua New Guinea, by the South Pacific Forum states. The treaty prohibits each Pacific Island developing Party from importing all hazardous and radioactive wastes from outside of the Convention area. Australia and New Zealand are prohibited from exporting hazardous or radioactive wastes to all other South Pacific Forum Island countries. The Convention is now in force with 13 of the 15 South Pacific Forum states having ratified.

Unlike the Bamako Convention, the Waigani Convention defines hazardous waste as the Basel Convention does but with the exception that Basel Annex II wastes are included on Annex I, and thus, these Annex I listed wastes will be hazardous unless they are shown not to exhibit a hazardous characteristic. If they do exhibit a hazardous characteristic they will be considered as "hazardous" waste, forbidden entry into the region if destined to a developing country. Australia and New Zealand are likewise forbidden from exporting such Basel Annex II such as hazardous Y46 plastic waste to a developing country in the region. The definition of Y46 has been altered slightly from Basel's version to read:

> Y46 Wastes collected from households, including sewage and sewage sludges with the exception of clean sorted recyclable wastes which do not possess any of the hazardous characteristics defined in Annex II.

Due to the uncertainty of classifying plastic waste in the Waigani Convention and its caveat that Basel Annex II entries are only included if they possess a hazardous characteristic (which is weaker than Basel) as it is currently drafted, it would perhaps be best if the treaty were amended to include a third annex of Basel Annex II wastes that will be considered hazardous without needing to possess a hazardous characteristic. Indeed, inclusion of the new Basel listings is Recommendation 14 of a recent report prepared by the Secretariat of the Pacific Regional Environment Program (SPREP), entitled Evaluation of the Waigani Convention (2021).

The Mediterranean's Izmir Protocol

The Parties to the Convention for the Protection of the Mediterranean Sea against Pollution (Barcelona Convention) adopted the Protocol on the Prevention of Pollution of the Mediterranean Sea by Transboundary Movements of Hazardous Wastes and Their Disposal (Izmir Protocol) on October 1, 1996, in Izmir, Turkey. Turkey led the push for the adoption of this instrument and thus was able to confer the title of the famous Turkish port city in naming the protocol. Ironically, Turkey now is seen as a Party that completely ignores the treaty and its implementation, not only for plastic waste but for obsolete ships as well.

The Izmir Protocol prohibits the export of hazardous and radioactive wastes to non-OECD countries and the import of hazardous and radioactive wastes to those Parties that are not members of the European Community. For the purposes of this protocol, Monaco is considered to be part of the OECD and the European

Community. The Protocol is in force, and Turkey is a Party, as are Albania, Malta, Montenegro, Morocco, Syria, and Tunisia.

The Izmir Protocol defines its scope similarly as has the Bamako Convention in that it considers waste to be hazardous by being either on the list of hazardous substances (Annex I) or possessing a hazardous characteristic (Annex II). Further, "hazardous substances which have been banned, cancelled or refused registration by government regulatory action, or voluntarily withdrawn from registration in the country of manufacture, for human health or environmental reasons," as noted above, could be useful in designating plastic bans found around the world as a trigger for the material as a hazardous substance. Additionally, Basel's Y46 and Y47 found in Basel Annex II are listed as part of Annex I in Izmir. This has the effect of including these in the Izmir import ban. This is especially important with respect to plastic wastes due to Y46 including household waste plastic.

Sadly, there has been a history of noncompliance with the Izmir protocol as Turkey, in particular, has ignored it for hazardous ships entering the shipbreaking yards at Aliaga, very near Izmir, the site of the signing of the protocol. Also, Turkey has had a terrible track record of allowing all manner of plastic wastes into their territory, many of which should be controlled due to their toxic additives, or due to their being wastes collected from households (e.g., municipal wastes from Europe) as stipulated by the scope of the Izmir Protocol. We look forward to the day when the Turkish government decides to embrace the obligations of the Izmir Protocol or is otherwise held accountable for the agreement it was so proud to espouse and host a few decades ago.

National Import Bans

China

As noted earlier, China has banned the import of all manner of scrap, including plastic scrap under their National Sword policy and legislation. Pellets and flakes that have been recycled already are seen as a commodity are not included. This prohibition was first put into place in March of 2018 with a cutoff limit of purity of no more than 0.5% contamination. Today, that limit has been removed, and 100% purity of plastic polymer is required to allow trade into China. This took place in an amendment to the national solid waste law and went into force the same day as the Basel plastic waste amendments – January 1, 2021 (Editorial Team, 2020). While laudable from the standpoint of protecting China's environment and implementing national self-sufficiency in waste management called for by the Basel Convention, the Chinese National Sword policy has created a tidal wave of exportation to neighbouring Asian countries, while China has done little to prevent or mitigate the harm caused by the redirection.

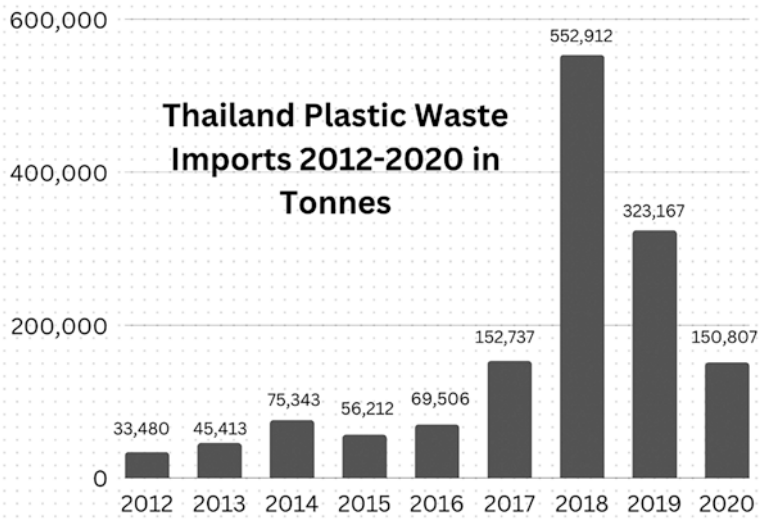

Fig. 9 Thailand's plastic waste imports from 2012 to 2020. (Source: Thailand Customs Data (Igini, 2023))

Thailand

Following the National Sword policy closing China to plastic waste imports in 2018, Southeast Asian countries were besieged with plastic scrap imports as Chinese businessmen set up their recycling operations across the rural areas of the region and in free trade zones (Fig. 9) creating a massive import surge that same year in Thailand. Thus, Thailand has announced a plastic waste import ban which is slated to go into force in 2025. [Source: https://earth.org/thailand-ban-plastic-imports/].

Closing the Remaining Plastic Waste Trade Pathways / Recommendations

While the Basel Convention and the regional treaties and national legislation it has encouraged has been a vital driver in minimizing transboundary movements of plastic wastes, the efforts to date are not comprehensive in scope and are sorely lacking in proper implementation and enforcement. The latter concern is corroborated by the global data (BAN Data) found in the chapter entitled "Major Six-Year Trends in Global Plastic Waste Trade".

A scan of the 6-year trends of global trade from 2017 to date shows significant overall decline in global shipments of OECD waste, but only modest evidence of reductions between 2020 and 2021, before and after the new Basel Amendments went into force. It is true that were many factors impacting global trade in plastic waste from 2020 to 2023 that could have scrambled data trends. These include the

very welcome decision by shipping line CMA CGM to ban the movement of plastic waste on their ships beginning on June 1, 2022 (CMA CGM, 2021). And they include the indirect effect of the global COVID-19 pandemic, which caused shipping line disruptions due to supply chain upheavals. The price of oil from which plastic is made, has had a major influence on plastics demand and therefore the amount of plastic waste as well. However, despite the inability to comprehensively assess the impacts of these varying factors, the major dip one might have expected after a major slice of global plastic waste trade was suddenly controlled for the first time, was not observed. And, as of this writing, we are seeing alarming plateaus and even some increases in plastic waste trade following the previous steady decline witnessed in the 6-year period from the OECD group.

While the United States has decreased exports to Asia in the last few years, their exports to Latin America, including Mexico, have increased. The EU has sadly seen a steady increase in exports from the EU to Asia and Turkey in comparison with the average levels seen in 2020 before entry-into-force of the Basel Amendments. Japan continues to show the highest levels of export to non-OECD countries in the world, and this trade has not diminished post entry-into-force (January 1, 2021).

Implementation and Enforcement of Basel's Plastic Amendments Must Improve

Perhaps the biggest concern with regard to the scant evidence of the new laws making a serious impact in trade volumes, is the concurrent data we receive from subscription sources (e.g., Panjiva or Datamyne) that noncompliance currently appears to be widespread. This is best revealed by a steady flow of plastic waste from the non-Party, the United States, and the apparent willingness of importing countries such as Malaysia, Vietnam, Indonesia, Thailand, and Mexico to receive it despite such imports being illegal due to the Basel Party to non-Party ban.

Searches in the bill of lading databases for the general HS Code 3915 (plastic scrap) show high volumes of exports from the United States to Basel Parties other than Canada. Remember trade between the US with the exception of Canada are supposed to be forbidden unless they are B3011 plastic waste which are uncontaminated and sorted by polymer. As such purity in shipments of most plastic waste is unlikely, it is feared that many of these shipments are illegal exports.

BAN has in the past contacted governments including India, Vietnam, Malaysia, Thailand, and Indonesia with information about shipments en route to their countries, alerting them to the fact that the shipments contained mixed plastic waste and were likely to be contraband. Only two of the countries said they would search the containers, and none of them subsequently informed BAN of actions taken.

BAN has direct knowledge that mixed plastics bales (Y48) are still flowing from the US electronics recycling industry to certain recyclers in Malaysia in contravention of the Party to non-Party ban in the Convention. It is unclear how this is possible given Malaysia's Basel obligations to prevent such illegal traffic from entering the country.

Another area where the noncompliance becomes indisputable and obvious is found in the exports of PVC from the EU to non-OECD countries or from the United States to any Basel Party other than Canada. PVC is an obvious halogenated polymer and is thus defined as Y48. Two examples of this very clear noncompliance are found in Figs. 10 and 11.

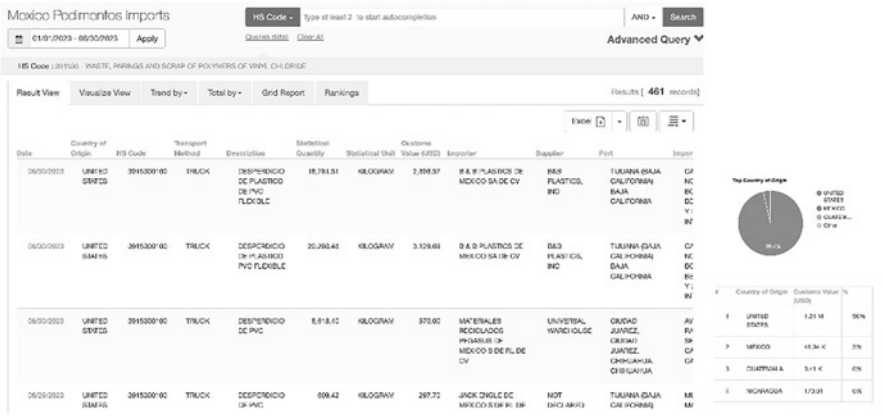

Fig. 10 Four hundred sixty-one records of PVC exports from the United States to Mexico from January 1, 2023, to June 30, 2023, making up $1,210,000 in customs value have moved to Mexico, a Basel Party that cannot legally accept PVC waste (Y48) from the United States. BAN analysis of shipping data from Datamyne via Material Research L3C

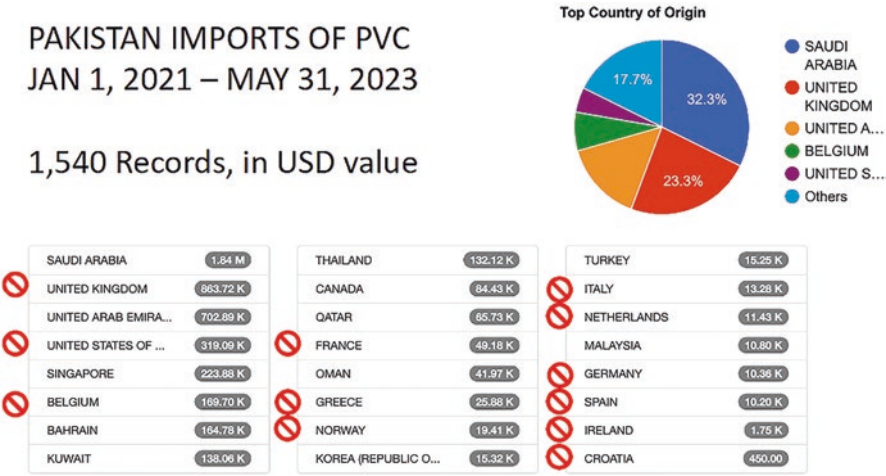

Fig. 11 These exports from the European Union and the United Kingdom are illegal due to Y48 being included in the Basel Ban Amendment implementation of the EU and the United Kingdom. The exports from the United States are also illegal due to a ban on the trade of Y48 between Parties and non-Parties without a valid Article 11 agreement. BAN analysis of shipping data from Datamyne via Material Research L3C

Basel Must Finally Begin to Address the Hazardous Additives in Plastic Waste

As noted above, the Basel Convention has kept its head firmly in the sand when it comes to addressing the hazardous nature of plastic waste. Every use of plastic has chemical additives in addition to the compounds that make up the resin, or polymer that serves as the basic matrix. Many of these additives are hazardous. And yet the presence of these is not assessed in determining whether a plastic waste is hazardous, a waste for special consideration or a non-hazardous waste. The construct of the Basel Convention is that the presence of a hazardous additive triggers the rebuttable presumption that the waste listed on Annex I is hazardous, and it is only by the demonstration with some evidence that the Annex I waste does not present a hazardous characteristic can it be presumed to not be hazardous. As such a demonstration or presentation of evidence is not in the offing for plastics containing hazardous additives, most shipments subject to transboundary movement must be defined as hazardous. Thus, the application of A3210 (hazardous plastic waste) should be far more common than it is today. B3011 (non-hazardous plastic) should only be reserved for scraps where it is known precisely what additives are being used and that in fact they do not present hazardous characteristics. Today that burden of proof of non-hazardousness has been turned on its head. This must be corrected at the earliset opportunity.

Basel Must Ensure Coverage of Hidden and Forgotten Plastic Wastes

While the original intent of the Basel plastic amendments was to ensure that all plastic waste would be covered by at least one of the three new listings (A3210 – hazardous, B3011 – nonhazardous, or Y48 – special consideration), in fact there are many types of plastic wastes that remain in a gray area of uncertainty due to their being covered in part by other previously existing Basel Annex IX listings for non-hazardous wastes, or sometimes were not listed at all and remain uncertain. A reading of the decisions taken at COP14 on plastics says nothing regarding the older listings taking precedence where overlapping definitions are in existence. Logically one would think the more recent decisions would trump the older ones but this has in fact not been the case in practice.

These hidden or forgotten plastic wastes to which the new amendments do not appear to apply include the following:

- Synthetic textile wastes
- Rubber wastes
- Plastics making up part of electronic waste
- Plastic making up part of waste motor vehicles
- Waste plastic mixed in bales of paper waste
- Refuse derived fuel which contains high levels of plastic waste
- Waste tyres

As an example of the problem, we can examine two issues which have been highlighted in a recent presentation given at the Basel Conference of Parties (COP16) – textile waste and waste plastics mixed into bales of paper (BAN/IPEN, 2023).

Globally, the trade in textile waste is massive with container loads of used clothing, carpets, etc., moving daily from the Global North to the Global South. About 60% of our clothing today is synthetic, using polymers such as nylon, polyester, and acrylic. By the fundamental definitions of the new Basel listings, these plastic wastes are almost certainly to be considered Y48, because the plastic is "contaminated" with natural fibers and other materials and will almost certainly be mixed polymers. However, these are not being considered as Y48 plastics due to the existence of the older listings B3030 (textile wastes) and B3035 (waste textile floor coverings, carpets) which are being used instead, and these listings of course are outside of the ambit of control, being listed on Annex IX (non-hazardous).

The previous listings should have been adjusted to accommodate the new intent of the plastic amendments. Likewise, using the HS code 3915 (waste parings and scrap of plastic) to serve as the metric for plastic waste trade is highly misleading as so much of the plastic waste trade is also being exported under other HS codes. This results in a global underreporting by about half of actual plastic waste trade in most studies that make exclusive use of HS3915 (chapter "Toxic Contamination Caused by Plastic Waste in Countries of the Global South").

Another example that has received recent attention is the mountain of plastic which go along for the ride of with the massive waste paper trade which moves across the world from Japan, Europe, Australia, and North America to countries like Indonesia and India (BAN/IPEN, 2023). As much as 30% of the bales shipped to the massive paper recycling mills in these countries are made up of plastic. These plastics pile up alongside the pulp mills as they must be removed to allow proper recycling of paper. These rejected plastics are often set ablaze or given to local business as fuel to produce tofu or sugar. The burning of mixed plastics in this way creates emissions of some of the deadliest compounds known, including dioxins and polycyclic aromatic hydrocarbons (PAHs), and thus this "paper" waste trade is some of the deadliest so far reported in terms of impact. And yet this form of plastic waste export is not being controlled under Basel due to the previous Annex IX listing of B3020 (paper, paperboard, and paper product waste) (Fig. 12).

Sadly, Parties are interpreting the ambiguity in a way which is least protective of the environment. Already the EU has gone so far as to formalize this exemption to Basel controls in their EU Correspondent's Guidelines #12 (European Commission, 2021):

> 16. A waste that, among other materials, contains plastic but can be classified under a specific entry in the Annexes III, IIIB and IV of the WSR (e.g., waste metal cables coated or insulated with plastics (see entries A1190 and B1115), waste electrical and electronic equipment (see, e.g., entries A1180, B1110 and GC020) or waste vehicles (see entry B1250)), cannot be classified under one of the entries on plastic waste, but is to be classified under the relevant specific entry.

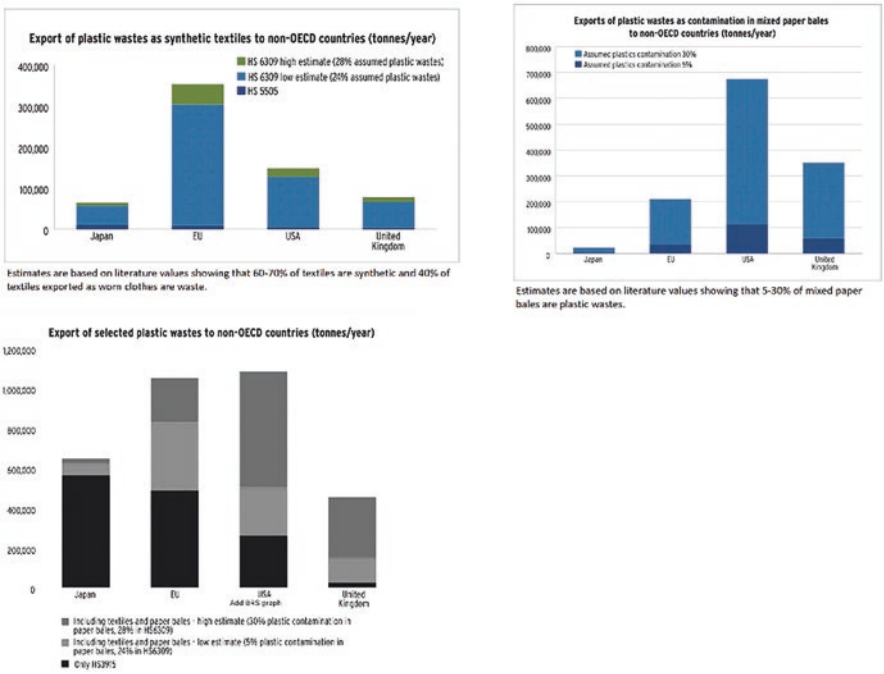

Fig. 12 If plastics in textiles and paper bales are included, the numbers for plastic waste trade are 1.6–2.4 times higher than if we only look at HS3915. And this still does not account for all plastics hidden in other HS codes. (Source: Karlsson et al. (2023))

The greater issue of the forgotten plastics falling through the regulatory cracks is in serious need of attention by the Basel Parties. It is scientifically illogical and legally incongruent for the package of three amendments, meant to cover all plastic waste together, made after older listings containing plastic wastes, to not supersede the older listings. However, the work to correct this ambiguity and incoherence has not been foreseen and scheduled. It is estimated that these forgotten plastics constitute as much of that which is supposedly now controlled today. Thus, we have only accomplished half of the regulatory work anticipated at the outset of the Basel effort to better control plastic wastes (BAN/IPEN, 2023).

Conclusion

While the adoption of the plastic amendments in 2019 at COP16 of the Basel Convention has been correctly hailed as a major accomplishment in the arena of global environmental governance and environmental justice, it is too early to applaud ourselves until we implement and enforce the new rules we have made and extend them to encompass all the plastic wastes we originally intended to control.

Our work, to 1) Better enforce that which has been agreed; 2) Implement the Convention for the hazarduos chemical additives found in plastic wastes; and 3) provide proper implementation for the hidden and forgotten plastic waste streams that often retain their status as unregulated due to non-listings or old non-hazardous waste listings; must continue. Until this is done, celebration is premature.

References

Basel Action Network. (2023a). *Misuse of the Basel Convention Article 11 to avoid compliance with new plastic waste controls*. http://wiki.ban.org/images/a/a1/Misuse_of_the_Basel_Convention_Article_11_to_Avoid_Compliance_with_New_Plastic_Waste_Controls.pdf

Basel Action Network. (2023b). *Plastic waste contamination table*. http://wiki.ban.org/images/8/85/Contamination_Table.pdf

Basel Action Network & International Pollutants Elimination Network. (2019). *The entry into force of the Basel ban amendment: A guide to implementation and next steps*. http://wiki.ban.org/images/4/4e/BAN_IPEN_Basel_Ban_Amend_Guide_Nov2019.pdf

Basel Action Network & International Pollutants Elimination Network. (2023, May 8). *Tackling the hidden Basel plastic wastes [Side event]*. Basel Convention 16th Conference of the Parties, Basel, Switzerland. https://www.youtube.com/watch?v=wse2ld0zUHA

BOC Sciences. (n.d.). *Halogenated polymers*. https://polymer.bocsci.com/products/halogenated-polymers-4183.html

Break Free From Plastic. (2019, March 4). *Progress on plastics update issue 10: UNEA4*. https://www.ciel.org/wp-content/uploads/2019/03/Progress-on-Plastics-Update-Issue-10-UNEA4-Mar-2019-1.pdf

CalRecycle. (2016). *Bale rate study* [PowerPoint slides]. https://www2.calrecycle.ca.gov/PublicNotices/Documents/6678

Center for International Environmental Law [CIEL]. (2020). *Legal analysis of the implications of the Basel Convention's decision on plastic waste trade for OECD countries*. https://www.ciel.org/wp-content/uploads/2020/07/Analysis-Basel-Plastic-Waste-Trade-OECD-Countries.pdf

CMA CGM. (2021, June 1). *The CMA CGM Group decides it will no longer carry plastic waste on its ships*. https://www.cmacgm-group.com/en/news-media/one-ocean-Summit-the-CMA-CGM-Group-decides-it-will-no-longer-carry-plastic-waste-on-its-ships

Editorial Team. (2020, December 2). China completely bans import of solid waste from 1st Jan 2021. *Safety4Sea*. https://safety4sea.com/china-completely-bans-import-of-solid-waste-from-1st-jan-2021/

European Commission. (2021). *Correspondents' Guidelines No 12 on the classification of plastic waste under Regulation (EC) No 1013/2006 on shipments of waste*. https://environment.ec.europa.eu/system/files/2021-12/Correspondents'%20guidelines%20No%2012%20final%20Nov%202021%20corr1.pdf

European Electronics Recyclers Association. (2022, June). *EERA position on plastics*. https://static1.squarespace.com/static/6273d6aab17e87401893aefc/t/62c5453d0004622d56e7605c/1657095490188/EERA+Position+on+Plastics+-++June+2022.pdf

GACC. (n.d.). *Overview of China Customs*. General Administration of Customs, People's Republic of China. http://english.customs.gov.cn/topic/customs17/info189290.htm

Global Alliance for Incinerator Alternatives. (2019). *Discarded: Communities on the frontlines of the global plastic crisis*. https://www.no-burn.org/wp-content/uploads/2022/02/Report-July-12-2019-Spreads-no-marks-1.pdf

Hann, S., Fletcher, E., Molteno, S., Sherrington, C., Elliott, L., Kong, M., Koite, A., Sastre, S., & Martinez, V. (2021). *Relevance of conventional and biodegradable plastics in agriculture*. European Commission. https://environment.ec.europa.eu/system/files/2021-09/Agricultural%20Plastics%20Final%20Report.pdf

Igini, M. (2023, February 22). *Thailand announces ban on plastic waste imports by 2025*. Earth.org. https://earth.org/thailand-ban-plastic-imports/

InforMEA. (1991, January 30). *Bamako Convention on the ban of the import into Africa and the control of transboundary movement and management of hazardous wastes within Africa*. https://www.informea.org/en/treaties/bamako-convention/text

InforMEA. (1995, September 16). *Waigani Convention to ban the importation into Forum island countries of hazardous and radioactive wastes and to control the transboundary movement and management of hazardous wastes within the South Pacific Region*. https://www.informea.org/en/treaties/waigani-convention/text

Karlsson, T., et al. (2023, March 7). *Plastic waste trade: The hidden numbers*. An IPEN report. https://ipen.org/sites/default/files/documents/ipen_plastic_waste_trade_report-final-3digital.pdf

Müller, S. M. (2023). *The toxic ship: The voyage of the Khian Sea and the global waste trade*. University of Washington Press.

OECD. (1992, March 29). *Decision of the council on the control of transboundary movements of wastes destined for recovery operations*. https://legalinstruments.oecd.org/en/instruments/OECD-LEGAL-0266

Puckett, J. (1989, March). *Eyewitness account by the author, who attended the final negotiations in March in Basel, Switzerland*.

Puckett, J., & Fogel, C. (1994). *A victory for environment and justice: The Basel ban and how it happened.* Greenpeace International. http://wiki.ban.org/A_Victory_for_Environment_and_Justice:_The_Basel_Ban_and_How_it_Happened

Rapoza, K. (2020, November 29). China doesn't want the world's trash anymore. Including "recyclable" goods. *Forbes*. https://www.forbes.com/sites/kenrapoza/2020/11/29/china-doesnt-want-the-worlds-trash-anymore-including-recyclable-goods/?sh=7ba0cdf87290

Secretariat of the Pacific Regional Environmental Programme. (2021). *An evaluation of the Waigani Convention*. https://www.sprep.org/sites/default/files/30-SPREP-Meeting/Waigani%20Convention/WC-6.1_Att.1-Final-Review-report-Waigani-Conv_July%202021.pdf

UNEP/MAP. (1996, October 1). *Protocol on the prevention of pollution of the mediterranean sea by transboundary movements of hazardous wastes and their disposal*. Izmir. https://www.unep.org/unepmap/who-we-are/contracting-parties/hazardous-wastes-protocol?_ga=2.57168106.1771559891.1691290212-963292404.1691290212

United Nations Environment Programme. (1989, March 22). *Basel Convention on the control of transboundary movements of hazardous wastes and their disposal*. https://www.basel.int/TheConvention/Overview/TextoftheConvention/tabid/1275/Default.aspx

United Nations Environment Programme. (2020). *Report of the conference of the parties to the Bamako Convention on the ban of the import into Africa and the control of transboundary movement and management of hazardous wastes within Africa on the work of its third meeting*. https://wedocs.unep.org/bitstream/handle/20.500.11822/32131/BamakoCOP3Report.pdf

United Nations Environment Programme. (2023). *Technical guidelines on the environmentally sound management of plastic wastes* (UNEP/CHW.16/6/Add.3/Rev.1). https://www.basel.int/TheConvention/ConferenceoftheParties/Meetings/COP16/tabid/9311/Default.aspx

Watson, S. K. (2018, June 28). China has refused to recycle the west's plastics. What now? *NPR*. https://www.npr.org/sections/goatsandsoda/2018/06/28/623972937/china-has-refused-to-recycle-the-wests-plastics-what-now

Wearden, G. (2016, January 19). More plastic than fish in the sea by 2050, says Ellen MacArthur. *The Guardian*. https://www.theguardian.com/business/2016/jan/19/more-plastic-than-fish-in-the-sea-by-2050-warns-ellen-macarthur

Wong, P. Y. (2021). *Malaysia is not a "garbage dump": Citizens against corruption, complacency, and climate crisis*. Center to Combat Corruption and Cronyism. http://wiki.ban.org/images/d/dd/2021_c4_center_special_report_malaysia_is_not_a_garbage_dump.pdf

Zhao, K. (2017, April 28). China's environmental woes, in films that go viral, then vanish. *The New York Times*. https://www.nytimes.com/2017/04/28/world/asia/chinas-environmental-woes-in-films-that-go-viral-then-vanish.html#:~:text=Wang's%2C%20%E2%80%9CPlastic%20China%2C%E2%80%9D,deleted%20the%20items%20or%20why

Part II
The Illicit Activities in the Plastic Waste Trade and Its Toxic Effects

Plastic Waste and Criminality

Virginia Comolli

Introduction

Waste management is not only a standard expectation of modern society, but it is also a big transnational business. As a society, we produce an ever growing amount of rubbish, including the ubiquitous plastic, and managing its collection and disposal is a crucial responsibility of local authorities. Yet, whereas the issue of waste may seem a local one, its supply or, rather, *disposal* chain usually crosses multiple borders and connects the largest waste producers in Europe and North America (Parker, 2020) to the less developed countries and regions that tend to be the main recipients. As a result, Amazon packaging from the United States ends up in illegal dumping sites in India (Mok, 2022), and carrier bags from British supermarkets are illegally burned in Turkey (Greenpeace, 2021).

Understanding the nature and actors behind these illegal activities is the aim of this chapter. To achieve that, it is first important to establish what constitutes illegality. A "throw away" culture, coupled with minimal domestic recycling facilities in the West, has made the export of waste a necessity for the past several decades (WMW, 2021). Waste trade is not in itself illegal. It needs however to be conducted in accordance to international conventions and national level legislation that regulate imports and exports.

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Legal Framework

The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (1989) is the most prominent of these legal tools and counts 187 countries and the European Union (EU) among its parties. Given its large membership – which however does not include the United States – most plastic waste shipments around the world are regulated by the Basel Convention and its amendments (USEPA, 2023). In brief, countries that are members of the Organization for Economic Co-operation and Development (OECD), the EU, and Liechtenstein are forbidden from shipping hazardous waste to developing countries (BAN and IPEN, 2020). In addition, the European Commission has banned its member states from sending anything other than "clean" plastic waste (i.e., plastic that is not mixed with other waste and is not considered hard to recycle) to non-OECD countries (EC, 2020).

Furthermore, individual countries, especially in Asia (the main destination region), have introduced import bans. Most notable is China's 2018 National Sword policy which resulted in a virtually overnight domino effect in redirecting waste flows from China – the hitherto largest waste recipient in the world – to a number of Southeast Asian countries such as Indonesia, Malaysia, the Philippines, and others (WTO, 2017). Countries in Africa, Latin America, and Eastern Europe as well as Turkey have also developed a more prominent role in the waste disposal business.

It is crucial to underscore the fact that the main driver behind these regulations is the desire to stop the flows of hazardous waste from reaching countries that do not have sufficiently sophisticated facilities to appropriately process and dispose of such harmful waste. In the absence of such facilities, waste is dumped, buried, or burned – all practices that pollute the soil, water, and atmosphere with nefarious environmental and health repercussions (INTERPOL, 2020).

Yet, despite the existing regulations and the serious negative effects that breaking them have on societies and ecosystems, there are financial incentives for businesses (and criminal actors) to ignore these restrictions and try to get a slice of the global market in recycled plastics which is forecasted to reach US$53 billion by 2029 (MMR, 2023).

Illegality in the Plastic Waste Supply Chain: Legitimate Actors

Multiple actors are involved along the supply chain of plastic waste breaking rules and legislations. Evidence suggests that most illegal activities are carried out by legitimate business operators who engage in so-called white-collar crimes. The most common include fraud, mis-invoicing, money laundering, tax evasion, and corruption. In addition, these actors engage in a whole host of activities that contravene the Basel Convention and national import and export bans (as well as faking their adherence to those rules). These fall under three categories. First is

misdeclaration which can pertain to the content, origin, and destination of waste but also to the operating capacity of recycling companies, i.e., claiming companies have greater capacity than they actually have. Second is the concealment of hazardous waste among other goods. It is in fact common for plastics to be mixed with e-waste and paper as these are waste products that are subject to a lower level of scrutiny. Third is the illicit disposal that could take the form of incineration or illegal dumping, for instance, in the sea or remote rural areas or even in forests (Comolli, 2021).

Brokers, waste management and recycling companies, shipping lines, corrupt customs and border control, and non-waste companies (e.g., paper and cement manufacturers) are among those involved in such illicit practices, which enable mixed hazardous plastic waste from Europe and North America to arrive, usually after a number of intermediate stops, to the likes of Turkey, Romania, Ghana, Ecuador, Indonesia, and more.

Brokers deserve particular attention. As already indicated, only a fraction of Western-produced waste is processed or recycled domestically. Most of it is sold to brokers whose job is to then facilitate the export on to countries and companies that would process the plastic waste and, in theory, recycle it into plastic pellets that are then sold as raw material. This is the appeal for receiving countries to accept foreign waste shipments as a way to generate revenues. Brokers are able to exploit their pivotal role along the supply chain to facilitate the shipment of banned waste to non-OECD countries. They are therefore the ones often responsible for misdeclaration of content as well as of intended origin and destination of a given cargo (INTERPOL, 2020).

Criminals

Albeit to a lesser extent than commercial operators, criminal actors are also involved in the illicit trade in plastic waste. This is hardly surprising. Criminal groups have long been attracted to the waste management industry. A notable example is the one of the Italian mafias which, by the 1980s, had already consolidated their involvement in this sector (Post, 2013) eager, as ever, to take advantage of lucrative opportunities. It has to be noted however that less information is available compared to what is known about business operators. Therefore, the extent of criminal involvement in the plastic waste business might actually be greater than suspected.

Turkey and Eastern Europe are where the involvement of criminals in the illicit disposal of European waste is most apparent. Similarly to the business operators described above, financial crimes such as fraud, forgery, money laundering, tax evasion, and manipulation of legal records (alongside the corruption of officials) are the most common offences carried out by criminals that infiltrate the waste sector. This is usually done through legitimate companies that are used as a façade for illegal activities.

Instances of convergence with other forms of crime are hard to corroborate, but it is possible that drugs and other illicit goods are trafficked alongside European

waste via Turkey, on to further destinations in the Middle East and beyond (Comolli, 2021).

Additionally, there are documented cases suggesting a convergence between human trafficking and the waste industry. These usually involve vulnerable individuals that are lured by traffickers with the promise of good employment only to then be forced in modern slavery conditions and living in substandard accommodation – such as in the case of Polish victims who ended up working for one of the UK's largest waste companies, Biffa (Gentleman, 2021).

On the other side of the Atlantic, Latin American countries have seen an increase in illicit shipments of plastic waste from the United States following the introduction of China's National Sword (Rueada, 2022). At the same time, there appears to be growing evidence that the Mara Salvatrucha gang (also known as MS13) controls dumping sites in Honduras which are run as businesses. Locals, including children, sort through mountains of rubbish to collect valuable waste such as plastic, copper, and nylon that is then sold by the kilo to MS13. Then, through a broker, the gang sells the material to recycling companies within Honduras as well as, allegedly, to regional recycling company Invema, according to an investigation by InsightCrime (Martínez D'aubuisson, 2022).

Conclusions

The preceding pages have given a flavor of the methods and networks of illegality that are built around the plastic waste trade. Despite the serious human and environmental harms resulting from the illicit trade and disposal of plastics and other waste, tackling this issue often remains a low priority. This is the result of a number of factors. Among others is the continued desire in many less affluent receiving countries to accept shipments in order to generate revenues, as well as some exporting countries' limited interest in these matters and just wanting to get rid of the waste without looking too closely at the routes and methods involved.

Therefore, resources available to environmental agencies and dedicated law enforcement units are limited. With this in mind, collaboration and information sharing across agencies, sectors, and jurisdictions becomes paramount in order to identify offences and pursue offenders. Together with this, capitalizing on technology to digitalize waste management, trace shipments, and monitor potentially suspicious brokers (who regularly advertise online) and other actors is certainly a necessity.

Across collaborative efforts and the use of technology, civil society actors such as NGOs, activists, and investigative journalists around the world have been playing an important role, especially by conducting investigations and exposing malpractice and illegality. Through their efforts, nongovernment actors are able to raise public awareness on plastic waste and related issues through different channels, from traditional to social media, thereby reaching different demographics. Albeit not always successful or long-lasting (Gündoğdu & Walker, 2021; Laville, 2021), some of

these campaigns have the power to increase policy prioritization and influence policy change which, in turn, can translate into the allocation of greater resources to combating waste crimes.

References

BAN, & IPEN. (2020). *The entry into force of the Basel Ban Amendment: A guide to implications and next steps*. https://ipen.org/sites/default/files/documents/ban-basel-fact-sheet-v2_1-en.pdf. Accessed on 10 July 2023.

Comolli, V. (2021). *Plastic for profit. Tracing illicit plastic waste flows, supply chains and actors*. GI-TOC. https://globalinitiative.net/wp-content/uploads/2021/10/GITOC-Plastic-for-Profit.pdf. Accessed on 10 July 2023.

European Commission. (2020, December 22). *Plastic waste shipments: New EU rules on importing and exporting plastic waste*. https://environment.ec.europa.eu/news/plastic-waste-shipments-new-eu-rules-importing-and-exporting-plastic-waste-2020-12-22_en. Accessed on 10 July 2023.

Gentleman, A. (2021, January 14). Three victims of trafficking and modern slavery to sue Biffa. *The Guardian*. https://www.theguardian.com/law/2021/jan/14/three-victims-of-trafficking-and-modern-slavery-to-sue-biffa. Accessed on 10 July 2023.

Greenpeace. (2021). *Trashed. How the UK is still dumping Plastic waste on the rest of the world*. https://www.greenpeace.org.uk/wp-content/uploads/2021/05/Trashed-Greenpeace-plastics-report-final.pdf?_ga=2.123036232.2120234364.1689006528-344669026.1689006528. Accessed on 10 July 2023.

Gündoğdu, S., & Walker, T. R. (2021). Why Turkey should not import plastic waste pollution from developed countries? *Marine Pollution Bulletin, 171*, 112772.

INTERPOL. (2020). *Emerging criminal trends in the global plastic waste market since January 2018*. https://www.interpol.int/content/download/15587/file/INTERPOL%20Report%20_criminal%20trendsplastic%20waste.pdf. Accessed on 10 July 2023.

Laville, S. (2021, May 19). Turkey to ban plastic waste imports. *The Guardian*. https://www.theguardian.com/world/2021/may/19/turkey-to-ban-plastic-waste-imports. Accessed on 10 July 2023.

Martínez D'aubuisson, J. J. (2022, January 19). *How the MS13 became Lords of the Trash Dump in Honduras*. InsightCrime. https://insightcrime.org/investigations/honduras-how-ms13-became-lords-trash-dump/. Accessed on 10 July 2023.

MMR. (2023, March 14). Recycled plastics market to grow at a CAGR of 8.9 percent reaching USD 53.01 Bn by 2029 says maximize market research. *Global Newswire*. https://www.globenewswire.com/en/news-release/2023/03/14/2626748/0/en/Recycled-Plastics-Market-to-grow-at-a-CAGR-of-8-9-percent-reaching-USD-53-01-Bn-by-2029-Says-Maximize-Market-Research.html. Accessed on 10 July 2023.

Mok, A. (2022, December 27). Amazon's plastic packaging was reportedly found thousands of miles away at illegal dump sites in India. *Business Insider*. https://www.businessinsider.com/amazon-delivery-packaging-found-in-illegal-dump-sites-in-india-2022-12?international=true&r=US&IR=T. Accessed on 10 July 2023.

Parker, L. (2020, October 30). U.S. generates more plastic trash than any other nation, report finds. *National Geographic*. https://www.nationalgeographic.com/environment/article/us-plasticpollution. Accessed on 10 July 2023.

Post, E. (2013). "Trash is gold": Documenting the ecomafia and Campania's waste crisis. *Interdisciplinary Studies in Literature and Environment, 20*(3), 597–621. https://doi.org/10.1093/isle/ist075

Rueada, A. (2022, November 6). Latin America, the US's new plastic dumping ground. *Servindi*. https://www.pressenza.com/2022/11/latin-america-the-uss-new-plastic-dumping-ground/. Accessed on 10 July 2023. Ramos, R., & Fernanda, M. (2022, October 12). From "Backyard" to "Dumpster": This is how the US is using Latin America as its dumping ground. *Latin American Post*. https://latinamericanpost.com/42329-from-backyard-to-dumpster-this-is-how-the-us-is-using-latin-america-as-its-dumping-ground. Accessed on 10 July 2023.

USEPA. (2023, last updated). *New international requirements for the export and import of plastic recyclables and waste*. https://www.epa.gov/hwgenerators/new-international-requirements-export-and-import-plastic-recyclables-and-waste#:~:text=As%20a%20result%20of%20these%20changes%2C%20transboundary%20movements%20of%20most,effect%20on%20January%201%2C%202021. Accessed on 10 July 2023.

WMW. (2021, March 19). EuCertPlast Report: European industry generated sales of three billion euros in 2020. *Waste Management World*. https://waste-management-world.com/artikel/eucertplast-report-european-industry-generated-sales-of-three-billion-euros-in/. Accessed on 10 July 2023.

WTO. (2017, July 18). *Notification by the Ministry of Environmental Protection of the People's Republic of China to the WTO*. https://docs.wto.org/dol2fe/Pages/SS/directdoc.aspx?filename=q:/G/TBTN17/CHN1211.pdf&Open=True. Accessed on 10 July 2023.

Toxic Contamination Caused by Plastic Waste in Countries of the Global South

Jindrich Petrlik, Bjorn Beeler, Yuyun Ismawati, and Lee Bell

Introduction

The enormous amounts of plastic waste transferred from developed to developing countries are an environmental problem because the transferred waste is difficult to handle. Plastics contain various chemical additives which make these wastes hard to easily destroy or recycle (Marine Litter Topic Group, 2019). We must also consider plastics from used electronics, in addition to waste from plastic packaging and general consumer products. Plastics used in electronics contain high levels of flame retardants, including ones which are banned or listed under the Stockholm Convention on persistent organic pollutants (POPs), such as polybrominated diphenyl ethers (PBDEs), hexabromocyclododecane (HBCD), or dechlorane plus (DP). The same applies to wrecked cars also often ending on scrap yards in developing countries as they contain many plastics with high concentrations of hazardous flame retardants and other chemical additives.

However, there are many chemicals in plastics which are not followed with same level of concern as the additives in electronics or cars. A recent study identified "more than 10,000 relevant substances" in plastics and categorized them "based on substance types, use patterns, and hazard classifications wherever possible" (Wiesinger et al., 2021). Over 2400 substances were identified as "substances of

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potential concern as they meet one or more of the persistence, bioaccumulation, and toxicity criteria in the European Union." The study also found that many of these substances (1327) "are not adequately regulated in many parts of the world" or are even "approved for use in food-contact plastics in some jurisdictions (901 substances)" (Wiesinger et al., 2021). Looking at pictures from plastic waste yards in Indonesia (see Photos 3, 4, and 5), Malaysia, or Turkey, we can identify plastic packaging in which a large number of these unregulated chemicals can be found.

A report published by UNEP identified even higher number of chemicals in relation to plastics: "More than 13,000 chemicals are associated with plastics and plastic production across a wide range of applications, of which over 3,200 monomers, additives, processing aids and non-intentionally added substances are of potential concern due to their hazardous properties. These properties include carcinogenicity, mutagenicity, reproductive toxicity, specific target organ toxicity, endocrine disruption, ecotoxicity, bioaccumulation potential, environmental persistence and mobility, including potential for long-range environmental transport to remote locations" (Weber et al., 2023).

Plastic waste is transferred to the Global South, including all the toxic additives in it. As most developing countries do not have appropriate disposal technologies, plastic waste, including automotive and electronic waste, ends at large scrap yards or dumpsites where it is often destroyed by open burning to get metals from it or simply to reclaim more space for new loads of plastic wastes (Gündoğdu, 2022; Petrlik et al., 2020a; Velis & Cook, 2021). This practice leads to the creation of even larger numbers of toxic chemicals released in the environment and affecting the health of communities in developing countries. One of the highest burdens is caused by burning plastics from electronic or automotive waste as the presence of metals in this process increases the creation of very toxic dioxins[1] (PCDD/Fs). This activity is also listed as one of major sources of unintentionally produced POPs (UPOPs) under the name "smoldering copper cables" (see Fig. 2) in Annex C to the Stockholm Convention (SC, 2009; Stockholm Convention, 2008).

Flows of various toxic chemicals in plastics may vary. Figure 1 illustrates such global flows for PBDEs and transfer of their emissions from developed to developing countries that was published in a recent study on unequal ecological exchange (Tong et al., 2022).

The International Pollutants Elimination Network (IPEN) and its member organizations carried out several studies mapping food chain contamination with toxic chemical releases, most likely from dumped plastic wastes or their burning, at a number of sites affected by these disposal practices mostly in developing or transition countries. These studies focused mainly on POP levels in free-range chicken eggs. They were summarized in a global report showing significant levels of POPs at 25 sites affected by plastic waste disposal in 14 countries around the globe (Petrlik

[1] Dioxins are a large group of unintentionally produced POPs of polychlorinated dibenzo-p-dioxins and dibenzofurans (PCDD/Fs). They are listed under Stockholm Convention in Annex C. This term also includes often another group of dioxin-like polychlorinated biphenyls (dl PCBs). We will use the acronym PCDD/Fs in our text.

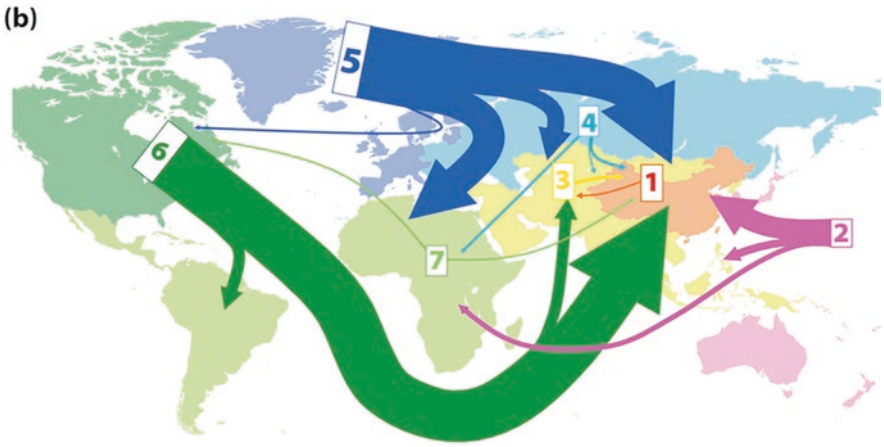

Fig. 1 Illustration of the flows of the trade embodied emissions of PBDEs between the world regions. (Source: Tong et al. (2022))

Photo 1 Typical example of smoldering copper cables at an e-waste scrap yard in Agbogbloshie, Ghana. (Photo: Martin Holzknecht (Arnika))

et al., 2021). A wide range of POPs was observed in free-range eggs from sites affected by disposal of plastic waste in Asia, Africa, Latin America, and Europe (Photo 1).

Free-range chicken eggs are sensitive indicators of POP contamination in soils/dust and represent an important human exposure pathway (Piskorska-Pliszczynska et al., 2014; Van Eijkeren et al., 2006). As "active samplers," they can be used to reveal POP contamination, particularly in areas impacted by PCDD/Fs and PCBs

(Arkenbout & Bouman, 2021; Aslan et al., 2010; DiGangi & Petrlik, 2005), as well as by brominated flame retardants (BFRs) (Petrlik et al., 2017; Polder et al., 2016) or brominated dioxins (PBDD/Fs) (Teebthaisong et al., 2021; Weber et al., 2015).

It is well established that toxic chemicals are released into the environment not only during the production and the use of plastics (Karlsson et al., 2021; Møller et al., 2020) but also during their disposal (BC & SC Secretariat, 2019; Hahladakis et al., 2018), in particular when burning or incineration is involved (Blankenship et al., 1994; Stockholm Convention, 2008).

It is not only dumping and open burning (Velis & Cook, 2021) of imported plastic waste that affects communities in Global South. In several places, local people found plastic waste to be a good fuel replacing the use of wood, but burning plastic as fuel produces a much wider range of toxic pollutants such as polychlorinated or polybrominated dibenzo-p-dioxins and dibenzofurans (PCDD/Fs and PBDD/Fs) as well as dioxin-like polychlorinated biphenyls (dl PCBs) or polycyclic aromatic hydrocarbons (PAHs). For example, in Tropodo, Indonesia (see Photo 2), imported plastic waste was used as fuel in tofu production facilities (Ismawati Drwiega et al., 2019). In Karawang, Indonesia, plastic waste is used as fuel in kilns for chalk production. At both places, high levels of dioxins were measured in free-range chicken eggs (Petrlik et al., 2022b, d).

Off-gases from facilities like tofu factories or chalk kilns are not the only sources of contamination as ashes produced by burning of plastics also contain dioxins and furans. The ashes contained up to 1.2 and 0.5 ng TEQ/g of PCDD/Fs in Tropodo and Karawang, respectively, yet they were not considered as being hazardous due to a loophole in international legislation which defines dioxin POP waste as hazardous only above a level of 15 ng TEQ/g PCDD/Fs. The ashes are widely repurposed for

Photo 2 Tofu factories burning plastic waste as fuel in Tropodo, Indonesia, as documented in November 2019. (Photo: Jindrich Petrlik (Arnika))

Photo 3 Plastic waste yard in Bangun, Indonesia, in 2019. (Photo: Fully Syafi (Ecoton))

Photos 4 and 5 Evidence of the origin of plastic packaging waste imported to Bangun, Indonesia, from the United Kingdom; November 2019. (Photo: Jindrich Petrlik (Arnika/IPEN))

construction of roads and public pathways or for embankments in these localities. Free-range hens can access these areas and become contaminated with PCDD/Fs or other POPs contained in ashes (Katima et al., 2018; Petrlik et al., 2020a). The ash from waste incineration is suggested by authorities to be used as soil amendment in

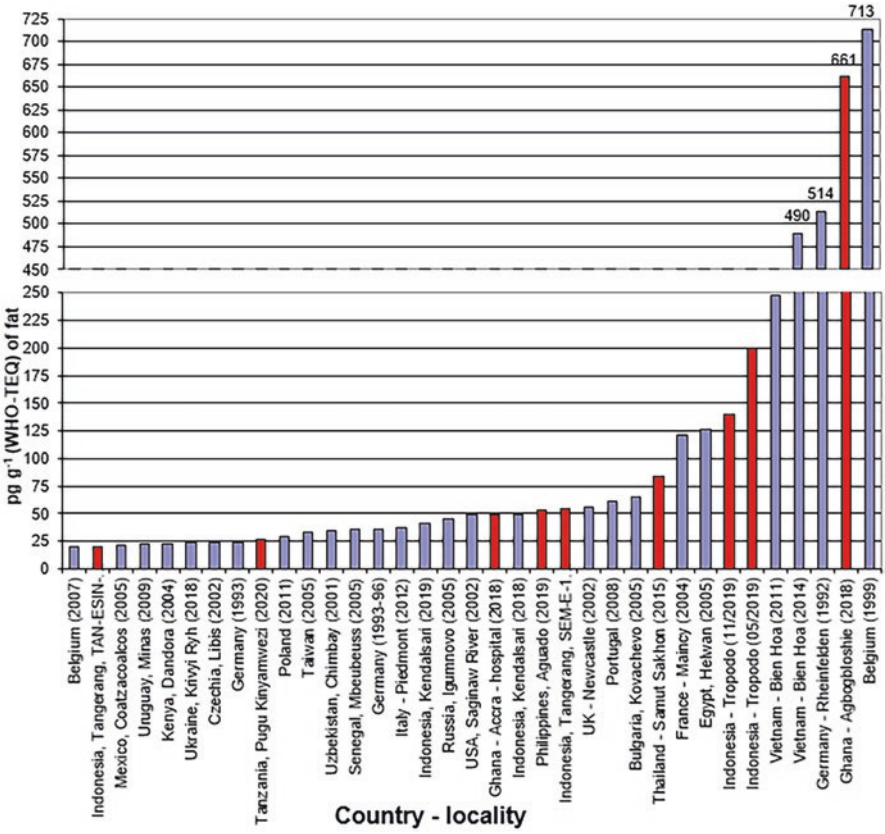

Fig. 2 Highest levels of PCDD/Fs measured globally in chicken eggs until 2020. Red bars show samples from sites affected by plastic waste disposal included in IPEN's report. (Source: Petrlik et al. (2021))

some developing countries (Dzonteu, 2020; Mochungong et al., 2012; Wang et al., 2008). This suggestion does not consider the high levels of PCDD/Fs and other POPs in waste incineration residues as consequence of burning plastics and how they will lead to soil and food chain contamination.

It was estimated that 53.6 million metric tons (Mt) of e-waste from consumer products alone were generated in 2019, and it is predicted to exceed 74 Mt by 2030 (Forti et al., 2020). An estimated 70–80% of e-waste was shipped from developed to low-income countries and was improperly recycled (Ádám et al., 2021; Forti et al., 2020). This also includes plastic casings and other plastic parts of e-waste, mostly treated with flame retardants including brominated or chlorinated compounds currently banned and listed under the Stockholm Convention (Stockholm Convention, 2009a, b, 2013, 2017, 2023), although they are contained in used electronic products produced in the years when the ban of some BFRs was still pending. Electronic waste was spotted at some sites included in IPEN's global study, like

Indonesia or Uruguay, and the report included one of the largest e-waste and automotive waste scrap yard in Agbogbloshie, Ghana, where high levels of PBDEs were measured in soils (Akortia et al., 2017). The highest ever measured levels of 661 and 300 pg TEQ/g fat of chlorinated and brominated dioxins (PCDD/Fs and PBDD/Fs), respectively, in free-range chicken eggs globally were found in samples from this scrap yard (Hogarh et al., 2019). High levels of PCDD/Fs, dl PCBs, and PBDD/Fs were also observed in free-range chicken eggs from the vicinity of other e-waste sites located in developing countries (Petrlik et al., 2022b; Zeng et al., 2018).

An adult eating just 1 egg from a free-range chicken foraging in Agbogbloshie area would exceed the European Food Safety Authority (EFSA) tolerable daily intake (TDI) at level of 0.25 pg WHO-TEQ/kg of body weight/day for dioxins (EFSA CONTAM, 2018a) by 220-fold. Indicator PCBs in these eggs were four-fold higher than the EU standard, and dioxins and dioxin-like PCBs were 171-fold higher than the standard (European Commission, 2016).

High levels of POPs, dioxins, and PBDEs in particular were also measured in samples of soil, dust, and hair from Guiyu, an e-waste site in China (Luksemburg et al., 2002; Xu et al., 2017). Also, rice hulls from the vicinity of another e-waste site in China contained relative high levels of PCDD/Fs, PCBs, and PBDEs (Fu et al., 2012).

Figure 2 shows that among the highest levels of PCDD/Fs measured globally in chicken eggs are more samples from the sites with plastic and/or electronic waste disposal, including Tropodo (Indonesia), Samut Sakhon (Thailand), and others.

A wide range of analyses was conducted at five dumping sites in Adana province, Turkey, where plastic waste imported mainly from the European Union and the United Kingdom was illegally dumped and burned (Gündoğdu, 2022). In comparison with the control samples, the concentrations of PCDD/Fs determined in the survey areas were found to be "approximately 400,000 times higher in Yüreğir/İncirlik field and 8000 times in Seyhan/Yenidam field. … The concentration of polycyclic aromatic hydrocarbons (PAHs) determined in the soil samples collected from Yenidam was up to 35 times higher than the concentration of PAHs reported in previous studies of other regions in Turkey" (Gündoğdu, 2022). PAHs are common pollutants occurring at sites of open burning of plastics (Velis & Cook, 2021), and plastic waste itself can contain them (Conesa et al., 2021) because plastic is mainly produced from oil.

Chinese scientists focused on heavy metal contamination at a typical plastic recycling site in North China and found that "the surface soils and sediments have suffered from moderate to high metal pollution and in particular, high Cd and Hg pollution" and "that there is considerable to high potential ecological risks in more than half of the soils and high potential ecological risk in almost all sediments" (Tang et al., 2015). Source assessment suggested that heavy metals in soils and sediments were mainly derived from inputs from poorly controlled plastic waste recycling in this area. High levels of heavy metals were observed also at the previously mentioned five sites in Adana province, Turkey (Gündoğdu, 2022).

It must be noticed that plastic recycling in areas in Southeast Asia is mostly turned to large plastic waste scrap yards like the one in Bangun, Indonesia (see Photo 3).

Intentionally produced POPs used as additives in plastics were measured in high levels in free-range chicken eggs from the sites affected by plastic waste disposal along with dioxins. The level of 27,159 ng/g fat of PBDEs in free-range eggs from Tropodo was the second highest level ever measured in eggs right after the level of 46,000 ng/g fat in eggs from e-waste site in Guiyu, China. High levels were measured also in other samples from the vicinity of the sites affected by plastic waste disposal, including Bangun, Indonesia, with a large plastic waste scrap yard or Taizhou (Labunska et al., 2013), another e-waste site in China (see graph at Fig. 3).

The egg samples from the Bangun waste yard, known for large quantities of imported plastic waste (Ismawati et al., 2019), have also shown levels of per- and polyfluorinated compounds (PFASs) comparable to the sites affected by industry from Western Europe (Petrlik et al., 2020a). An adult eating half an egg per day from a free-range chicken foraging in the vicinity of the Bangun dumpsite would exceed the proposed tolerable daily intake (TDI) of PFOS (EFSA CONTAM, 2018b) up to almost 16-fold (Petrlik et al., 2020a).

PFASs are known to contaminate drinking water source near industrial and military sites (Hu et al., 2016; Post et al., 2012). A study conducted in the vicinity of waste disposal sites, including plastic wastes in Thailand, demonstrated "that waste disposal site leachates represent a likely major PFAS source in groundwater in Thailand" (Hongkachok et al., 2023). Thailand became one the key destinations of electronic and plastic waste exports in Southeast Asia, after China closed its doors to mixed plastic waste imports in 2017 (Petrlik et al., 2022c; Roberts-Davis & Saetang, 2019).

The occurrence of short and medium chain chlorinated paraffins (SCCPs and MCCPs) and dechloranes, also additives to plastics, was confirmed in free-range chicken eggs and soil collected near waste disposal sites in Tanzania in a recent study (Haarr et al., 2023), which confirmed results for SCCPs in eggs from previous research by IPEN (Petrlik et al., 2020b). The study concluded, "risk assessment of CPs shows that consumption of eggs from free-range chickens could represent a health concern regarding exposure to SCCPs" (Haarr et al., 2023) (Photos 4 and 5).

POPs analyzed in soil, eggs, rice, and other locally grown food from the sites affected by imported plastic waste, including plastic in electronic and automotive waste, have serious impacts on human health. BFRs such as PBDEs are known endocrine-disrupting chemicals (EDCs) and adversely impact the development of the nervous system and of children's intelligence (POP RC, 2006, 2007, 2014).

Per- and polyfluoroalkyl substances (PFASs) are a large class of more than 4500 (OECD, 2018) very persistent fluorinated chemicals (including PFOS) that have been widely used in packaging, textiles, and other plastics. Scientists are concerned with their widespread presence in the environment, and the Madrid Statement said that they "call on the international community to cooperate in limiting the production and use of PFASs and in developing safer nonfluorinated alternatives" (Blum et al., 2015). In animal studies, some long-chain PFASs have been found to cause

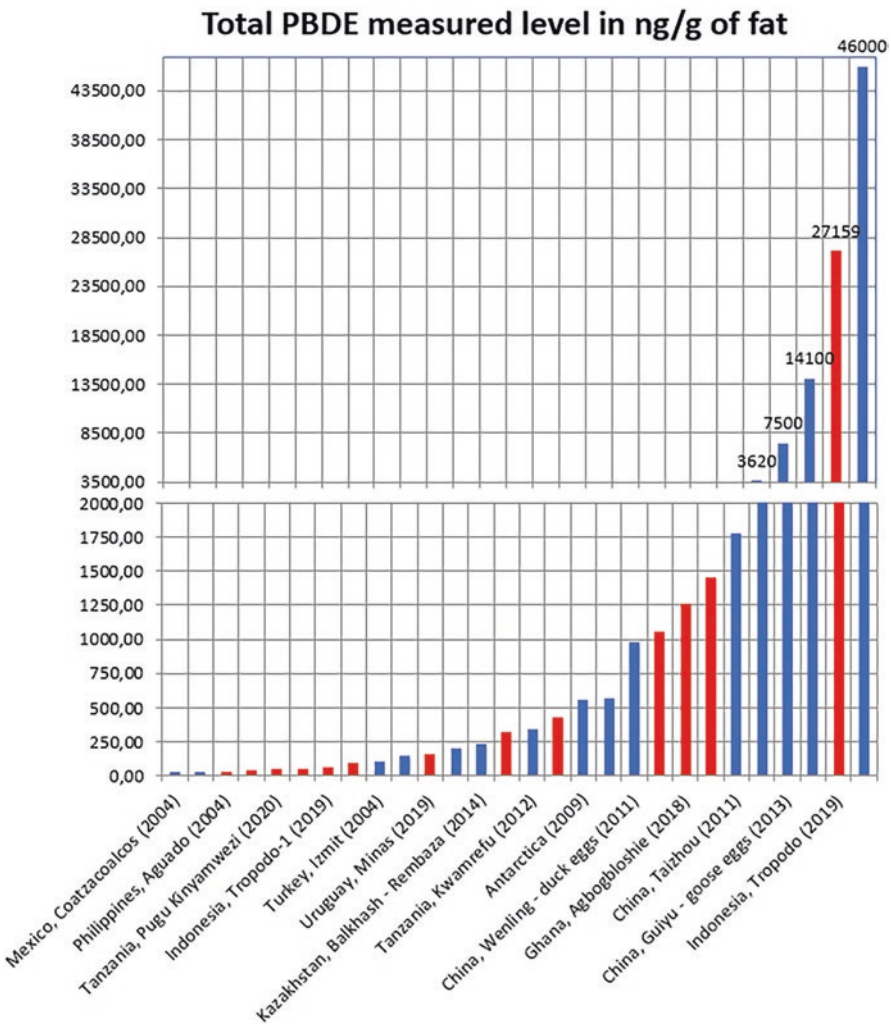

Fig. 3 The highest levels of PBDEs measured globally in chicken eggs until 2020. Red bars show samples from sites affected by plastic waste disposal included in IPEN's report. (Source: Petrlik et al. (2021))

liver toxicity, disruption of lipid metabolism and of the immune and endocrine systems, adverse neurobehavioral effects, neonatal toxicity and death, and tumors in multiple organ systems (Lau et al., 2007; Post et al., 2012). More health effects of this very large group of chemicals are summarized in the Madrid and Zurich statements as well as in the toxicological profiles of PFASs (ATSDR, 2018; Blum et al., 2015; Fenton, 2019; Ritscher et al., 2018).

Chlorinated dioxins (PCDD/Fs) are known to be extremely toxic. Numerous epidemiologic studies have revealed a variety of human health effects linked to dioxin

exposure including cardiovascular disease, diabetes, cancer, porphyria, endometriosis, early menopause, alteration of testosterone and thyroid hormones, and altered immune system response among others (Schecter, 2012; White & Birnbaum, 2009). Laboratory animals given dioxins suffered a variety of effects, including an increase in birth defects and stillbirths. Food (particularly from animals) is the major source of dioxin exposure for humans (BRS, 2017).

PBDD/Fs have been found to exhibit similar toxicity and health effects as their chlorinated analogs (PCDD/Fs) (Behnisch et al., 2003). They can, for example, affect brain development, damage the immune system and fetus, or induce carcinogenesis (Kannan et al., 2012).

Exposure to chemicals contained in consumer products such as toys, hair accessories, and/or kitchen utensils (Kuang et al., 2018; Møller et al., 2021; Samsonek & Puype, 2013; Strakova & Petrlik, 2017) made of recycled plastic from used electronics and cars is additional burden to human health globally, including developing countries. A recent study has shown widespread occurrence of products contaminated with BFRs obtained at markets from African and Arabic countries (Petrlik et al., 2022a), and a similar situation was previously found in products from a wide range of other developing countries (DiGangi & Strakova, 2016).

POPs and heavy metals represent the groups of chemicals brought in imported plastics from the Global North to the Global South. UPOPs are created by insufficient plastic waste management as a result of the widely ignored fact that developing countries lack proper technologies for disposal of plastic waste while acknowledging that for wide range of plastics, such technologies do not exist anywhere at this time.

We have not discussed the other toxic chemical effects of plastics or contamination with other additives such as phthalates or bisphenol A in this chapter yet. The levels of phthalates found increased in the vicinity of some dumpsites in South Africa (Adeniyi et al., 2008). Another study based on research in six Asian developing countries suggested that microplastics "could be potential sources of the phthalates and brominated retardants" in soils at dumpsites (Tun et al., 2022). These toxic chemicals' effects were demonstrated in numerous studies (Fantke et al., 2021; Groh, 2019; Marine Litter Topic Group, 2019; Verma et al., 2016).

Plastic waste management remains challenging mainly from the point of view of potentially toxic substances in plastics. It was well documented on PBDEs: "Since the largest proportion of interregional PBDE emission transfer arises from the waste disposal stage, global efforts aiming to address the issue of the ecological unequal exchange and reduce the health and environmental impacts of PBDEs should focus on tackling the problem of e-waste trade. Since countries in the developed regions often have higher labor costs and more stringent environmental regulations, a large proportion of their wastes are exported to other, often less developed countries" (Tong et al., 2022).

Minimization of use of plastics remains the primary solution to this problem alongside phasing out of toxic additives in plastics and phasing out of the most problematic plastics such as PVC in relation to UPOPs generated during their disposal. It is also necessary to set more strict limits to control POPs (Weber et al., 2019) and

heavy metal content in the wastes in order to halt their free movement across borders. The Stockholm Convention could apply material substitution[2] much more rigorously to avoid UPOP releases.

The plastic waste crisis including the spread of toxic chemicals related to the production, use, and disposal of plastics is accelerating and requires immediate action. Unfortunately, the most severe consequences will be felt in developing countries as more recent studies demonstrate. One study suggests that "the strategies that are appropriate for OECD nations are not always appropriate for developing economies" (Browning et al., 2021). Locally focused approaches like "Locally Managed Decentralized Circular Economy (LMDCE) provide the best option for addressing the problem of mismanaged and unmanaged plastic waste in infrastructure limited countries and has the potential to be transformative for both women and men" (Browning et al., 2021).

Increasing volumes of plastic waste and toxic chemical releases globally led to the conclusion "that humanity is currently operating outside the planetary boundary" (Persson et al., 2022). "The increasing rate of production and releases of larger volumes and higher numbers of novel entities with diverse risk potentials exceed societies' ability to conduct safety related assessments and monitoring," stated scientists in the global assessment in 2022 (Persson et al., 2022). The new global treaty on plastic waste must therefore also address toxic pollution caused by plastic overuse and overproduction. Developing countries should not serve as dumping grounds for plastic waste collected worldwide.

References

Ádám, B., Göen, T., Scheepers, P. T. J., Adliene, D., Batinic, B., Budnik, L. T., Duca, R.-C., Ghosh, M., Giurgiu, D. I., Godderis, L., Goksel, O., Hansen, K. K., Kassomenos, P., Milic, N., Orru, H., Paschalidou, A., Petrovic, M., Puiso, J., Radonic, J., et al. (2021). From inequitable to sustainable e-waste processing for reduction of impact on human health and the environment. *Environmental Research, 194*. https://doi.org/10.1016/j.envres.2021.110728

Adeniyi, A., Dayomi, M., Siebe, P., & Okedeyi, O. (2008). An assessment of the levels of phthalate esters and metals in the Muledane open dump, Thohoyandou, Limpopo Province, South Africa. *Chemistry Central Journal, 2*, 9. https://doi.org/10.1186/1752-153X-2-9

Akortia, E., Olukunle, O. I., Daso, A. P., & Okonkwo, J. O. (2017). Soil concentrations of polybrominated diphenyl ethers and trace metals from an electronic waste dump site in the Greater Accra Region, Ghana: Implications for human exposure. *Ecotoxicology and Environmental Safety, 137*, 247–255. https://doi.org/10.1016/j.ecoenv.2016.12.008

Arkenbout, A., & Bouman, K. (2021). *The true toxic toll – Biomonitoring research results – Czech Republic, Lithuania, Spain*. https://zerowasteeurope.eu/library/the-true-toxic-toll-biomonitoring-of-incineration-emissions/

[2] Part V, Annex C, of the Stockholm Convention names the following measure among the general prevention measures relating to both best available techniques and best environmental practices: "Replacement of feed materials which are persistent organic pollutants or where there is a direct link between the materials and releases of persistent organic pollutants from the source."

Aslan, S., Kemal Korucu, M., Karademir, A., & Durmusoglu, E. (2010). Levels of PCDD/Fs in local and non-local food samples collected from a highly polluted area in Turkey. *Chemosphere, 80*(10), 1213–1219. https://doi.org/10.1016/j.chemosphere.2010.06.008

ATSDR. (2018). *Toxicological profile for perfluoroalkyls*. Draft for public comment.

BC & SC Secretariat. (2019). *Report on the activities of the Basel and Stockholm conventions regional centres; Addendum: Plastic and toxic additives, and the circular economy: The role of the Basel and Stockholm Conventions. UNEP/CHW.14/INF/29/Add.1 – UNEP/POPS/COP.9/INF/28/Add.1*. Basel Convention Secretariat, Stockholm Convention Secretariat.

Behnisch, P. A., Hosoe, K., & Sakai, S.-I. (2003). Brominated dioxin-like compounds: In vitro assessment in comparison to classical dioxin-like compounds and other polyaromatic compounds. *Environment International, 29*(6), 861–877. http://www.sciencedirect.com/science/article/B6V7X-48YT5WD-2/2/8e1c507cf4be6f401341f3befddb4fc8

Blankenship, A., Chang, D., Jones, A., Kelly, P., Kennedy, I., Matsumura, F., Pasek, R., & Yang, G. (1994). Toxic combustion by-products from the incineration of chlorinated hydrocarbons and plastics. *Chemosphere, 28*(1), 183–196. http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?db=pubmed&cmd=Retrieve&dopt=AbstractPlus&list_uids=NIOSH/00219630DOCNO-NIOSH/00219630

Blum, A., Balan, S. A., Scheringer, M., Trier, X., Goldenman, G., Cousins, I. T., Diamond, M., Fletcher, T., Higgins, C., Lindeman, A. E., Peaslee, G., Voogt, P. D., Wang, Z., & Weber, R. (2015). The Madrid statement on poly- and perfluoroalkyl substances (PFASs). *Environmental Health Perspectives, 123*(5), A107–A111. https://doi.org/10.1289/ehp.1509934

Browning, S., Beymer-Farris, B., & Seay, J. R. (2021). Addressing the challenges associated with plastic waste disposal and management in developing countries. *Current Opinion in Chemical Engineering, 32*. https://doi.org/10.1016/j.coche.2021.100682

BRS. (2017). *All POPs listed in the Stockholm Convention*. Retrieved 7 Mar 2019 from http://www.pops.int/TheConvention/ThePOPs/AllPOPs/tabid/2509/Default.aspx

Conesa, J. A., Nuñez, S. S., Ortuño, N., & Moltó, J. (2021). PAH and POP presence in plastic waste and recyclates: State of the art. *Energies, 14*(12). https://doi.org/10.3390/en14123451

DiGangi, J., & Petrlik, J. (2005). *The Egg Report – Contamination of chicken eggs from 17 countries by dioxins, PCBs and hexachlorobenzene*. IPEN Report, 52 p.

DiGangi, J., & Strakova, J. (2016). Recycling of plastics containing brominated flame retardants leads to contamination of plastic childrens toys. *Organohalogen Compounds, 78*(2016), 9–11.

Dzonteu, D.-C. (2020, February 2). *Gabon: GES s'invite dans la destruction par incinération aux normes internationales*. Retrieved 13 Apr 2023 from https://www.gabonreview.com/gabon-ges-sinvite-dans-la-destruction-par-incineration-aux-normes-internationales/

EFSA CONTAM. (2018a). Risk for animal and human health related to the presence of dioxins and dioxin-like PCBs in feed and food. *EFSA Journal, 16*(11), 331. https://doi.org/10.2903/j.efsa.2018.5333

EFSA CONTAM. (2018b). Risk to human health related to the presence of perfluorooctane sulfonic acid and perfluorooctanoic acid in food. *EFSA Journal, 16*(12), 284. https://doi.org/10.2903/j.efsa.2018.5194

European Commission. (2016). Commission Regulation (EC) No 1881/2006 of 19 December 2006 setting maximum levels for certain contaminants in foodstuffs (Text with EEA relevance) (OJ L 364, 20.12.2006, p. 5). *Official Journal*.

Fantke, P., Chiu, W. A., Aylward, L., Judson, R., Huang, L., Jang, S., Gouin, T., Rhomberg, L., Aurisano, N., McKone, T., & Jolliet, O. (2021). Exposure and toxicity characterization of chemical emissions and chemicals in products: Global recommendations and implementation in USEtox. *The International Journal of Life Cycle Assessment*. https://doi.org/10.1007/s11367-021-01889-y

Fenton, S. E. (2019, 2020 February 22). *PFAS collection*. Retrieved 21 June 2020 from https://ehp.niehs.nih.gov/curated-collections/pfas

Forti, V., Balde, C. P., Kuehr, R., & Bel, G. (2020). *The Global E-waste Monitor 2020: Quantities, flows and the circular economy potential*. 120 p.

Fu, J., Wang, T., Wang, P., Qu, G., Wang, Y., Zhang, Q., Zhang, A., & Jiang, G. (2012). Temporal trends (2005–2009) of PCDD/Fs, PCBs, PBDEs in rice hulls from an e-waste dismantling area after stricter environmental regulations. *Chemosphere, 88*(3), 330–335. https://doi.org/10.1016/j.chemosphere.2012.03.006

Groh, K. J. (2019, August 23). *Benchmarking in vitro toxicity of plastics*. Food Packaging Forum. Retrieved 19 Sept 2019 from https://www.foodpackagingforum.org/news/benchmarking-in-vitro-toxicity-of-plastics

Gündoğdu, S. (2022). *Game of waste: Irreversible impact*. Greenpeace Mediterranean, 34 p. https://doi.org/10.13140/RG.2.2.21342.72005

Haarr, A., Nipen, M., Mwakalapa, E. B., Borgen, A. R., Mmochi, A. J., & Borga, K. (2023). Chlorinated paraffins and dechloranes in free-range chicken eggs and soil around waste disposal sites in Tanzania. *Chemosphere*. https://doi.org/10.1016/j.chemosphere.2023.138646

Hahladakis, J. N., Velis, C. A., Weber, R., Iacovidou, E., & Purnell, P. (2018). An overview of chemical additives present in plastics: Migration, release, fate and environmental impact during their use, disposal and recycling. *Journal of Hazardous Materials, 344*, 179–199. https://doi.org/10.1016/j.jhazmat.2017.10.014

Hogarh, J. N., Petrlik, J., Adu-Kumi, S., Akortia, E., Kuepouo, G., Behnisch, P. A., Bell, L., DiGangi, J., Rosmus, J., & Fišar, P. (2019). Persistent organic pollutants in free-range chicken eggs in Ghana. *Organohalogen Compounds, 81*(2019), 507–510.

Hongkachok, C., Boontanon, S. K., Boontanon, N., Sukeesan, S., Polprasert, C., & Fujii, S. (2023). Per- and polyfluoroalkyl substances in groundwater in Thailand: Occurrence, source identification and spatial distribution. *International Journal of Environmental Science and Technology*. https://doi.org/10.1007/s13762-023-04894-w

Hu, X. C., Andrews, D. Q., Lindstrom, A. B., Bruton, T. A., Schaider, L. A., Grandjean, P., Lohmann, R., Carignan, C. C., Blum, A., Balan, S. A., Higgins, C. P., & Sunderland, E. M. (2016). Detection of poly- and perfluoroalkyl substances (PFASs) in U.S. drinking water linked to industrial sites, military fire training areas, and wastewater treatment plants. *Environmental Science & Technology Letters*. https://doi.org/10.1021/acs.estlett.6b00260

Ismawati, Y., Septiono, M. A., Arisandi, P., & Bell, L. (2019). *Plastic waste trade in Indonesia. Country update report*. Nexus3 Foundation, 66 p.

Kannan, K., Liao, C., & Moon, H.-B. (2012). Polybrominated dibenzo-p-dioxins and dibenzofurans. In A. Schecter (Ed.), *Dioxins and health including other persistent organic pollutants and endocrine disruptors* (3rd ed., pp. 255–302). Wiley.

Karlsson, T., Brosché, S., Alidoust, M., & Takada, H. (2021). *Plastic pellets found on beaches all over the world contain toxic chemicals*. International Pellet Watch, IPEN, 26 p. Available form: https://ipen.org/documents/plastic-pellets-foundbeaches-all-over-world-contain-toxic-chemicals

Katima, J. H. Y., Bell, L., Petrlik, J., Behnisch, P. A., & Wangkiat, A. (2018). High levels of PCDD/Fs around sites with waste containing POPs demonstrate the need to review current standards. *Organohalogen Compounds, 80*, 700–704.

Kuang, J., Abdallah, M. A.-E., & Harrad, S. (2018). Brominated flame retardants in black plastic kitchen utensils: Concentrations and human exposure implications. *Science of the Total Environment, 610–611*(Supplement C), 1138–1146. https://doi.org/10.1016/j.scitotenv.2017.08.173

Labunska, I., Harrad, S., Santillo, D., Johnston, P., & Yun, L. (2013). Domestic duck eggs: An important pathway of human exposure to PBDEs around E-waste and scrap metal processing areas in Eastern China. *Environmental Science & Technology, 47*(16), 9258–9266. https://doi.org/10.1021/es402300m

Lau, C., Anitole, K., Hodes, C., Lai, D., Pfahles-Hutchens, A., & Seed, J. (2007). Perfluoroalkyl acids: A review of monitoring and toxicological findings. *Toxicological Sciences, 99*(2), 366–394. https://doi.org/10.1093/toxsci/kfm128

Luksemburg, W., Mitzel, R., Peterson, R., Hedin, J., Maier, M., Schuld, M., Zhou, H., & Wong, A. (2002). Polychlorinated dibenzodioxins and dibenzofurans (PCDDs/PCDFs) levels in environmental and human hair samples around an electronic waste processing site in Guiyu, Guangdong Province, China. *Organohalogen Compounds, 55*, 347–349.

Marine Litter Topic Group. (2019, April 29–May 10). *Plastic and toxic additives, and the circular economy: The role of the Basel and Stockholm Conventions. UNEP/CHW.14/INF/29/Add.1 – UNEP/POPS/COP.9/INF/28/Add.1*. Conference of the parties to the basel convention on the control of transboundary movements of hazardous wastes and their, disposal fourteenth meeting; Conference of the parties to the Stockholm Convention on persistent organic pollutants, ninth meeting, Geneva.

Mochungong, P. I., Gulis, G., & Sodemann, M. (2012). Clinical waste incinerators in Cameroon--A case study. *International Journal of Health Care Quality Assurance, 25*(1), 6–18. https://doi.org/10.1108/09526861211192377

Møller, M., Jopkova, M., Kristian, J., Brabcova, K., & Petrlikova, L. (2020). *Phthalates in the environment of children – Case studies from the Czech Republic in the period 2007–2016*. Arnika, 54 p.

Møller, M., Randjelovic, J., Petrlik, J., Gramblicka, T., Pulkrabova, J., Bell, L., & Petrlikova Maskova, L. (2021). The ongoing hazards of toxic BFRs in toys, kitchen utensils and other consumer products from plastic in Czechia and Serbia. *Organohalogen Compounds, 82*(2021), 93–96.

OECD. (2018). *Toward a new comprehensive global database of per- and polyfluoroalkyl substances (PFASs): Summary report on updating the OECD 2007 list of per- and polyfluoroalkyl substances (PFASs). Joint meeting of the Chemicals Committee and the Working Party on Chemicals, Pesticides and Biotechnology* (Series on Risk Management No. 39, Issue). http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=ENV-JM-MONO(2018)7&doclanguage=en

Persson, L., Carney Almroth, B. M., Collins, C. D., Cornell, S., de Wit, C. A., Diamond, M. L., Fantke, P., Hassellov, M., MacLeod, M., Ryberg, M. W., Sogaard Jorgensen, P., Villarrubia-Gomez, P., Wang, Z., & Hauschild, M. Z. (2022). Outside the safe operating space of the planetary boundary for novel entities. *Environmental Science & Technology, 56*(3), 1510–1521. https://doi.org/10.1021/acs.est.1c04158

Petrlik, J., Kalmykov, D., Bell, L., & Weber, R. (2017). Brominated flame retardants in eggs – Data from Kazakhstan and Thailand. *Organohalogen Compounds, 79*(2017), 167–170. http://dioxin20xx.org/wp-content/uploads/pdfs/2017/9773.pdf

Petrlik, J., Ismawati, Y., Arisandi, P., Bell, L., Beeler, B., Grechko, V., & Ozanova, S. (2020a). *Toxic hot spots in Java and persistent organic pollutants (POPs) in eggs*. IPEN, Arnika – Toxics and Waste Programme, Nexus3, Ecoton, 128 p. ISBN: 978-80-87651-78-0.

Petrlik, J., Ochieng Ochola, G., & Mng'anya, S. (2020b). *POPs in eggs from Kenya and Tanzania – Plastic waste poisons the food chain in Kenya and Tanzania*. Arnika, IPEN, 12 p.

Petrlik, J., Bell, L., Beeler, B., Møller, M., Brabcova, K., Carcamo, M., Chávez Arce, S. C., Dizon, T., Ismawati Drwiega, Y., Jopkova, M., Kuepouo, G., Mng'anya, S., Ochieng Ochola, G., & Skalsky, M. (2021). *Plastic waste disposal leads to contamination of the food chain*. International Pollutants Elimination Network (IPEN), Arnika – Toxics and Waste Programme, 118 p. ISBN: 978-1-955400-07-7.

Petrlik, J., Beeler, B., Strakova, J., Møller, M., Allo'o Allo'o, S. M., Amera, T., Brosché, S., Gharbi, S., Hajri, I., Kuepouo, G., Mng'anya, S., Ngakeng, A., Ochieng Ochola, G., Rhalem, N., Al-Refai, O., Grechko, V., Walaska, H., & Zulkovska, K. (2022a). *Hazardous chemicals in plastic products – Brominated flame retardants in consumer products made of recycled plastic from eleven Arabic and African countries*. Arnika, IPEN, 74 p. ISBN: 978-1-955400-17-6.

Petrlik, J., Bell, L., DiGangi, J., Allo'o Allo'o, S. M., Kuepouo, G., Ochieng Ochola, G., Grechko, V., Jelinek, N., Strakova, J., Skalsky, M., Ismawati Drwiega, Y., Hogarh, J. N., Akortia, E., Adu-Kumi, S., Teebthaisong, A., Carcamo, M., Beeler, B., Behnisch, P., Baitinger, C., et al. (2022b). Monitoring dioxins and PCBs in eggs as sensitive indicators for environmental pollution and global contaminated sites and recommendations for reducing and controlling releases and exposure. *Emerging Contaminants, 8*(2022), 254–279. https://doi.org/10.1016/j.emcon.2022.05.001

Petrlik, J., Boontongmai, T., Bubphachat, N., Thowsakul, C., Teebthaisong, A., Saetang, P., Jelinek, N., Strakova, J., Grechko, V., & Jeungsmarn, P. (2022c). *POPs in the surroundings of e-waste sites*. EARTH, Arnika, IPEN, 41 p.

Petrlik, J., Ismawati, Y., Bell, L., Beeler, B., Grechko, V., Jelinek, N., & Septiono, M. A. (2022d). POPs contamination caused by use of plastic waste as fuel at locations in Indonesia. *Organohalogen Compounds, 83*(2022), 117–121.

Piskorska-Pliszczynska, J., Mikolajczyk, S., Warenik-Bany, M., Maszewski, S., & Strucinski, P. (2014). Soil as a source of dioxin contamination in eggs from free-range hens on a Polish farm. *Science of the Total Environment, 466–467*(0), 447–454. https://doi.org/10.1016/j.scitotenv.2013.07.061

Polder, A., Müller, M. B., Brynildsrud, O. B., de Boer, J., Hamers, T., Kamstra, J. H., Lie, E., Mdegela, R. H., Moberg, H., Nonga, H. E., Sandvik, M., Skaare, J. U., & Lyche, J. L. (2016). Dioxins, PCBs, chlorinated pesticides and brominated flame retardants in free-range chicken eggs from peri-urban areas in Arusha, Tanzania: Levels and implications for human health. *Science of the Total Environment, 551–552*, 656–667. https://doi.org/10.1016/j.scitotenv.2016.02.021

POP RC. (2006). *Risk profile on commercial pentabromodiphenyl ether, UNEP/POPS/POPRC.2/17/Add.1*.

POP RC. (2007). *Risk profile on commercial octabromodiphenyl ether, UNEP/POPS/POPRC.3/20/Add.6*.

POP RC. (2014). *Risk profile on decabromodiphenyl ether (commercial mixture, c-decaBDE), UNEP/POPS/POPRC.10/10/Add.2*.

Post, G. B., Cohn, P. D., & Cooper, K. R. (2012). Perfluorooctanoic acid (PFOA), an emerging drinking water contaminant: A critical review of recent literature. *Environmental Research, 116*, 93–117. https://doi.org/10.1016/j.envres.2012.03.007

Ritscher, A., Wang, Z., Scheringer, M., Boucher, J. M., Ahrens, L., Berger, U., Bintein, S., Bopp, S. K., Borg, D., Buser, A. M., Cousins, I., DeWitt, J., Fletcher, T., Green, C., Herzke, D., Higgins, C., Huang, J., Hung, H., Knepper, T., et al. (2018). Zurich statement on future actions on per- and polyfluoroalkyl substances (PFASs). *Environmental Health Perspectives, 126*(8), 084502. https://doi.org/10.1289/EHP4158

Roberts-Davis, T. L., & Saetang, P. (2019). *Trading away health and the environment: The toxic business of waste imports into Thailand*. EARTH, Arnika, 61 p.

Samsonek, J., & Puype, F. (2013). Occurrence of brominated flame retardants in black thermo cups and selected kitchen utensils purchased on the European market. *Food Additives & Contaminants: Part A, 30*(11), 1976–1986. https://doi.org/10.1080/19440049.2013.829246

SC. (2009). *Stockholm Convention on Persistent Organic – Pollutants quantities of POPs reported in national implementation plan inventories of 88 Parties to the Convention*. UNEP/POPS/COP.4/30.

Schecter, A. (2012). *Dioxins and health including other persistent organic pollutants and endocrine disruptors* (3rd ed.). Wiley, 644 p. ISBN: 9780470605295.

Stockholm Convention. (2008). *Guidelines on best available techniques and provisional guidance on best environmental practices relevant to Article 5 and Annex C of the Stockholm Convention on Persistent Organic Pollutants*. http://www.pops.int/documents/guidance/batbep/batbepguide_en.pdf

Stockholm Convention. (2009a). Listing of tetrabromodiphenyl ether and pentabromodiphenyl ether. Decision SC 4/18.

Stockholm Convention. (2009b). Listing of hexabromodiphenyl ether and heptabromodiphenyl ether. Decision SC 4/14.

Stockholm Convention. (2013). Listing of hexabromocyclododecane. Decision SC-6/13.

Stockholm Convention. (2017). Listing of decabromodiphenyl ether. Decision SC-8/10.

Stockholm Convention. (2023). Decision SC-11/[--]: Listing of Dechlorane Plus.

Strakova, J., & Petrlik, J. (2017). *Toy or toxic waste? An analysis of 47 plastic toy and beauty products made from toxic recycling*. Arnika, 17 p.

Tang, Z., Zhang, L., Huang, Q., Yang, Y., Nie, Z., Cheng, J., Yang, J., Wang, Y., & Chai, M. (2015). Contamination and risk of heavy metals in soils and sediments from a typical plastic waste recycling area in North China. *Ecotoxicology and Environmental Safety, 122*, 343–351. https://doi.org/10.1016/j.ecoenv.2015.08.006

Teebthaisong, A., Saetang, P., Petrlik, J., Bell, L., Beeler, B., Jopkova, M., Ismawati, Y., Kuepouo, G., Ochieng Ochola, G., & Akortia, E. (2021). Brominated dioxins (PBDD/Fs) in free range chicken eggs from sites affected by plastic waste. In *Dioxin 2021*, Xi'an, China.

Tong, K., Li, L., Breivik, K., & Wania, F. (2022). Ecological unequal exchange: Quantifying emissions of toxic chemicals embodied in the global trade of chemicals, products, and waste. *Environmental Research Letters, 17*(4). https://doi.org/10.1088/1748-9326/ac5f95

Tun, T. Z., Kunisue, T., Tanabe, S., Prudente, M., Subramanian, A., Sudaryanto, A., Viet, P. H., & Nakata, H. (2022). Microplastics in dumping site soils from six Asian countries as a source of plastic additives. *Science of the Total Environment, 806*(Pt 4), 150912. https://doi.org/10.1016/j.scitotenv.2021.150912

Van Eijkeren, J., Zeilmaker, M., Kan, C., Traag, W., & Hoogenboom, L. (2006). A toxicokinetic model for the carry-over of dioxins and PCBs from feed and soil to eggs. *Food Additives & Contaminants: Part A, 23*(5), 509–517.

Velis, C. A., & Cook, E. (2021). Mismanagement of plastic waste through open burning with emphasis on the Global South: A systematic review of risks to occupational and public health. *Environmental Science & Technology, 55*(11), 7186–7207. https://doi.org/10.1021/acs.est.0c08536

Verma, R., Vinoda, K., Papireddy, M., & Gowda, A. (2016). Toxic pollutants from plastic waste-A review. *Procedia Environmental Sciences, 35*, 701–708.

Wang, T., Liu, T., & Sun, C. (2008). Application of MSWI fly ash on acid soil and its effect on the environment. *Waste Management, 28*(10), 1977–1982. Epub 2007 Sept 1918.

Weber, R., Watson, A., Petrlik, J., Winski, A., Schwedler, O., Baitinger, C., & Behnisch, P. (2015). High levels of PCDD/F, PBDD/F and PCB in eggs around pollution sources demonstrates the need to review standards. *Organohalogen Compounds, 77*(2015), 615–618.

Weber, R., Bell, L., Watson, A., Petrlik, J., Paun, M. C., & Vijgen, J. (2019). Assessment of POPs contaminated sites and the need for stringent soil standards for food safety for the protection of human health. *Environmental Pollution, 249*, 703–715. https://doi.org/10.1016/j.envpol.2019.03.066

Weber, R., Ashta, N. M., Aurisano, N., Wang, Z., Outters, M., Miguel, K., Schlummer, M., Blepp, M., Wiesinger, H., Andrade, H., Scheringer, M., & Fantke, P. (2023). *Chemicals in plastic: A technical report*. https://doi.org/10.13140/RG.2.2.31417.34409

White, S. S., & Birnbaum, L. S. (2009). An overview of the effects of dioxins and dioxin-like compounds on vertebrates, as documented in human and ecological epidemiology. *Journal of Environmental Science and Health, Part C, 27*(4), 197–211. https://doi.org/10.1080/10590500903310047

Wiesinger, H., Wang, Z., & Hellweg, S. (2021). Deep dive into plastic monomers, additives, and processing aids. *Environmental Science & Technology, 55*(13), 9339–9351. https://doi.org/10.1021/acs.est.1c00976

Xu, P., Tao, B., Zhou, Z., Fan, S., Zhang, T., Liu, A., Dong, S., Yuan, J., Li, H., Chen, J., & Huang, Y. (2017). Occurrence, composition, source, and regional distribution of halogenated flame retardants and polybrominated dibenzo-p-dioxin/dibenzofuran in the soils of Guiyu, China. *Environmental Pollution, 228*, 61–71. https://doi.org/10.1016/j.envpol.2017.05.024

Zeng, Y., Huang, C., Luo, X., Liu, Y., Ren, Z., & Mai, B. (2018). Polychlorinated biphenyls and chlorinated paraffins in home-produced eggs from an e-waste polluted area in South China: Occurrence and human dietary exposure. *Environment International, 116*, 52–59.

The Human Rights Impacts of Plastic Waste Exports

Krista Shennum

Introduction

I met "Çiçek" and her two younger sisters in Adana, Turkey, while investigating the human rights impacts of plastic recycling for Human Rights Watch (Human Rights Watch, 2022).[1] While sitting with the three teenage girls on their living room floor, Çiçek told me how her family fled the war in Syria nearly overnight, with the girls only able to bring a single bag with them as they fled to Turkey as refugees. Shortly after arriving in Adana, Çiçek and her sisters began working at a nearby plastic recycling facility, where they sorted mixed plastic by color for 12 hours per day, 6 days per week, in spite of legal provisions preventing any children in Turkey from working in such a hazardous workplace. The girls reported sorting imported plastic waste, which they were able to identify by foreign language labels. And despite laws requiring exported plastic waste to be clean, recyclable, and already sorted, Çiçek told me that the imported waste was often dirty and contaminated with things like soiled baby diapers.

For decades, high-consuming economies in the Global North, including the United States, the United Kingdom, Canada, Japan, and European Union member states, have exported their plastic waste to countries where it is cheaper to process or otherwise get rid of the refuse. Often, recipient countries have weak or unenforced environmental regulations, low labor costs, and limited government accountability for environmental and labor abuses. For years, most exported plastic

[1] Here and throughout this chapter, I am using quotation marks to indicate that a pseudonym is being used to protect the identity of the individual over fears of retaliation.

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waste was sent to China, with the country importing 45% of global plastic waste from 1992 to 2018. But in 2018, the Chinese government implemented its National Sword policy, which banned the import of plastic waste due to its immense environment and human health impacts. Instead of taking this global policy decision as an opportunity to build domestic waste management systems or take concrete steps to minimalize plastic production or consumption, countries in the Global North began shipping their waste to new countries, with Turkey, Malaysia, Indonesia, the Philippines, and Mexico rapidly becoming major importers of plastic waste. Countries in the Global North continue to externalize the health, environmental, and economic costs of their high consumption.

While the entire plastic life cycle can pose serious threats to human rights, plastic disposal, recycling, and waste management pose acute risks to the rights to health, water, food, access to information, life, and a healthy environment. When plastic waste is exported from one country to another, its management – or lack thereof – can impact local communities and workers who are exposed to that waste or its pollution. This concerning trend of the export of plastic waste by wealthy, high-consuming countries perpetuates inequality between high- and middle- or low-income countries. It enables wealthy individuals to continue their high carbon life cycles that contribute to climate change, which disproportionately impacts communities in the Global South that have contributed the least to the climate crisis.

This chapter will discuss the human rights consequences of exported plastic waste on receiving communities. First, it will discuss threats to the right to health for communities in importing countries, including workers in the informal economy and at plastic recycling facilities. Next, this chapter will discuss the role of the plastic waste trade on the human right to clean drinking water. Then, we will dive into the various ways that the plastic waste trade threatens the rights to access of information by analyzing what types of information are readily available for communities in importing countries, as well as the role of fast-moving consumer goods companies and plastic producers in driving misinformation in high-consuming economies about recyclability. Finally, this chapter will end with a discussion of the impacts of the plastic waste trade on the right to a healthy environment, including its contributions to the climate crisis.

The Right to Health

> The enjoyment of the highest attainable standard of health is one of the fundamental rights of every human being without distinction of race, religion, political belief, economic or social condition. (World Health Organization, 1946)

Plastics' ubiquity is not an indicator that they are safe for humans and the environment. Plastics are made from fossil fuel feedstocks – typically oil or gas – and chemical additives. While additives can provide important material characteristics, like color and rigidity, many common chemical additives are toxic to human health. More than 13,000 chemicals are associated with plastics, yet scientists have found

that roughly 3200 of those substances are of concern due to their hazardous properties, including endocrine disruption, carcinogenicity, and environmental persistence (UNEP et al., 2023). In addition, there is limited research and oversight on the health impacts of chemicals around the globe. Of the 350,000 chemicals marketed globally, only 7% have been registered through the European Union's Registration, Evaluation, Authorization, and Restriction of Chemicals regulation, which studies the safety of chemicals and can ban chemicals if they are deemed too hazardous (European Chemicals Agency, 2023).

Exposure to common chemical additions in plastic, like phthalates, bisphenol A (BPA), and per- and polyfluoroalkyl substances (PFAS), can lead to serious illnesses and diseases. Phthalates are a group of chemicals used to make plastics more durable, yet they are also endocrine disrupting chemicals that are linked to early menopause in women, low birth rates, and higher rates of miscarriage (Wang & Qian, 2021). BPA is used in common plastic products, including food containers and baby bottles, but exposure to BPA contributes to increased risk of cancer, cardiovascular disease, and liver problems (Jalal et al., 2018). PFAS are a group of chemicals known as "forever chemicals" due to their longevity in our bodies and the environment. Researchers have found that exposure to PFAS leads to decreased fertility, low birth weight, reduced immune system response, and increased risk of cancer (US EPA, n.d.).

For people in importing countries at the frontlines of plastic waste management (or mismanagement), exposure to toxic chemicals in plastic products threatens their right to health because those toxins are released into the air, soil, and water when plastic is recycled, burned, incinerated, or dumped.

Under the Basel Convention's Plastic Amendments, plastic waste exported from one country to another must be properly managed, including through recycling or for incineration to generate energy. Yet, there have been documented cases in importing countries where imported plastic waste has been illegally dumped, landfilled, or burned. For instance, Greenpeace documented cases in Turkey where plastic food packaging – which is not typically recyclable – from Germany and the United Kingdom was illegally dumped and set aflame (Greenpeace UK, 2021). Plastic waste is often incinerated or burned as a waste management solution because it provides a low-cost solution to reducing or "eliminating" plastic waste. Plastic incineration emits toxic chemicals and particulate matter that harm human health. For instance, particulate matter emitted from burning plastic can lead to immediate and short-term impacts on respiratory systems. Even in healthy individuals, particulate matter can cause irrigation of the airways, coughing, and difficulty breathing (US EPA, 2016). For people with preexisting cardiovascular or respiratory issues, short-term exposure to particulate matter may aggravate asthma, cause nonfatal heart attacks, or lead to premature death.

In addition to the serious health problems posed by plastic burning and incineration, the process of recycling plastic can also be harmful. Mechanical plastic recycling goes beyond the sorting of plastic from other waste by consumers; it is a multistep process that typically takes place in industrial warehouses and involves chopping plastic materials into small pieces, washing and drying those plastic

particles to remove contaminants (like food or chemical residue), heating the material to extremely high temperatures, and then reforming the plastic into a form that can be used to make a new material. When plastic is shredded and melted, it releases toxic particles into the environment that can pose threats to human and environmental health. In some cases, poor recycling practices, like recycling multiple types of plastic together, can result in plastic recycling generating even more toxic substances, including dioxins (Petrlik et al., 2022).

My research with Human Rights Watch found that plastic recycling in small-scale facilities in Adana and Istanbul, Turkey, threatened the health of workers and nearby residents (Human Rights Watch, 2022). Dozens of current and former workers, including children, migrants, and refugees, and local residents described developing respiratory illnesses, rashes, headaches, and other ailments as a result of working or living near plastic recycling centers. For example, a 20-year-old man, "Ahmet," stopped working at a plastic recycling facility due to the health impacts. He explained, "There's a huge cauldron where they're cooking the material, they keep adding water which comes back up as steam. When I inhaled that, it would feel like my lungs were squeezed and under pressure … I stopped working there two months ago, but I still have a problem with breathing."

For people like "Ahmet" at the frontlines of plastic waste management, exposure to toxins released during plastic recycling can lead to serious, long-lasting health impacts. Because plastics are often made of toxic chemicals, the plastic waste trade can be thought of as a trade in toxic materials. By shipping toxic plastic materials from one country to another, the global plastic waste trade exports health harms to communities in receiving countries, threatening the right to health.

Workers' Rights

> The international transfer of dangerous and dirty work, whether extraction of natural resources, use of toxic chemicals and pesticides or disposal of hazardous wastes, without appropriate measures to protect workers against exposures to toxic substances has left workers, their families and their communities at considerable risk of grave impacts on their human rights. (Tuncak, 2019)

Countries in the Global North often send their garbage to countries with lower labor costs and little government enforcement of labor laws. Once plastic waste is imported, workers in the waste management sector, including both formally employed and informal workers, are tasked with waste management, exposing them to potential occupational health and safety harms.

Waste pickers collect, sort, repurpose, and sell discarded materials and are a part of the informal economy. According to the International Alliance of Waste Pickers, waste pickers collect 60% of all plastic that is collected for recycling, playing a critical role in reducing pollution (International Alliance of Waste Pickers, 2022). Globally, waste pickers are often members of marginalized groups and live in extreme poverty (Morais et al., 2022). The lack of formal work recognition, limited

access to healthcare and other social services, economic vulnerability, and exposure to physical hazards make waste pickers particularly susceptible to rights abuses.

In some cases, waste pickers have alleged that the plastic waste trade has made their job more difficult. Waste pickers in Thailand protested in 2021 over a drop in the price of collected recyclables due to a rapid increase in imported plastic waste (Duggleby, 2021). In Turkey, waste pickers have described how the influx of plastic waste from the United Kingdom and the European Union countries limited their ability to sell hand collected Turkish recyclables because imported waste was already sorted, thus cheaper for recycling facilities to purchase (Human Rights Watch, 2022). The rise in imported plastic waste also resulted in less domestically produced plastic waste from being recycled. For low-income people and people living in extreme poverty, any drop in income can contribute inability to pay for food, clothing, housing, healthcare, and other basic services needed to actualize the right to an adequate standard of living.

For workers at plastic recycling facilities, exposure to toxins released during recycling threatens their rights. In a report by the former UN Special Rapporteur on the implications for human rights of the environmentally sound management and disposal of hazardous substances and wastes, Baskut Tuncak, the human rights consequences of toxic exposure for workers are made clear: "Everyone, including workers in both formal and informal settings, has the inherent right to life, the right to enjoy the highest attainable standard of physical and mental health and the right to the physical integrity of their body. Acute poisonings and other cases of extreme exposure to toxic substances are unquestionable violations of these rights of workers, subjecting them to violent, cruel, inhuman and degrading forms of treatment. However, these rights also extend to longer-term, chronic exposure to toxic substances, which can also give rise to violent, cruel, inhuman and degrading outcomes" (Tuncak, 2019).

Studies have found volatile organic compounds and polycyclic aromatic hydrocarbons, both cancer-causing classes of chemicals, in the air breathed in by workers at plastic recycling facilities (Tsai et al., 2009). Workers can also be exposed to harmful heavy metals, like arsenic, cadmium, and chromium, through direct skin contact with recycled plastic pellets and the inhalation of contaminated dust (Huang et al., 2021). To ensure that workers' rights are fully respected in plastic recycling facilities, workers need full access to appropriate personal protective equipment, including masks, gloves, and goggles, and proper training on how to use that equipment to protect themselves from potential harms. Employers must also ensure that workers understand the health risks they are exposed to in plastic recycling facilities. Yet, research suggests that both workers and plastic recycling facility owners in Turkey do not understand the serious risks of exposure to toxins emitted during plastic recycling (Human Rights Watch, 2022). Under the United Nations Guiding Principles on Business and Human Rights, businesses have a responsibility to respect human rights and ensure their practices do not cause human rights abuses; thus, plastic recycling facility owners must provide a safe workplace and the equipment and information needed for workers to protect themselves. Under international

human rights law, governments are obligated to implement policies to protect the health and safety of workers.

Waste management workers, including waste pickers and recycling facility workers, play an incredibly important role in pollution prevention and have the right to be safe in their jobs. Oftentimes, the plastic waste trade is promoted as a job creator in importing countries, yet the rights of workers are sacrificed by this promise of economic growth. Importing countries must uphold and respect the rights of workers and should take into account the impact of imported plastic waste on informal and formal waste management workers prior to permitting the import of that waste.

Right to Water

> Pollution and over-abstraction of water resources through industrial activities or dumping are among the most commonly identified threats to the realization of the human rights to water and sanitation. (de Albuquerque, 2014)

When plastic particles contaminate freshwater resources, they threaten the human right to safe drinking water. After plastic waste is imported, those plastic products and particles of those waste products may enter waterways as dumped material or through the process of recycling. Plastic does not biodegrade but instead breaks down to smaller particles that infiltrate freshwater and ocean water resources, get suspended in the air, and make their way into the bodies of humans and wildlife. Microplastics, or plastics smaller than 5 mm in length, can be so small they are not removed through municipal water filtration systems, which may include coagulation/sedimentation, sand filtration, or UV-based oxidation (Na et al., 2021).

In addition, as plastic is shredded and washed during mechanical recycling, small plastic particles, including microplastics, can pollute freshwater systems if they are not properly filtered and disposed of. A study of three mechanical plastic recycling facilities in Vietnam found that annual microplastic emissions ranged from 0.014 to 5.8 tons per year (Suzuki et al., 2022). While the study does not describe the origin of plastic waste recycled in those facilities, Vietnam is one of the world's largest importers of plastic waste, with nearly 300,000 metric tons of plastic waste imported in 2021 (United Nations Statistics Division, n.d.). Imported plastic waste exacerbates water filtration and sanitation systems in importing countries by introducing additional sources of microplastic pollution without providing any technical or financial support to mitigate that pollution.

Currently, the full health consequences of consumption of microplastics in drinking water is not known, but there is reason to believe that precautions should be taken to protect water resources. Studies have found that microplastics in freshwater can promote the growth of microbes, including human pathogens and antibiotic resistant microbes (Eckert et al., 2018). In addition, microplastics ingested through drinking water have been found to produce oxidative stress in the body, which is linked with chronic inflammation and tissue damage (Eerkes-Medrano et al., 2019).

Following the precautionary principle, governments should take measures to protect environmental and human rights risks from plastic in drinking water even while scientific uncertainty remains. In practice, this should include removing harmful chemicals from plastic products, investing in better waste management systems, installing proper filters to remove microplastics from drinking water, and ending the import of plastic waste which exacerbates water filtration and sanitation systems in importing countries. The human right to clean drinking water is indispensable for life and securing other human rights, and the impacts of plastic waste on drinking and other freshwater resources must be prioritized in decisions made about the import and export of plastic waste.

Right of Access to Information

> Access to environmental information enables people to understand how environmental harms caused by plastics undermine their human rights …The vast majority of rights holders do not have access to information relating to the impacts of the various stages of the plastics cycle. (Orellana, 2021)

The global plastic waste trade can threaten peoples' right of access to information in importing countries. The right of access to information includes the right and freedom to seek, receive, and share information and is a prerequisite for the exercise of many other rights. Under international law, the Aarhus Convention guarantees the right of access to environmental information for citizens in participating European countries, including information about air, soil, and water quality and government legislation, policies, or other measures that may impact health and well-being. The Escazú Agreement also lays out robust standards for access to information in environmental decision-making in Latin America and sets out specific measures to ensure that people or groups in vulnerable situations, including Indigenous Peoples and ethnic groups, are able to access environmental information.

In the context of the plastic waste trade, access to information is key for community members, workers, employers, and others to make informed decisions regarding what precautions to take to reduce toxic exposure. The United Nations Human Rights Council has stated that governments are obligated to, "proactively put in the public domain Government information of public interest. States parties should make every effort to ensure easy, prompt, effective and practical access to such information" (UN Human Rights Committee, 2011). Thus, policymakers and governmental decision-makers have the duty to make information about the plastic waste trade, including the potential health impacts of exposure to toxins in plastic waste products, easily accessible and available to the public.

The lack of accessible information regarding toxic chemical additives in plastics is a threat to the rights of people in countries that import plastic waste. When plastic is made, producers are not required to disclose what chemical additives are included in their products. Therefore, consumers are not able to make informed decisions about the chemicals they may be exposed to when choosing a product containing

plastic. Once that plastic is disposed, waste management workers and other people who come into contact with that plastic material are likely unknowingly exposed to harmful chemicals, as toxins in the original products are typically undisclosed. Yet, people encountering plastic materials at each stage of the plastic life cycle have the right to know what chemicals they may be exposed to.

Some steps are currently being taken to increase chemical transparency in plastic products, yet further action is necessary to protect rights. Under the Global Plastic Treaty, which at the time of writing is under negotiation by parties to the United Nations Environment Assembly, access to information about chemicals in plastic products is becoming a key concern, with international human rights experts calling for the treaty to guarantee access to information on chemicals added to plastics (OHCHR, 2023).

Beyond issues regarding chemical transparency, the plastic waste trade contributes to a global disinformation campaign around the true role of recycling. Studies have found that only 9% of all plastics created have been recycled, with most plastic waste dumped in landfills, incinerated, or accumulated in the environment (Geyer et al., 2017). Yet, plastic recycling has been pushed as a key solution by fossil fuel and plastic producing companies for decades, while they continued to increase plastic production (Sullivan, 2020). In 2022, the Attorney General of the State of California announced an investigation into fossil fuel and petrochemical companies for their role in causing the global plastic crisis, claiming, "for more than half a century, the plastics industry has engaged in an aggressive campaign to deceive the public, perpetuating a myth that recycling can solve the plastics crisis" (State of California Department of Justice, 2022). The global waste trade plays into this myth of recycling. By exporting their plastic waste, high-consuming countries are able to count that refuse toward "zero waste" or national recycling goals, regardless if it is actually recycled. Meanwhile, people consuming those plastic products believe they are being environmentally responsible by sorting their waste into a recycling bin and therefore are not incentivized to reduce plastic consumption or advocate for more sustainable alternatives.

The Right to a Healthy Environment

> The global crises we currently face, including climate change, the loss of biodiversity, and pollution, represent some of the biggest threats to humanity, severely affecting the exercise and enjoyment of human rights. (OHCHR et al., 2023)

The right to a clean, healthy, and sustainable environment is not only a recognized right in itself, but it is also a precondition for the realization of many other rights, including the rights to life, food, and water. While there is not a universal definition for the right to a healthy environment, the right generally includes both substantive elements, like a safe climate, clean air and water, healthy ecosystems, and a non-toxic environment, and procedural elements, including access to information, public participation, and access to justice or remedies (OHCHR et al., 2023). More than

100 countries have guaranteed the right to a healthy environment in their national constitution, and in 2022, the United Nations General Assembly officially recognized the right to a clean, healthy, and sustainable environment as an inalienable human right.

The global plastic waste trade threatens the right to a clean, healthy, and sustainable environment by exporting pollution to importing countries. As described in the sections above, pollution stemming from both the mismanagement and recycling of imported plastic waste leaches toxins into the air, soil, and water of importing countries, directly threatening the right to a healthy environment for local communities. The plastic waste trade is also demonstrative of resource-intensive, mass consumption, which has become the norm in the Global North and intrinsically threatens the right to a healthy environment by prioritizing economic growth and continuous development over human and environmental well-being.

In addition to the direct environmental rights harms posed by exported plastic waste, the global plastic waste trade is a contributor to the climate crisis, the world's greatest threat to human rights. At each stage of the plastic life cycle, plastics emit greenhouse gases, thus driving climate change. And global plastic production is expected to continue increasing. At the current rate of growth, plastic and other petrochemical production is projected to increase dramatically in the next few decades, driving roughly half of the growth in oil demand by 2050 (International Energy Agency, 2018). With emissions from the plastics industry alone projected to reach between 10% and 13% of the global carbon budget by 2050, it will be difficult – if not impossible – to reach Paris Agreement climate targets (Orellana, 2021). By enabling wealthy countries in the Global North to export their waste, the plastic waste trade is a global threat to the right to a clean, healthy, and sustainable environment by polluting ecosystems, harming human health and wildlife, contaminating food chains and water systems with toxic pollutants, and threatening the climate.

Conclusion

The global plastic waste trade is a human rights issue. As plastic production and consumption have grown over the past few decades, the human impacts of plastic have become more acute and more recognized. Unfortunately, plastic waste is projected to triple by 2060 as production and consumption continues to increase, putting people at even greater risk of plastic-related human rights harms (OECD, 2022). The global plastic waste trade does little, if anything, to actually address the growing issue of how to deal with plastic waste, as it simply shifts the burden to communities who are not responsible for the problem. Plastic can take centuries to break down, so plastic waste dumped today will cause harms for generations. The global plastic waste trade is a result of an extractive, capitalist economy, where products are used for a limited amount of time before being discarded, and it is a modern act of colonialism. By exporting their plastic waste, high-consuming economies are perpetuating a system of ever-increasing fossil fuel, petrochemical, and

plastic production that damages the climate, harms the natural environment, and threatens the rights of people in importing countries.

Yet, the human rights harms posed by plastic waste and the global plastic waste trade are not inevitable. Major exporting nations have a responsibility to end the practice of exporting their plastic waste and must be accountable for their high rates of consumption. Countries should enact policies to protect people and the environment from the harms posed by plastics, including by banning the use of toxic chemicals in plastics and investing in waste management infrastructure. Critically, steps must be taken to cap the production of new plastic products and ban the production of harmful and unnecessary plastics, like single-use plastic products. If the global plastic waste trade continues, communities in importing countries will continue to disproportionately bear the human cost of the plastic crisis.

References

de Albuquerque, C. (2014). *Report of the Special Rapporteur on the human right to safe drinking water and sanitation, Catarina de Albuquerque: Common violations of the human rights to water and sanitation. A/HRC/27/55*. United Nations General Assembly. https://undocs.org/Home/Mobile?FinalSymbol=A%2FHRC%2F27%2F55&Language=E&DeviceType=Desktop&LangRequested=False. Accessed 29 Sept 2023.

Duggleby, L. (2021). Thai trash collectors threatened by continued waste imports. *China Dialogue*. https://chinadialogue.net/en/cities/thai-saleng-trash-collectors-livelihoods-threatened-by-waste-imports/. Accessed 15 May 2023.

Eckert, E. M., Cesare, A. D., Kettner, M. T., et al. (2018). Microplastics increase impact of treated wastewater on freshwater microbial community. *Environmental Pollution, 234*. https://doi.org/10.1016/j.envpol.2017.11.070

Eerkes-Medrano, D., Leslie, H. A., & Quinn, B. (2019). Microplastics in drinking water: A review and assessment. *Current Opinion in Environmental Health and Science, 7*, 69–75. https://doi.org/10.1016/j.coesh.2018.12.001

European Chemicals Agency. (2023). *REACH Registration Statistics*. https://echa.europa.eu/documents/10162/2741157/registration_statistics_en.pdf/58c2d7bd-2173-4cb9-eb3b-a6bc14a6754b?t=1649160655122. Accessed 26 Mar 2023.

Geyer, R., Jambeck, J. R., & Law, K. L. (2017). Production, use, and fate of all plastics ever. *Science Advances, 3*(7). https://doi.org/10.1126/sciadv.1700782

Greenpeace UK. (2021). *Trashed: How the UK is still dumping plastic waste on the rest of the world*. https://www.greenpeace.org.uk/wp-content/uploads/2021/05/Trashed-Greenpeace-plastics-report-final.pdf. Accessed 15 Sept 2021.

Huang, G., Xie, J., Li, T., & Zhang, P. (2021). Worker health risk of heavy metals in pellets of recycled plastic: A skin exposure model. *International Archives of Occupational and Environmental Health, 94*(7), 1581–1589. https://doi.org/10.1007/s00420-021-01727-6

Human Rights Watch. (2022). *It's as if they're poisoning us": The health impacts of plastic recycling in Turkey*. https://www.hrw.org/report/2022/09/21/its-if-theyre-poisoning-us/health-impacts-plastic-recycling-turkey. Accessed 21 Sept 2022.

International Alliance of Waste Pickers. (2022). *GlobalRec seeks meaningful participation of waste pickers in the first negotiations of Plastics Treaty in Uruguay*. https://globalrec.org/2022/07/15/globalrec-participation-waste-pickers-plastics-treaty-uruguay/. Accessed 2 May 2023.

International Energy Agency. (2018). *The future of petrochemicals*. https://www.iea.org/reports/the-future-of-petrochemica.ls. Accessed 12 Oct 2022.

Jalal, N., Surendranath, A. R., Pathak, J. L., et al. (2018). Bisphenol A (BPA) the mighty and the mutagenic. *Toxicology Reports, 5*, 76–84. https://doi.org/10.1016/j.toxrep.2017.12.013

Morais, J., Corder, G., Golev, A., et al. (2022). Global review of human waste-picking and its contribution to poverty alleviation and a circular economy. *Environmental Research Letters, 17*. https://doi.org/10.1088/1748-9326/ac6b49

Na, S. H., Kim, M. J., Kim, J. T., et al. (2021). Microplastic removal in conventional drinking water treatment processes: Performance, mechanism, and potential risk. *Water Research, 202*. https://doi.org/10.1016/j.watres.2021.117417

OECD. (2022). *Global plastic waste set to almost triple by 2060, says OECD*. https://www.oecd.org/environment/global-plastic-waste-set-to-almost-triple-by-2060.htm. Accessed 22 May 2023.

Orellana, M. (2021). *Report of the Special Rapporteur on the implications for human rights of the environmentally sound management and disposal of hazardous substances and wastes, Marcos Orellana: The stages of the plastics cycle and their impacts on human rights. A/76/207*. United Nations General Assembly. https://digitallibrary.un.org/record/3936771?ln=en. Accessed 15 Oct 2021.

Petrlik, J., Beeler, B., & Strakova, J. (2022). *Hazardous chemicals in plastic products*. International POPs Elimination Network. https://ipen.org/sites/default/files/documents/ipen-toxic-plastic-products-africa-v2_3w-en.pdf. Accessed 15 Mar 2023.

State of California Department of Justice. (2022). *Attorney General Bonta announces investigation into fossil fuel and petrochemical industries for role in causing global plastics pollution crisis*. https://oag.ca.gov/news/press-releases/attorney-general-bonta-announces-investigation-fossil-fuel-and-petrochemical. Accessed 19 Feb 2023.

Sullivan, L. (2020). *How big oil misled the public into believing plastic would be recycled*. NPR. https://www.npr.org/2020/09/11/897692090/how-big-oil-misled-the-public-into-believing-plastic-would-be-recycled. Accessed 22 Mar 2023.

Suzuki, G., Uchida, N., Tuyen, L. E., et al. (2022). Mechanical recycling of plastic waste as a point source of microplastic pollution. *Environmental Pollution, 303*. https://doi.org/10.1016/j.envpol.2022.119114

Tsai, C. J., Chen, M. L., Chang, K. F., et al. (2009). The pollution characteristics of odor, volatile organochlorinated compounds and polycyclic aromatic hydrocarbons emitted from plastic waste recycling plants. *Chemosphere, 74*(8), 1104–1110. https://doi.org/10.1016/j.chemosphere.2008.10.041

Tuncak, B. (2019). *Principles on human rights and the protection of workers from exposure to toxic substances. A/HRC/42/41*. UN Human Rights Council. https://ap.ohchr.org/documents/dpage_e.aspx?si=A/HRC/42/41. Accessed 15 Feb 2023.

UN Human Rights Committee. (2011). *International Covenant on Civil and Political Rights; General comment No. 34; Article 19: Freedoms of opinion and expression*. CCPR/C/GC/34, para. 19. https://www2.ohchr.org/english/bodies/hrc/docs/gc34.pdf. Accessed 2 May 2023.

UN OHCHR. (2023). *UN human rights experts urge treaty to address 'plastic tide.'* https://www.ohchr.org/en/press-releases/2022/02/un-human-rights-experts-urge-treaty-address-plastic-tide. Accessed 24 Apr 2023.

UN OHCHR, UNEP, & UNDP. (2023). *What is the right to a healthy environment*. https://www.undp.org/sites/g/files/zskgke326/files/2023-01/UNDP-UNEP-UNHCHR-What-is-the-Right-to-a-Healthy-Environment.pdf. Accessed 10 May 2023.

UN Statistics Division. (n.d.). *UN Comtrade Database*. Trade Statistics Branch. https://comtrade.un.org/data/. Accessed 18 Apr 2023.

UNEP and Secretariat of the Basel, Rotterdam and Stockholm Conventions. (2023). *Chemicals in plastics: A technical report*. https://www.unep.org/resources/report/chemicals-plastics-technical-report. Accessed 5 May 2023.

US EPA. (2016). *Health and environmental effects of particulate matter (PM) [Overviews and Factsheets]*. https://www.epa.gov/pm-pollution/health-and-environmental-effects-particulate-matter-pm. Accessed 28 Apr 2023.

US EPA. (n.d.). *Our current understanding of the human health and environmental risks of PFAS*. https://www.epa.gov/pfas/our-current-understanding-human-health-and-environmental-risks-pfas. Accessed 16 May 2023.

Wang, Y., & Qian, H. (2021). Phthalates and their impacts on human health. *Healthcare, 9*(5), 603. https://doi.org/10.3390/healthcare9050603

World Health Organization. (1946). *Constitution of the World Health Organization*. https://www.who.int/about/governance/constitution. Accessed 15 Feb 2023.

The Darker Side of Dutch Colonialism: Exporting Plastic Waste Is Plastic Pollution Trafficking

Helena Danton and Tony R. Walker

Introduction

Unsustainable plastic production and overconsumption has resulted in a global plastic waste and plastic pollution crisis (Walker, 2018; Lau et al., 2020; Walker & McGuinty, 2020; Walker & Fequet, 2023). Geyer et al. (2017) estimated that more than 75% of all plastics ever produced now exists as waste in landfills or as plastic pollution in the environment. Based on data from 2016, Borrelle et al. (2020) estimated that 19–23 million metric tons of plastic pollution enters aquatic and marine environments annually. In the Netherlands, with a population of almost 18 million people, this plastic waste and plastic pollution crisis is no different than anywhere else, although arguably maybe contributing more than its fair share beyond its national borders (CBS Statistics Netherlands, 2019).

Single-use plastics are the major contributors to this plastic waste and pollution crisis as they are produced and discarded after a single use and are notoriously difficult to recycle (Navarre et al., 2022) or have limited end of life recyclable market value (Diggle & Walker, 2020, 2022; Diggle et al., 2023). Yet, despite their limited recyclability or end of life value, single-use plastics are widely used in food packaging (Walker et al., 2021; Kitz et al., 2022), in plastic grocery bags (Xanthos & Walker, 2017; Schnurr et al., 2018; Adam et al., 2020), and in plastic containers or utensils for takeout food (Molloy et al., 2022).

One of the major issues with this unsustainable plastic use and increasing waste generation is that most countries can not properly manage their domestic waste. This has resulted in a global plastic waste trade that lacks adequate transparency or accurate monitoring of plastic waste trade flows (March et al., 2022). This lack of transparency is further exacerbated as mismanaged or lost volumes are often not

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accounted for, which falsely increases recycling performance rates of high-income countries, such as the Netherlands, which export their waste to low-income countries for so-called recycling (Lau et al., 2020; Walker, 2023a, b). Another major problem of this global plastic waste trade is that it is often contaminated with food scraps, comingled with other plastic polymers, or is simply of too poor quality that it is impossible to "recycle" (Navarre et al., 2022). Thus, much of this traded plastic waste is landfilled, incinerated, burned in open pits or is released into the environment as plastic pollution (Lau et al., 2020; Gündoğdu & Walker, 2021; Walker, 2023a, b).

Southeast Asian countries have been adversely impacted by plastic pollution from domestic and transboundary sources as well plastic imports from high-income countries (Jambeck et al., 2015; Brooks et al., 2018; Liang et al., 2021; Navarre et al., 2022). In 2015, it was reported that five Asia Pacific countries (including China, Indonesia, the Philippines, and Thailand) were collectively responsible for ~60% of ocean plastic pollution (Jambeck et al., 2015), giving rise to the commonly held misperception that Southeast Asian countries are the biggest sources of global plastic pollution (Walker et al., 2021). However, recent research on sources of this plastic pollution suggests otherwise, as a lot of this plastic waste often does not originate from these importing countries (Navarre et al., 2022). In other words, plastic waste and plastic pollution from high-income countries are exacerbating the plastic pollution problem in low-income countries with inadequate waste management infrastructure (Walker, 2023a, b). This practice has now recently been referred to as *plastic pollution colonialism* by several plastic pollution researchers (Liboiron, 2021; Fuller et al., 2022).

Since 1993, global annual imports and exports of plastic waste, as part of the global plastic waste trade, increased rapidly to 723% and 817% in 2016, respectively (Brooks et al., 2018). High-income countries, including the Netherlands, have overwhelmingly been the primary exporters of plastic waste to low-income countries since the 1980s, which has been valued at $71B USD (Liu et al., 2021). Prior to 2018, most of the global plastic waste trade from high-income countries was exported to China. In 2012, imports to China from high-income countries accounted for over 50% of the global plastic waste trade, which was used by Chinese plastic waste recycling industries for feedstock materials for use in the massive manufacturing sector in China (Liu et al., 2021). However, in January 2018, China enacted the "National Sword" policy, which banned the import of most plastics and other materials (Liu et al., 2018; Walker, 2018).

After China closed its doors to plastic waste imports in 2018, high-income countries began exporting plastic waste to other low-income countries (Liu et al., 2018; Walker, 2018; Gündoğdu & Walker, 2021). However, many of these importing countries lack adequate waste management facilities, which has led to excessive open dumping or burning of plastic waste, including waste-to-energy incineration (Walker, 2023a, b). Burning plastic waste for energy releases greenhouse gases, contributes to accelerating climate change, and produces toxic atmospheric pollutants and toxic ash residues impacting local communities and surrounding ecosystems, including locally produced food (DeWeerdt, 2022; Walker, 2023b;

Teebthaisong et al., 2021). Even when recycling infrastructure exists, they have been found to be major contributors of microplastic pollution to aquatic receiving environments (Brown et al., 2023).

International Plastic Waste Trade

The global plastic waste trade is managed by multiple levels of government (international, national, and municipal levels) and by a myriad of private sector companies making the international trade in plastic waste a complex web of regulations and middlemen lacking transparency (Liu, 2021; March et al., 2022). If plastic waste is not recycled domestically, it can be exported but must be issued with a specific trade code (Plastic Soup Foundation, 2022). Although plastic waste should be traded in compliance with international agreements, such as the Basel Convention, stringent enforcement is often lacking (Yang, 2020; van Der Marel, 2022). Traded plastic waste can be transported to various intermediate countries via waste brokers before arriving at the destination country (Plastic Soup Foundation, 2022). Waste brokers can profit from each of these intermediate transactions, and the plastic waste trade can be even more lucrative when selling plastic waste to recycling plants at the final destination. Government regulations and financial subsidies can make it attractive for plastic waste to be processed in other countries (Plastic Soup Foundation, 2022). This has created a highly complex and competitive international market for plastic waste in which huge quantities of plastic waste are transported globally, but at every step there is a lack of transparency making it increasingly difficult to oversee the trade (Liu, 2021; March et al., 2022).

Eurostat and the European Environment Agency are the overarching agencies that monitor waste of European countries (Ministerie Van Infrastructuur en Waterstaat, 2021a). Monitoring of general waste streams in the Netherlands is covered by Rijkswaterstaat (Ministerie Van Infrastructuur en Waterstaat, 2021a). Prezero (previously known as Suez) is the biggest company for the collection and separation of plastic household waste in the Netherlands, and they monitor these processes to keep track of their recycling rates, which is now known to be falsely inflated by many high-income countries participating in plastic pollution trafficking (Lau et al., 2020). However, monitoring of plastic waste generated from individual trading or recycling companies is virtually nonexistent since there is a lack of management oversight (Snijder & Nusselder, 2019). Liang et al. (2021) documented the conditions which Asian countries established for incoming waste. For example, monitoring of what goes into the containers for export to Asia is inconsistently reported. Low-quality plastic waste continues to end up in Asia. This may be due to lax interpretations of the Basel Convention: “Non-hazardous plastic wastes listed in Annex IX can be moved among Parties without any specific control under the Convention” (Yang, 2020; van Der Marel, 2022).

Exporting plastic waste for high-income countries that produce and consume huge quantities of plastic is one way to get rid of (“manage” or “recycle”) excess

plastic waste, much of which is hard to recycle (CBS Statistics Netherlands, 2019). For a long time, China was the primary importer until, in the face of large-scale pollution, it closed its borders for almost all imports of plastic waste in 2018 (Liu et al., 2018; Walker, 2018; Gündoğdu & Walker, 2021; Plastic Soup Foundation, 2022). In 2018, over three-quarters of plastic waste were destined for a country within Europe. Germany was one of the most important destinations and recorded the strongest increase compared to 2010. Plastic waste exports to Asian countries (other than China) such as Indonesia and Vietnam rose during the period (CBS Statistics Netherlands, 2019; Plastic Soup Foundation, 2022).

Plastic Waste Management Internationally

The Basel Convention governs plastic waste exports. It is an international treaty that is legally binding for 186 countries (Yang, 2020; van Der Marel, 2022). The focus, however, lies more on hazardous waste. The most important rules governing the international trade in waste products are laid down in the Basel Convention (1989). This agreement was passed to regulate the international transport and processing of hazardous waste. In May 2019, several amendments were introduced to the Basel Convention to make the trade in plastic waste more transparent and enforceable. These amendments took effect on January 1, 2021. One important amendment was the introduction of a "prior informed consent" (PIC) for mixed plastic waste, which means that it is easier to monitor the export of plastic waste and that countries may reject shipments (Plastic Soup Foundation, 2022). However, for plastic waste that is separated according to polymer type (e.g., polyethylene (PE), polyvinyl chloride (PVC), or polyethylene terephthalate (PET)) and is labelled "almost free from contamination," no permission is required. Unfortunately, the Convention does not define what falls under this description so that there is plenty of room for misinterpretation resulting in the export of huge quantities of contaminated plastic waste which inevitably ends up as plastic pollution at the final destination.

The Basel Convention specifies separate trade codes for various plastic waste streams that must be used by relevant parties and which should make it clear whether the PIC is needed. This is a different coding system than that used for the UN COMTRADE database. All the codes in the Basel Convention fall under the umbrella of UN COMTRADE trade code 3915. As of 2021, countries that have ratified the Convention may only export contaminated or mixed plastic waste (unseparated) to another country if that country has signed the Convention and in doing so has given permission. Countries that have not ratified the Convention, such as the United States, may make separate agreements with the receiving convention about the import and export of plastic and other waste, resulting in a patch work of regulation, mismanagement, and lack of transparency or harmonization (Plastic Soup Foundation, 2022).

Plastic Waste Management in the European Union and in the Netherlands

In addition to the Basel Convention, the European Union (EU) has implemented its own legislation and regulations for packaging material. The transport of waste must meet the terms of the "Directive on shipments of waste" (1013/2006) (EU, 2006). This Directive also covers the trade in plastic waste. The export of waste that will end up in landfill in countries outside the EU is banned. Permission must be obtained from the relevant authority in the receiving country for some, not polluted, specified waste streams. For the export to countries outside the EU, 2% of the waste may be contaminated, and for export to countries within the EU, 6% may be contaminated (Plastic Soup Foundation, 2022). In this case, "contaminated" means irregular plastic waste or plastic waste that is of low quality and cannot be recycled. These EU rules follow from the European Green Deal, the Waste Framework Directive, and the Circular Economy Action Plan (European Commission, 2008, 2020, 2022). The objective is for "keeping the value of products, materials and natural resources in the economy as long as possible and, at the same time, minimising waste, the transition to a circular economy can make an important contribution to the creation of a low-carbon, resource-efficient, competitive economy" (Ministerie Van Infrastructuur en Waterstaat, 2019, p. 1). These plans also make shipment possible between member states (EU, 2006). Additionally, "waste must be classified as a good" (Ministerie Van Infrastructuur en Waterstaat, 2019, p. 72). This means that extra monitoring on the quality of the "waste" is not always required and can be overlooked, which can lead to the transportation of mismanaged plastic waste (Ministerie Van Infrastructuur en Waterstaat, 2019). The EU is currently modifying this legislation. The proposed new regulations on the transport of waste, including plastic, will be more stringent (Plastic Soup Foundation, 2022). However, they should ensure that the EU no longer exports waste that is too difficult or expensive to recycle domestically. The EU should address the illegal export of waste more effectively. The EU should only export waste that receiving countries can guarantee will be processed responsibly and transparently. Despite the call of environmental organizations, up to now the proposed regulations do not impose a general ban of the export of plastic waste to countries outside the EU (Plastic Soup Foundation, 2022).

Apart from legal waste streams, such as those included in the UN COMTRADE database, there is also a sizeable illegal trade in plastic waste. In a 2020 report, Interpol noted a strong rise in criminality connected to the trade in plastic waste. In recent years, under the name of "recycling," ever more plastic has been dumped (INTERPOL, 2020). Criminals take advantage of the highly complicated legislation, irregular control in the export countries, and the lack of control in countries that receive illegal container freight. One of the ways in which plastic waste is illegally traded is by hiding it behind bales of old paper for export (Plastic Soup Foundation, 2022). Although the Netherlands has an extensive management plan for waste management called Landelijk Afvalbeheer Plan (LAP3) or National Waste Management Plan, which became effective on March 2, 2021 (Bergsma et al.,

2014), the government relies heavily on individual companies and institutions for proper management of their waste (Ministerie Van Infrastructuur en Waterstaat, 2021c).

Plastic Waste Management in Municipalities

Typically, collection of household waste is the responsibility of municipalities (i.e., local governments) (Walker & Xanthos, 2018). In the Netherlands, there are two ways in which plastic waste is collected: separately in Plastic packaging material, Metal/Cans and Drinks cartons (PMD) bins for source separation or mixed with other material. These two options depend on individual municipalities (Ministerie Van Infrastructuur en Waterstaat, 2021b). Prezero (the largest plastic recycling company using source separation in the Netherlands) handles 80,000 tons/year (Çevikarslan et al., 2022; Prezero, 2022). Although material in PMD bins is intended for recycling, a substantial portion of the plastic waste ends up in waste-to-energy facilities which produce greenhouse gas emissions and contribute to climate change (Government of the Netherlands, 2018). After collection, the plastic waste is separated into homogeneous streams used to make plastic flakes of which new plastic materials are made. However, not all plastic waste is suitable for recycling (e.g., mixed and/or colored plastics are difficult for detection machinery to recognize and separate). Thus, these are not appropriate for producing flakes and directed to mixed waste stream (Prezero, 2022). Mixed streams are sent to companies that attempt to retrieve useful materials out of the waste stream or make new products from the mixed plastics, but this can be extremely difficult, even when infrastructure exists (Vollmer et al., 2020). However, because of their low quality, these mixed plastic waste streams have extremely low or even negative value and when exported to Asia have little chance of ever being recycled.

Management of Waste Exports

The exportation of recyclable plastic waste is allowed within the EU (EU, 2006; Ministerie Van Infrastructuur en Waterstaat, 2019). The Netherlands does this, claiming that the country is too small and greater recycling capacity exists elsewhere. The exporting country must make sure that the material exported is indeed "recyclable" and the importing country can have conditions on what type of waste they accept (Faraca & Astrup, 2019; Liang et al., 2021). After the import ban on plastic waste from China, most Asian countries updated their conditions for accepting specific recyclable materials (e.g., clean, no composites, certain polymers) (Liang et al., 2021). However, according to Navarre et al. (2022), the quality of exported waste from the Netherlands does not meet the specific criteria required by importing countries. Since these countries do not want to accept low-quality plastic

waste for recycling, there are no management strategies to address this pressing issue. Therefore, the opportunity for proper recycling in these countries is not possible and combined with a lack of monitoring results in widespread leakage of Dutch plastics into the environment.

The European Environment Agency states that "The objective is a shift towards a circular economy, handling natural resources as efficiently as possible and ensuring the lowest possible environmental impact" (European Environment Agency, 2021, p. 5). To reach this objective, the following action plans have been proposed next to the LAP3.

The Transition Agenda Circular Economy focuses on moving toward a circular economy which means relying less on raw materials and concentrating on the reuse of materials. The goal is that plastics are fully circular by 2050. To achieve this, the emphasis will lie on prevention, supply of renewable plastics, quality, and strategic chain operation (Government of the Netherlands, 2018). This report mentions the intended result, action holders, the budget required, and the timeline. It can therefore be considered as a solid plan. Afvalpreventie programma (the waste prevention program) focuses on the prevention of creating waste, the negative consequences of waste products for the environment, and lowering the number of dangerous substances in materials (Rijksoverheid, 2021). Circulair Materialen Plan (Circular Material Plan) has a stronger legal basis. It also supports the treatment of materials from companies and, with that, offers incentive for innovation (Ministerie Van Infrastructuur en Waterstaat, 2022). This plan has been written as an extension of the LAP3.

Within the Organization for Economic Cooperation and Development (OECD), the EU, as a trading block comprising of 27 member states, was the largest exporter of plastic waste in the world to non-OECD countries in 2021. The net weight of exported plastic from the EU to non-OECD countries in 2021 was 887 million kg. After the EU, the following individual countries were the top 5 exporters of plastic waste to non-OECD countries in 2021: Japan (462 million kg), the United States (250 million kg), the Netherlands (211 million kg), Germany (95 million kg), and Australia (84 million kg), respectively (Plastic Soup Foundation, 2022).

Following China's import ban in 2018, the export of plastic waste from the Netherlands to non-OECD countries decreased but increased dramatically in 2020 and 2021, despite stricter rules in the Basel Convention taking effect in 2021. Indonesia, Vietnam, and Malaysia were the main destinations for plastic waste export from the Netherlands in 2021, with Indonesia being the main export destination country. Further, the Netherlands is the largest exporter of plastic waste to Indonesia during the 5 years prior to 2021 (Plastic Soup Foundation, 2022). This is in stark contrast to the sharp decrease in exports to OECD countries from the Netherlands. In 2021, the Netherlands was the world's largest exporter of plastic waste to Indonesia, totaling 70 million kg, and exported almost 64 million kg to Vietnam (Plastic Soup Foundation, 2022).

Is the Netherlands Wish Cycling?

Up until the import ban on plastic waste, the Netherlands had been exporting much of its waste to China, with the intention that it would be recycled into feedstock materials for the Chinese manufacturing industries (Brooks et al., 2018). However, the quality of the plastic that was exported by the Netherlands was too low for the creation of raw materials, and there was also a lack of technology for recycling of this material in China and other importing countries (Liang et al., 2021). With the overflow of low-quality plastics to Asian countries following the import ban by China, it is now continuing to leak into marine and terrestrial environments causing harm to wildlife and local communities.

This chapter provides insights on the plastic waste trade of the Netherlands. According to Brooks et al. (2018), the Netherlands is the seventh biggest exporter of plastic waste in the world. The Dutch Afvalfonds voor Verpakkingen (Waste Fund for Packaging) claims that 50% of plastic packaging is recycled; however, this claim is misleading as this does not include mixed plastics since these are already considered nonrecyclable materials (Snijder & Nusselder, 2019).

Limitations, Recommendations, and Future Considerations

Companies are not required to separate plastics from their waste (Ministerie Van Infrastructuur en Waterstaat, 2021b). This means that the waste is mostly going to incineration and the recycling rates for this sector are low (Snijder & Nusselder, 2019). To obligate companies to cooperate with plastic recycling, a law should be implemented that requires companies to take part in recycling. Proper monitoring is required with random spot checks at recycling companies.

The Netherlands has a strict policy on landfill of household waste but when recycling is not possible, incineration is used (Snijder & Nusselder, 2019; Çevikarslan et al., 2022). The tax on landfill reduced the use of landfills discernably. Therefore, it can be assumed that a tax on recyclable plastic waste, which is being shipped abroad or incinerated, will make a positive impact on this problem. The money obtained can be used for improving recycling rates (Government of the Netherlands, 2018, p. 31).

There is a wide variety in materials used for plastic packaging. This makes recycling extremely difficult. Producers should not mix or color plastics to help decrease the mixed waste stream and increase the recycling rate in the Netherlands to help prevent useless exportation. To push this transition, the government should help by providing rewards for companies that improve their products and fine companies that neglect innovation.

For customers, it is extremely difficult to select products with less packaging material. Supermarkets should help the customer in this. There is already one example of a supermarket chain that moved away from useless packaging material:

Ekoplaza (2022). Other supermarkets should follow their example. The Netherlands is not the only country exporting plastic waste, but this is no excuse for its actions. Other countries that have reduced their export of plastic waste should be looked at to learn from their successes and failures. This can help the transition away from the exportation of plastic waste faster for the Netherlands. The United Kingdom and Norway are great examples for management, monitoring, and mitigation strategies in Europe (Plastics Europe, 2022).

Current plastic production use and disposal may continue to undermine implementation of many of the UN SDGs by 2030 without reductions in global consumption of fossil fuel-based plastics (Walker, 2021). Although solutions required to reduce plastic waste and plastic pollution are diverse and cannot be adequately addressed in this chapter, some solutions include extended producer responsibility programs (Diggle & Walker, 2020, 2022; Diggle et al., 2023), prevention initiatives to reduce single-use plastic use (Xanthos & Walker, 2017; Schnurr et al., 2018; Adam et al., 2020; Bezerra et al., 2021; Clayton et al., 2021), and the Plastics Treaty which will consider the entire plastic life cycle including curbing production, circular economy and environmental reporting standards, increased consumer awareness, and improved performance measures (Ammendolia & Walker, 2022; Bergmann et al., 2022; Dey et al., 2022). For example, plastic packaging and plastic waste comprise complex mixtures consisting of over 13,000 chemical substances such as additives, processing aids, and non-intentionally added substances, and many of them are known to be hazardous to human health and the environment (Wiesinger et al., 2021; Dey et al., 2022). Thus, toxic chemicals used in plastic production hamper recycling efforts.

Conclusions

Despite its small size and population compared to other EU countries, the Netherlands remains a large player in the international trade in plastic waste, and this is also despite the modifications to the Basel Convention. The Netherlands exports most of its plastic waste to Indonesia, Malaysia, and Vietnam. This suggests that greater transparency is required in the Basel Convention, which would allow the public to gain access to data of the trade streams originating from the Netherlands. Current updates to the European Waste Shipment Directive also offers opportunities to improve transparency about plastic waste exports from the Netherlands to non-OECD countries. However, a ban on the export of plastic waste to countries outside the EU would be the most effective mitigation to curb this plastic pollution trafficking, yet it is not included in the proposed changes. A ban would lead to pollution being tackled as close to the source as possible and make the illegal trade in plastic waste much more difficult. The current legislation and regulations are too complicated and leaves too much space for transporting contaminated plastic waste.

References

Adam, I., Walker, T. R., Bezerra, J. C., & Clayton, A. (2020). Policies to reduce single-use plastic marine pollution in West Africa. *Marine Policy, 116*, 103928.

Ammendolia, J., & Walker, T. R. (2022). Global plastics treaty must be strict and binding. *Nature, 611*(7935), 236.

Basel Convention (1989). Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal, Mar. 22, 1989, 1673 UNTS 126.

Bergmann, M., Almroth, B. C., Brander, S. M., Dey, T., Green, D. S., Gundogdu, S., Krieger, A., Wagner, M., & Walker, T. R. (2022). A global plastic treaty must cap production. *Science, 376*(6592), 469–470.

Bergsma, G. C., Vroonhof, J., Blom, M. J., & Odegard, I. Y. R. (2014). *Evaluatie Landelijk Afvalbeheerplan (LAP) 1 en 2*. https://ce.nl/wp-content/uploads/2021/03/CE_Delft_2C95_Evaluatie_landelijk_Afvalbeheerplan_LAP_1_en_2.pdf

Bezerra, J. C., Walker, T. R., Clayton, C. A., & Adam, I. (2021). Single-use plastic bag policies in the Southern African development community. *Environmental Challenges, 3*, 100029.

Borrelle, S. B., Ringma, J., Law, K. L., Monnahan, C. C., Lebreton, L., McGivern, A., Murphy, E., Jambeck, J., Leonard, G. H., Hilleary, M. A., Eriksen, M., Possingham, H. P., De Frond, H., Gerber, L. R., Po, B., & Rochman, C. M. (2020). Predicted growth in plastic waste exceeds efforts to mitigate plastic pollution. *Science, 369*(6510), 1515–1518. https://doi.org/10.1126/science.aba3656

Brooks, A. L., Wang, S., & Jambeck, J. R. (2018). The Chinese import ban and its impact on global plastic waste trade. *Science Advances, 4*(6), 1–8. https://doi.org/10.1126/sciadv.aat0131

Brown, E., MacDonald, A., Allen, S., & Allen, D. (2023). The potential for a plastic recycling facility to release microplastic pollution and possible filtration remediation effectiveness. *Journal of Hazardous Materials Advances, 10*, 100309.

CBS Statistics Netherlands. (2019). *Less recyclable plastic waste sent to China*. https://www.cbs.nl/en-gb/news/2019/11/less-recyclable-plastic-waste-sent-to-china

Çevikarslan, S., Gelhard, C., & Henseler, J. (2022). Improving the material and financial circularity of the plastic packaging value chain in The Netherlands: Challenges, opportunities, and implications. *Sustainability, 14*(12), 7404. https://doi.org/10.3390/su14127404

Clayton, C. A., Walker, T. R., Bezerra, J. C., & Adam, I. (2021). Policy responses to reduce single-use plastic marine pollution in the Caribbean. *Marine Pollution Bulletin, 162*, 111833.

DeWeerdt, S. (2022). How to make plastic less of an environmental burden. *Nature, 611*(7936), 2–5.

Dey, T., Trasande, L., Altman, R., Wang, Z., Krieger, A., Bergmann, M., Allen, D., Allen, S., Walker, T. R., Wagner, M., & Syberg, K. (2022). Global plastic treaty should address chemicals. *Science, 378*(6622), 841–842.

Diggle, A., & Walker, T. R. (2020). Implementation of harmonized Extended Producer Responsibility strategies to incentivize recovery of single-use plastic packaging waste in Canada. *Waste Management, 110*, 20–23.

Diggle, A., & Walker, T. R. (2022). Environmental and economic impacts of mismanaged plastics and measures for mitigation. *Environments, 9*(2), 15.

Diggle, A., Walker, T. R., & Adams, M. (2023). Examining potential business impacts from the implementation of an extended producer responsibility program for printed paper and packaging waste in Nova Scotia, Canada. *Circular Economy, 2*(2), 100039.

Ekoplaza (2022). *Sparen voor zomerse bio producten*. https://www.ekoplaza.nl/nl/campagnes/verwenpakket

EU. (2006). Regulation (EC) No 1013/2006 of the European Parliament and the Council of 14 June 2006 on shipments of waste. *Official Journal of the European Union, L190*, 1–98. https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32006R1013&from=EN

European Commission. (2008). *Waste framework directive*. https://environment.ec.europa.eu/topics/waste-and-recycling/waste-framework-directive_en

European Commission. (2020). *A European green deal*. https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_en#Highlights

European Commission. (2022). *Circular economy action plan*. https://environment.ec.europa.eu/strategy/circular-economy-actionplan_en

European Environment Agency. (2021). *Overview of national waste prevention programmes in Europe The Netherlands*. https://www.rijksoverheid.nl/documenten/rapporten/2021/02/

Faraca, G., & Astrup, T. (2019). Plastic waste from recycling centres: Characterisation and evaluation of plastic recyclability. *Waste Management, 95*, 388–398. https://doi.org/10.1016/J.WASMAN.2019.06.038

Fuller, S., Ngata, T., Borrelle, S., & Farrelly, T. (2022). Plastics pollution as waste colonialism in Te Moananui. *Journal of Political Ecology, 29*(1), 534–560.

Geyer, R., Jambeck, J. R., & Law, K. L. (2017). Production, use, and fate of all plastics ever made. *Science Advances, 3*(7), 3–8. https://doi.org/10.1126/sciadv.1700782

Government of the Netherlands. (2018). *Transition agenda circular economy – Circular construction economy*. https://hollandcircularhotspot.nl/wp-content/uploads/2018/06/TRANSITION-AGENDA-PLASTICS_EN.pdf

Gündoğdu, S., & Walker, T. R. (2021). Why Turkey should not import plastic waste pollution from developed countries? *Marine Pollution Bulletin, 171*, 112772.

INTERPOL. (2020). *INTERPOL report alerts to sharp rise in plastic waste crime*. https://www.interpol.int/News-and-Events/News/2020/INTERPOL-report-alerts-to-sharp-rise-in-plastic-waste-crime

Jambeck, J., Geyer, R., Wilcox, C., Siegler, T. R., Perryman, M., Andrady, A., Narayan, R., & Law, K. L. (2015). Plastic waste inputs from land into the ocean. *Science, 347*(6223), 768–771.

Kitz, R., Walker, T., Charlebois, S., & Music, J. (2022). Food packaging during the COVID-19 pandemic: Consumer perceptions. *International Journal of Consumer Studies, 46*(2), 434–448.

Lau, W. W., Shiran, Y., Bailey, R. M., Cook, E., Stuchtey, M. R., Koskella, J., Velis, C. A., Godfrey, L., Boucher, J., Murphy, M. B., & Thompson, R. C. (2020). Evaluating scenarios toward zero plastic pollution. *Science, 369*(6510), 1455–1461.

Liang, Y., Tan, Q., Song, Q., & Li, J. (2021). An analysis of the plastic waste trade and management in Asia. *Waste Management, 119*, 242–253. https://doi.org/10.1016/j.wasman.2020.09.049

Liboiron, M. (2021). *Pollution is colonialism*. Duke University Press.

Liu, Z. (2021). Regulate waste recycling internationally. *Nature, 594*(7863), 333–333.

Liu, Z., Adams, M., & Walker, T. R. (2018). Are exports of recyclables from developed to developing countries waste pollution transfer or part of the global circular economy? *Resources, Conservation and Recycling, 136*, 22–23.

Liu, Z., Liu, W., Walker, T. R., Adams, M., & Zhao, J. (2021). How does the global plastic waste trade contribute to environmental benefits: Implication for reductions of greenhouse gas emissions? *Journal of Environmental Management, 287*, 112283.

March, A., Roberts, K. P., & Fletcher, S. (2022). A new treaty process offers hope to end plastic pollution. *Nature Reviews Earth & Environment, 3*(11), 726–727.

Ministerie Van Infrastructuur en Waterstaat. (2019). *LAP3 A.6 International*. https://lap3.nl/service/english/

Ministerie Van Infrastructuur en Waterstaat. (2021a). *LAP3 A.7 Monitoring van het afvalbeheer*. https://lap3.nl/beleidskader/deel-aalgemeen/a7-monitoring/

Ministerie Van Infrastructuur en Waterstaat. (2021b). *LAP3 B.3 Gescheiden houden van afvalstoffen*. https://lap3.nl/beleidskader/deel-bafvalbeheer/b3-afvalscheiding/

Ministerie Van Infrastructuur en Waterstaat. (2021c). *LAP3 D.7 Handhaving*. https://lap3.nl/beleidskader/deel-dvergunning/d7-handhaving/

Ministerie Van Infrastructuur en Waterstaat. (2022). *Circulair Materialenplan 1*. https://www.platformparticipatie.nl/CMP1/default.aspx

Molloy, S., Varkey, P., & Walker, T. R. (2022). Opportunities for single-use plastic reduction in the food service sector during COVID-19. *Sustainable Production and Consumption, 30*, 1082–1094.

Navarre, N., Mogollón, J. M., Tukker, A., & Barbarossa, V. (2022). Recycled plastic packaging from the Dutch food sector pollutes Asian oceans. *Resources, Conservation and Recycling, 185*, 106508. https://doi.org/10.1016/j.resconrec.2022.106508

Plastic Soup Foundation. (2022). *A neocolonial plastic scandal: The Netherlands plays a leading role in the international trade in plastic waste*. https://www.plasticsoupfoundation.org/en/2022/09/netherlands-pivotal-in-global-export-of-plastic-waste-to-non-western-countries-report-finds/

Plastics Europe. (2022). *The circular economy for plastics*. https://plasticseurope.org/wp-content/uploads/2022/06/PlasticsEurope-CircularityReport-2022_2804-Light.pdf

Prezero. (2022). *Prezero*. https://prezero.nl/

Rijksoverheid. (2021). *Afvalpreventieprogramma Nederland Inhoud Inleiding*. https://open.overheid.nl/repository/ronl-a5b3b35c-d786-4f10-8ca6-b04bc8a913ce/1/pdf/afvalpreventieprogramma-nederland.pdf

Schnurr, R. E., Alboiu, V., Chaudhary, M., Corbett, R. A., Quanz, M. E., Sankar, K., Srain, H. S., Thavarajah, V., Xanthos, D., & Walker, T. R. (2018). Reducing marine pollution from single-use plastics (SUPs): A review. *Marine Pollution Bulletin, 137*, 157–171.

Snijder, L., & Nusselder, S. (2019). *Plasticgebruik en verwerking van plastic afval in Nederland*. https://ce.nl/wp-content/uploads/2021/03/CE_Delft_2T13_Plasticgebruik_en_plastic_afval_verwerking_NL_DEF.pdf

Teebthaisong, A., Saetang, P., Petrlik, J., Bell, L., Beeler, B., Jopkova, M., Ismawati, Y., Kuepouo, G., Ochieng Ochola, G., & Akortia, E. (2021). Brominated dioxins (PBDD/Fs) in free range chicken eggs from sites affected by plastic waste. *Organohalogen Compounds, 82*, 199–202.

van Der Marel, E. R. (2022). Trading plastic waste in a global economy: Soundly regulated by the Basel Convention? *Journal of Environmental Law, 34*(3), 477–497.

Vollmer, I., Jenks, M. J. F., Roelands, M. C. P., White, R. J., van Harmelen, T., de Wild, P., van der Laan, G. P., Meirer, F., Keurentjes, J. T. F., & Weckhuysen, B. M. (2020). Beyond mechanical recycling: Giving new life to plastic waste. *Angewandte Chemie – International Edition, 59*(36), 15402–15423. https://doi.org/10.1002/anie.201915651

Walker, T. R. (2018). China's ban on imported plastic waste could be a game changer. *Nature, 553*(7686), 405–406.

Walker, T. R. (2021). (Micro) plastics and the UN sustainable development goals. *Current Opinion in Green and Sustainable Chemistry, 30*, 100497.

Walker, T. R. (2023a). The tropics should not become the world's plastic pollution problem. *Journal of Tropical Futures*, 27538931231165273. https://doi.org/10.1177/275389312311652

Walker, T. R. (2023b). The Maldives should not become the world's garbage dump by importing plastic waste. *Marine Pollution Bulletin, 189*(4), 114749.

Walker, T. R., & Fequet, L. (2023). Current trends of unsustainable plastic production and micro (nano) plastic pollution. *TrAC Trends in Analytical Chemistry, 160*(3), 116984.

Walker, T. R., & McGuinty, E. (2020). *Plastics* (pp. 1–12). Springer International Publishing.

Walker, T. R., & Xanthos, D. (2018). A call for Canada to move toward zero plastic waste by reducing and recycling single-use plastics. *Resources Conservation and Recycling, 133*, 99–100.

Walker, T. R., McGuinty, E., Charlebois, S., & Music, J. (2021). Single-use plastic packaging in the Canadian food industry: Consumer behavior and perceptions. *Humanities and Social Sciences Communications, 8*, 80.

Wiesinger, H., Wang, Z., & Hellweg, S. (2021). Deep dive into plastic monomers, additives, and processing aids. *Environmental Science & Technology, 55*(13), 9339–9351.

Xanthos, D., & Walker, T. R. (2017). International policies to reduce plastic marine pollution from single-use plastics (plastic bags and microbeads): A review. *Marine Pollution Bulletin, 118*(1–2), 17–26.

Yang, S. (2020). Trade for the environment: Transboundary hazardous waste movements after the Basel Convention. *Review of Policy Research, 37*(5), 713–738.

Part III
The Receiving Country's Perspectives

Plastic Waste Trade in Indonesia and Country's Response to Waste Trade Challenges

Yuyun Ismawati, Mochamad Adi Septiono, Nindhita Proboretno, and Krishna Zaki

Introduction

The term "waste colonialism" was first introduced by Puckett and Smith in their 2002 report titled "The digital dump: exporting high-tech re-use and abuse to Africa" (Puckett et al., 2002). They used the term to describe the practice of exporting hazardous electronic waste from developed countries to developing countries, particularly in Asia and Africa. Since then, the term has been widely adopted in academic and activist circles to describe the broader environmental and social impacts of waste disposal practices on marginalized communities. According to Liboiron (2021) the term "waste colonialism" highlights how pollution is not only a symptom of capitalism but a violent enactment of colonial land relations that claim access to indigenous land of local land (Liboiron, 2021).

The idea of "waste colonialism" draws on the historical and ongoing legacies of colonialism, which saw colonial powers exploiting the resources and labor of colonized countries for their own benefit. Waste colonialism reflects similar patterns of domination and exploitation, where developed countries continue to dump their waste in developing countries, often for little or no financial benefit to the receiving countries. In the last 30 years, waste colonialism has become a term widely adopted by scholars, activists, and policy-makers to describe the unequal and exploitative distribution of waste in the global context, where wealthy countries in the developed world send their waste materials, particularly plastic waste, to developing countries in Asia, Africa, and South America (Brooks et al., 2018; EEA, 2019; Foundation, 2023; Fuller et al., 2022; Michaelson, 2021; Pratt, 2011; Sridhar & Kumar, 2019). In many cases, these developing countries have weak or nonexistent regulatory

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oversight and waste management infrastructure and resources to properly dispose of this waste, leading to environmental pollution and public health risks.

Plastic waste colonialism occurs because recycling or disposing of plastic waste can be expensive, and some developed countries have found it more cost-effective to export their waste than to handle it domestically. Often, the waste is not adequately sorted or cleaned before it is shipped, leading to contamination and health risks for those managing it (OECD, 2018). Moreover, the lack of data and reporting makes identifying how many traded commodities were recycled difficult. In some cases, more than 40% of the content of items in the containers ended up in illegal dumping sites, being burned, and the chemicals in plastics contaminating the food chains (Karlsson et al., 2023; Petrlik et al., 2019, 2021).

The recipients of this waste are often countries that are already struggling with poverty and injustice, and they become the dumping ground for the waste of others. This type of colonialism perpetuates the power dynamic between developed and developing countries, with wealthy nations taking advantage of the resources and vulnerabilities of less-powerful nations (Marrs et al., 2019).

Waste colonialism has received greater attention in recent years with the implementation of waste import bans by countries such as China, Malaysia, the Philippines, and Thailand (Chen et al., 2021; Liang et al., 2020; Sasaki, 2020; Sembiring, 2019; Wang et al., 2019). These countries no longer accept plastic waste from developed countries, which has led to increased scrutiny of waste management practices and calls for greater responsibility from those who generate the waste.

Materials and Methods

We used data for plastic production, trade, and recycling taken from UN statistics (UN Comtrade Database) 2018–2022, state environmental bureaus or statistical bureaus, and reports published by several networks.

Of all the plastic products (code 39) in the HS (International Convention for Harmonized Commodity Description and Coding System, Harmonized System), code 3915 refers to plastic waste, parings, and scrap. Here plastic waste relates to the products belonging to code 3915 and other plastic products to commodities belonging to code 39 (3915: includes the value and quantity of plastic trade in this study).

We also obtained qualitative data and information from interviews with experts, relevant government officials, and focus group discussions with the Indonesian plastics and papers industry associations.

Results

Waste Trade Actors and Stakeholders

The actors involved in the plastic waste trade vary depending on the specific context but generally include the following:

- Exporters: These companies or individuals generate plastic waste and seek to dispose of it or sell it abroad. Exporters can include waste management companies, manufacturers, and retailers. Statistics and trade databases identify exporters based on countries where the companies are registered. Some importers have internal trade within the same group or between sister companies.
- Importers and plastic recyclers: These companies or individuals purchase plastic waste from exporters to process it into raw materials or for recycling purposes. Importers typically operate recycling facilities and may also export processed plastic waste. Plastic recyclers reprocess post-consumers' plastics and plastic wastes where it is washed, shredded, and sorted further. The plastic is then melted and extruded into new recycled plastic pellets to make new products.
- Brokers and traders: These intermediaries facilitate the buying and selling plastic waste between exporters and importers. Brokers and traders may be located in the same country as the exporter or the importer or may be based in a third country. Waste brokers and shipping lines also play a significant role in waste colonialism, particularly in the context of plastic waste trades. Waste brokers act as intermediaries between waste generators and waste processors or recyclers. They often operate in countries with weak regulatory systems and are known to engage in fraudulent activities, such as mislabeling waste shipments as recyclable materials. Waste brokers profit from the trade of plastic waste by charging fees for their services.
- Shipping and logistics companies: These companies provide transportation and logistics services to move plastic waste traded between exporting and importing countries. Shipping lines transport commodities from one country to another. They have been known to transport plastic waste under pretenses, such as labeling plastic waste shipments as "scrap plastic" or "recyclable materials." This mislabeling allows shipping lines to bypass regulations on the export of plastic waste and avoid paying higher fees for transporting hazardous waste. Shipping lines also made profits from the trade of plastic waste by charging fees for their services. In February 2021, 52 environmental and social organizations (BAN, 2021a) called on the major shipping lines to prove their sustainability commitments by pledging not to transport plastic waste to developing countries. The organizations wrote letters to the nine most prominent global shipping lines: Hapag- Lloyd (Germany), Maersk (Denmark), CMA CGM (France), MSC (Switzerland), Hamburg SUD (Germany), Hyundai Merchant Marine (Korea), Evergreen (Taiwan), COSCO (China), and Orient Shipping (Jordan) (BAN, 2022). They urged them to establish policies to prevent the export of plastic

wastes of all kinds moving from OECD to non-OECD countries or the OECD countries such as Turkey and Mexico.

- Governments and regulatory agencies: These entities oversee the trade of plastic waste and enforce regulations related to waste disposal and recycling. Agencies overseeing plastic waste trade in Indonesia within the Coordinating Ministry of Economy and Industry are the Customs and Excise of the Ministry of Finance (MoF), Ministry of Trade (MoT), Ministry of Industry (MoI), Ministry of Environment and Forestry (MoEF), and to some degree, the Ministry of Foreign Affairs (MoFA). However, although Customs and Excise units are on the front-line, their decision to intercept and confiscate containers will be based on the technical recommendations from the Ministry of Trade and the Ministry of Environment and Forestry.
- Consumers: These individuals purchase products made from recycled plastic, promoting demand for recycled plastics and encouraging recycling efforts.
- Both waste brokers and shipping lines have been implicated in the illegal plastic waste trade. In 2019, for example, Malaysia returned 150 shipping containers of plastic waste to their countries of origin, including the United States, Canada, and the United Kingdom. Authorities found these containers to contain contaminated and nonrecyclable plastic waste, which violated Malaysia's import regulations (Chen et al., 2021).

New Global Rules

As of January 1, 2021, the new plastic waste entries clarify the scope of control under the Basel Convention for other types of plastic waste and mixtures and the specific conditions under which plastic waste is subject to the Prior Informed Consent (PIC) procedure.

As explained on the Basel Convention guidance document, all plastic waste and mixtures of plastic wastes, except waste covered by entry B3011, will be subject to the PIC procedure (Secretariat, 2021). The categories include:

- Plastic waste classified as hazardous waste: new entry A3210 reads, "Plastic waste, including mixtures of such waste, containing or contaminated with Annex I constituents, to the extent that it exhibits an Annex III characteristic (note the related entries Y48 in Annex II and on list B B3011)." Examples of hazardous constituents that may be found in plastic waste due to their use as additives in various applications are lead compounds (used as heat or light stabilizers) and organohalogen compounds (e.g., halogenated organic compounds used as flame retardants).
- Plastic waste requiring special consideration: new entry Y48 covers plastic waste, including mixtures of such wastes, except for those falling under entries A3210 or B3011.

As specified in entry B3011, the following plastic waste will not be subject to the PIC procedure, provided it is destined for recycling in an environmentally sound manner and almost free from contamination and other types of waste:

- Plastic waste almost exclusively consists of one non-halogenated polymer. Such polymers include commonly used ones like polyethene (PE), polypropylene (PP), and polyethene terephthalate (PET).
- Plastic waste almost exclusively consists of one cured resin or condensation product. Such resins include urea-formaldehyde resins and epoxy resins.
- Plastic waste almost exclusively consists of one of the following fluorinated polymers:
  - Perfluoroethylene/propylene (FEP)
  - Perfluoroalkoxy alkanes:

    Tetrafluoroethylene/perfluoroalkyl vinyl ether (PFA)
    Tetrafluoroethylene/perfluoro methyl vinyl ether (MFA)

  - Polyvinyl fluoride (PVF)
  - Polyvinylidene fluoride (PVDF)

As of 2022, as a Party to Basel Convention, the Indonesian government has not specifically issued new regulations to adopt the Basel Amendment on plastic waste and no PIC list has been communicated to importers.

Indonesia's Responses to Waste Trade Dynamic

Waste Definition, Ports of Entry, and Registered Exporters

Importation of waste is prohibited in Indonesia, as stipulated in the Indonesian Waste Management Law No. 18/2008. Violation of such an Act is equivalent to committing a criminal act. The context for the Article within the Act is subject to the term "trash" instead of "waste." Further, waste importation is regulated under the jurisdiction of the Ministry of Trade, considering there are recyclable materials that are beneficial as raw materials in manufacturing processes. Certain commodities such as types of metal, rubber, plastic, and paper are included in the Ministry of Trade Regulation that has been developed to regulate the importation of nonhazardous waste. In the last 4 years, there have been several changes to the regulation that oversees nonhazardous waste imports.

The most recent policy regulating plastic waste importation, including paper waste, is the Minister of Trade Regulation No. 20/2021 jo. 25/2022 (MoT Reg. 20/2021 jo. 25/2022) on Import Control and Policy, which replaces the MoT Reg. No. 84/2019 concerning "The Importation of Non-Hazardous Waste as Industry Secondary Raw Materials." MoT Reg. No. 84/2019 has redefined nonhazardous

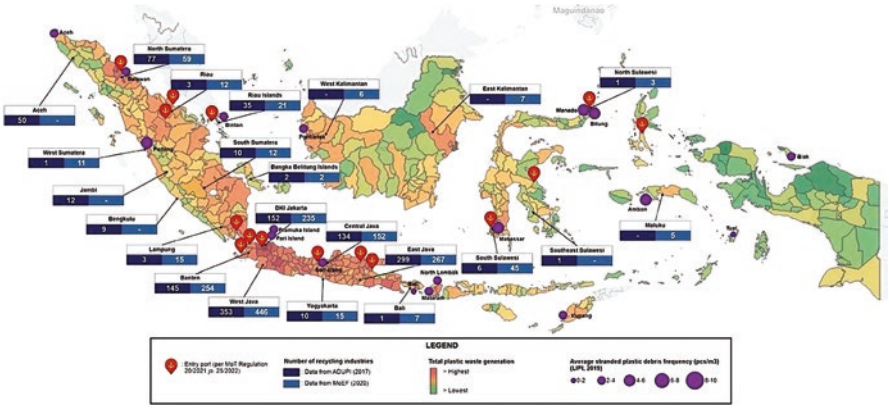

Fig. 1 Locations of plastic industry and recycling industries in Indonesia. (Source: Association of Plastic Recycler Industry/ADUPI, 2021)

waste for importation, as distinct from garbage that has no economic value, or "trash," as stipulated in the Waste Management Act, including:

- The waste should not be sourced from landfills (clean and not mixed with soil or dirt).
- The waste should not be sourced from household waste.
- The waste should not be contaminated with hazardous materials or waste.
- The waste should be homogenic.

The policy also short-listed the port of entry for these inward shipments, only certain entry portal was available (see Fig. 1):

1. Tanjung Priok Port, DKI Jakarta Province
2. Tanjung Emas Port, Central Java Province
3. Tanjung Perak Port, Eastern Java Province
4. Soekarno Hatta Port, Southeast Sulawesi Province
5. Belawan Port, North Sumatra Province
6. Batu Ampar Port, Riau Islands Province
7. Teluk Lamong Port, Eastern Java Province
8. Merak Port, Banten Province
9. Weda Port, North Maluku Province (addition from MoT Reg. 92/2019)
10. Cigading Port, Banten Province (addition from MoT Reg. 92/2019)
11. Bahodopi Port, Central Sulawesi Province (addition from MoT Reg. 92/2019)
12. Bitung Port, North Sulawesi Province (addition from MoT Reg. 92/2019)
13. Pekanbaru Port, Riau Province (addition from MoT Reg. 83/2020)
14. Sekupang Port, Riau Islands Province (addition from MoT Reg. 20/2021)
15. Panjang Port, Lampung Province (addition from MoT Reg. 25/2022)

The first amendment of MoT Reg. 84/2019 issued in MoT Reg. 92/2019 further detailed the means of shipment. It prohibits transfer shipments in other ports not

indicated in the shipment documents unless the shipment is kept sealed and intact. It also added the requirement to include the exporters' company profiles and track records validated by relevant authorities. They must obtain registration certificates at the Indonesian Embassies or Consulates in the exporting countries (T. KBRI, 2021; W. KBRI, 2021).

Up to August 2021, the Ministry of Foreign Affairs has issued 355 Certificates of Registered Exporters (*Bukti Eksportir Terdaftar*/BET) in 28 countries. Forty-one Indonesian Embassies and Consulates issued these exporters' registration certificates. Most registered exporters are in the United States (62 exporters), Australia (38 exporters), Japan (53 exporters), the United Kingdom (24 exporters), and Singapore (48 exporters) (see Table 1) (Kemenlu, 2021).

While the second and third amendment in MoT Reg. 58/2020 and MoT Reg. 83/2020 is mainly amendments to administrative and permit details, the rest of the amendment is to merge the nonhazardous waste import regulation list with all the other regulated commodities into one regulation paper, with the additional ports of entry.

Waste Contaminants and National Recycling Capacity

Several relevant authorities, namely, the MoT, MoEF, MoI, and the National Police, issued a joint decree in May 2020 to set a 2% maximum contamination for imported plastic and paper scraps. These allowable contaminants include the taping to tie the bales, the bale separator within the container shipments, the pallet or the base beneath the shipment bales, and the wrapping. These contaminants, however, should

Table 1 Number of registered exporters (August 2021)

Country	# of registered exporters	Country	# of registered exporters
United States	62	Norway	3
Japan	53	Belgium	3
Singapore	48	France	3
Australia	38	Portugal	3
United Kingdom	24	Greece	3
South Korea	18	Poland	2
Netherland	17	Bahrain	2
New Zealand	15	Philippines	1
Italy	10	Denmark	1
Canada	9	Papua New Guinea	1
Malaysia	9	Austria	1
Germany	9	Vietnam	1
Spain	7	Brunei Darussalam	1
Brazil	6	Jordan	1
Chile	4	--	--

Source: Kemenlu, Min. of Foreign Affairs (2021)

not be mixed or contain hazardous materials and waste (e.g., medical waste, electronic waste, and radioactive materials), containers of hazardous materials and waste, drugs packaging, liquid leakage other than water, household waste (e.g., apparel waste, diapers, sanitary pad, food waste, toys, etc.), nonrecyclable single-use plastic, wood scraps, and dirt. These contaminants are the importer's responsibility to treat and manage or cooperate with other industries to treat, as it is also included in the checklist before MoEF issue recommendation for import permit application (Nexus3, 2021). As part of the checklist for importers, the MoEF includes a point in the integrity pact to be signed by the importer, a statement "7. The quantity of the non-hazardous waste that will be imported is no more than 50% of the production's capacity." However, this integrity pack statement is no longer available online. The form has been replaced with a new form (see Fig. 2) that looks likely edited from the recommendation lists for importers of hazardous wastes (Limbah Bahan Berbahaya Beracun or LB3) (KLHK, 2020).

The joint regulation also mandated the government to develop a baseline study to establish a roadmap for nonhazardous waste management for industrial purposes (Sugasri et al., 2021). Further, the roadmap would set out incremental restrictions and import quotas depending on the availability of materials for plastic and paper recycling over time. This applies to the Basel Convention update since specific requirements from countries are allowed under the amendment.

During incoming shipment processes, customs authorities would receive import notification and the necessary documents, including the import approval and surveyor report. In addition, the Indonesia National Single Window (INSW) – a synchronizing platform for permitting, customs clearance, and release – and the customs risk management system alert mandatory and random inspection for incoming shipments (Cukai, 2020).

Indonesia has yet to determine its national recycling capacity to handle plastic waste, even domestically. The Ministry of Environment and Forestry Regulation No. 97/2017 already planned and stipulated a national program-based strategy. However, they have yet to include performance-based indicators. For instance, the plan to enact incentives or disincentives in 11 cities/regencies to go beyond compliance in recycling has no percentage or volume targets. This creates big unknowns for recyclers to scout or collect recyclable waste.

The national annual plastic production is 6.8 million tons, but the recycling industry is only equipped to accommodate two million tons of recycling capacity. The Centre of Green Industry (*Pusat Industri Hijau*), under the MoI, emphasized that the lack of capability in waste sorting, collection, and transportation was the main reason the Indonesian industry still needs to import plastic waste from abroad (Sanderson, 2021) (see also Fig. 3). The national recycling capacity and the plan to incrementally reduce import quotas will be addressed in the *Roadmap of Non-Hazardous Waste Management as Secondary Raw Material for Industries.*

LETTER HEAD OF IMPORTER (COMPANY)

INTEGRITY PACK

Recommendation request for Importation of Non-Hazardous Waste from (company name) on (address).

I, (name of executive director), as the executive director, declared that:

1. I shall be in the act of full transparency, honesty, objective, and accountable in the process of creating this recommendation for non-hazardous waste import;
2. I shall request the recommendation as accordingly to procedures and statutory provisions that currently are taking into force;
3. I shall carry out all provisions and obligations in accordance with decisions stipulated in the recommendations and/or statutory provisions;
4. I shall prevent the occurrence of environmental pollution and use environmentally friendly technology;
5. The non-hazardous waste that are requested to be imported are not within the prohibited list;
6. The non-hazardous waste that will be imported suffices the necessary demand and is technologically available;
7. The quantity of the non-hazardous waste that will be imported are no more than 50% of the production capacity;
8. I shall conduct production that prioritizes domestically sourced secondary raw materials;
9. I shall ensure the non-hazardous waste that will be imported are converted to downstream products;
10. If I violate my previous statement points, I am willing to accept sanctions according to the statutory provision.

(place of agreement), (date of agreement)
Signatory,

(sign + stamp)

(name of signatory)

Fig. 2 Template of agreement letter from the MoEF for Indonesia importers. (Source: Kementerian Lingkungan Hidup dan Kehutanan, 2020)

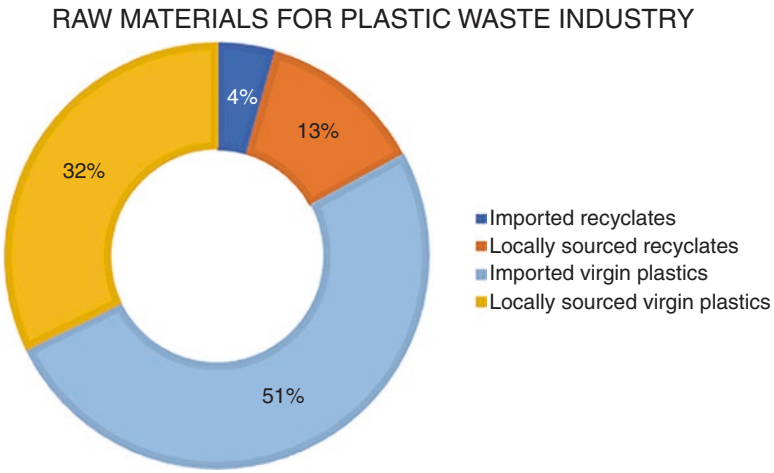

Fig. 3 Raw materials for plastic industry in Indonesia. (Source: Ministry of Industry)

Plastics and Paper Wastes Imported by Indonesia

Plastic Waste Imports

After 2018, the inflow of plastic waste trade to Indonesia increased from the United States, Australia, the United Kingdom, and Spain. Meanwhile, Malaysia imported significant shipments of plastic waste from the United States, the United Kingdom, and Spain (The International Criminal Police Organization, 2020). At the peak of Indonesia's import of plastic waste in 2018, imports of plastic waste to Indonesia rose from different regions of the world, either from North America (fourfold), Europe (eightfold), as well as Australia and Oceania (34%).

The plastic waste trade volume decreased overall after the restriction and reviewed regulations in Indonesia in 2019. Shipments from Australia and Oceania dropped by almost half to 43,000 tons, and from North America by 30% to 37,000 tons, dominated by the Marshall Islands and the United States, respectively. However, shipments from Western European countries rose to 107,000 tons, making the region the most significant source of plastic waste imported by Indonesia until today. The latest data from 2020 showed that shipments from West Europe accounted for 57% of total imported plastic waste to Indonesia (see Fig. 4). Despite the fluctuation in the total trade value, which is also dependent on the shipment quantity, the average tonnage price for imports and export shows an increasing trend (see Fig. 5).

Indonesia's import partner of plastic waste was dominated by trade partners from North America, mainly from the United States, until 2016. In the same year, emerging shipments came from the Marshall Islands with no export reports from their end (Ismawati & Septiono, 2019). The following year, imports from the United States sharply decreased by 70%, reaching 11,000 tons. At the same time, Indonesia reported shipments from the Marshall Islands tripled to 68,000 tons, making

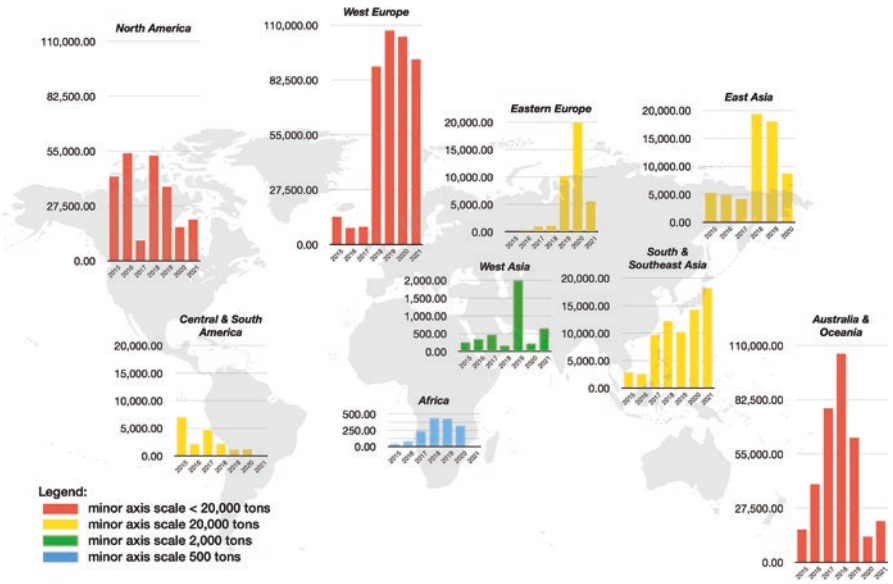

Fig. 4 Indonesia's import of plastic waste (HS Code 3915) by region (in tons). (Source: Indonesia Bureau of Statistics)

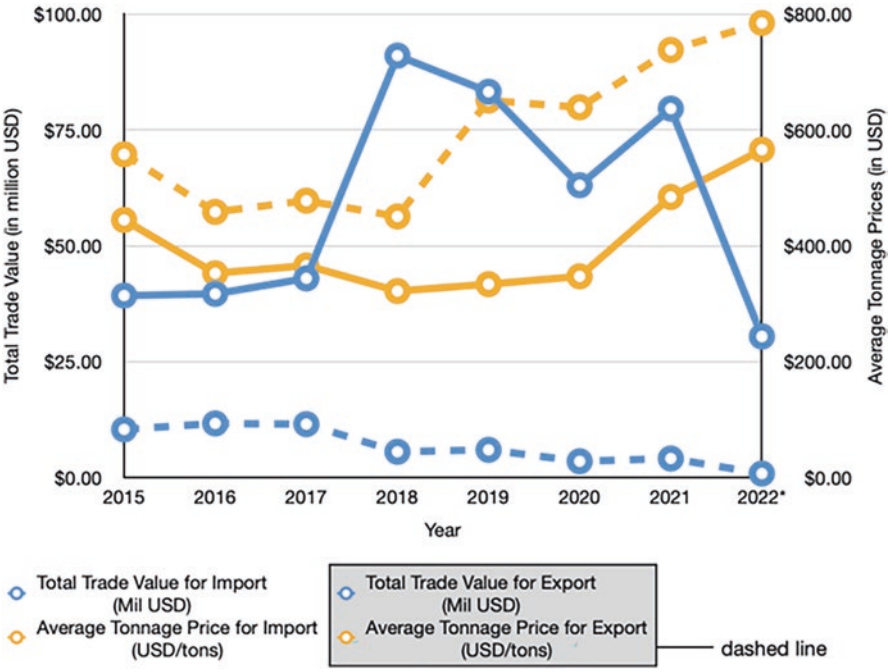

Fig. 5 Fluctuations in annual average tonnage import and export price of plastic scraps (HS3915). (Source: Indonesia Bureau of Statistics *Data in 2022 is only available for January–March)

shipments from the Marshall Islands the most significant volume of imports in 2017 (Septiono & Ismawati, 2022).

The reviewed nonhazardous waste import regulation resulted in the short-listed port of entry through which plastic and paper waste shipments were allowed to enter Indonesia. However, there was a minor shipment to Sekupang Port and several airports, which was not included in the MoT 92/2019 list, probably due to the reviewed date in October 2019.

In 2019 and 2020, the port of entry shifted from predominantly Tanjung Priok in Jakarta Province (Ismawati & Septiono, 2019) to Batu Ampar Port in Batam City, Riau Islands Province (52% and 75% in 2019 and 2020, respectively). Tanjung Priok Port is still the second-highest entry port for plastic waste (42% and 12% in 2019 and 2020, respectively), followed by Belawan Port. A small quantity of paper waste imports is still observed in four airports of Semarang, Tangerang, Pontianak, and Surabaya cities.

Paper Waste Imports

The investigations of paper waste imports in the plastic waste trade arose due to multiple news coverage of plastic waste contamination in paper waste shipments (The International Criminal Police Organization, 2020). Indonesia's paper mills and paper recycling companies demanded 320,000 tons for their processes (Kurniawan, 2019). The import of paper waste peaked in 2019, reaching more than 3,180,000 tons, tenfold higher than the demand from paper recycling companies. In 2020, the import volumes slightly decreased to 3 million tons.

Plastic wastes often become paper scrap contaminants. In addition, Indonesian paper mills are not equipped with treatment capacity for certain types of plastics that are hard to recycle. This unwanted plastic was thrown out or "donated" by the importing paper companies to local communities to further "illegally" sort and sent to middlemen for recycling or downcycling (Ismawati & Septiono, 2019; Septiono & Ismawati, 2022).

Paper scrap imports predominantly consisted of paper waste under HS code 4707.10, non-bleached corrugated paper, or cardboard. The import shipment proportion of mixed paper (HS code 4707.90) was higher before significantly decreasing to 0.53% of the total paper waste shipments in 2020.

Indonesia receives paper waste shipments dominantly from Western European countries (see Fig. 6). Shipments from West Europe almost doubled in 2018 from the previous year to 1,158,307 tons. In 2018 and 2019, there was also a temporary increase in paper waste imports from North American Region, with a little more than 2 million tons in total for both years, before dropping back to 403,000 tons in 2020.

Shipments from the North Americas are mainly sourced from the United States, while Western European countries varied, including from the United Kingdom,

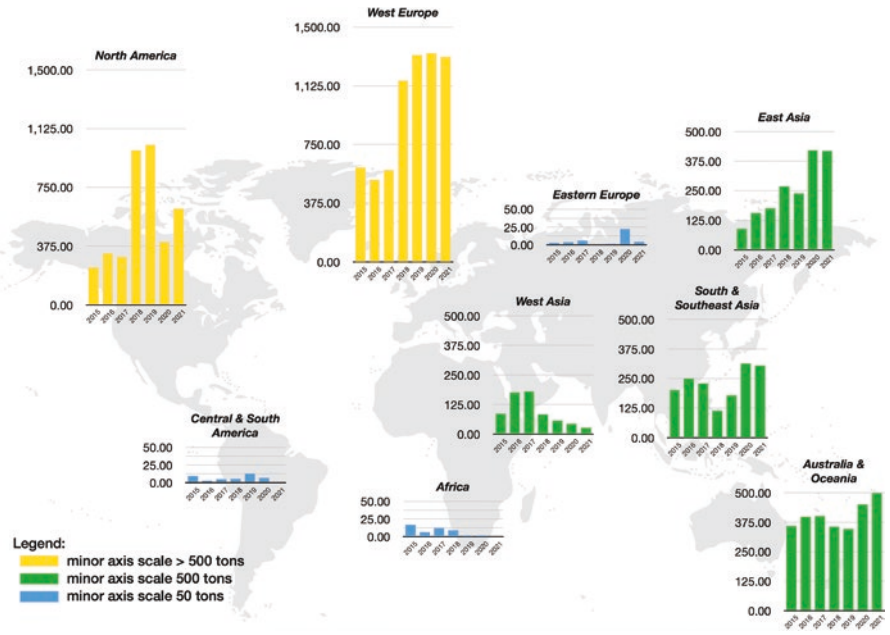

Fig. 6 Indonesia's import of paper waste (HS Code 4707), by region, in thousand tons. (Source: Indonesia Bureau of Statistics)

Netherlands, Italy, France, Greece, and others. Paper waste imported from Asia predominantly originated from Japan and Singapore. In 2020, the three highest import volumes came from Italy, the United States, and Australia (Septiono & Ismawati, 2022).

About 67% of the paper scrap shipment's port of entry was Tanjung Priok in 2019 and 2020. Figs. 7 and 8 show plastic contaminant landfill and piles belong to paper industries near Jakarta. The second highest port of entry receiving paper waste was Tanjung Perak in East Java, followed by Tanjung Emas in Central Java. The entry port for paper waste is dominated across Java Island and Riau Islands Province, where most paper industries are located (APKI, 2022; Asosiasi Industri Pulp and Kertas Indonesia, 2021; Septiono & Ismawati, 2022). The import entry points of Batu Ampar, Tanjung Priok, Tanjung Perak, and Tanjung Emas ports were according to the revised MoT Reg No. 84/2019. A small quantity of paper waste imports is still observed in three airports in Bali, Tangerang, and Surabaya.

In East Java and West Java, unwanted plastic waste dumped by paper mills that imported paper scraps as their production materials were delivered by factory drivers every day to the nearby villages. Communities took the opportunity to make money from these leftover scraps and sell it for fuel to tofu factories or lime furnace

Fig. 7 A mountain of plastic waste contaminants in a private landfill belongs to one of the largest paper mills in Indonesia, PT Indah Kiat in Serang. (Photo credit: Yuyun Ismawati)

Fig. 8 Plastic waste contaminants from one paper mills in Karawang, Indonesia, to be transferred to lime burning plants near the factory. (Photo credit: Tio Septiono)

owners (Ismawati & Septiono, 2019) (see Figs. 9 and 10). Plastic burning as fuel without proper tools and equipment releases black smoke and toxic emissions to the surroundings. Studies conducted in 2019 (Petrlik et al., 2019) and 2022 (Petrlik et al., 2022) showed high levels of dioxins and toxic chemicals released into the environment, entering the food chains.

Fig. 9 Tropodo village in East Java is a tofu-making village that uses plastic scrap as fuel, purchased from paper factories. (Photo credit: Yuyun Ismawati)

Fig. 10 (Left) Dried shredded plastic waste from paper mill company prepared to be used as fuel in a tofu factory. (Photo credit: Yuyun Ismawati). (Right) Discarded plastic waste from paper companies, sponges, and tires used as fuel to burn lime in Karawang. (Photo credit: Yuyun Ismawati)

Like plastic scraps, the recycled imported nonhazardous paper waste would be distributed to the paper production companies. Paper scraps are needed to produce various paper products, gypsum boards, asbestos boards, and recovered pulps. The distribution of paper production companies in Indonesia mainly concentrated in Java and Sumatera Island. Fifty-two companies have a total production capacity of 12.6 million tons, although they only produced 7.6 million tons of products in 2020 (APKI, 2021). In 2020, total demand for paper scraps was 6.6 million tons with an import volume of 3 million, covering 50% of the total demand. The market for paper scraps is projected to increase to over 8 million tons in 2024 (Asosiasi Industri Pulp and Kertas Indonesia, 2021).

Indonesia's Waste Trade Partner

OECD Countries

Since 2016, global export from OECD countries has declined from a little over 7 million tons that year to almost 3 million tons in 2020, due to China's restriction policy. However, the market for plastic waste exports for OECD countries still exists in some European countries, like Turkey, and Asian countries, including Southeast Asia.

Regarding their trade with Indonesia, OECD countries' export to Indonesia spiked in 2018 when China enacted their waste import inspection program, the Blue Sky Policy, a continuation from the National Sword Policy in 2017. Among the OECD country members, the three largest countries that exported their plastic waste to Indonesia were the Netherlands (58,326.8 tons), Germany (42,421.28 tons), and Japan (26,718.63 tons). OECD countries also received plastic waste scraps from Indonesia, increasing from 2016 (6479.43 tons) to 2020 (23,725.00 tons). In 2020, the three largest countries that imported plastic waste from Indonesia were the United States (13,140.64 tons), Belgium (4713.70 tons), and Ireland (3945.58 tons) (Septiono & Ismawati, 2022). However, after 2021, the EU was the major exporter of plastic waste to Indonesia which mainly came from the Netherlands (see Figs. 11 and 12). Plastic waste imports from OECD countries accounted for 62.17% of Indonesia's total import of plastic waste in 2020 alone, dominated by the Netherlands, Germany, Japan, the United States, and Slovenia.

United States

One of Indonesia's largest import partners of plastic waste is the United States. Being a nonparty to Basel Convention, the dynamics of waste trade between Indonesia and the United States raise concerns about the legality under the Basel Convention (Basel Action Network, 2021a, b). The United States exported over 21,000 tons of plastic waste in 2020, declining 37% from their 2016 export to

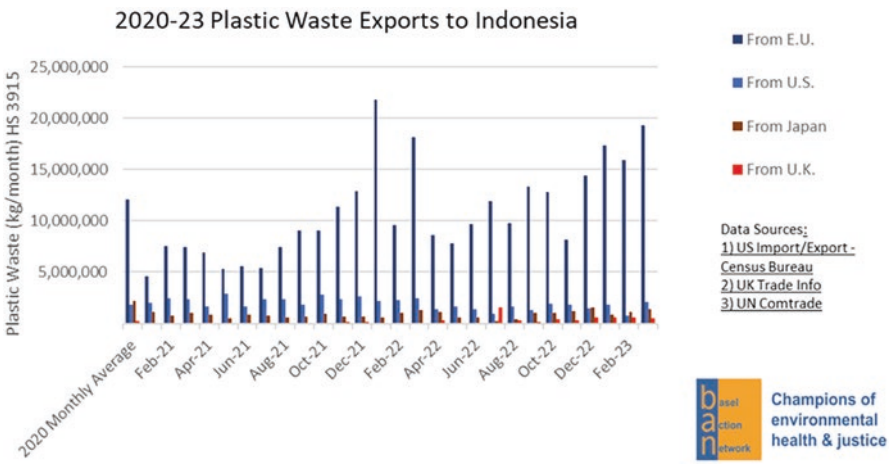

Fig. 11 Plastic waste exports (HS 3915) from the EU, the United States, Japan, and the United Kingdom to Indonesia 2020–2023. (Graph credit: Basel Action Network, 2021a, b)

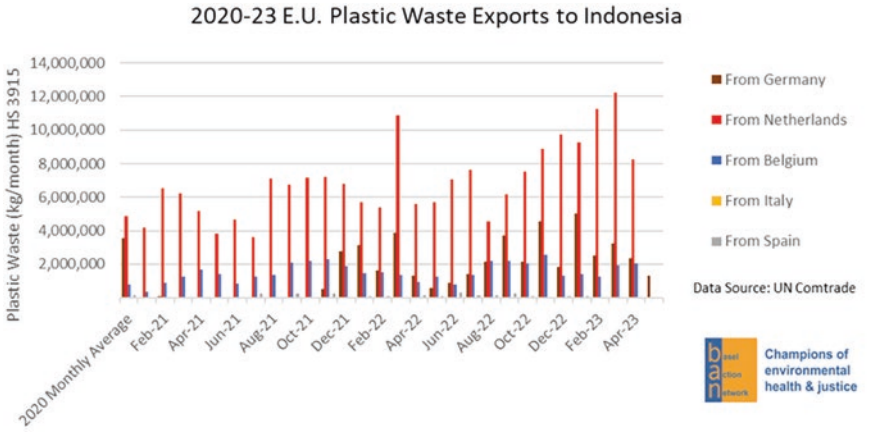

Fig. 12 Plastic waste exports (HS 3915) from the EU to Indonesia 2020–2023. (Graph credit: Basel Action Network, 2021a, b)

Indonesia (34,521 tons). Their import from Indonesia, however, shows an increasing trend from 2016 to 2020. Compared to 2016 imports from Indonesia (1245.19 tons), their import volume rocketed by 955% to 13,140 tons in 2020. Between 2020 and 2023, the major type of plastic waste exported by the United States to Indonesia was HDPE and LDPE (see Fig. 13).

Indonesia is one of the countries of interest of the United States in international waste trade. The US Census Bureau data shows that over 25,900 tons of plastic waste were still exported to Indonesia in 2021. There has been a strong lobby from

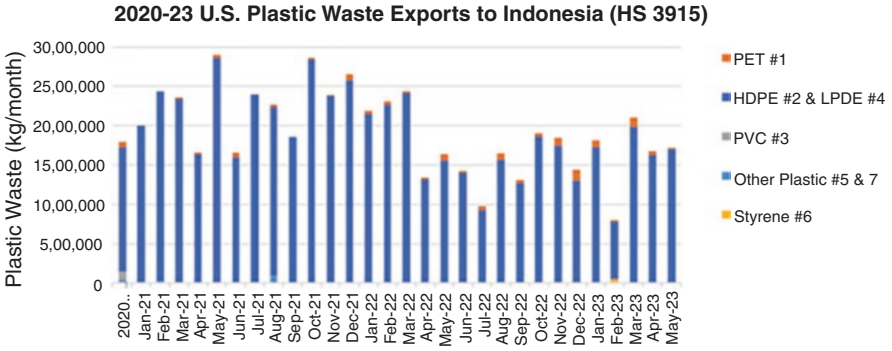

Fig. 13 Plastic waste exports (HS 3915) from the United States to Indonesia 2020–2023. (Graph credit: Basel Action Network, 2021a, b)

American plastic and paper industry associations during the discussion about the contaminant standard process (Ismawati & Septiono, 2019). In addition, the waste trade agreement between Canada and the United States also increases the unknowns about plastic waste that originated between these two countries.

Australia

Indonesia imported 11,464 tons of plastic waste from Australia in 2020, which decreased by approximately 33% from the previous year. The plastic waste imported from Australia fluctuated, with a peak in 2019, reaching 17,277 tons. Between 2020 and 2022, the main plastic waste exported from Australia to Indonesia was ethylene type of plastics (HDPE and LDPE) and other types of plastic, which are potentially contaminants, including PET (see Fig. 14).

Indonesia has re-exported several containers to Australia due to the contamination level that violated the MoT Regulation standards and misdeclarations (Boediwardhana, 2019; Septiari, 2020). One observed impact of these shipment violations on the ground was the infamous use of foreign plastic waste as fuel in tofu-making processes, mainly slipped in together with imported paper waste (Ismawati & Septiono, 2019; Petrlik et al., 2019). Indeed, Australia's most exported waste-derived products to Indonesia is paper waste. In March 2020, the Council of the Australian Government responded to the complaints and protests from CSOs, and public pressure, by prohibiting the export of waste commodities within a certain date (Pickin & Donovan, 2020).

With the prohibition of waste products, Australia was to only export properly processed waste to prevent potential dumping or contamination of such shipments outside of the Australian border (Australian Department of Agriculture, 2021).

At least two significant known material recovery and recycling companies in Australia, RecycleCo Group and Cleanaway, have been shifting to produce process-engineered fuel (PEF) products, and some also aim to export them to Southeast

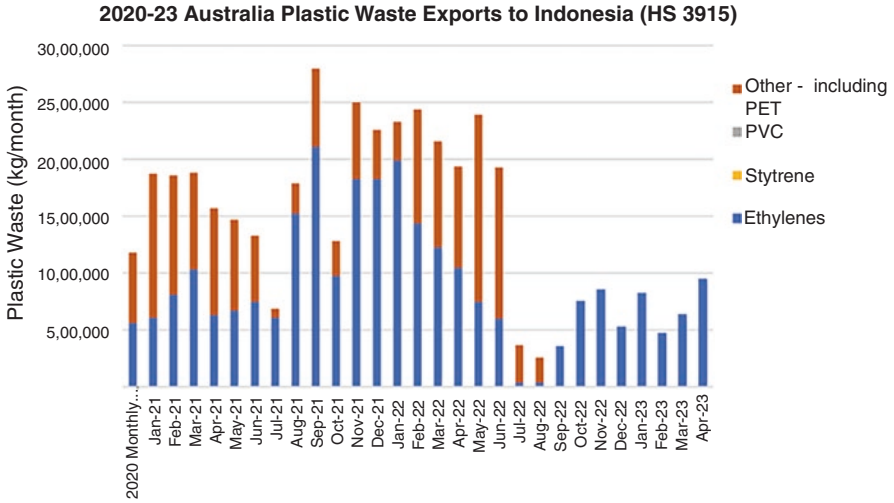

Fig. 14 Plastic waste exports (HS 3915) from Australia to Indonesia 2020–2023. (Graph credit: Basel Action Network, 2021a, b)

Asian region (Australian Clean Energy Finance Corporation, 2020; Metso, 2019; Resource Recycling, 2020; ResourceCo, 2019). This development raises concerns about potential loopholes in the MoT Regulation.

Considering PEFs are yet to be defined explicitly in the HS Code, these waste-derived products needed to be added to the Indonesian government's watchlist. In addition, a report from a company in the Philippines has identified commodity code ATHN's 38,251,000 (Holcim Philippines, 2019), which could also apply in Indonesia. If such commodities are being pushed and imported, the trade of PEFs or refused-derived fuels (RDFs) will undermine the Indonesian government's current measures to increase solid waste treatment capacity and domestic recycling rate. However, since the Basel Convention amendments have not provided clear guidance about the identified HS codes for PEF, RDF, or solid-recovered fuel (SRF), the mislabeling of plastic fuels as mixed waste meant for recycling could lead to new problems in the importing countries.

ASEAN Member Countries

Among country members of the Association of Southeast Asian Nations (ASEAN), only Indonesia, Singapore, and Malaysia have ratified the Basel Convention, which at least provides added environmental protection within the global environmental law framework. Indonesia has trade relations with ASEAN country members. As an exporter of plastic scraps, Indonesia's export spiked in 2018 (13,153.10 tons) to Malaysia (40.53%), Vietnam (28.3%), and Thailand (17.11%) (see Fig. 15). Among

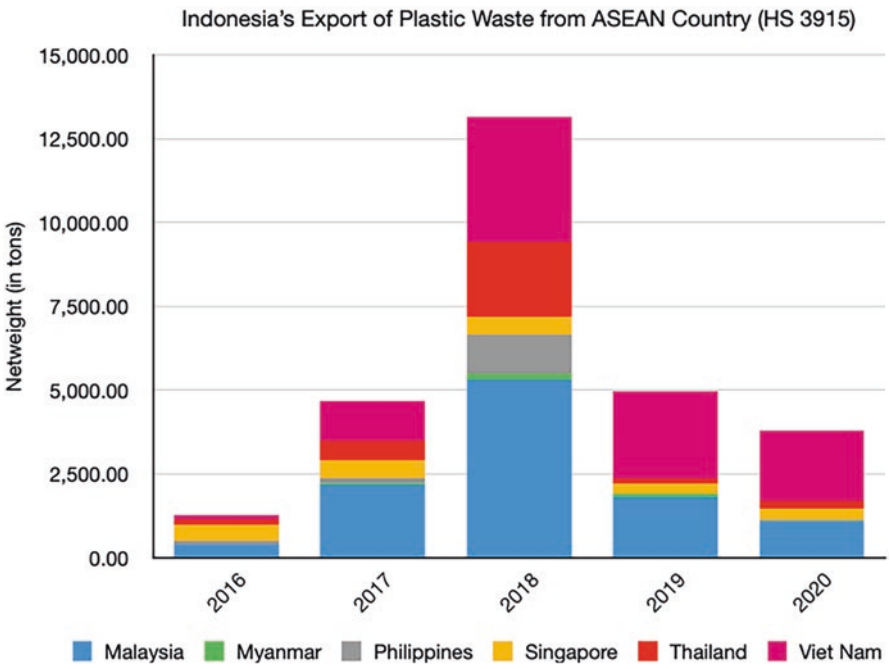

Fig. 15 Indonesia plastic waste exports (HS 3915) to ASEAN countries 2016–2020. (Source: Indonesia Bureau of Statistics)

the ASEAN countries, Indonesia exported to Malaysia, Myanmar, the Philippines, Singapore, Thailand, and Vietnam.

Aside from export, Indonesia imported plastic waste from Malaysia, the Philippines, Singapore, Thailand, and Vietnam. Further, the import volumes from ASEAN countries show an increasing trend until 2020 (14,272.64 tons), mainly from Singapore and Malaysia (see Fig. 16). The high import volume from Singapore may also occur because Singapore is a trade hub of Southeast Asian countries (Capri, 2021; Singapore Economic Development Board, 2021).

Data Discrepancies

We found discrepancies in plastic waste trade data in both export and import. We compared databases from Indonesia Statistics and UN Comtrade for plastic waste import and export. Tables 2 and 3 show three data types: Indonesia Statistics, Indonesia reports in the UN Comtrade, and country partner reports in the UN Comtrade.

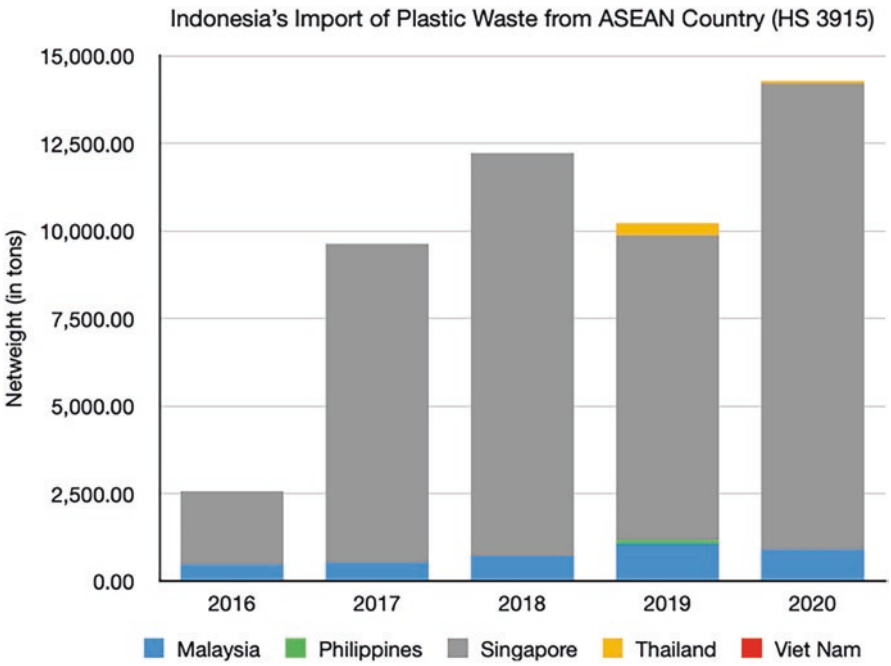

Fig. 16 Indonesia plastic waste imports (HS 3915) from ASEAN countries 2016–2020. (Source: Indonesia Bureau of Statistics, 2021)

In this mirroring data analysis of import data, positive discrepancy values indicate that the country reported more quantity than Indonesia received. For import, the highest discrepancy was found in the import data from the Marshall Islands in 2016, 2017, and 2018. However, no report of plastic waste export from the Marshall Islands was recorded (Ismawati & Septiono, 2019). The latest data in 2020 showed a difference of more than 32,000 tons, meaning the country partner recorded higher volumes of exported plastic waste than Indonesia's import record.

For export, negative values in the discrepancies show that the country partners recorded more plastic waste imported compared to what Indonesia exported. In 2020, for instance, there was a negative 11,000 ton discrepancy between the data from Indonesia Statistics and country partner reports in the UN Comtrade data.

Discrepancies between import and export data from both countries may occur due to the differences in recording and documentation systems in each country. For instance, Indonesia keeps import records by country of origin and does not document transit consignment of goods in third countries before they arrive at the destinations (see Table 4) (Septiono & Ismawati, 2022).

Table 2 Indonesia's import of plastic waste report (HS Code 3915) period of 2015–2020

			UN Comtrade							
			Indonesia report				Country partner report			
	Indonesia statistics		Indonesia report data		Data discrepancy		Country partner report data		Data discrepancy	
Year	Netweight (Ton)	Trade value (Mil USD)	Netweight (Ton)	Trade value (Mil USD)	Netweight (Ton) (4)–(2)	Trade value (Mil USD) (5)–(3)	Netweight (Ton)	Trade value (Mil USD)	Netweight (Ton) (8)–(2)	Trade value (Mil USD) (9)–(3)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
2015	88,240.19	$39.20	97,146.23	$42.74	8906.04	$3.54	115,095.70	$47.87	26,855.51	$8.66
2016	112,366.42	$39.58	120,978.86	$42.48	8612.44	$2.90	104,055.12	$31.20	−8311.31	-$8.39
2017	117,383.43	$42.91	128,951.34	$45.87	11,567.91	$2.95	121,567.81	$33.54	4184.37	-$9.38
2018	283,152.25	$91.02	320,451.81	$102.37	37,299.56	$11.35	320,259.04	$79.43	37,106.79	-$11.59
2019	249,618.37	$83.22	249,618.39	$83.22	0.02	$0.00	231,639.45	$66.75	−17,978.92	-$16.47
2020	181,718.75	$63.04					213,923.61	$67.12	32,204.86	$4.09

Source: Indonesia Bureau of Statistics and UN Comtrade (2021)

Table 3 Indonesia's export of plastic waste (HS Code 3915) 2015–2020

			UN Comtrade							
			Indonesia report				Country partner report			
	Indonesia statistics		Indonesia report data		Data discrepancy		Country partner report data		Data discrepancy	
Year	Netweight (Ton)	Trade value (Mil USD)	Netweight (Ton)	Trade value (Mil USD)	Netweight (Ton) (4)–(2)	Trade value (Mil USD) (5)–(3)	Netweight (Ton)	Trade value (Mil USD)	Netweight (Ton) (8)–(2)	Trade value (Mil USD) (9)–(3)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
2015	148,734.61	$82.95	148,734.61	$82.95	−0.00	$0.00	142,102.99	$88.35	−6631.61	$5.40
2016	203,586.22	$93.28	203,586.22	$93.28	−0.00	$0.00	213,009.76	$113.97	9423.54	$20.68
2017	192,891.17	$92.13	193,544.82	$92.28	653.65	$0.15	229,312.25	$141.24	36,421.08	$49.11
2018	98,450.21	$44.34	98,516.36	$44.34	66.15	-$0.00	36,031.87	$24.40	−62,418.34	-$19.94
2019	73,275.20	$47.67	73,277.24	$47.67	2.04	$0.00	33,509.40	$25.75	−39,765.80	-$21.92
2020	43,724.72	$27.94					32,349.88	$23.61	−11,374.84	-$4.32

Source: Indonesia Bureau of Statistics and UN Comtrade (2021)

Table 4 Trading partners acknowledgement in Indonesia

Trade	Partner countries	Indonesia
Import	Country of origin + country of consignment	Country of origin
Export	Country of last-known destination + country of consignment	Country of last-known destination

Source: *Direktorat Jendral Bea dan Cukai, Kementerian Keuangan* (Cukai, 2015)

Illicit Waste Trade Cases

Between 2019 and 2022, several cases of illicit waste trade attracted significant attention from officials and the public. Some of these cases were triggered by civil society reports or community complaints.

The investigations in 2019 were prompted by several reports from Ecological Observation and Wetlands Conservation (Ecoton) and Nexus for Health, Environment, and Development Foundation (Nexus3 Foundation) about illegal dumping and burning of plastic waste properly in West Java, Banten, and East Java Provinces, which were then covered by several national and international media. The importing company rejected several plastic types from the declared plastic (HS 3915) and paper waste (HS 4707) due to the lack of technical and economic feasibility of recycling. These unwanted materials were then "donated," sold, or dumped on the communities around the factories, violating MoT Reg. No. 31/2016 (Ismawati et al., 2019, 2022; Petrlik et al., 2019, 2022; Septiono et al., 2021).

In June 2019, 65 container shipments inspected by Customs in Batu Ampar Port, Batam, from four different importing companies: PT. Royal Citra Bersama, PT. Arya Wiraraja Plastikindo, PT. Tanindo Sukses, and PT. Hongtay. The imported plastic scraps were suspected to be contaminated with hazardous waste, violating the MOT Decree 31/2016 at the time (Helmi, 2019).

Despite the government claiming to repatriate the violated shipments, some of the re-exported waste did not end up back in the country of origin. In June 2019, 58 containers were meant to be returned to the United States. However, only 12 containers docked in the United States. The remaining were re-routed to India, Thailand, Vietnam, South Korea, Mexico, Netherlands, and Canada (BAN & Foundation, 2019). In response to the report that the shipments had ended up in India, Indonesian MoEF and Customs representatives refused to acknowledge that the containers were re-exported to other countries instead of the country of origin. They stated that the shipments were still on the way to their destinations. The Indonesian officials also indicated that re-exportation is a law mandate and "if importers do not re-export properly, they would be subject to administrative sanctions by revocation of import permits, and companies could also be subject to criminal sanctions to provide a deterrent effect" (Arumningtyas & Maulidin, 2019).

Article 39 of Law No. 18/2008 states that "anyone who unlawfully imports and/or imports household waste and/or household waste-like waste into the territory of the Unitary State of the Republic of Indonesia is punishable by imprisonment for a minimum of 3 (three) years and a maximum of 9 (nine) years and a fine of at least

Rp 100,000,000.00 (one hundred million rupiah) and a maximum of Rp 3,000,000,000.00 (three billion rupiah)" (Wahyudi et al., 2020). Synergy between Customs, the Ministry of Environment and Forestry, and other state agencies is needed to enforce the law. However, although PT MSE and PT SM found violating the law, they have never been sanctioned and are still running their operations until now. A trusted source stated that the two companies were "sacrificed" because they are not members of the pulp and paper industry association.

Indonesian Customs and the MoEF seized another 102 incoming plastic waste shipments in September 2019, imported by PT. New Harvestindo International (PT NHI). The 23 containers were contaminated with hazardous waste, while 79 passed the clearance and continued to be released. Further, the contaminated waste containers were re-exported to Australia (13 containers), the United States (7 containers), New Zealand (2 containers), and the United Kingdom (one container). In addition, the Tangerang Region Customs also seized 138 container shipments of mixed plastic waste imported by PT. New Harvestindo International. The shipments were partially cleared (29 containers), while the remaining 109 containers were reexported back to Australia (80 containers), the United States (4 containers), New Zealand (3 containers), and the United Kingdom (22 containers) (Astuti, 2019; Direktorat Jenderal Bea dan Cukai, 2021).

In addition to PT NHI case, another 24 containers found lacked of proper permitting documents among import shipments by PT. Advanced Recycle Technology (PT ART). Ten containers were contaminated and were traced back and re-exported to Hong Kong (three containers) and Australia (seven containers) (Astuti, 2019). Customs cleared the remaining 14 containers after inspections.

Due to the high influx of imported nonhazardous waste and the risk to human health and the environment, the Secretary of Cabinet arranged a meeting in August 2019 to discuss the matter. The meeting established general decisions to maximize domestic sources of waste, improve waste management, and implement stricter enforcement (Sekretariat Kabinet Republik Indonesia, 2019; Watubun, 2019).

In October 2019, the Indonesian authorities identified two Singaporeans, with an alias LSW and KWL, involved in smuggling the imported contaminated plastic scrap. The imported shipments were contaminated by used remote controls, batteries, printed circuit boards, and wires, despite the lack of necessary import documents (Septiari, 2021). LSW was subjected to Articles 105 and 106 of the Environmental Management and Protection Act (Law No. 32/2009), with a potential maximum sentence of 15 years and a fine of Rp 15 billion (USD 1 million) (Syahni, 2019). However, their court paperwork was never followed up.

Until early 2020, more than 1000 containers had already been seized for inspection at Tanjung Priok Port (Jakarta). Such a condition prompted the MoEF, Commission IV of the House of Representatives, Ministry of Maritime and Investments, Ministry of Trade, and Customs and Excise to conduct the unexpected inspection, specifically to check the KSO SCISI (KSO SCISI is a collaboration between two Indonesian state-owned enterprises in the field of testing, inspections, and certifications) office in Tanjung Priok port.

The team sampled several containers and observed multiple MoT Regulation No. 84/2019 violations. The visit (Kementerian Lingkungan Hidup dan Kehutanan, 2020) concluded that:

- Customs and Excise would organize for re-exportation, with the Basel Convention focal point when found relevant.
- The House of Representatives agreed that contaminated imported waste was not eligible for plastic processing and recycling raw materials.
- Sanction for KSO-CSISI, the surveyor company, and possible replacement of surveyor companies that violated the rules supported by evidence.
- Review of KSO-SCISI's performance in validating nonhazardous waste import shipments is needed.

A series of meetings, with multiple ministries and parliament committee members involved, was held over the matter (Risalah Rapat Dengar Pendapat Komisi IV DPR RI dengan Kementerian Luar Negeri, Kementerian Lingkungan Hidup dan Kehutanan RI, Kementerian Perdagangan Ri, Kementerian Perindustrian RI, dan Kementerian Keuangan RI (Bidang Pertanian, Lingkungan Hidup dan Kehutanan, dan Kelautan, 2020). In May 2020, a limited ministry coordination meeting established decisions to re-export the confiscated containers. Based on Cabinet Secretariat Letter No. B.164/Seskab/Ekon/05/2020, they decided to develop a scheme for exterminating the unclaimed containers which were unable to be re-exported. The letter informed of several decisions to (Direktorat Jenderal Bea dan Cukai, 2021):

- Start the re-exportation process for the total 63 containers of PT. ART by that time, which did not have a proper surveyor report and import permit document, with the lead from the MoEF.
- Continue the re-exportation process for 107 containers of PT. NHI, which once requested to be exterminated because the Indonesian government had already sent the notification to do so to the country of origin.
- Reinspect 20 containers of PT. AWP in Batam Customs.
- Reinspect 114 containers of PT. NHI (which was later confirmed by the MoEF letter No. S.241/PSLB3/VPLB3/PLB.3/06/2020 on June 2020 (mediaindonesia.com, 2020)).
- Exterminate 901 containers belonging to PT. NHI, which had no proper import permit document, with the lead from the MoEF. PT NHI should bear the cost of extermination (which was confirmed by the MoEF letter No. S478/VPLB3/PLB.3/06/2020 on June 2020 (mediaindonesia.com, 2020)).

Further, due to the continuous and large quantity of incoming flagged shipments, several multistakeholder meetings of national agencies' task forces continued for coordination. As of August 2020, the Indonesian Customs and the MoEF inspected 1146 containers declared as nonhazardous waste with the remaining 1078 uninspected at the time, making a total of 2224 containers under their watch. Later, the task force cleared 562 containers and declared another 584 containers contaminated with other types of waste commodities, such as household waste and hazardous waste (Direktorat Jenderal Bea dan Cukai, 2021; Septiono & Ismawati, 2022).

Fig. 17 Seized containers suspected contaminated with hazardous wastes. (Photo credit: Liputan 6. (Nurdin, 2019))

In 2020, in total, 450 containers had been re-exported to the countries of origin. The identifiable "contaminated" containers came from multiple countries, and the highest volumes of shipment came from Australia, followed by Germany, the United States, the Netherlands, and others. Most of these containers were intercepted and inspected by Banten and Batam Customs Offices (Direktorat Jenderal Bea dan Cukai, 2021) (see Fig. 17).

Thereafter, the second amendment of the MoT Regulation No. 84/2019 was enacted, along with the previously established Task Force for the Import of Waste (Huda, 2019), had issued a joint-decree setting the maximum contaminant of 2%, and developed the technical guideline for import verification within the MoFA.

In July 2021, the Indonesian Customs and the MoEF started the extermination process of the unresolved investigation and repatriation containers. The Indonesian Customs finally transferred the authorization of the enforcement process to the Directorate of Hazardous Waste Verification (MoEF) that month, following the extermination plan that had been approved by the Task Force for Non-Hazardous Waste Import (mediaindonesia.com, 2020; Ocean Week, 2021).

However, the serious case of PT NHI has never been processed and followed up in court, nor has the company been ordered to pay penalties for the violations in the past. Although the breach of waste importation laws by PT NHI is considered a criminal act, the only punishment given by the Indonesian government for PT NHI was to cancel their import permit. On the contrary, on 30 July 2021, the UK Court fined a waste management company, Biffa Waste Services Ltd., £1.5 million for exporting mixed household wastes to Indonesia and India. This fine is the highest penalty ever ordered by the court for a waste crime case (UK Environment Agency, 2021).

On the 24th of September 2020, local media, citraindonesia.com, covered the first event of PT NHI exterminating nine plastic waste containers in their

Fig. 18 Old bales of plastics waste at PT NHI's premises confiscated in 2019 covered by wild plants. (Photo credit: Yuyun Ismawati)

mini-incinerator. It took 3 days to burn them all. However, when the Nexus3 team tried to access the news for this study, the original link of this online information was no longer available and could not be displayed. Fortunately, the source is available to obtain using the archive search engine (Darling, 2020). Figure 18 taken in March 2022 shows the old bales of mixed plastic waste in PT NHI's premises already covered by wild plants.

Updates from a trusted source stated that the mini-incinerator was broken several times and can only burn the plastic waste for a couple of hours in a day. Until March 2023, when the Nexus3 team found out that PT NHI was still working to exterminate the remaining confiscated plastic wastes, the team spotted new fresh bales of uniform PET bottles in PT NHI's premises. However, when they try to investigate further, the database of PT NHI could not be found anymore in the company registration system.

Since October 2019, Indonesia Maritime, Transportation and Logistics Watch (IMLOW) expressed their concern for the hazard of the lengthy holding time for these containers, posing risks of self-combustion due its material properties, per Indonesian Shipping Act (Law No. 17/2008). The lengthy process also affected the scarce in container availability for exports on the transfer depo (Asosiasi Pengusaha Tempat Penimbunan Sementara Indonesia, 2020; Azka, 2020). Until June 2021, there were still hundreds on containers held in the Tanjung Priok port waiting for extermination (Yati, 2021). Safety practices should be uphold strictly, considering that these containers were loaded with contaminated waste. Importers and shipping companies complained about the accumulated charges of demurrage costs at the ports and demanded authorities review the regulations faster (Pelindo, 2020; Wahyudi et al., 2020).

In February 2021, Basel Action Network and NGOs in Malaysia, Indonesia, and India flagged shipments from the United States (not a party to the Basel Convention) to those countries (parties to the Basel Convention), from a company Newport CH International. In total, five containers received by their Indonesian counterpart on Belawan Port, North Sumatera. Despite the fact that the company declared the shipment as HS Code 3915.10 (plastic waste, parings, and scrap of polyethylene), the shipment should have been considered illegal due to the provisions of Basel Convention, as the United States is yet to be the party of the international agreement (BAN, 2021b).

Conclusions and Recommendations

The issue of nonhazardous waste has been partially addressed in the revision of The Minister of Trade Regulation, which addressed lessons learned from past violation cases of waste importation in Indonesia, and delivered state's liability to protect human health and the environment (Sonia & Sunyowati, 2020).

The government have established several measures to address waste trade challenges and opportunities, such as by setting a new standard of maximum 2% contaminants in waste import shipments, as well as additional procedures, including mandating exporter registration at the Indonesian Embassy in the country of origin, requesting for a master list of importing companies to the Ministry of Industry, having multiple parameter checklists from the Ministry of Environment and Forestry for importer's recommendation letter, and strengthening inspection procedure of the Customs from the regulator's perspective. However, sanctions and punishment for companies violating the rules should be increased and publicly announced.

More needs to be done to minimize the impacts of waste colonialism on Indonesia. The Government of Indonesia is not on track to establish the roadmap for plastic and paper recycling industries. The roadmap should be designed to incrementally reduce the import of nonhazardous waste by setting import quotas, to allow domestically sourced nonhazardous waste or post-consumers plastics and paper to become a main source of secondary materials for the local recycling industries. The roadmap must be developed by relevant ministries and agencies at the national level in consultations with industries and civil society representatives. In parallel, waste management system and infrastructures in the country need to be improved to increase the rate of recycling and recyclability of post-consumer products to feed the recycling industries.

As a Party to Basel, the Government of Indonesia should strengthen Basel Convention enforcement and compliance, especially the repatriation of contaminated waste shipments or return-to-senders. Indonesian authorities should adopt and revise the existing regulations to accommodate the Basel Convention Plastic Waste Amendments that had entered into force on January 1, 2022.

The Ministry of Trade and the Ministry of Foreign Affairs should notify the Indonesian Embassy and Consulates and other relevant stakeholders in exporting

countries about the decision on maximum contaminants. Information on the maximum contaminant limit should not be considered a barrier-to-trade, because the definition and provisions of import of nonhazardous waste is aiming for the ease of the recycling sector. This rule aligns with the Basel Convention amendments on plastic waste trade, where provisions such as being "almost free from contamination" may be supplemented with a specific national point of reference (Secretariat, 2021).

The Ministry of Environment and Forestry should prohibit the imports of nonrecyclable plastic, hard-to-recycle plastics, and waste-derived products (PEFs or RDFs). Mixed plastic and several types of plastic are technically recyclable, but they have higher costs and the risk of releasing toxic chemicals.

Considering Indonesia does not have a protective regulatory framework from the emission standards for multiple persistent organic pollutants (POPs) and emerging and carcinogenic chemicals – such as methylmercury, PBDEs, PCBs, PFAS, and UV-328, and several others – the precautionary principle should be implemented. Mixed plastic poses health risks due to the chemicals, with contamination through plastic components used in electronic products. Chlorinated-based plastic, such as PVC, also releases dioxins and furans during thermal melting and shaping, potentially harming recycling workers.

In addition, Indonesia has already enacted MoEF Reg. 75/2019, which will prohibit the use of some plastics on products by 2030, such as polystyrene and PVC plastics. The use of such plastic types and their demand in the recycling sector will drop due to the regulating policy for the industry. Such policy implications should be considered while developing the Indonesian *Roadmap of Non-Hazardous Waste as Secondary Raw Materials for Industries*.

The Ministry of Environment and Forestry should increase laboratory capacity to improve the safeguarding of public health and the environment. Indonesia is still unable to analyze several POPs, organic metalloids, and other emerging chemicals. Increasing the capacity of commercial and educational laboratories in Indonesia would also lower the cost of laboratory instrumentation and analysis.

The Ministry of Environment and Forestry and the Ministry of Foreign Affairs should maximize the newly established exporter registry for waste repatriation/return-to-sender. Violation in waste shipment harms domestic recycling industries and the public. Ultimately, trade violations in the past increased the burden of environmental and health costs of the public. The Government of Indonesia should apply the lessons learned from past experiences to develop plans for prevention and curative actions to pursue waste repatriation to the country of origin.

Overall, there is a growing recognition among exporting countries that authorities should address illegal waste exports through regulations and enforcement efforts. However, challenges remain, particularly in developing countries with limited enforcement capacity.

Holding waste brokers and shipping lines accountable for their actions is essential. This can be done by implementing stricter regulations on the export and import of plastic waste, increasing penalties for the violation of these regulations, and enforcing these regulations through monitoring and inspections.

It is important to note that not all actors involved in the plastic waste trade are necessarily engaged in illegal activities. However, waste crime and illegal waste trade remain major concerns in the global waste management sector, and effective regulation and enforcement are vital to promoting responsible and sustainable waste management practices.

Finally, efforts to combat waste colonialism and illegal waste trade involve a combination of government regulation and oversight, improved waste management practices, greater social and environmental awareness, and activism.

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References

APKI. (2021). *Kebutuhan Bahan Baku Kertas Daur Ulang (KDU)* [Presentation]. Paper presented at the FGD Peta Jalan Daur Ulang Kertas dan Plastik di Indonesia, Virual.

APKI. (2022). *Berbasis ESG, Industri Pulp dan Kertas Indonesia Bisa Terus Bersaing di Pasar Global*. Retrieved from https://apki.net/wp-content/uploads/2022/05/Berbasis-ESG-Industri-Pulp-dan-Kertas-Indonesia-Bisa-Terus-Bersaing-di-Pasar-Global1.pdf

Arumningtyas, L., & Maulidin, M. A. (2019, November 7). *Pengembalian Limbah B3 Tak Sampai Negara Asal? Importir Terancam Sanksi*. Mongabay. Retrieved from https://www.mongabay.co.id/2019/11/07/pengembalian-limbah-b3-tak-sampai-negara-asal-importir-terancam-sanksi/

Asosiasi Daur Ulang Plastik Indonesia. (2021). *ADUPI – Asosiasi Daur Ulang Plastik Indonesia* [Presentation]. Retrieved from Indonesia.

Asosiasi Industri Pulp and Kertas Indonesia. (2021). *Kebutuhan Bahan Baku Kertas Daur Ulang (KDU)* [Presentation]. Retrieved from Indonesia.

Asosiasi Pengusaha Tempat Penimbunan Sementara Indonesia. (2020). *Miris, Kontainer Ekspor Langka, Namun Ribuan Kontainer Limbah Masih Mangkrak di Priok*. Retrieved from https://aptesindo.com/miris-kontainer-ekspor-langka-namun-ribuan-kontainer-limbah-masih-mangkrak-di-priok-20201204348

Astuti, I. (2019). *Bea Cukai dan KLHK Tindak 3 Importir Limbah*. Retrieved from https://mediaindonesia.com/humaniora/260361/bea-cukai-dan-klhk-tindak-3-importir-limbah

Australian Clean Energy Finance Corporation. (2020). *Case study: Turning waste into processed engineered fuel*. Retrieved from https://www.cefc.com.au/where-we-invest/case-studies/turning-waste-into-processed-engineered-fuel/

Australian Department of Agriculture, W., and Environment. (2021). *Waste exports*. Retrieved from https://www.awe.gov.au/environment/protection/waste/exports

Azka, R. M. (2020). *Apa Kabar Limbah Kontainer di Tanjung Priok?* Retrieved from https://ekonomi.bisnis.com/read/20201021/98/1307974/apa-kabar-limbah-kontainer-di-tanjung-priok

BAN. (2021a). *NGOs signing on to letter to shippers to stop plastic waste exports*. Retrieved from https://www.ban.org/plastic-waste-transparency-project-hub/shipping-lines-campaign

BAN. (2021b). *Three current examples of likely illegal plastic waste exports from US*. Retrieved from http://wiki.ban.org/images/a/ae/Three_Current_Examples_of_Likely_Illegal_US_Plastic_Waste_Exports_from_US.pdf

BAN. (2022). *Shipping line CMA CGM to halt global trade of plastic waste*. Retrieved from https://www.ban.org/plastic-waste-transparency-project-hub/shipping-lines-campaign

BAN, & Foundation, N. (2019). *Global shell game: Report on fate of re-exports of seized illegal imports of waste from the USA to Indonesia*. Retrieved from USA and Indonesia. https://www.nexus3foundation.org/_files/ugd/13eb5b_907439e852d14544824343170a823ad4.pdf

Basel Action Network. (2021a). *Indonesian government uncertain as local protests begin, eyes are on India*. Retrieved from https://www.ban.org/news/2021/3/25/whistle-blown-whistle-heard-malaysia-declares-reported-shipments-of-us-plastic-wastes-to-asia-are-illegal

Basel Action Network. (2021b). *Three current examples of likely illegal plastic waste exports from US*. Retrieved from USA http://wiki.ban.org/images/a/ae/Three_Current_Examples_of_Likely_Illegal_US_Plastic_Waste_Exports_from_US.pdf

Boediwardhana, W. (2019). *After plastic, Indonesia now also returns contaminated paper waste to Australia*. Jakarta Post. Retrieved from https://www.thejakartapost.com/news/2019/07/09/after-plastic-indonesia-now-also-returns-contaminated-paper-waste-to-australia.html?src=mostviewed&pg=news/2019/02/08/turkey-building-collapse-death-toll-hits-14.html

Brooks, A. L., Wang, S., & Jambeck, J. R. (2018). The Chinese import ban and its impact on global plastic waste trade. Science. *Advances, 4*(6), eaat0131. https://doi.org/10.1126/sciadv.aat0131

Capri, A. (2021). *Commentary: How Singapore will remain a top trading hub in a post-pandemic world*. Commentary. Retrieved from https://www.channelnewsasia.com/commentary/singapore-top-trading-hub-post-coronavirus-covid-19-pandemic-936541

Chen, H. L., Nath, T. K., Chong, S., Foo, V., Gibbins, C., & Lechner, A. M. (2021). The plastic waste problem in Malaysia: Management, recycling and disposal of local and global plastic waste. *SN Applied Sciences, 3*(437). https://doi.org/10.1007/s42452-021-04234-y

Cukai, D. B. D. (2015). *Analisa Diskrepansi Perdagangan Merkuri*.

Cukai, D. B. D. (2020). *Pengawasan Impor Limbah* [Presentation].

Cukai, D. B. D. (2021). *Pengawasan Impor Limbah Non-B3* [Presentation].

Darling, M. (2020, September 24). *Dimusnahkan 9 Kontainer Limbah Non B3 Plastik Milik PT. NHI. Citra Indonesia*. Retrieved from https://web.archive.org/web/20201022205210/https://citraindonesia.com/dimusnahkan-9-kontainer-limbah-non-b3-plastik-milik-pt-nhi/

Direktorat Jenderal Bea dan Cukai. (2021). *Pengawasan Impor Limbah Non-B3* [Presentation]. Retrieved from Indonesia.

EEA. (2019). *The plastic waste trade in the circular economy*. European Environmental Agency.

Foundation, T. O. (2023). *Stop waste colonialism: Leveraging extended producer responsibility to catalyze a justice-led circular textiles economy*. Retrieved from https://stopwastecolonialism.org/stopwastecolonialism.pdf

Fuller, S., Ngata, T., Borrelle, S. B., & Farrelly, T. A. (2022). Plastics pollution as waste colonialism in Te Moananui. *Journal of Political Ecology, 29*, 534–560.

Helmi, I. (2019). *BC Batam Periksa Puluhan Kontainer Sampah Plastik Impor di Pelabuhan Batuampar*. Retrieved from https://probatam.co/2019/06/15/bc-batam-periksa-puluhan-kontainer-sampah-plastik-impor-di-pelabuhan-batuampar/

Holcim Philippines. (2019). *Holcim Philippines statement on alternative fuels held at other ports*. Retrieved from https://www.holcim.ph/holcim-philippines-statement-alternative-fuels-held-other-ports

Huda, L. (2019). *Pemerintah Bentuk Satgas Penanganan Impor Limbah*. Retrieved from https://bisnis.tempo.co/read/1271435/pemerintah-bentuk-satgas-penanganan-impor-limbah/full&view=ok

Ismawati, Y., & Septiono, M. A. (2019). *Plastic waste trade in Indonesia country update report 2019*. Nexus3 Foundation.

Ismawati, Y., Septiono, M. A., Arisandi, P., & Bell, L. (2019). *Plastic waste trade in Indonesia*. Retrieved from Denpasar, Indonesia https://bit.ly/35H6EUm

Ismawati, Y., Proboretno, N., & Septiono, M. A. (2022). *Plastic waste management and burden in Indonesia*. Retrieved from Jakarta https://bit.ly/PlasticBurden2022

Karlsson, T., Dell, J., Gündoğdu, S., & Carney Almroth, B. (2023). *Plastic waste trade: The hidden numbers*. Retrieved from Gothenburg https://ipen.org/documents/plastic-waste-trade-hidden-numbers

KBRI, T. (2021). *Impor Limbah Non B3*. Retrieved from https://kemlu.go.id/tokyo/en/pages/impor_limbah_non_b3/4351/etc-menu

KBRI, W. (2021). *Procedure for authentification NZ exporter of non-hazardous and non-toxic waste*. Retrieved from https://kemlu.go.id/wellington/en/pages/prosedur_oten-

tikasi_untuk_eksportir_limba%20h_tidak_berbahaya_dan_tidak_beracun/3920/etc-menu

Kemenlu, Min. of Foreign Affairs. (2021). *Penandasahan Eksportir Terdaftar oleh Perwakilan RI* [Presentation]. Paper presented at the FGD Plastic and Paper Waste Trade Virtual.

Kementerian Lingkungan Hidup dan Kehutanan. (2020). *Sidak KLHK bersama Komisi IV DPR ke PT. KSO Sucofindo, terkait impor sampah dalam konteiner*. Retrieved from http://pslb3.menlhk.go.id/read/sidak-klhk-bersama-komisi-iv-dpr-ke-pt-kso-sucofindo-terkait-impor-sampah-dalam-kontainer

KLHK. (2020). *Formulir Permohonan Rekomendasi Impor Limbah Non Bahan Berbahaya Dan Beracun*. Retrieved from http://pelayananterpadu.menlhk.go.id/images/dokumen/nonperizinan/PERSYARATAN-REKOM-IMPOR-LB3.pdf

Kurniawan, G. (2019). *Pasok Bahan Baku Manufaktur, Industri Daur Ulang Plastik Dipacu*. Retrieved from https://ekonomi.bisnis.com/read/20190823/257/1140332/pasok-bahan-baku-manufaktur-industri-daur-ulang-plastik-dipacu

Liang, Y., Tan, Q., Song, Q., & Li, J. (2020). An analysis of the plastic waste trade and management in Asia. *Waste Management, 119*, 242–253. https://doi.org/10.1016/j.wasman.2020.09.049

Liboiron, Max. (2021). *Pollution is colonialism*. Duke University Press. https://doi.org/10.2307/j.ctv1jhvnk1

Marrs, D. G., Ručevska, I., & Villarrubia-Gómez, P. (2019). *Controlling transboundary trade in plastic waste*. Policy Brief. Retrieved from https://www.grida.no/publications/443

mediaindonesia.com. (2020). *KLHK Susun Peta Kelola Limbah Non-B3 sebagai Bahan Industri*. Retrieved from https://mediaindonesia.com/humaniora/327115/klhk-susunpeta-kelola-limbah-non-b3-sebagaibahan-industri

Metso. (2019). *From waste to fuel: Success in PEF production*. Retrieved from https://recycling.metso.com/casestudies/recycling/from-waste-to-fuel/

Michaelson, R. (2021). *'Waste colonialism': World grapples with west's unwanted plastic*. The Guardian.

Nexus3. (2021). *Focus Group Discussion: Pengetatan Impor Limbah Non-B3 Scrap Plastik dan Scrap Kertas: Permendag 84/2019 (jo. Permendag 83/2020) dan Basel Convention Plastic Waste Amendment.* Paper presented at the FGD with Indonesians Paper and Plastic Industries Association, Virtual. Retrieved from https://bit.ly/3NZ6iPp

Nurdin, A. (2019). *Bea Cukai: 38 Kontainer Bermuatan Limbah Plastik Positif Mengandung B3*. Liputan 6. Retrieved from https://www.liputan6.com/bisnis/read/4003388/bea-cukai-38-kontainer-bermuatan-limbah-plastik-positif-mengandung-b3

Ocean Week. (2021). *Kontainer Limbah di Priok Akan Dimusnahkan*. Retrieved from https://oceanweek.co.id/kontainer-limbah-di-priok-akan-dimusnahkan/

OECD. (2018). *Improving plastics management: Trends, policy responses, and the role of international co-operation and trade*. Background report. Retrieved from https://www.oecd.org/environment/waste/policy-highlights-improving-plastics-management.pdf

Pelindo, T. P. (2020). *Tarif konteiner petikemas.* Retrieved from https://ipctpk.co.id/tarif/

Petrlik, J., Ismawati, Y., DiGangi, J., Arisandi, P., Bell, L., & Beeler, B. (2019). *Plastic waste flooding Indonesia leads to toxic chemical contamination of the food chain*. Retrieved from Jakarta, Surabaya, Prague, San Francisco. https://bit.ly/2N7a3Wk

Petrlik, J., Bell, L., Beeler, B., Møller, M., Jopkova, M., & Brabcova, K. (2021). *Plastic waste poisoning food and threatening communities in Africa, Asia, Central & Eastern Europe and Latin America*. Arnika–IPEN. Retrieved from https://ipen.org/sites/default/files/documents/ipen-plastic-waste-contaminates-food-chain-en.pdf

Petrlik, J., Ismawati, Y., Bell, L., Beeler, B., Grechko, V., Jelinek, N., & Septiono, M. A. (2022). *POPs contamination caused by use of plastic waste as fuel at locations in Indonesia*. Paper presented at the Symposium on Halogenated Persistent Organic Pollutants, New Orleans, October 9–14.

Pickin, J., & Donovan, S. (2020). *Exports of Australian waste-derived products and wastes in 2019-20*. Retrieved from https://www.dcceew.gov.au/sites/default/files/documents/data-exports-australian-wastes-2019-20.pdf

Pratt, L. (2011). Decreasing dirty dumping? A reevaluation of toxic waste colonialism and the global management of transboundary hazardous waste. *William and Mary Environmental Law and Policy Review, 35*(2010–2011)(2), 581–622. Retrieved from https://scholarship.law.wm.edu/cgi/viewcontent.cgi?article=1519&context=wmelpr

Puckett, J., Westervelt, S., Gutierrez, R., & Takamiya, Y. (2002). *The digital dump: Exporting re-use and abuse to Africa*. Retrieved from Seattle, WA https://static1.squarespace.com/static/558f1c27e4b0927589e0edad/t/55d79038e4b069c9055c8720/1440190520196/BANsDigitalDump-2005.pdf

Resource Recycling. (2020). *From green fence to red alert: A China timeline*. Retrieved from https://resource-recycling.com/recycling/2018/02/13/green-fence-red-alert-china-timeline/

ResourceCo. (2019). *A world away from waste*. Retrieved from https://resourceco.com.au/a-world-away-from-waste/

Risalah Rapat Dengar Pendapat Komisi IV DPR RI dengan Kementerian Luar Negeri, Kementerian Lingkungan Hidup dan Kehutanan RI, Kementerian Perdagangan Ri, Kementerian Perindustrian RI, dan Kementerian Keuangan RI (Bidang Pertanian, Lingkungan Hidup dan Kehutanan, dan Kelautan), Dewan Perwakilan Rakyat Republik Indonesia. 56 (2020).

Sanderson, P. (2021). *Indonesia imports recyclate because it lacks collection infrastructure says Industry Ministry*. Retrieved from https://www.rebnews.com/indonesia-imports-recyclate-because-it-lacks-collection-infrastructure-says-industry-ministry/

Sasaki, S. (2020). The effects on Thailand of China's import restrictions on waste: measures and challenges related to the international recycling of waste plastic and e-waste. *Journal of Material Cycles and Waste Management, 23*, 77. https://doi.org/10.1007/s10163-020-01113-3

Secretariat, B. (2021). *BC-14/12: Amendments to Annexes II, VIII and IX to the Basel Convention*. Retrieved from https://www.basel.int/Implementation/Plasticwaste/PlasticWasteAmendments/FAQs/tabid/8427/Default.aspx

Sekretariat Kabinet Republik Indonesia. (2019). *Berpotensi Rusak Lingkungan, Presiden Jokowi Minta Impor Sampah dan Limbah Dikendalikan* [Press release]. Retrieved from https://setkab.go.id/berpotensi-rusak-lingkungan-presiden-jokowi-minta-impor-sampah-dan-limbah-dikendalikan/

Sembiring, M. (2019). *Global waste trade chaos: Rising environmentalism or cost-benefit analysis*. NTS Insight, IN19-02. Retrieved from https://www.jstor.org/stable/pdf/resrep26804.pdf

Septiari, D. (2020). *Indonesia to send back hazardous materials to Australia, NZ, UK, US*. Retrieved from https://www.thejakartapost.com/news/2020/12/25/indonesia-to-send-back-hazardous-materials-to-australia-nz-uk-us.html

Septiari, D. (2021). *Two Singaporeans named suspects in toxic waste import case*. Retrieved from https://www.thejakartapost.com/seasia/2019/10/04/two-singaporeans-named-suspects-in-toxic-waste-import-case.html

Septiono, T., & Ismawati, Y. (2022). *Indonesia waste trade updates: Focusing on plastic and paper waste in Indonesia*. Retrieved from Denpasar https://www.nexus3foundation.org/2022/11/03/indonesia-waste-trade-updatesfocusing-on-plastic-andpaper-waste-in-indonesia/

Septiono, M. A., Ismawati, Y., & Arisandi, P. (2021). *Indonesia waste trade update: Focusing on plastic and paper waste trade*. Retrieved from www.nexus3foundation.org/reports.

Singapore Economic Development Board. (2021). *We connect you to the world*. Global connectivity. Retrieved from https://www.edb.gov.sg/en/why-singapore/global-connectivity.html

Sonia, V., & Sunyowati, D. (2020). The state liability of plastic waste dumping in Indonesia. *Utopía y Praxis Latinoamericana, 25*(1). https://doi.org/10.5281/zenodo.3784901

Sridhar, L., & Kumar, P. (2019). The new face of waste colonialism: A review of legal regulations governing the import waste into India. *Socio-Legal Review, 15*(2), 101–130. Retrieved from https://repository.nls.ac.in/slr/vol15/iss2/1

Sugasri, A., Permanasari, T., Suryana, A., Herlina, L., & Apriella, N. (2021). *Kajian Daur Ulang Plastik dan Kertas Dalam Negeri*. Retrieved from Jakarta https://www.scribd.com/document/501879526/Kajian-Daur-Ulang-Plastik-dan-Kertas-Dalam-Negeriiii

Syahni, D. (2019). *Kala Dua Pengusaha Singapura Terjerat Kasus Impor Sampah Plastik Ilegal di Tangerang*. Retrieved from https://www.mongabay.co.id/2019/10/14/kala-dua-pengusaha-singapura-terjerat-kasus-impor-sampah-plastik-ilegal-di-tangerang/

The International Criminal Police Organization. (2020). *Strategic analysis report: Emerging criminal trends in the global plastic waste market since January 2018*. Interpol.

UK Environment Agency. (2021). *Biffa caught exporting banned waste again. Climate change impact in developing countries*. Retrieved from https://www.gov.uk/government/news/biffa-caught-exporting-banned-waste-again

UN Comtrade. (2021). https://comtradeplus.un.org/TradeFlow

Wahyudi, I. T., Anggara, W., & Zein, M. R. (2020). Tinjauan Kebijakan Importasi Limbah Di Indonesia. *JURNAL PERSPEKTIF BEA DAN CUKAI, 4*(1). https://doi.org/10.31092/jpbc.v4i1.739

Wang, W., Themelis, N. J., Sun, K., Bourtsalas, A. C., Huang, Q., Zhang, Y., & Wu, Z. (2019). Current influence of China's ban on plastic waste import. *Waste Disposal & Sustainable Energy, 1*, 67–78. https://doi.org/10.1007/s42768-019-00005-z

Watubun, K. (2019). *'Zero Tolerance' Impor Sampah & Limbah B3*. Retrieved from http://staging-point.com/read/2019/08/29/142522/.Zero.Tolerance.Impor.Sampah.Limbah.B3

Yati, R. (2021). *Kontainer Limbah Mangkrak di Priok, Pengusaha TPS Rugi Ratusan Miliar*. Retrieved from https://ekonomi.bisnis.com/read/20210622/98/1408475/kontainer-limbah-mangkrak-di-priok-pengusaha-tps-rugi-ratusan-miliar.

Plastic Waste Trade Issues and Environmental Contamination in Romania

Florin-Constantin Mihai and Simona Roxana Ulman

Introduction

Waste management activities imply the import-export of waste flows between countries for recycling and recovering purposes. Besides other international regulations, the prohibition of the export of hazardous substances and toxic wastes from well-developed countries to emerging economies of Asia and Africa under the Basel Convention must be achieved (Mihai et al., 2022a).

Even in such context, illegal trade activities in the waste sector are still widespread, posing further risks to public health and environment, particularly in countries where there are gaps in domestic waste management activities. E-waste is commonly exported in Africa where the largest e-waste dump is formed on the outskirts of Accra (Ghana) such as Agbogbloshie (Dodd et al., 2023), and textile wastes end up in dumpsites owing to the fast-fashion consumption model in high-income economies and second-hand exportation (Niinimäki et al., 2020). Since the China ban on plastic imports, other South Asian countries are facing challenges with the surplus of imported plastic waste, while domestic waste management also has its own deficiencies (Wang et al., 2020).

A similar context appears in Eastern Europe, where low landfill fees combined with law enforcement gaps are attractive for waste brokers to trade plastic waste and other waste flows through illicit procedures (BAN, 2021). Romania proved to be a key destination for illegal waste trade in the last years (Europol, 2022), while waste management performances are still low compared with other EU countries (Rios & Picazo-Tadeo, 2021). Therefore, imported waste flows put additional pressure on the current waste management systems. Plastic waste management has significant shortcomings related to poor performances of source-separation collection schemes

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despite a developed recycling infrastructure and investments made by the business sector (Ganea, 2021). Moreover, civil society is concerned about Romania's exposure to illegal waste trade (Euroactiv, 2020). This country, like other new EU members, struggles to comply with EU targets in terms of recycling and recovery of the municipal waste stream (Bunding-Venter et al., 2022). On this background, the current work aims to examine the role of formal and illegal plastic waste trade in Romania and its effects on domestic plastic waste management practices and environmental contamination risks (freshwater-land-air pollution) through illegal dumping, burying, open burning, or co-incineration in cement factories (see Fig. 1).

Moreover, it intends to analyze the main mitigation strategies in the case of illegal plastic trade and environmental contamination, with a focus on the legislative framework at the EU and national levels, on law enforcement and monitoring, and, also, on improvements in terms of plastic waste management through circular solutions in this particular context.

Plastic Waste Management in Romania Under Linear Economy

Romania is a landfill-based country despite the aspirations toward a circular economy transition in line with 2030 EU targets. Plastic waste is a common waste fraction in the municipal waste stream and packaging waste flows. In addition, e-waste, end-of-life vehicles (ELVs), or textile waste contain plastic items are additional plastic pollution sources for the natural environment, even to a greater extent if they are not properly managed. Previous studies showed that Romania is facing waste management challenges in municipal waste management systems (Dobre-Baron et al., 2022), packaging waste (Teodor et al., 2020; Mihai & Ulman, 2022), e-waste (Modoi & Mihai, 2022), end-of-life vehicles (Rovinaru et al., 2019), textile waste (Tripa & Indrie, 2021), or construction and demolition waste (Mihai, 2019). As it is

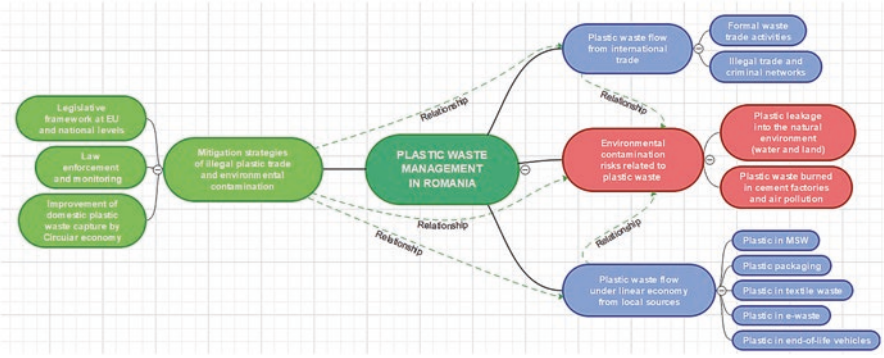

Fig. 1 Plastic waste trade issues and environmental contamination in Romania: a general overview

well-known, plastic items can be easily, unfortunately, released into the environment via illegal dumpsites or littering behavior. Therefore, the mismanagement of plastic waste that feeds plastic pollution of natural environment has multiple generation sources at national and regional levels besides the municipal waste stream. In detail, the key problems related to plastic waste management in Romania identified by the Circular Economy Strategy are low recycling levels (31%), reduced content of recycled materials in new products, or low consumer awareness (Ministry of Environment, 2022). As found in the literature, these main national vulnerabilities might have some current responses, at least from the theoretical point of view (Fig. 2). Accordingly, (i) plastic in the municipal waste stream could be better managed through more efficient separated collection systems and through more numerous and correlated actions made for increasing the pro-environmental general awareness, with a focus on this specific concern (Mihai et al., 2022b). (ii) Some alternatives for replacing the plastic in packaging waste flows might be found, i.e., plant-based and compostable packaging materials; glass, when it is reused and recycled; or cardboard mono-material (McNeish & Neufeldt, 2023; Mihai et al., 2024). (iii) The concern for plastic in textile waste might be attenuated if it is, no less than partially, replaced to natural fibers and, also, if this industry starts to follow the principles of circular economy, closing the loop (Tripa & Indrie, 2021). (iv) Plastic in e-waste might be reduced through different actions like reducing the use of electronics and selecting more eco-friendly options that have the same output; putting

Fig. 2 Main plastic waste management challenges and potential solutions to them in Romania

more frequently into practice other specific strategic circular principles like reuse, repair, return, recycle, recover, and remanufacture; and choosing energy-efficient electronics that, at least, are more environmentally safe (Mihai et al., 2022b; Mihai & Ulman, 2023). (v) Plastic in end-of-life vehicles might be a problem potentially improved through a higher level of implemented green mobility and more circular approaches in the automotive industry (Bănică et al., 2019; Andrei et al., 2022; Mihai & Ulman, 2023) (see Fig. 2).

Post-consumer packaging waste such as PET bottles is the most visible pollution item on freshwater bodies particularly after the flood events when these plastic items are accumulating behind the dam lakes or are trapped in the riparian vegetation (Mihai, 2018). This fact suggests gaps in the current plastic waste management system in the context in which PET bottles are one of the most recycled plastic items with high demand in the plastic recycling market. GreenTech is one of the largest plastic recycling companies from Southeast Europe, providing "bottle to bottle" mechanisms while closing the PET bottle loop (rPET). However, the low efficiency of source-separated schemes in the last decade in Romania led to the importation of PET bottles from abroad to feed the operational demands of recycling facilities, while undocumented domestic plastic waste flows were exported to the Asian market (Cojocariu, 2013). For instance, the official data shows that plastic waste exported in China was 810 t in 2016–2017, but equal to zero in 2018–2019 after China's ban on importing plastic waste (Romanian Court of Accounts, 2022).

On the other side, imported PET bottles seem to be more qualitative than domestic plastic flow according to recycling actors. GreenTech imports almost 60% of PET bottles mainly from the business sector (Ganea, 2021). This fact suggests that the domestic collection system is inefficient despite the available recycling capacity and technology in Romania. The source-separated waste collection systems such as the dual system (dry versus humid fraction) or the collection in four to five waste fractions (plastic/metal, paper/cardboard, glass, organic/residual) imply contamination risks in the absence of a strong environmental awareness of the community and a better law enforcement (Modoi et al., 2022; Jigani et al., (2020). The bins for plastics could receive various plastics types (packaging or nonpackaging plus metals or aluminum cans) that need to be further sorted, treated, cleaned, and prepared for recycling/recovery operations. In this regard, the deposit-refund system appears to be a better alternative to providing clean PET bottles for producing rPET. However, besides PET and HDPE packaging materials where the business sector seems to be better developed, the other plastic packaging materials and plastic parts (e.g., e-waste, automotive industries) must be attentively integrated into higher circular mechanisms (Modoi & Mihai, 2022).

In the case of municipalities, the transition from a dual system toward five fractions combined with a strong involvement of local authorities and more numerous awareness events might be able to determine radical changes in plastic waste capture in a relatively short period of time, an example in this regard being offered by Salacea, a rural community of Bihor County (Zero Waste Europe, 2019). This is important because a significant share of the population still lives in rural areas in Romania where plastic waste is more exposed to illegal or open burning practices

(Mihai & Grozavu, 2019), adding concern on the low-quality plastics imported through formal and/or illicit channels or derived from raw dismantling activities of e-waste and end-of-life vehicles. On the other side, better plastic waste capture rates in both quantity and quality from residents will decrease the current importation of plastics from abroad necessary for feeding the plastic recycling facilities located in this national context.

Plastic Waste Flow in Romania from International Trade

Formal Waste Trade Activities

Analyzing the evolution of annual exports and imports of plastic waste in Romania in relation to intra-EU countries and also to non-EU countries between 2004 and 2021, some figures could be overseen (Fig. 3a, b) (considering Eurostat Databases, 2004–2021). Accordingly, regarding the relation to intra-EU countries, the annual imports appear to have an ascendant trend in the analyzed period, especially between 2009 and 2019. This last year represents the peak point, with a value equal to 83,460 tons and with an increase from 2413 tons which is the value registered in 2009. This represents a huge quantity of plastic officially introduced in Romania, while the exported quantity appears to be significantly lower. Still, the annual exports of plastic waste also seem to have an ascendant but a much slower trend in the indicated context. Another aspect to be observed is the fact that, while in 2004, the annual imported and exported quantities of plastic waste appear to be quite similar (14 tons of annual imports versus 2652 tons of annual exports), in 2019, the differences become huge (83,460 tons of annual imports versus 19,063 tons of annual exports). In 2021, the differences are still very high, but not as high as in 2019 (58,354 tons of annual imports versus 22,573 tons of annual exports).

If comparing the annual exports to EU member states and the ones to non-EU countries, the difference is equal to 12,228 tons in favor of the first ones. In addition, when analyzing the annual imports of plastic waste in Romania, the difference between these two groups of countries is much higher, being equal to 50,141 tons. Moreover, while the quantity of plastic exported in non-EU countries is higher than the imported one in 2021, the figures are quite the opposite when the relation of Romania to the other EU countries is analyzed in this regard, as we have already mentioned above.

Synthetizing, as a general overview, the amount of plastics that circulate between Romania and the EU space is significantly higher than the one between Romania and other countries outside of it. The most visible difference is in regard to the imported quantity from the other EU countries with not so obvious distinction when it comes to observing the prices implied. Consequently, the situation appears to be not very good for Romania which seems to import much plastic waste at low prices. The official figures seem to be also confirmed by the remarks and conclusions of the

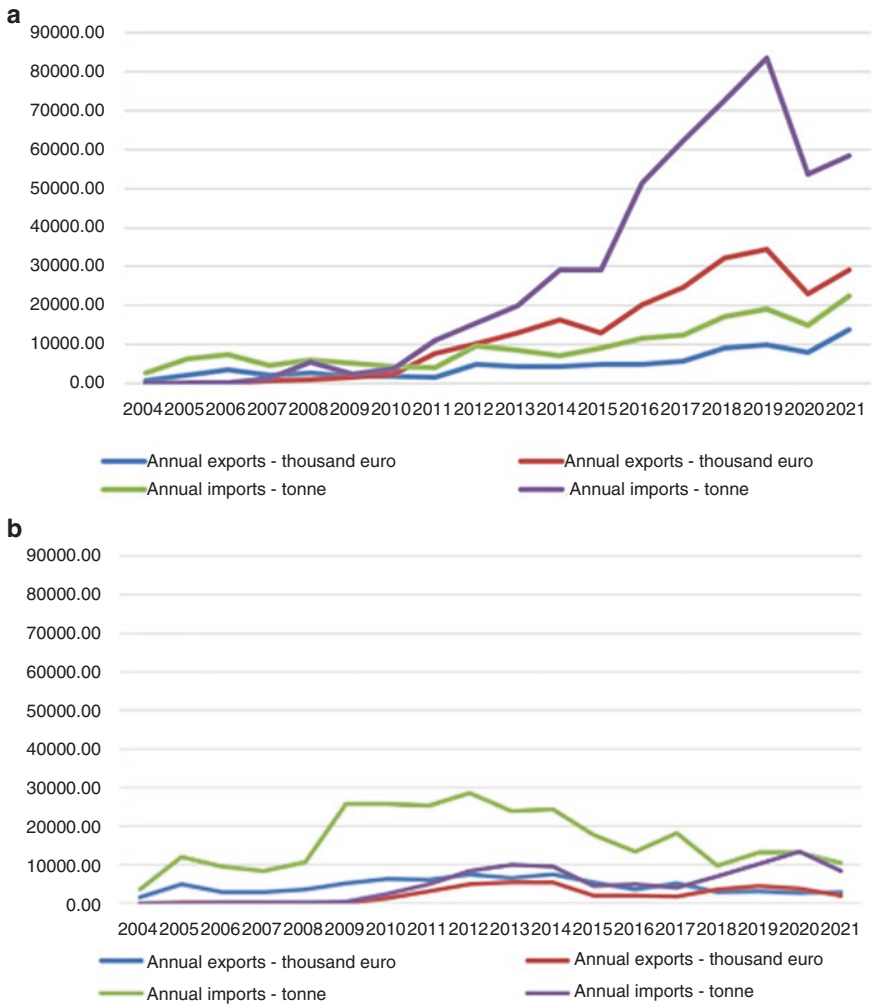

Fig. 3 (**a**) (upper panel). Evolution of annual imports and exports of plastic waste in Romania in relation to intra-EU countries between 2004 and 2021. (Source: Eurostat [ENV_WASTRDMP]); (**b**) (lower panel). Evolution of annual imports and exports of plastic waste in Romania in relation to non-EU countries between 2004 and 2021. (Source: Eurostat [ENV_WASTRDMP])

official institutions' reports and found in the Romanian press, as it will be emphasized in the next part of this section that stresses the improper situation of this country in regard to plastic waste trade and management.

Still, if comparing this country with the other EU member states, although the situation is expected to be different and more severe in terms of plastic waste imports from the intra-EU area, especially when considering the above observations, the figures show that Romania has almost similar problems to other EU countries, for example, Bulgaria, Greece, Slovakia, Croatia, etc. in 2021. Moreover, similar

circumstances appear to be met in their majority, the exception being made by Austria, Czechia, Luxembourg, Poland, Germany, Belgium, and the Netherlands. The figures seem to be even more complicated when analyzing plastic waste imports of EU member states from non-EU countries for the same year, with countries like Spain, Italy, Austria, Poland, Germany, Sweden, and the Netherlands as the greatest importers (see Fig. 4) (considering Eurostat Databases, 2021).

On the other hand, the EU countries that mostly export to non-EU space appear to be Spain, Belgium, Germany, and the Netherlands, differently from Romania which seems to be situated among the states with the lowest levels of exported plastic waste outside the EU area. Completing the perspective, France, Luxembourg, Belgium, Germany, the Netherlands, nearby Italy, Austria, Poland, and Sweden are the largest exporters of plastic waste to other countries of the EU.

Illegal Trade and Criminal Networks

Moving from the analysis of formal waste trade activities to the observation of some situations regarding illegal trade and criminal networks, it has to be mentioned that the informal waste business sector appears to be profitable as investigated by the Romanian mass-media. At the same time, the country struggles to divert waste from landfills under EU regulations on recycling and recovery operations. According to Romanian Border Police, the international illegal traffic of waste decreased from 14,286 tons in 2021 to 3994 tons in 2022 (Romanian Border Police, 2023). However, there is no data before 2021, and this fact suggests that the illegal waste trade started to gain more attention from authorities in the last years. There is an inter-institutional

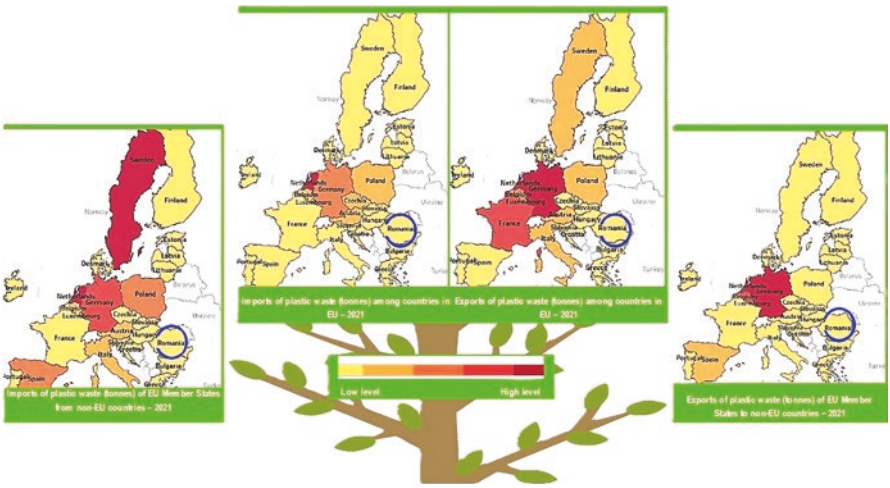

Fig. 4 The perspective of imports and exports of plastic waste in EU member states in 2021. (Source: Eurostat [ENV_WASTRDMP])

cooperation regarding waste shipments between the National Environmental Guard and the Border Police (terrestrial routes), or the Coast Guard in Constanta Port (maritime routes). In 2022, the most shipments were registered in the following border regions: Giurgiu (826), Oradea (272), Sighetu Marmației (169), Iași (41), and Timișoara (31), while the Coast Guard has requested environmental commissioners to inspect 215 shipments of waste (Ecologic, 2022).

Ferrous and copper waste are highly demanded in the informal recycling economy using both domestic and imported e-waste or end-of-life vehicle waste streams. This informal scrap network developed in the last years involves huge quantities of recyclable waste (ferrous and non-ferrous items in particular) that are outside the official records. This activity leads to the development of entire communities involved in waste recovering operations from ELVs or e-waste items. In such communities, the process of ELVs treatment is poorly performed on streets and in front of households using open burning and manual dismantling practices (Digi24, 2017).

The revenues obtained by organizations skip the official taxes and do not comply with environmental obligations. Through tax avoidance, the profitability of such activities increases, being also fed by the cheap labor from marginalized communities. On this background, some criminal organizations are born and proliferate on the backs of individuals under the poverty line and socially excluded (Digi24, 2021).

The Environmental Guard and the National Police have investigated several environmental crimes and revealed complex networks of criminal organizations (practicing tax avoidance, fake recycling and waste collectors, exploitation of individuals or children, etc.). Hotspots of environmental pollution associated with informal activities of waste recovery operations were detected in the proximity of Bucharest (the Romanian capital city) such as Sintesti village. In addition, the South of Romania is predisposed to a huge informal network of scrap metals dealing with ELV treatment in poor conditions in terms of safety and environmental conditions such as Sarulesti village (Calarasi County). Here, over 800 people are involved in the dismantling activities of ELVs in such deficient circumstances (Digi24, 2017). Used car parts are sold unregulated on the open market, car bodies reach Turkey, while copper and aluminum recovered from this source are further sold to the smelters in Slatina or Galați, where small factories specialized in the production of semiconductors function (Burla, 2021). Therefore, practices characterized by complex mechanisms of dark urban mining are established for both ELVs and e-waste flows in Romania which underpins the efforts for sustainable waste management transition in line with circular economy principles. After dismantling activities and sorting of recyclable items, the rest of the ELVs components with less economic value on the recycling market (e.g., seats, plastic items, and tires) are uncontrollably disposed of through open burning, burying, or illegal dumping in the natural environment (e.g., floodplains, water bodies, forest areas, wild dumps) as shown in Fig. 5a, b.

According to a report of INTERPOL (2019), illegal plastic waste was most prevalent in Europe in comparison to the other regions of the world. It is generally accepted that the most economically developed countries use to represent the net exporters of plastic waste (FundacióENT, 2021; Environmental Investigation Agency, 2021). Based on field checks performed by national authorities, some

Fig. 5 (**a**) (left panel). Plastic waste disposed from ELVs dismantling activities on Bistrita river floodplain with open burning activities (Roznov city, Neamt County Sept 2022) (Photo: FCM); (**b**) (right panel). Plastic waste disposed from ELVs dismantling activities on Bahlui river floodplain (Holboca commune, March 2021, Iasi County). (Photo: FCM)

examples of illegal plastics trade are revealed, as shown in Table 1. As also frequently noticed within the mass media, different crime structures put pressure on customs points from Romania for introducing more waste into the country. This happens in the context in which the storage costs from here are much lower if compared to the ones from other European countries (Pavalasc, 2021). Moreover, giving birth to an entire business, the number of illegal cases is constantly increasing. The most recent assessment of Europol (2022) in regard to this subject also validates the general ideas formed in the press about the EU criminal networks, that "are increasingly targeting Central and Eastern Europe to traffic illicit waste produced in Western Europe," with Romania included in the list of "key destinations" (EUROPOL, 2022). For instance, 7000 cubic meters of plastic waste imported from Italy is stored at Pata Rat (Cluj Napoca) landfill site to be burned into the pyrolysis station despite the fact that this facility is intended only for local waste (Niculescu, 2020). In addition, based on field checks performed by national authorities, other examples of illegal plastics trade are presented in the Table 1.

Nearby this high pressure from abroad, the general image in regard to national waste management is not more favorable in the context in which the separate collection proves to be ineffective, with a lack of solutions for sorting and treating waste. As it is constantly mentioned in public sources, there is a system-based problem, caused especially by the political leaders but also by businessmen and other different actors taking part even in European criminal networks (i.e., the one from Italy) and, consequently, in corruption.

Europol (2022) offers a clear explanation in regard to the manner in which these kinds of networks are involved in the global trafficking of plastic waste using legal businesses as cover, remembering "a common modus operandi," i.e., the reintroduction of contaminated plastics, but declared as clean, that arrive to be used plastics into the recovery processes. This manner of action hinders the detection of illegal actions on waste. Complicating more the context, public institutions engaged to resolve these situations are not able to cooperate, blocking and blaming each other.

Table 1 Examples of illegal plastic trade from Romanian borders according to the National Environment Guard, Coast Guard, and Border Police

Import route	Border passing	Plastic waste (t)	Period/date	Observations
Bulgaria	Giurgiu	31 t	March 30, 2021–May 30, 2021	Special campaign to monitor the illegal waste trade – PET bottles (93 transportations stopped) with destination at a recycling center from Buzau, nearby other 21 transportations stopped with plastic foils with destination at Afumati commune (Ilfov county)
Bulgaria	Giurgiu	18.26 t	September 21, 2021	Noncompliant documents with Regulation (EC) no. 1013/2006 on waste transfers
Bulgaria (Novi Iskar)	Chiscau (Calarasi)	14.4 t	May 04, 2022	PET bottles bailed and contaminated with paper, dust, oils
Germany	Bors II (Bihor County)	4.29 t	May 05, 2023	No legal documents
Greece	Giurgiu	11.5 t	June 28, 2021	Plastic waste with destination at Galati, noncompliant documents with Regulation (EC) no. 1013/2006 on waste transfers
Greece	Giurgiu	37 t	August 18, 2021	Noncompliant documents with Regulation (EC) no. 1013/2006 on waste transfers
Indonesia	Constanta Port	15.5 t	January, 2023	Synthetic textile waste of poor quality for recovering operations
Israel	Constanta Port	33 t	August 30, 2022	Polystyrene waste, noncompliant documents with Regulation (EC) no. 1013/2006 on waste transfers
Italy	Nadlac II (Arad county)	24 t	November 01, 2021	Plastic waste and used tires, noncompliant documents with Regulation (EC) no. 1013/2006 on waste transfers
Italy, Germany	Nadlac II (Arad county)	22.9 t	October 29, 2022	Plastic waste and used tires, noncompliant documents with Regulation (EC) no. 1013/2006 on waste transfers
Poland	Bors II (Bihor County)	24 t	October 18, 2022	No legal documents
United Kingdom	Constanta port	38 t	January 07, 2023	Two containers checked, noncompliant documents with Regulation (EC) no. 1013/2006 on waste transfers

Compilation by authors

For a more complete perspective in terms of total lack of public environmental awareness, there were reported cases in which even public institutions were practicing such illegal dumping or in which besides environmental campaigns officially launched, no pro-environmental activity was done (see Digi24, 2023).

Environmental Contamination Risks Related to Plastic Waste from Abroad

Plastic Leakage into the Natural Environment (Water and Land)

Plastic Pollution of Freshwater Bodies

Romania has a developed hydrographic network of rivers, lakes, and streams mainly fed by the Carpathian Mountains and with the Danube as the main fluvial collector system that develops a delta region before spilling into the Black Sea. Mountain rivers are prone to illegal dumping of plastic waste due to domestic waste management gaps in these regions and geographical restrictions of built-up environments. These lead to the direct dumping of waste in the watercourses in the proximity of households or behind the courtyards. Floodplains and riverbanks are often regarded as waste disposal sites in various geographical landscapes (mountain, hilly, lowland) as seen in the "Let's Do It Clean-up" events from past years or "Clean-up Romania" event organized in 2022 by the Ministry of Environment (Mihai & Ulman, 2022). This fact points out that environmental awareness and law enforcement must be improved in the following years. In detail, Romania is facing massive plastic pollution of freshwater bodies (rivers, streams, lakes) associated with inefficient source-separated waste collection schemes. Furthermore, wastewater flows are additional plastic and organic pollution sources without proper connection of urban and rural municipalities to sound sanitation and wastewater treatment facilities (Mihai et al., 2023).

On this background, the import of low-quality plastic materials that were refused by recycling companies will further feed the plastic leakage to freshwater bodies. Illegal dismantling activities of e-waste and end-of-life vehicles were observed on Bahlui and Bistrita floodplains as well (see Fig. 5a, b) where plastic materials were disposed of nearby river courses. The informal urban mining practices represent a lucrative sector as investigated by journalists (Pirca, 2022), but copper and ferrous materials are recovered to be sold on the recycling market. The plastic parts of these waste flows are undesirable items and they are either burned in backyards or disposed of on illegal dumping sites.

Land Pollution

Landfills and illegal dumping sites are the main waste disposal practices that contaminate the soil with plastics. Noncompliant landfills represent the norm in the last decades in Romania in the condition in which plastic waste tends to infiltrate into the soil and further into aquifers or reach nearby lands via wind (Pop et al., 2022; Ioana-Alina & Anca, 2019). Old rural dumpsites were closed by 2010, but field observations and clean-up events reveal that the illegal dumping of waste is a significant environmental problem in rural Romania. In such a context, PET bottles

should represent a particular environmental concern among postconsumer plastic materials despite the high recycling market demand. The uncollected plastic waste from rural regions related to low waste collection coverages has polluted the surrounding land in the last decades. Land pollution with illegal dumpsites is more visible in extra-Carpathian regions where areas are more densely populated compared to mountain regions (Mihai & Grozavu, 2019). Besides the inadequate waste disposal sites, plastic litter is another key pollution source for streets, roadsides, forest areas, or trekking routes. Agricultural practices such as plastic mulching or greenhouses and improper plastic packaging associated with pesticides could be other ways of soil contamination with plastics. These sources of plastic pollution are related to domestic activities, but the context is important when we examine the role of plastic waste importation from abroad as additional pressure on current plastic waste management systems in Romania.

If poor-quality mixed plastics are imported and, consequently, could not be further processed in sorting and recycling facilities, their disposal is likely to occur through landfills, cement factories, or illegal dumpsites. On the other hand, recycling companies such as GreenTech capture only 40% of PET bottles generated in Romania, the rest of 60% being imported (Ganea, 2021) due to low performances of separate collection schemes from urban and rural municipalities, while terrestrial and aquatic environments are polluted, as it has already been pointed out.

Plastic Waste Burned in Cement Factories and Air Pollution

Energy recovery based on combustible waste materials is seen as a better alternative to municipal/industrial landfills in the waste management hierarchy framework, as outlined by the cement business sector of Romania (CIROM, n.d.). The use of waste materials to reduce the demand for fossil fuels (e.g., coal, coke) is part of the co-incineration process in cement kilns. Used tires and nonrecyclable plastic materials are common waste materials prone to energy recovery processes. The mixed plastics refused by sorting stations and recycling companies are co-incinerated in cement factories. However, the co-incineration process poses further environmental risks that need to be properly monitored. Mixed unsorted plastics, contaminated plastic packaging with organic materials, or other chemical substances are either destined for landfills or co-incineration plants under the formal sector. The illegal trade of plastics with Romania as the final destination is also prone to unsound practices such as burying, burning, or open dumping practices, as revealed in section "Illegal trade and criminal networks". An investigation finalized with a video documentary entitled "Cement's Dirty Business" reveals the impact of waste combustion in cement industries, including plastics. The case involved international criminal networks (Italy-Germany-Romania), politicians, waste brokers, businesses, and authorities combined with legislative and environmental gaps (e.g., dioxins, furans) in the monitoring procedures while highlighting the high level of pollution generated in Chiscadaga village, where a cement factory is operating (RiseProject, 2019).

On the other hand, the cement business advocates for the co-incineration of nonrecyclable waste (including plastics and used tires) claiming that emissions such as dioxins and furans are negligible and below legal limits, while there are no residual materials since the ash is used as substitutive material for clinker production (CIROM, n.d.).

Therefore, independent monitoring (e.g., environmental authorities) of various emissions and dust from cement factories and surroundings should be mandatory and transparent by law, while improvement of combustible waste flows traceability is required on both domestic and imported sources. Besides the legislative framework, independent logistics (state of art monitoring equipment and laboratories) and human resources (specialized personnel of the Environmental Guard) are critical to reducing the environmental threats associated with plastic waste trade, illegal traffic, and combustion in cement factories.

However, the cement business sector claimed that the scale of imported waste was reduced in previous years (around 2% of total waste) and, in 2021, all co-processed waste in cement factories was generated in Romania (CIROM, n.d.). Still, the poor quality of domestic source-separated plastic waste stream leads to large amounts of plastics collected that are not proper for recycling activities feeding less circular activities (co-incineration) or even to their disposal in landfills, following the traditional linear pathway.

Mitigation Strategies of Illegal Plastic Trade and Environmental Contamination

Legislative Framework at EU and National Levels

One of the most important pillars of mitigating illegal plastic trade and environmental contamination is represented by the global, international, national, and/or regional legislative framework, supposed to function based on systemic thinking.

At the international level, the United Nations Sustainable Development Goals (SDGs), through Goal 14: Life below water, specifically address the problem of plastic use, emphasizing that "usage and wrong disposal of plastic is a major cause of marine pollution," while organizing cleanup projects for rivers and oceans with the involvement of the whole local community is a clear and direct recommendation in this regard. In addition, contributing to Goal 12 and Goal 13 achievements might aid the curbing of plastic waste generation, besides additional improvements to other SDGs. Other important global initiatives with great soundness around the world were the ones of the United Nations Environment Programme (UNEP), i.e., the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (adopted in 1989 and coming into force in 1992, with nearly universal membership, and amended in 2019 to support more the management of plastic waste, with changes becoming effective from 2021) or the Global

Partnership on Marine Litter (launched during the UN Conference on Sustainable Development, June 2012), bringing together the actors implied in marine litter and plastic pollution prevention and reduction. Other examples could be the Stockholm Convention, the United Nations Convention on the Law of the Sea, the G20 Action Plan on Marine Litter, or the UNEP Global Plan of Action for the Protection of the Marine Environment from Land-Based Activities. All these initiatives include directions for reducing plastic use through the improvement of waste management while promoting sustainable production and consumption.

Aware of the fact that "voluntary initiatives alone will not be enough" (UNEP, 2022), an entire list of complementary efforts is present or is planned to be added in the endeavor of fighting against massive plastic accumulation and environmental contamination. The most important one is announced to be a global agreement on plastic pollution under Ellen MacArthur Foundation/UNEP Global Commitments for Plastics. It aims to address the full life cycle of plastics and protect human health and nature while focusing especially on countries most in need (Smit et al., 2021). Besides this large initiative, others came to support and complement the national reporting that, in some cases, seems to be at a very low level, including the National Guidance for Plastic Pollution Hotspotting and Shaping Action (IUCN, UNEP, and the Life Cycle Initiative); the Minderoo Foundation Plastic Waste Makers Index; Guidelines for the Monitoring and Assessment of Plastic Litter in the Ocean (developed by Group of Experts on the Scientific Aspects of Marine Environmental Protection); the Back to Blue Plastics Management Index (Economist Impact and Nippon Foundation); or UNEP's Global Tourism Plastics Initiative (GTPI) (UNEP, 2022).

Proceeding to the European Union (EU) level, closely linked to the international movements in regard to plastic reduction, several regulations addressing it could be observed. Among them, the EU plastics strategy (2018), the Directive on single-use plastics (2019), New Circular Economy Action Plan (2020), the Proposal for a revision of EU legislation on Packaging and Packaging Waste (2022b), or Waste Framework Directive revision (expected in 2023) (EC, 2022a, b) seem to be the most important current initiatives of mitigating illegal plastic trade and/or environmental contamination while establishing the main steps in regard to future directions for reducing the plastic quantity arrived in the nature be it legally or not, but also for diminishing the whole quantity of plastic produced and used. Observing the approach of policies and rules coordination in the EU, as mentioned by the European Commission (2022a, b), the administrative details in terms of requirements are managed by the member states, and only preventions of market distortions or obstacles to free movement are taken into account and regulated at the EU level. For instance, aiming at removing the barriers in the case of different partnerships across EU states, the harmonized rules in regard to extended producer responsibility, packaging collection, deposit and return schemes, or reuse systems are seen as necessary establishments both for the achievement of environmental targets and for offering the same conditions for businesses from these specific markets (EC, 2022a, b).

Being promoted as "the best place to lead the transition to the plastics of the future" (EC, 2018), the foundations of a new plastics economy established in 2018

as an ambitious set of EU measures are continuously completed (EC, 2018). One filling in this regard appears to be the Directive of single-use plastics, entering into force in 2019 and establishing that single-use plastic (SUP) products cannot be placed on the market in the context in which different alternatives do exist, or taking measures for reducing the consumption of certain SUPs for which there is no alternative. The objective of informing consumers and encouraging responsible consumer behavior in order to reduce litter from different specific products while increasing the level of awareness among them in regard to, for example, reusable alternative products is also pointed out here. In the same way, considering the perspectives of the European Green Deal (EC, 2019) and the Circular Economy Action Plan (EC, 2020) in regard to products, the entire life cycle of packaging, reducing plastic litter, and improving recycling are targeted, complementing the European Strategy for Plastics in a Circular Economy (EC, 2018).

Adding up to this legal perspective, the protection of the environment through criminal law should not be neglected. In this sense, in the context in which environmental crime is found to be the fourth largest criminal activity in the world (according to Interpol and UNEP), with a rapid annual growth rate, the real need to strengthen the legal framework appears to be clear. It determined a reaction within the European Commission that proposed a new Directive on environmental crime in 2021. This aims to better define criminal offenses related to the environment like illegal trafficking in waste, pollution crimes, or illegal trading with hazardous substances considered to be among the most serious ones (EC, 2021). In addition, it focuses on new sanctions besides the classical ones (prison sentences and fines) like withdrawal of permits, disqualifications, and exclusion from access to public funding, potentially more effective than the first ones (EC, 2021).

As in all EU countries, in Romania, the legislative framework for plastic waste is primarily based on EU regulations and directives. Being transposed into national legislation, some of the key regulations and directives addressing plastic waste in this country were already mentioned when the EU framework was discussed. For instance, the Single Use Plastics (SUP) Directive, transposed into Romanian law in 2021 and setting out measures to reduce the environmental pressure of single-use plastic products, imposes bans on certain products, such as plastic cutlery and plates, straws, and stirrers, nearby specific requirements to reduce the consumption of others (EEA, 2022). In the same way, the Waste Framework Directive and the Packaging Waste Directive were transposed into national law that establishes the legal framework for waste management in Romania, while also including provisions for the management of plastic waste. Completing the legal framework, different decisions are taken from time to time in order to improve the manner in which the environment is protected in regard to waste. For instance, at the end of 2020, considering the fact that the quantities of imported waste have to be correlated with the recycling capacity of the existing companies, Romania has limited the number of border crossing points through which recyclable waste comes into the country while also adopting a decision to combat the illegal import of waste, as shown in Table 2.

Table 2 Legal provisions adopted in the waste area in Romania in the period between 2021 and 2022

New legal provisions (2021–2022)	Issuer	Main legal issues
ORDER no. 1647 from June 10, 2022	Ministry of Environment, Water and Forests	Methodological norms regarding the controls of waste transfers
ORDER no. 1736 from June 28, 2022	Ministry of Environment, Water and Forests	Registration, reporting, and declaration procedure for economic operators that bring waste into the country with aim of reutilization/ recovering
ORDER no. 831/49 from April 29, 2022	Ministry of Environment, Water and Forests, no. 831 from April 8, 2022/Ministry of Internal Affairs, no. 49, April 19 from 2022	Establishing the single cross-border points of waste shipment or second-hand goods
Government Decision no. 1265 from December 17, 2021	Romanian Government	Supervision and control of waste transfers while taking into account the need to conserve, protect, and improve the quality of the environment and human health
Government Emergency Ordinance no. 92 from August 19, 2021	Romanian Government	Aligning the national legislation with European objectives in waste regime in order to contribute to the transition to a circular economy
Law no. 268 from November 9, 2021	Romanian Parliament	Establishing the Romanian Customs Authority, as a specialized body of the central public administration in the customs field

In this national endeavor of strengthening the legal framework for improving waste management across the country, including concerns like waste transfers within Romania, but also cross-border ones, new legal provisions were adopted (see Table 2). In addition, others are proposed and/or in the course of being adopted. For instance, Government Emergency Order no. 125 from September 16, 2022, with its main aim of modifying and completing the old Government Emergency no. 196 from December 30, 2005, regarding the Environmental Fund, is following at the moment the necessary steps for its adoption and, accordingly, it is still under discussion. All of these provisions imply certain repercussions that the policymakers should carefully analyze and consider when opting for law changes. In regard to this new proposal, there is an entire debate within the press (see, e.g., Economica.net, 2023) regarding its potential impact if it arrives to be adopted in the actual proposed form. Among its potential effects, negative consequences on final consumers like higher prices for products on the shelf because of the artificially increased costs for managing packaging waste are also emphasized.

In addition, a national circular economy strategy has been published, establishing ambitious targets such as recycling 55% of total municipal waste by 2025 and 60% by 2023 and recycling 50% of waste generated through plastic packaging by

2025 and 55% by 2030 in line with EU regulations (Romanian Ministry of Environment, Water and Forests, 2022). In this document, reference is made to the EU Directive 2019/904 regarding the imposed utilization of recycled materials in plastic packaging, being necessary to regulate the right of first refusal on the secondary recycled materials of the companies that comply with the Extended Producer Responsibility (REP). Outside the scope of the European Plastic Waste Directive, in this national document, the introduction of some bans on the sale of certain plastic materials and, accordingly, the usage increasing in terms of more sustainable alternatives, extending or introducing mandatory BPA criteria for plastic products, are pointed out (Romanian Ministry of Environment, Water and Forests, 2022).

In addition, the deposit-refund system (DRS) in the case of nonreusable primary packaging has been introduced in the Romanian context, with the legal framework for its implementation in the entire country being established in 2022 (Romanian Government, 2022).

Law Enforcement and Monitoring

Despite the entire effort made in the last years, as also shown in the precedent sections, the statistics reveal that, unfortunately, plastic pollution is continuously increasing (OECD, 2022). Proper enforcement should be one step forward in making regulations more effective.

The enforcement and monitoring of plastic laws in the EU are primarily the responsibility of the member states, who are required to transpose EU directives and regulations into national law and ensure their effective implementation. The European Commission checks the transposition of EU Directives into national law, assists member states in correctly implementing them, monitors their implementation, and legally takes action against member states that fail to comply. Such penalties in regard to the manner in which the national measures are implemented for accomplishing the requirements of the Waste Framework Directive should follow the desideratum of effectiveness and proportionality while embracing the role of a kind of beneficial barrier, deterring the misconduct. For offering an example in this respect, the attention is drawn to the EU notification C (2021)/2137 about the lack of fulfilment of the obligation to communicate the transposition measures into the national legislation of the Directive (EU) 2018/851 while emphasizing on the financial sanctions that might be imposed to Romania. This warning led to the publication of Government Emergency Ordinance no. 92/2021 regarding the waste regime for aligning the national legislation with European objectives in this area and, consequently, for contributing to the transition to a circular economy.

Considering that the design and application of penalties represent a matter for member states, governments detain the specific role of strengthening regulations and enforcing mechanisms to deter and penalize illegal plastic trade and environmental contamination, increasing fines, imposing prison sentences, and/or confiscating illegal plastic shipments. For instance, in Romania, environmental crimes

such as burying and burning waste are punishable by 3–5 years in prison; in the same way, the penalties for dumping waste were increased (EEA, 2022). Working for observing the way of complying with plastic laws and regulations in the case of organizations and citizens, several key actors are engaged, such as regulatory bodies, law enforcement agencies, and environmental organizations. In general, member state bodies act as regulatory authorities in relation to matters covered by EU law. The same role is played by the EU bodies but in relation to various centralized EU environmental regimes (Coxall & Souter, 2021).

Given the fact that the manner in which plastic laws are enforced and monitored is mainly the responsibility of the member states. According to Guillot (2022), the chances of success are highly dependent on the EU countries' willingness to cooperate. Although agencies like Europol, Eurojust, and the EU Anti-Fraud Office (OLAF) are able to play a significant role in this regard, their involvement is possible only in the situation in which a country reports a crime and asks for assistance Guillot (2022).

One influential instrument for law enforcement and monitoring should be accurate data on environmental crime. However, since the member states do not have a single body with the function of central coordinating all data on environmental illegalities, a lack of comprehensive and comparable statistical data in this regard has been identified and emphasized as an obstacle in combating environmental crime in the EU (Smit et al., 2021). For instance, in an EU report analyzing the assessment of statistical data collection for environmental crime, Romania is given as a negative example of a country in which no statistics in this respect are collected by the National statistical institute (Smit et al., 2021).

Another essential tool for enforcing the international and national legal framework should be environmental awareness campaigns and education. In regard to appropriate education regarding environment and sustainable development, including circular economy and plastic pollution, the United Nations Economic Commission for Europe (2021), in their country report dedicated to Romania and to its national environmental performance, mentioned that the formal education system integrates them somehow mainly through the optional curriculum, civic education, and extracurricular activities, as well as in several subjects of the compulsory curriculum. Besides other issues like global warming, human rights, or renewable energies, including at the initiative of individual teachers and responding to rising interest among students, plastic pollution is also pointed out (Gherhes et al., 2022). Still, it is clearly emphasized that a systematic approach to developing, promoting, and implementing environmental education in the national education system is lacking.

Improvement of Domestic Plastic Waste Management by Circular Economy

Romania is still a landfill-based country (Mihai, 2021) and, potentially interlinking, registers vulnerability in regard to the openness of its citizens to circular initiatives such as product repair, plastic material, and single-use packaging avoidance or separate collection of waste (Romanian Ministry of Environment, Water and Forests, 2022). Along with these facts denoting the citizens' and local authorities' behavioral patterns and awareness, other significant barriers in the Romanian context are regarding institutional challenge to develop a policy for a complex cross-sectoral issue; market barriers for recycled products; companies' ability to grasp opportunities; and good indicators and targets (EEA, 2022). As a clear effect, besides other contextual causes, Romania is among the EU countries registering the lowest performances in regard to waste management, especially in the matter of waste generation related to economic activity (GDP), waste treatment, and use of recycled materials in the economy (Romanian Ministry of Environment, Water and Forests, 2022).

Taking into account the peculiarities of this national context, some specific ways for improving the capture of domestic plastic waste through integrating and following a circular economy approach have to be considered. In the proposed Action Plan for Implementing Circular Economy in Romania (Romanian Ministry of Environment, Water and Forests, 2023), certain ways are indicated. They focus especially on increasing the rates of separate collection and waste recycling through the enforcement of pay-as-you-throw system and through the development of an adequate infrastructure for waste collection (i.e., adequate collection systems, sorting and processing facilities, and markets for recycled materials). Other directions of action mentioned in this strategic document are the ones in regard to pro-environmental education among Romanian citizens through awareness campaigns in terms of circular economy with a focus, especially on separate collection, waste reduction, or illegal dumping. Innovation and collaboration are also put into discussion, and aspects like available data basis and waste management systems need to be improved through research and development in the area of the circular economy.

In addition, strengthening the domestic plastic waste capture might be assured through other ways such as extended producer responsibility, designing products for better reutilization, refurbishment, recycling, and implementing take-back programs as a responsible approach for the entire life cycle of their products. Likewise, deposit return schemes and waste banks might be among the alternatives fostering improvements in waste management from the level of households. In addition, development projects like the ones supported by the Recovery and resilience plan for Romania (Ministry of European Investments and Projects, 2021) could be of real help. For instance, a recent call is for projects aiming at financing digital ecological islands that could represent a means for the improvement of domestic plastic waste capture.

Among them, as mentioned in one previous section, the deposit-refund system (DRS) in the case of nonreusable primary packaging has been introduced in the Romanian context (Romanian Government, 2022). Being closely linked to the extended producer responsibility (EPR) principle in waste management, DRS seems to represent a potentially promising way to solve the problem of SUP (Walls, 2011). Collecting the plastic bottles that have to be brought back to the shop or collection point (instead of the amount of money paid in the moment of buying and included in the final price of that product bought) appears to be a more realistic manner of action, especially in regard to consumer behavior patterns, frequently considered across the literature as a barrier in this process of pro-environmental change. At the same time, through the higher possibility of increasing the recycling rates and offering more qualitative recycled material, it might be an efficient way to facilitate the activity of companies using in their production such recycled plastic while reducing imports of such material (see, e.g., the case of Green Tech, one of the most important plastic recyclers in Europe, a top producer of PET flakes, R-PET, and PET strap and the company which paved the way of the recycling market in Romania). Besides these benefits, other economic and environmental ones could be pointed out such as cost reduction for collection systems and landfill operations or more employment than other waste management options (Millette et al., 2022; Hogg et al., 2011). Accordingly, it is expected that, once it begins to be effectively implemented in Romania, just like it happened in other cases, the deposit-refund system (DRS) to enforce the entire range of (both international and national) initiatives for improving the plastic waste management in these national countries.

Conclusions

The poor-quality plastic surplus from abroad (EU and non-EU countries) destined for recycling plants or cement factories increase the environmental contamination risks of the natural environment in Romania. This country is a key destination and transition route for legal and illegal plastic waste trade (e.g., packaging materials, textile waste, used tires, plastics contaminated with other municipal solid waste fractions, or e-waste plastics). The main point of access is Constanta port followed by terrestrial routes particularly from the West (border with Hungary) and the South (border with Bulgaria) parts of the country. Recovering scrap metal from ELVs or e-waste is a prosperous activity in Romania that engages both the formal and informal sectors including waste importation from aboard. The informal sector relies on recovering scrap metals (ferrous items, copper) resulting from unsound dismantling activities that are further sold to recycling companies. The plastic components of ELVs and e-waste streams have no recycling value on current markets, and these are uncontrollably disposed to natural environments polluting water-air-land nexus via illegal activities (open dumping, burying, open burning) or end up in landfills under formal channels. Some legal incentives are implemented to better check and moni-

tor the transboundary movement of waste, but Romania is still exposed to illegal traffic of plastic waste from the EU and overseas.

In such a context, an intensive plastic waste trade in Romania was shown to be linked especially to the European Union space. Moreover, the official statistics revealed a high level of imported plastic waste. One explanation could be the fact that this country fails in offering the necessary quantity of plastic used in its current recycling activities. This is why a more efficient domestic collection system, along with a stronger general environmental awareness among citizens and a better law enforcement, is a need in the national context. Complicating it more and moving the discussion to illegal waste trade and criminal networks, frequent cases reveal that the pressure on the customs points for introducing more waste, including plastics, does exist, being also amplified by the lower storage costs.

Bringing this entire image to attention, besides the various complex measures implemented across the European Union area in regard to plastic waste, the failure of offering a proper/fair trade context might be overseen. The presence and frequency of illegal waste trade and criminal networks denote systemic problems like lack of legality, transparency, equality, and, as a whole, integrity at the national, but also EU levels.

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References

Andrei, L., Negulescu, M. H., & Luca, O. (2022). Premises for the future deployment of automated and connected transport in Romania considering citizens' perceptions and attitudes towards automated vehicles. *Energies, 15*(5), 1698.

BAN. (2021). *After China ban, Romania hit by illegal waste imports*. Available at https://www.ban.org/news/2021/4/28/after-china-ban-romania-hit-by-illegal-waste-imports. Accessed on 3 Nov 2021.

Bănică, A., Eva, M., & Iațu, C. (2019). Perceptions of green and smart urban transport issues in Romanian cities: A preliminary exploratory analysis. *Territorial Identity and Development, 4*(2), 58–75.

Bunding-Venter, C., Silimela, Y. T., & Oe, N. (2022). *Solid waste management deep dive: Bulgaria, Croatia, Poland and Romania-sustainable cities implementation framework*. https://policycommons.net/artifacts/2363856/solid-waste-management-deep-dive/3384827/

Burla, V. (2021). *Dezmembrările de mașini, o afacere prosperă care poluează enorm.* https://Romania.europalibera.org/a/poluarea-dindezmembrareamasinilor/31553536.html?fbclid=IwAR2K2kx_QVY-TQm2w6V9Zqe6DbUl52E6Kw754xVMXkUFjE_X9gvIEZx8IMA. Accessed on 6 Mar 2023.

CIROM. (n.d.). *Co-processing waste in cement industry*. Available at https://cirom.ro/industria-cimentului-deseurile-care-nu-pot-fi-reciclate-prin-procesele-de-reciclare-existente-devin-o-resursa-alternativa-in-productia-de-ciment-si-salveaza-mii-de-tone-de-combustibil-fosil-si-resurs

Cojocaru, B. (2013). *Why Romania is covered by PET bottles and Romania is still importing plastic waste*. Available at https://www.zfcorporate.ro/energie/de-ce-este-romania-acoperita-

de-pet-uri-si-totusi-am-ajuns-sa-importam-deseuri-din-plastic-10874974. Accessed on 17 Mar 2023.

Coxall, M., & Souter, K. (2021). *Environmental law and practice in the European Union: Overview*. Thomson Reuters Practical Law. Available at https://uk.practicallaw.thomsonreuters.com/w-027-3735?transitionType=Default&contextData=(sc.Default)

DIGI24. (2017). *Săruleşti, the "country" of scrap metal sellers*. Available at https://www.digi24.ro/stiri/actualitate/social/sarulesti-tara-vanzatorilor-de-fier-vechi-unde-doarjandarmiii-se-incumeta-sa-intre-808524. Accessed on 23 Feb 2023.

Digi24. (2021). *The terrible scheme of burning in Sinteşti*. Chief of the Environmental Guard: People are enslaved on dumpsites, there are thousands of children (27.03.2021). Available at https://www.digi24.ro/stiri/actualitate/teribila-schema-a-arderilor-de-la-sintesti-seful-garzii-de-mediu-oamenii-sunt-sclavi-pe-plantatii-de-deseuri-sunt-mii-de-copii-1475281. Accessed on 17 Mar 2023.

Digi24. (2023). *Gunoaiele Europei la porţile României. Aproape 3.800 de tone au fost oprite la frontier*. Available at https://www.digi24.ro/stiri/actualitate/gunoaiele-europei-la-portile-romaniei-aproape-3-800-de-tone-au-fost-oprite-la-frontiere-2201561?fbclid=IwAR3JoTvj_vORZYxCSkavuscNOajwwPOOseTvEEFzQ4CZTrz_BZSENbEH8J8. Accessed on 01 Jan 2023.

Directive (EU) 2019/904 of the European Parliament and of the Council. (2019, June 5). *Official Journal of the European Union*. Available at https://eur-lex.europa.eu/eli/dir/2019/904/oj

Dobre-Baron, O., Nițescu, A., Niță, D., & Mitran, C. (2022). Romania's perspectives on the transition to the circular economy in an EU context. *Sustainability, 14*, 5324. https://doi.org/10.3390/su14095324

Dodd, M., Amponsah, L. O., Grundy, S., & Darko, G. (2023). Human health risk associated with metal exposure at Agbogbloshie e-waste site and the surrounding neighbourhood in Accra, Ghana. *Environmental Geochemistry and Health*, 1–17.

EC. (2018). A *European strategy for plastics in a circular economy*. Brussels, 16.1.2018, COM(2018) 28 final. Available at https://ec.europa.eu/environment/circular-economy/pdf/plastics-strategy.pdf

EC. (2019). *The European Green Deal*. Brussels, 11.12.2019, COM(2019) 640 final. [pdf]. Available at https://eur-lex.europa.eu/resource.html?uri=cellar:b828d165-1c22-11ea-8c1f-01aa75ed71a1.0002.02/DOC_1&format=PDF

EC. (2020). *A new circular economy action plan for a cleaner and more competitive Europe*. Available at https://environment.ec.europa.eu/strategy/circular-economy-action-plan_en

EC. (2021). *Proposal for a Directive of the European Parliament and of the Council on the protection of the environment through criminal law and replacing Directive 2008/99/EC*. Brussels, 15.12.2021, COM(2021) 851 final, 2021/0422 (COD). Available at https://commission.europa.eu/system/files/2021-12/1_1_179760_prop_dir_env_en.pdf

EC. (2022a). *Environmental impact of waste management – Revision of EU waste framework*. Available at https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/13225-Environmental-impact-of-waste-management-revision-of-EU-waste-framework_en

EC. (2022b). *Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on packaging and packaging waste, amending Regulation (EU) 2019/1020 and Directive (EU) 2019/904, and repealing Directive 94/62/EC*.

Ecologic. (2022). *The number of illegal waste shipments is reduced more reduced in 2022*. Available at https://ecologic.rec.ro/in-2022-s-a-redus-numarul-transporturilor-ilegale-de-deseuri/. Accessed on 20 Apr 2023.

Economica.net. (2023). *Exportul de ambalaje folosite devine un posibil motiv de scumpiri generalizate la raft*. Asociația OIREP AMBALAJE: O decizie a deputaților aruncă în aer întreaga piață a deșeurilor de ambalaje. Available at https://www.economica.net/exportul-de-ambalaje-folosite-devine-un-posibil-motiv-de-scumpiri-generalizate-la-raft-asociatia-oirep-ambalaje-o-decizie-a-deputatilor-arunca-in-aer-intreaga-piata-a-deseurilor-de-ambalaje666896_666896.html?fbclid=IwAR0LR3KIQCPwRXULAd0Rn5LKmiGe4rrkylvrlFa1sfbzFE9nZRru_EVJgfk

EEA. (2022). *Circular economy country profile – Romania*. ETC CE Report 2022/5 – Romania. Available at https://www.eionet.europa.eu/etcs/etc-ce/products/etc-ce-products/etc-ce-report-5-2022-country-profiles-on-circular-economy/romania-ce-country-profile-2022_for-publication.pdf

Environmental Investigation Agency. (2021). *The truth behind trash. The scale and impact of the international trade in plastic waste.* Environmental Investigation Agency. Available at https://eia-international.org/wp-content/uploads/EIA-The-Truth-Behind-Trash-FINAL.pdf

EU. (2018). Directive (EU) 2018/851 of the European Parliament and of the Council of 30 May 2018 Amending Directive 2008/98/EC on waste. *Official Journal, L150*, 109–114. Available at https://eur-lex.europa.eu/legalcontent/EN/TXT/?uri=CELEX:32018L0851

Euroactiv. (2020). *Activists concerned over increase in waste smuggling in Romania*. Available at https://www.euractiv.com/section/energy-environment/news/activists-concerned-over-increase-in-waste-smuggling-in-romania/

EUROPOL. (2022). *ENVIRONMENTAL CRIME threat assessment 2022 in the age of climate change*. Available at https://www.europol.europa.eu/cms/sites/default/files/documents/Environmental%20Crime%20in%20the%20Age%20of%20Climate%20Change%20-%20Public%20report_5.pdf

Eurostat Databases. (2004-2021). *Trade in waste by type of material and partner*. Available at https://rethinkplasticalliance.eu/wp-content/uploads/2021/11/RPa-ZWE-Illegal-plastic-shipments-Spain-report-1-1.pdf

FundacióENT. (2021). *Understanding illegal plastic waste shipments: A focus on Spain*. Report of Rethink Plastic alliance. Available at https://rethinkplasticalliance.eu/wp-content/uploads/2021/11/RPa-ZWE-Illegal-plastic-shipments-Spain-report-1-1.pdf

Ganea, M. (2021). *Waste recycling in Romania by Green Group*. Available at https://zin.ro/20/04/2021/mediu/romania-reciclare-deseuri-green-group-green-tech-green-fiber-green-management-constantin-damov/ Accessed on 6 Apr 2023.

Gherheș, V., Fărcașiu, M. A., & Para, I. (2022). Environmental problems: An analysis of students' perceptions towards selective waste collection. *Frontiers in Psychology, 12*, 6346.

Guillot, L. (2022). *Europe's dirty problem: Environmental crime*. Politico Pro. Available at Europe's dirty problem: Environmental crime – POLITICO.

Hogg, D., Fletcher, D., Eye, M., Mulcahy, K., & Elliott, T. (2011). *From waste to work: The potential for a deposit refund system to create jobs in the UK*. Eunomia Research & Consulting Ltd.

INTERPOL. (2019). *INTERPOL KEY FINDINGS REPORT: OPERATION 30 DAYS AT SEA 2.0 (2019)*. Note by the General Secretariat of the International Criminal Police Organization-INTERPOL.

Ioana-Alina, C., & Anca, M. (2019, September). Closure solutions for a non-compliant landfill: Case study from Parța non-compliant landfill, Timiș County, Romania. *IOP Conference Series: Materials Science and Engineering, 603*(4), 042009. IOP Publishing.

Jigani, A. I., Delcea, C., & Ioanăș, C. (2020). Consumers' behavior in selective waste collection: A case study regarding the determinants from Romania. *Sustainability, 12*(16), 6527.

McNeish, J. E., & Neufeldt, J. (2023). Can Nestlé transform from a corporation that 'talks about doing good' to 'doing good' for the environment? In *Dealing with socially responsible consumers: Studies in marketing* (pp. 429–456). Springer Nature Singapore.

Mihai, F.-C. (2018). Rural plastic emissions into the largest mountain lake of the Eastern Carpathians. *Royal Society Open Science, 5*(5), 172396. Available at https://doi.org/10.1098/rsos.172396

Mihai, F.-C. (2019). Construction and demolition waste in Romania: The route from illegal dumping to building materials. *Sustainability, 119*(11), 3179. Available at https://doi.org/10.3390/su11113179.

Mihai, F.-C. (2021, November). Waste management challenges in Romania during the COVID-19 pandemic. In *Waste-to-resources 2021: 9th international symposium circular economy, MBT, MRF and recycling* (p. 335). Cuvillier Verlag.

Mihai, F.-C., & Grozavu, A. (2019). Role of waste collection efficiency in providing a cleaner rural environment. *Sustainability, 11*(23), 6855. https://doi.org/10.3390/su11236855

Mihai, F.-C., & Ulman, S.-R. (2022). Post-consumer plastic waste pollution under linear economy mechanisms in Romania. In *9th SWS international scientific conferences on SOCIAL SCIENCES-ISCSS 2022*. Available at https://doi.org/10.35603/sws.iscss.2022/s15.129

Mihai, F.-C., & Ulman, S.-R. (2023). Circular economy in Green Deal strategies. In *Sustainable and circular management of resources and waste towards a Green Deal* (pp. 49–63) Elsevier. Available at https://doi.org/10.1016/b978-0-323-95278-1.00029-2

Mihai, F.-C., Gnoni, M. G., Meidiana, C., Schneider, P., Ezeah, C., & Elia, V. (2022a). A global outlook on the implementation of the Basel Convention and the Transboundary Movement of E-waste. In *Paradigm shift in E-waste management* (pp. 49–75). CRC Press. Available at https://doi.org/10.1201/9781003095972-4

Mihai, F.-C., Gündoğdu, S., Markley, L. A., Olivelli, A., Khan, F. R., Gwinnett, C., Gutberlet, J., Reyna-Bensusan, N., Llanquileo-Melgarejo, P., Meidiana, C., Elagroudy, S., Ishchenko, V., Penney, S., Lenkiewicz, Z., & Molinos-Senante, M. (2022b). Plastic pollution, waste management issues, and circular economy opportunities in rural communities. *Sustainability, 14*, 20. Available at https://doi.org/10.3390/su14010020

Mihai, F.-C., Minea, I., & Ulman, S.-R. (2023). Water resources preservation through circular economy. The case of Romania. In *Water management and circular economy*. 143–176, Elsevier, https://doi.org/10.1016/B978-0-323-95280-4.00002-3

Mihai, F.-C., Meidiana, C., Elagroudy, S., Ulman, S.-R., Gutberlet, J., & Carvalho, C. (2024). Plastic waste management for zero waste to landfills: potential, challenges, and opportunities. In Bhat, R. A., Dar, G. H., & Hajam, Y. A. (Eds), *Zero waste management technologies: Advanced transformations for resource development and environmental protection*, Springer Nature Switzerland AG. (in press)

Millette, S., et al. (2022). *Global deposit book. An overview of deposit return Systems for single-use beverage containers. Reloop – Resources remain resources*. Available at https://www.reloop-platform.org/wp-content/uploads/2022/11/RELOOP_Global_Deposit_Book_11I2022_P1.pdf

Ministry of Environment. (2022). *Circular economy strategy*. available at http://www.mmediu.ro/app/webroot/uploads/files/Strategia%20Nationala%20privind%20Economia%20Circulara%20-%20var%20finala.pdf

Ministry of Environment, Water and Forests. (2022a). ORDER no. 1647 from June 10, 2022. Available at https://legislatie.just.ro/Public/DetaliiDocument/256826

Ministry of Environment, Water and Forests. (2022b). ORDER no. 1736 from June 28, 2022. Available at https://legislatie.just.ro/Public/DetaliiDocumentAfis/256828

Ministry of Environment, Water and Forests. (2022c). ORDER no. 831/49 from April 29, 2022. Available at https://lege5.ro/gratuit/geytcmzygqydm/ordinul-nr-831-49-2022-privind-stabilirea-punctelor-de-trecere-a-frontierei-de-stat-pentru-transferurile-de-deseuri-si-marfuri-bunuri-secondhand

Ministry of European Investments and Projects. (2021). *National recovery and resilience plan.* Available at https://mfe.gov.ro/pnrr/

Ministry of the Environment, Japan. (2021). *G20 report on actions against marine plastic litter. Third information sharing based on the G20 implementation framework.* Available at https://g20mpl.org/wp-content/uploads/2021/07/G20MPL-report-2021_final-edition1119.pdf

Modoi, O.-C., & Mihai, F.-C. (2022). E-waste and end-of-life vehicles management and circular economy initiatives in Romania. *Energies, 15*, 1120. Available at https://doi.org/10.3390/en15031120

Modoi, C., Dascăl, D., Roba, C., & Bălc, R. (2022). On the importance of public views regarding the environmental impact of plastic pollution in Cluj County, Romania. *International Multidisciplinary Scientific GeoConference: SGEM, 22*(4.2), 83–91.

Niculescu, P. (2020). *Tons of waste illegally brought from Italy illegally burned (?) At Pata Rât*. Available at https://www.monitorulcj.ro/actualitate/78340-tone-intregi-de-deseuri-aduse-din-italia-se-ard-la-pata-rat

Niinimäki, K., Peters, G., Dahlbo, H., Perry, P., Rissanen, T., & Gwilt, A. (2020). The environmental price of fast fashion. *Nature Reviews Earth and Environment, 1*(4), 189–200.

OECD. (2022). *Global plastics outlook: Economic drivers, environmental impacts and policy options*. Available at https://www.oecd-ilibrary.org/environment/global-plastics-outlook_de747aef-en

Pavalasc, M. (2021). *How Romania turned into an illegal dumping ground for EU waste*. Availabe at https://www.rferl.org/a/romania-garbage-asia-european-union/31429822.html

Pirca, R. (2022). *Informal waste industry in Romania*. Available at https://www.wall-street.ro/articol/Social/285142/industria-la-negru-a-deseurilor-in-romania-cat-se-castiga-din-arderile-de-masini-si-gropile-ilegale-de-gunoi.html#gref

Pop, M., Bucur, I., Zoldan, D., Imre, K., Nichita, I., Cristina, G., et al. (2022). Chemical and microbiological air quality in a municipal solid waste landfill and its surroundings, in South-Eastern Romania. *Sustainability, 14*(1), 156.

Rios, A. M., & Picazo-Tadeo, A. J. (2021). Measuring environmental performance in the treatment of municipal solid waste: The case of the European Union-28. *Ecological Indicators, 123*, 107328.

RiseProject. (2019). *Cement's dirty business*. Available at https://www.riseproject.ro/articol/video-secrete-de-ciment/ Accessed on 6 Apr 2023.

Romanian Border Police. (2023). *Activity report for 2022 year*. Available at https://www.politiadefrontiera.ro/ro/giurgiu/i-analiza-activitatii-politiei-de-frontiera-romane-pe-anul-2022-32548.html. Accessed on 20 Apr 2023.

Romanian Court of Accounts. (2022). *Sinteza raportului de audit al performanței. Evaluarea modului de gestionare a nivelului de generare a deșeurilor de plastic/Summary of performance audit report. Evaluation of the management mode of the level of plastic waste generation*. Department IX, Directorate 2 (In Romanian). Available at https://www.curteadeconturi.ro/uploads/a611a0a4/9c39be71/46669cee/6ffecf53/1ce27039/1bcd2971/6f4df098/cbc94ec4/Raport.pdf

Romanian Government. (2021a). *Government Decision no. 1265 from December 17, 2021*. Available at https://www.lege-online.ro/lr-HOT%C4%82R%C3%82RE-1265%20-2021-(249714)-(2).html

Romanian Government. (2021b). *Government Emergency Ordinance no. 92/2021 regarding the waste regime*. Available at https://lege5.ro/Gratuit/ha3tsnbtgi4a/ordonanta-de-urgenta-nr-92-2021-privind-regimul-deseurilor

Romanian Government. (2022). *The Decision no. 1214/2022 for the amendment and supplementing of Government Decision no. 1074/2021 on the establishment of the Guarantee-return System for the not reusable primary packaging*. Available at https://lege5.ro/gratuit/gezdonjtge2ds/sistemul-de-garantie-returnare-hotarare-1214

Romanian Ministry of Environment, Water and Forests. (2022). *Strategia națională privind economia circulară/National strategy regarding circular economy*. Monitorul Oficial al României, Partea I, Nr. 943 bis/27.IX.2022, Romania.

Romanian Ministry of Environment, Water and Forests. (2023). *Action plan for implementing circular economy in Romania*.

Romanian Parliament. (2021). Law no. 268 from November 9, 2021. Available at https://legislatie.just.ro/Public/DetaliiDocumentAfis/248350

Rovinaru, F. I., Rovinaru, M. D., & Rus, A. V. (2019). The economic and ecological impacts of dismantling end-of-life vehicles in Romania. *Sustainability, 11*(22), 6446.

Smit, P., Jandl, M., Carausu, F., & McGuinn, J. (2021). *Assessment on statistical data collection for environmental crime*. Final report JUST/2020/JACC/FW/CRIM/0122. Gopa Luxembourg and Milieu Consulting SRL.

Teodor, C., Tricã, C. L., Ignat, R., & Drăcea, R. M. (2020). Good practices of efficient packaging waste management. *Amfiteatru Economic, 22*(55), 937–953.

Tripa, S., & Indrie, L. (2021). Households textile waste management in the context of a circular economy in Romania. *Environmental Engineering & Management Journal (EEMJ), 20*(1), 81–87.

UNEP/EA.5/Res.14. (2022). *Resolution adopted by the United Nations Environment Assembly on 2 March 2022*. Information on reports and updates by the Technology and Economic Assessment Panel (unep.org).

United Nations Economic Commission for Europe. (2021). *Romania environmental performance reviews. Third review* (Environmental performance reviews series no. 53). Available at https://unece.org/sites/default/files/2021-12/ECE_CEP_189.pdf

United Nations Environment Programme (UNEP). (1989). *Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal*. Available at http://disasterlaw.sssup.it/wp-content/uploads/2014/10/BASEL-CONVENTION-ON-THE-CONTROL-OF-TRANSBOUNDARY-MOVEMENTS-OF-HAZARDOUS-WASTES-AND-THEIR-DISPOSAL-1989.pdf

United Nations Environment Programme (UNEP). (2012). *The global partnership on marine litter*. Available at https://www.unep.org/explore-topics/oceans-seas/what-we-do/addressing-land-based-pollution/global-partnership-plastic

Walls, M. (2011). *Deposit-refund systems in practice and theory. Resources for the future* (Discussion Paper, RFF DP, 11–47). Available at https://media.rff.org/documents/RFF-DP-11-47.pdf

Wang, C., Zhao, L., Lim, M. K., Chen, W. Q., & Sutherland, J. W. (2020). Structure of the global plastic waste trade network and the impact of China's import ban. *Resources, Conservation and Recycling, 153*, 104591.

Zero Waste Europe. (2019). *The story of Salacea (Romania)*. Available at https://zerowastecities.eu/bestpractice/the-story-of-salacea/

An Imported Problem?

Plastic Waste Effects on Türkiye's Environment with Specific Emphasis on Relevant Multilateral Environmental Agreements

Ezgi Ediboğlu Sakowsky and Sedat Gündoğdu

Introduction

Since the beginning of trade records in the late 1980s, over 250 million tons of plastic waste have been relocated globally (EIA, 2021). The increasing awareness about the environmental harm posed by waste has created pressure on industry and governments and has brought attention to the plastic waste trade in industrialized countries throughout the 1970s and 1980s (Kummer, 1995, UN Secretary–General, 1989). Subsequently, in 1989, the creation of the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes sought to reduce harm to human health and the environment, particularly in countries of the Global South. Since then, the trade of much of the waste stream partly falls under the remit of the Basel Convention. This Convention is the international instrument that, among other objectives, regulates the requirements outlining what is permissible concerning the transboundary movement of hazardous wastes or wastes requiring special consideration (1989, Articles 4, 4A and 6–10).

Plastic waste trade from wealthy to poorer countries emerged as a solution for domestic waste management issues in high waste-generating industrialized countries (Kummer, 1995). Plastic consumption is still linked to the gross domestic product (OECD, 2022a). Hazardous waste exports of higher income per capita countries created a pollution haven effect in lower-income per capita countries. The plastic waste trade is directly related to increased plastic production, unsustainable consumption patterns, and the high cost of proper disposal of hazardous wastes. The practice, also referred as the colonial transfer of plastic waste pollution, caused

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issues in recipient countries with inadequate waste management systems. The transboundary movement and the excessive waste load led to plastic leakage, burning plastic, and unlicensed operations causing severe environmental damage (OECD, 2022a). These problems mainly occur in the Global South and Türkiye, which is one of the primary destinations of Global North's waste (OECD, 2022a).

Before the Chinese ban on plastic waste imports in 2018, China was the primary destination for Global North's plastic waste exports. The Chinese decision disrupted the global plastic waste trade industry and changed the direction of Global North's plastic waste to countries such as Türkiye, Malaysia, Tunisia, etc. (Gündoğdu & Walker, 2021).

With 32 million tons of municipal waste (MSW) produced annually, Türkiye is among the top four European MSW-producing countries (TÜİK, 2021; Gündoğdu & Walker, 2021). It is calculated that the global average proportion of plastic in MSW varies between 8.3 and 13.2% (Lebreton & Andrady, 2019). Applying this rate to Türkiye's total MSW, it corresponds to approximately 3.9 million metric tons of plastic waste. It is estimated that the percentage of the plastic waste collection rate in Türkiye is 10–20% (Gündoğdu & Walker, 2021). Even if this value is assumed to be 20% with the most optimistic estimation, this amount is almost equal to the amount of plastic waste imported by Türkiye in 2020 (Gündoğdu & Walker, 2021).

Türkiye is one of the major plastic pollution sources in the Mediterranean and the Black Sea, due to its inadequacy of plastic waste management, the high amount of plastic production and consumption, illegal dumping of plastic waste, and wastewater treatment plants (WWTP) (Çevik et al., 2021). In fact, inadequate waste management infrastructure makes Turkish rivers the primary source of plastic pollution for the Mediterranean Sea (Gonzalez-Fernandez et al., 2021). Considering Türkiye's inability to manage its own plastic waste, importing plastic waste from high-income countries very likely worsens the issue considerably. Since China banned plastic waste imports in 2018, many developed countries are scrambling to find new plastic waste destinations (Gündoğdu & Walker, 2021; Zhao et al., 2022). After this historical shift, Türkiye became one of the top destinations for the Global North's plastic waste (Gündoğdu & Walker, 2021). Before the Chinese ban, Türkiye imported 261,864 t of plastic waste annually, mainly from the UK, EU27, and the USA (TÜİK, 2021). By the end of 2020, this has rapidly increased to 772,831 t (Gündoğdu & Walker, 2021; Fig. 1). In 2021, Türkiye generated a total of 3.9 million tons of plastic waste domestically and imported 669,535 tons of plastic waste. Therefore, the total plastic waste treated domestically was 4.6 million tons, resulting in a total recycling rate, including net imports, of 18.4% (EIA, 2021). Türkiye's plastic waste import is the equivalent of 16.94% of domestically generated plastic waste in 2020. Hence, if Türkiye did not import plastic waste, its recycling rate would increase to 21.50% (Table 1).

In this chapter, we aim to analyze the impact of plastic waste on the land, the seas, and air quality in Türkiye and assess Türkiye's practice of managing plastic waste in relation to international standards set by multilateral environmental agreements. Even though we acknowledge the unity of world ecosystems and the

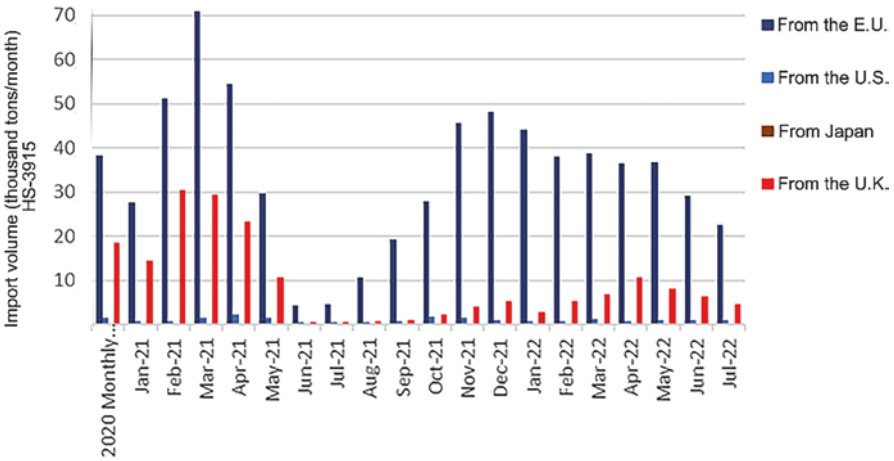

Fig. 1 The monthly plastic waste export to Türkiye in the period of 2020 to July 2022. (Source: https://www.ban.org/plastic-waste-project-hub/trade-data/Türkiye-import-data)

Table 1 Snapshot of main waste exporters and Türkiye's municipal solid waste and plastic waste and recycling in 2021

Metric (million tons)	Türkiye	Belgium	France	Germany	Netherlands	The UK
The municipal solid waste generated	32.93	8.79	38.01	53.75	9.04	27.10[a]
Plastic waste generated domestically	3.95	0.693	2.99	6.96	1.28	3.67
Plastic waste imported	0.682	0.238	0.341	0.444	0.807	no data
Plastic waste exported	0.012	0.348	0.150	0.721	0.597	0.47

Source (TÜİK 2021; EIA 2021)
[a]For 2020

difficulty of drawing a line on the environmental harm caused by plastic waste on the land, the seas, and air, below, we analyze each element separately for the sake of clarity. Although negotiations for a plastic treaty are currently in place for the land/sea ecosystem (UNEA, 2022; Bergmann et al., 2022), the Basel Convention (1989) is currently the only international treaty in force directly regulating waste management and trade. It covers the standards for plastic waste management and trade and gives relatively clear obligations on its Parties for this purpose. Section "Plastic Waste Impacts on the Land: In Light of the Basel Convention" presents a deeper analysis of plastic waste's environmental impact on the land and assesses whether Türkiye complies with the Basel Convention obligations relevant for plastic waste.

As for the sea ecosystem, Turkish seas are governed by two regional sea regimes. The Convention on the Protection of the Black Sea Against Pollution (Bucharest Convention, 1992) is the main agreement for the Black Sea regime, and the Barcelona Convention for the Protection of the Mediterranean Sea Against Pollution

(Barcelona Convention, 1976) is the main agreement for the Mediterranean Sea regime. Unlike the Basel Convention, these agreements and most relevant protocols do not directly address plastic waste (For Barcelona Convention amendments and other legal documents, Barcelona Convention Website, 2022; For Basel Convention amendments, Basel Convention Website, 2022; For Bucharest Convention amendments and other legal documents, Commission on the Protection of the Black Sea Website, 2022). Therefore, it is methodologically not possible to assess the compliance of Türkiye with these agreements by only looking at plastic waste management practices. We therefore take the overall aim and broad obligations of these agreements on waste management into account and analyze whether the state of the environment in the regional seas and the practice of Türkiye demonstrate a sufficient level of prevention of environmental harm from plastic wastes. Section "Imported and Domestic Plastic Waste Impact on the Seas: With Respect to Regional Sea Regimes" undertakes such an assessment and delves into the effects of plastic waste on the Turkish seas.

In terms of air quality, it is estimated that the plastic life cycle accounts for 15% of allowed greenhouse gas (GHG) emissions by 2050, threatening the aim of the United Nations (UN) climate change regime on limiting global warming at a safe level for all ecosystems (UNEP, 2021). However, since Türkiye does not incur direct obligations about plastic waste under the climate change regime, this chapter provides a bird's eye analysis on Türkiye's practice in relation to plastic waste management and climate change rather than a systemic analysis. Section "Plastic Waste Impacts on the Air" provides such an analysis after discussing the impact of plastic waste management of Türkiye on air quality and climate change.

Needless to say, there are relevant international principles, customary international law, decisions of agreement bodies and regional organizations (especially decisions of the Organization for Economic Cooperation and Development, OECD), and nonbinding but influential soft law documents (especially sustainable development goals and declarations from global summits about the environment) (Kummer et al., 2016; see also, Kummer, 1995) to plastic waste (for all instruments, UNEP, 2016). We, however, aim to analyze the effects of plastic waste on Türkiye's "immediate environment" and only consider Türkiye's obligations under treaties (hard law documents) concerning plastic waste. For such an analysis, we selected the treaties in Table 2 and their subsequent protocols since they broadly cover core treaty obligations and commitments of Türkiye under treaties to prevent environmental damage from waste, including plastic waste effects on the land, the seas, and air. As mentioned above, the obligations or commitments of Türkiye from the selected legal instruments do not always relate to plastic waste specifically. Nevertheless, plastic waste constitutes a portion of sea pollution and GHG emissions, which are discussed under the broader waste management issue. In this light, Table 2 lists legal instruments that are considered for the analysis.

This chapter provides significant evidence that Türkiye exhibits poor management of both its domestic and imported plastic wastes. Plastic imports make it nearly impossible for the country to manage the issue with its current practice. Our analysis demonstrates that the Basel Convention standards and obligations are

Table 2 Full list of selected multilateral legal instruments taken into account for the analysis in this study

Selected multilateral treaties, amendments, and protocols to those treaties	Opened for signature	Entry into force	Signature by Türkiye	Entry into force for Türkiye	Relevance to plastic waste
1. On the land					
1.1. Basel Convention on the Control of Transboundary Movements of Hazardous Wastes	March 22, 1989	May 5, 1992	March 22, 1989	Sept. 20, 1994	Direct reference to plastics after amendments
Amended, renamed as the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal	Sept. 22, 1995	Dec. 05, 2019	Aug. 27, 2003	Dec. 05, 2019	
Amended, Amendments to Annexes II, VIII and IX to the Basel Convention	–	Jan. 1, 2021	–	Feb. 10, 2022	
2. On the seas					
2.1. Bucharest Convention on the Protection of the Black Sea Against Pollution	April 21, 1992	Jan. 15, 1994	April 21, 1992	March 29, 1994	Reference to the broader issue of waste
2.1.a. Protocol on the Protection of the Black Sea Marine Environment against Pollution by Dumping	April 21, 1992	Jan. 15, 1994	April 21, 1992	March 29, 1994	Reference to the broader issue of waste
2.1.b. Protocol on the Protection of the Black Sea Marine Environment against Pollution from Land–Based Sources	April 21, 1992	Jan. 15, 1994	April 21, 1992	March 29, 1994	Reference to the broader issue of waste
Amended, renamed as the Protocol on the Protection of the Marine Environment of the Black Sea from Land–Based Sources and Activities	April 7, 2009	Not yet in force	April 7, 2009	Not yet in force	
2.2. Barcelona Convention for the Protection of the Mediterranean Sea Against Pollution	Feb. 16, 1976	Feb. 12, 1978	Feb. 16, 1976	May 6, 1981	Reference to the broader issue of waste
Amended, renamed as the Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean	June 10, 1995	July 9, 2004	Sept. 18, 2002	July 9, 2004	

(continued)

Table 2 (continued)

Selected multilateral treaties, amendments, and protocols to those treaties	Opened for signature	Entry into force	Signature by Türkiye	Entry into force for Türkiye	Relevance to plastic waste
2.2.a. Protocol for the Prevention of Pollution of the Mediterranean Sea by Dumping from Ships and Aircraft	Feb. 16, 1976	Feb. 12, 1978	Feb. 16, 1976	May 6, 1981	Reference to the broader issue of waste
Amended, renamed as Protocol for the Prevention and Elimination of Pollution of the Mediterranean Sea by Dumping from Ships and Aircraft or Incineration at Sea	June 10, 1995	Not yet in force	Sept. 18, 2002	Not yet in force	
2.2.b. Protocol for the Protection of the Mediterranean Sea Against Pollution from Land–Based Sources	May 17, 1980	June 17, 1983	Feb. 21, 1983	June 17, 1983	Reference to the broader issue of waste
Amended	March 7, 1996	May 11, 2008	Sept. 18, 2002	May 11, 2008	
2.2.c. Protocol on the Prevention of Pollution of the Mediterranean Sea by Transboundary Movements of Hazardous Wastes and their Disposal	Oct. 1, 1996	Jan. 18, 2008	Oct. 01, 1996	Jan. 18, 2008	Direct reference to plastics
3. On air quality					
3.1. United Nations Framework Convention on Climate Change	May 9, 1992	March 21, 1994	Feb. 24, 2004	May 24, 2004	Reference to the broader issue of waste
3.1.a. Kyoto Protocol	Dec. 11, 1997	Feb. 16, 2005	May 28, 2009	Aug. 26, 2009	Reference to the broader issue of waste
3.1.b. Paris Agreement	Dec. 12, 2015	Nov. 4, 2016	April 22, 2016	Oct. 11, 2021	Indirect reference

technically mostly respected and can be found in Turkish legal documents. Looking at the application of procedures and the execution of relevant laws, however, we encounter severe implementation issues and identify enormous environmental damage. The adoption of domestic laws does not necessarily translate to environmental protection in practice when it concerns plastic waste management in Türkiye. In terms of the regional seas and climate change regimes, Türkiye demonstrates a very poor record of environmental protection. This could also indicate that the country does not substantially commit to improving plastic waste pollution in the seas and limiting emissions from plastic waste. We raise concerns over the country's future actions, especially its position in ongoing Plastics Treaty negotiations. We propose that Türkiye should decrease its reliance on a plastic-based economy and discontinue plastic waste imports, which exacerbates the problem.

Plastic Waste Impacts on the Land: In Light of the Basel Convention

Overall Environmental Impact of Plastics on the Land

Plastic waste undergoes degradation due to physical, chemical, and biological factors. Plastics larger than 5 mm, called macroplastics, turn into particles smaller than 5 mm, called microplastics, due to various factors (GESAMP, 2015). Microplastics can also be released directly into the environment by producing micro-sized particles designed for various purposes (resin pellets, etc.) (Gündoğdu et al., 2022). Further degradation of microplastics by various factors causes particles with dimensions smaller than 1 μm, called nanoplastics (GESAMP, 2015). Microplastics are pollutants that can be found in soil, water, and the air (Duis & Coors, 2016; Dehghani et al., 2017; Gündoğdu & Çevik, 2017; Gündoğdu, 2018; Lusher et al., 2018).

Plastics have several toxic additives such as phthalates, poly-fluorinated chemicals, bisphenols (BPA–BPS, etc.), and brominated flame retardants, which can reach the environment and adversely affect environmental and public health (GESAMP, 2015). From production to disposal of plastic, plastics and additives can pollute terrestrial environments in many ways. This pollution is commonly caused by the direct littering of plastics and by landfilling MSW. Landfills and dumping sites constitute almost 90% of Türkiye's MSW disposal and recovery methods (TÜİK, 2021). It is known that dumping plastics in the soil or landfills can cause plastic additives (stabilizers, harmful colorants, plasticizers, and heavy metals) to eventually leach into various compartments of the environment, thereby creating soil and water pollution (UNEP, 2016). The leachate of landfills can be a potential source of microplastics for groundwater, even if adequately managed. The risks of microplastic leaching from informal landfills are naturally high; they are not constructed, do not operate in accordance to applicable standards, and are characterized by unsophisticated construction and a lack of environmental protection measures (Wan et al., 2022). Previous research also demonstrated that the presence of microplastics can be high in formal landfills as well (Su et al., 2019; Praagh et al., 2018; Sun et al., 2021).

Mixed plastic waste can contain numerous hazardous chemicals incorporated in the plastic during manufacture. For this reason, the circulation of national and international plastic waste is controlled by regulations, and a new treaty, the Plastic Treaty, specifically on plastic waste is in preparation, discussed further below. In practice, however, several studies and reports indicate that hazardous plastics with transboundary movement could be the subject of illegal dumping and open burning practices (Greenpeace, 2022; Gündoğdu & Walker, 2021). A couple of previous reports in several countries where mixed plastic waste had been disposed of, and in some cases burned, highlighted a broad range of hazardous chemical contaminants within plastic wastes and in post-burning residues, as well as in the local environment (Greenpeace, 2018; Petrlik et al., 2021; Greenpeace, 2021).

All these environmental risks are already apparent for Türkiye. According to a study conducted in the Turkish city of Adana, a wide range of toxic chemicals, many known to be produced while burning plastics, was identified in ash and soil samples (Greenpeace, 2022). The amount of some of the chemicals (PCDD/F, PBDD/F, PBDE, HBCD) reported by Greenpeace (2022) was found to be at the highest level globally. These chemical pollutants include highly persistent toxic compounds (resistant to environmental degradation), which can, in many cases, bioaccumulate if they enter the food chain.

The Basel Convention

Efforts to globally manage the transboundary movement of hazardous waste, as put into perspective by Kummer (1992, 1995, see also, UN Secretary–General, 1989), have been ongoing for nearly 50 years. In the 1970s, local environmental laws regulating hazardous waste disposal began to emerge in some countries, and with the support of Principles 21 and 22 of the 1972 Stockholm Declaration, the issue of toxic waste colonialism gained international attention, leading to discussions in the 1980s. After soft law documents and ad hoc negotiations on environmental issues raised awareness about toxic waste colonialism, the most significant milestone in addressing this issue came with the Basel Convention in 1989. The Basel Convention, which entered into force in 1992, is widely regarded as the primary international agreement for regulating the transboundary movement of hazardous waste, including plastics (1989, Preamble and Article 4). The Basel Convention played a crucial role in globally recognizing the issue of hazardous waste and even prompted discussions on including plastics in its texts. However, the Basel Convention may not be the only effective and final international agreement in this field in the near future. The Plastic Treaty, negotiated by the UN Environment Programme (UNEP), can be seen as an extension of the path paved by the Basel Convention. Both the Basel Convention, to which Türkiye is a party, and the Plastic Treaty will shape the current and future state of global management of hazardous waste that encompasses plastic pollution.

The Basel Convention plays a heightened role in regulating plastic waste internationally, as it is as of yet the only convention in force specifically targeting waste. The obligations of the Basel Convention vary, but they mainly concern the disposal, exports, imports, and the aim of waste minimization (Basel Convention, 1989, Preamble, Articles 4, 4A, 6–10 and 13–14). We focus on the general obligations on parties for our analysis as they encapsulate the overall expectations from parties for their waste management, including plastic waste. The core obligations most relevant to this study are the minimization of waste (Article 4(2)(a)), providing adequate waste disposal facilities (Article 4(2)(b)), ensuring the people involved in all waste management processes take necessary steps to prevent pollution due to hazardous wastes (Article 4(2)(c)), the minimization of the transportation of hazardous waste (Article 4(2)(d)), the prevention of "the import of hazardous wastes and other

wastes if it has reason to believe that the wastes in question will not be managed in an environmentally sound manner" (Article 4(2)(g)), creating "legal, administrative and other measures" for implementing the obligations of the Basel Convention (Article 4(4)), and creating procedural means to authorize people for the transportation and disposal of hazardous waste, which should be undertaken via standards of packaging, labeling, and transportation accompanied with information about their transport (Article 4(7)).

In 2019, the parties to the Basel Convention adopted the decision amending lists II, VIII, and IX, and plastic waste was incorporated into those lists (Conference of the Parties to the Basel Convention, 2019, Decision BC–14/12). The amendments have been in effect since January 1, 2021. Annex II concerns waste requiring special consideration and created the new entry Y48 to incorporate plastic waste. A new entry was also added to Annex VIII as A3210 for plastic waste. Plastic waste falling under this category is accepted as hazardous, and their transboundary movement requires prior informed consent from the importer state (Basel Convention, 1989, Articles 1, 6 and Annex VIII, A3210; see also, Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade, 1998). The transboundary movement of such waste also requires states to establish domestic systems to authorize stakeholders involved in the process and have some level of packaging, labeling, and transporting standards (Basel Convention, 1989, Article 4(7)). Furthermore, hazardous waste transport from the industrialized states to other states is prohibited by the Ban Amendment to the Basel Convention in order to prevent the Global South from carrying the burden of the production and consumption practices of the Global North (Conference of Parties to the Basel Convention, 1995, Decision III/1; Basel Convention, 1989, Article 4A, Annex VII; IPCC, 2022). The last amendment in the Basel Convention about plastic waste was made in Annex IX, which replaces the waste stream B3010 with B3011. It identifies the types of plastic waste that are not hazardous and hence not subjected to both the requirement of prior informed consent from states and stricter waste management standards.

Discussions on Domestic Regulations of Türkiye on Plastic Waste

Since Türkiye is a party to the Basel Convention, Turkish domestic laws on waste management should be in line with its Basel obligations. Turkish laws on plastic waste and their implementation are investigated in this regard in the following.

Plastic waste is not always governed by a regulation directly and is often regulated under the broader issue of waste, or in subject specific by-laws such as packaging regulations. Waste is governed by multiple legal instruments (see Table 3). The Turkish Constitution grants Turkish citizens the right to a clean environment by Article 56: "Everyone has the right to live in a healthy and balanced environment. It

Table 3 List of domestic legal instruments that are most relevant to plastic waste management at the land in Türkiye

Selected domestic legal instruments of Türkiye	Adoption date	No. of the legislation
The Constitution of the Republic of Türkiye	1982	2709
Laws		
Law on Environment	1983	2872
Metropolitan Municipalities Law	2004	5216
Municipality Law	2005	5393
By–Laws and a Communiqué		
By–Law on the Incineration of Wastes	2010	27721
By–Law on Organized Landfill of Wastes	2010	27533
By–Law on Waste Management	2015	29314
By–Law on Zero Waste	2019	30829
By–Law on Control of Packaging Wastes	2021	31523
Communiqué on Procedures and Principles Regarding the Establishment and Operation of Waste Collection Centers and Zero Waste Practices	2021	–

is the duty of the State and citizens to improve the natural environment, to protect the environmental health and to prevent environmental pollution (…).” The article covers the aim of the Basel Convention by incorporating its main elements of protecting human health and the environment and preventing environmental pollution by environmentally sound waste management. Even though it is beyond the scope of this study to analyze whether Türkiye sufficiently fulfils its positive obligation to provide its citizens with a clean environment, it is worth noting that the term waste is used specifically in the Constitution.

A list of regulations that are most relevant for plastic waste management at land as of June 2023 is given in Table 3. It is important to note that Türkiye amends its laws relatively often and further changes are expected.

The Law on Environment is especially relevant as it provides domestic waste-related definitions, domestic waste management obligations for stakeholders involved in the process, and administrative fines and judicial punishment for bad waste management practices (Articles 2, 8, 10–13, 20, 26). The scope of the Law on Environment was expanded to cover more types of waste by amendments, especially with the amendments entered into force in 2006, 2018, 2020, and 2022. Some recent amendments directly refer to minimizing plastic bags, single-use plastics, and packaging (Articles 2, 3(h), and 20). Minimizing plastic waste is a valuable step for protecting the land ecosystem and complying with the obligation covered by Basel Convention Article 4(2)(a). The Law on Environment also regulates that incentives will be available for those establishing zero waste management systems, such as municipalities and other actors (Article 29). Incentives for municipalities are an especially crucial step as municipalities manage MSW (Metropolitan Municipalities Law No. 5216, 2004; Municipality Law No. 5393, 2005). Incentivizing municipalities to implement better waste management could be

interpreted as a step by Türkiye to fulfil its obligations under Articles 4(2)(b)–(c). Municipalities adopting better waste management systems are also increasing (TMEU, 2020).

On the other hand, municipalities are far from being well-equipped in practice. A study calculating climate change-related expenditures of metropolitan municipalities in Türkiye in 2022 found that, on average, they allocate 20–40% of their climate change-related budgets to waste management (Public Expenditures Monitoring Platform, 2022). This budget, however, includes the wastewater management expenditures of water and sewage administrations. Recycling and waste effectiveness constitute approximately 14% of municipal waste budgets (Public Expenditures Monitoring Platform, 2022). It should be added that, except for the Istanbul Metropolitan Municipality, none of the climate change budgets of municipalities amount to 20% of their total budget, and many are below 10% (Public Expenditures Monitoring Platform, 2022). This translates into less than 2% of the total budgets of many municipalities spent on recycling and waste effectiveness, and this is lower than the world average both for high- and low-income countries (Kaza et al., 2018). Considering that the main responsibility for waste management in Türkiye falls on municipalities, the low budgets allocated to municipal waste management are causing the Turkish waste management infrastructure to become insufficient.

The import of plastic waste exacerbates the issue and further diminishes the ability of municipalities to cope. Companies with licenses for waste recycling tend to import more plastic waste because it is profitable, which is also a limiting factor for developing an effective waste management system. This also has led to Türkiye being ranked the lowest MSW recovery member country of the OECD (OECD, 2020). As reported by Interpol (2020) and Comolli (2021), importing plastic waste, which is particularly difficult to recycle, into Türkiye via mislabeling is also a factor that puts strain on the waste management infrastructure. Plastic wastes that are mislabeled or have a high percentage of hard-to-recycle materials are either illegally dumped into the environment by importers or sent to landfills with municipal waste (Gündoğdu & Walker, 2021). Therefore, increasing amounts of MSW, including plastic waste, are dumped mainly in more than 2000 open landfills in Türkiye (Berkun et al., 2011). This number is almost double that of licensed waste management facilities (1128 licensed recycling and 731 collection and separation sites) in Türkiye (TMEU, 2020; see also, Karasik, 2022). These implementation issues bring about the questions of whether the Basel obligations of providing adequate waste disposal facilities (Article 4(2)(b)) and ensuring that the people involved in all waste management processes take necessary steps to prevent pollution due to hazardous wastes (Article 4(2)(c)) are actually fulfilled, further discussed below.

The By-Law on Waste Management sets the rules for waste management, responsibilities of relevant authorities and other stakeholders, and waste imports (2015). It is therefore very relevant to the plastic waste management and also plastic waste import issues in the country. It directly refers to the Basel Convention in Article 3 and explains that it is prepared accordingly. It does not classify plastic as hazardous, unless contaminated, since it was adopted before the Basel Convention amendments

labeling certain plastics as hazardous. On the other hand, the classification is perhaps a conscious choice because Turkish laws are subjected to changes often, and the country has dealt with large amounts of untreated, mislabeled, and illegally treated plastic waste since 2018 (OECD, 2022a). In fact, since 2010, the country has adopted many by-laws relevant for waste management (see Table 3) and amended the Law on Environment multiple times. Looking at the practice also shows that the country is aware of the issues in practice. For instance, workers in plastic waste management facilities report that they deal with all kinds of waste, including potentially hazardous ones labeled as nonhazardous plastic wastes by Turkish authorities at the borders (HRW, 2022). This also means that quite a few of the aforementioned plastic waste imports could be procedurally legal under Turkish by-laws related to waste management (TMEU, 2020; TMEUCC 2022), even though they significantly harm the environment. Prima facie this situation could mean that the obligation of the prevention of "the import of hazardous wastes and other wastes if it has reason to believe that the wastes in question will not be managed in an environmentally sound manner" is not respected (Basel Convention, 1989, Article 4(2)(g)). This also means that actors of the Global North also mislabel their plastic wastes as nonhazardous for waste export (Interpol, 2020; HRW, 2022).

It is questionable why Türkiye would knowingly allow such practices causing a severe level of environmental damage. One reason could be the issue of the difficulty of the implementation of domestic laws on waste management. Türkiye admits that there are issues in its waste management by stating the following in a communication with the Basel Convention Secretariat about preparing national inventories: "we need a transition period" (Basel Convention Website, Country Profiles: Türkiye, Submission heading, Others section, 2022a). In its national reports to the Basel Convention (due to Article 13(3)), the Turkish government indicates diverse implementation problems regarding managing waste transportation (e.g., Basel Convention Website, Basel Convention National Reports – Year 2020, Türkiye, 2020, Response to Question 4). This is rather unsurprising as a 2022 Intergovernmental Panel on Climate Change (IPCC) report acknowledges the commonality of implementation problems of waste-related regulations amongst countries (IPCC, 2022). However, for the Turkish case, we claim that the problem is not only the implementation such as weak border controls but probably also the intention of the stakeholders involved in this issue, including the Turkish government. In fact, after the aforementioned Chinese ban on most of its waste imports in 2018 and with the Ban Amendment to the Basel Convention, Türkiye became a plastic waste hotspot for highly industrialized nations (Basel Action Network Website, 2022; OECD, 2022a, b, c). Regardless of its environmental deprivation, Türkiye was one of the few countries that sent a notification of nonacceptance, which it withdrew later, for the Plastic Waste Amendments aimed at better controlling the transboundary movements of such wastes (Basel Convention Website, Plastic Waste Amendment, Status of Ratification, 2022b). In another case, Türkiye adopted a domestic regulation banning ethylene polymer waste imports in May 2021 by including it in the prohibited list for imports (Republic of Türkiye Ministry of Trade, 18 May 2021b, Number: 31485; see also, Republic of Türkiye Ministry of Trade, 31 December 2020,

Number: 31351). Due to intense industry pressure, the ban was withdrawn after a week when it came into force in July 2021, and imports were rereleased (Republic of Türkiye Ministry of Trade, 10 July 2021a, Number: 31537; see the latest regulation, Republic of Türkiye Ministry of Trade, 31 December 2022, Number: 32060). As seen in Fig. 1, this regulation caused a dramatic decrease in plastic waste imports, with a significant increase shortly thereafter. The last example illustrates that the plastic waste trade is an influential business with some degree of lobbying power. Waste imports created an industry worth 14 billion USD in 2021 in Türkiye (Ünker, 2022). Perhaps this is another reason that the country is less than eager to improve its implementation issues on waste management, especially for the profitable plastic waste imports.

Considerations and Türkiye's Compliance with Basel Convention Obligations

At first glance, domestic regulations in the country cover the waste management practices in detail, and it is hard to claim that the country lacks regulations for plastic waste management. It is noticeable that the vast majority of the regulations are dated after the adoption of the Basel Convention and the plastic amendments are mainly incorporated after 2015. In fact, since 2015, the country also announced further policies and programs. For instance, the National Waste Management and Action Plan for 2016–2023 has been in effect since 2017, and the Ministry of Environment, Urbanisation, and Climate Change initiated a nationwide Zero Waste Project (2017). Regulations and waste policies, as shown in Table 3, can give the impression that the abovementioned procedural requirements of the Basel Convention by Article 4(4) and Article 4(7) may be fulfilled.

When the implementation of domestic laws and the compliance with the substantial obligations of the Basel Convention are investigated, the picture changes drastically. In practice, Türkiye bypasses the aim of the Basel Convention by following the procedural standards without actually protecting the environment. In fact, regardless of the Zero Waste Project in the country, plastic waste imports are very high and the minimization of waste obligation of the Basel Convention is far from being met (Article 4(2)(a)).

Looking at the practice regarding the Basel Convention obligation on providing adequate waste disposal facilities (Article 4(2)(b)), as discussed above, the country heavily lacks proper facilities to fulfil such an obligation. The minimization of the transportation of hazardous waste (Article 4(2)(d)) and the prevention of "the import of hazardous wastes and other wastes if it has reason to believe that the wastes in question will not be managed in an environmentally sound manner" (Article 4(2)(g)) obligations can be also judged by the practice. As explained, most waste enters the country either by mislabeling the waste's content as nonhazardous to ease its transportation or by illegal means. Nevertheless, even if all plastics imported would

fall under Annex IX without hazardous components, the Turkish environment would still be contaminated due to the lack of recycling facility standards (HRW, 2022). HRW (2022) shows that workers at the plastic recycling facility in Adana/Türkiye, and those living near these facilities, may be exposed to harmful chemicals when they breathe in the toxic dust and fumes emitted during the recycling process, threatening their right to lead a healthy life. Exposure to air pollution puts employees and residents of recycling facilities at risk of developing major life-long health problems, including cancer and reproductive system disorders. Similarly, in a report published by Greenpeace (2021), it has been reported that a wide variety of hazardous chemicals are in the soils where imported plastic wastes are dumped and burned and that the concentration of some of these chemicals is much higher than the threshold levels. Both studies reveal that there is no safe plastic import level for the environment considering Turkish plastic waste management practices. In this regard, Türkiye does not only fail to comply with its obligations under Articles 4(2)(d) and 4(2)(g) but also with Article 4(2)(c) as the practice demonstrates that it falls short on ensuring the actors involved in the waste management process take necessary steps to prevent pollution due to hazardous wastes.

The analysis above demonstrates that Türkiye is struggling with establishing a reliable system for plastic waste management especially after the increase in its plastic imports. However, the responsibility belongs to Türkiye to regulate its system (Basel Convention, 1989, Article 4 in general). Therefore, instead of allowing plastic waste to cause significant harm to the environment, it could ban the import of plastic waste based on Article 4(1) until it establishes reliable facilities and implementation means. In fact, the Basel Convention Preamble clearly recognizes that "any State has the sovereign right to ban the entry or disposal of foreign hazardous wastes and other wastes in its territory" (See also, Rio Declaration, 1992, Principle 2; Legality of the Threat or Use of Nuclear Weapons, 1996). In this light, we argue that Türkiye needs substantial changes in its plastic waste management practices and should ban imports until it adopts environmentally sound plastic waste management practices.

Imported and Domestic Plastic Waste Impact on the Seas: With Respect to Regional Sea Regimes

The Overall State of the Environment and the Contribution of Türkiye to Plastic Pollution at the Black Sea and the Mediterranean Sea

Two regional seas surround Türkiye, the Black Sea and the Mediterranean. Marine pollution in both seas is one of the most concerning environmental challenges of the country. To illustrate the severity of the issue, pollution in the Black Sea reached a level that leads to scholars warning against the death of the Black Sea ecosystem at

some point in the 1990s (Pokazeev et al., 2021). Today, plastic waste at sea presents the majority of this issue, as it constitutes "95 to 100% of marine floating waste and 50% of litter on sea beds" in the Mediterranean (UNEP, 2020a). Numerous studies have been conducted to reveal the direct and indirect harmful effects of plastic pollution on coastal and marine biota, estuaries, and freshwater environments (Galloway & Lewis, 2017; Lusher et al., 2017; Güven et al., 2017; Bergmann et al., 2022; Blettler et al., 2018; Çevik et al., 2021). Most plastic litter arriving in aquatic ecosystems is of terrestrial origin (Jambeck et al., 2015; Nizzetto et al., 2016; Lebreton et al., 2017). The most important of these sources are agricultural activities, urban activities, and poor wastewater treatment (Gündoğdu et al., 2018, 2022). In addition, illegal waste dumping related to plastic waste imports, inappropriate wastewater discharge from recycling facilities, and both traffic-related microplastics from roads and plastic particles escaping during transportation are also important sources (Gündoğdu & Walker, 2021; Çevik et al., 2021).

The Mediterranean and the Black Sea are semi-enclosed basins mostly isolated from the World Ocean and can be considered traps for plastic pollution. González-Fernández et al. (2021) predicted an annual input of 98 million floating macro-litter items to the Black Sea, where Türkiye is one of the most significant contributors. Plastic is the most common type of litter on the Turkish coast of the Black Sea, comprising >80% of the macro-sized debris found in the seabed, sea surface, and beaches (Aytan et al., 2022). Landfilling and illegal dumping activities are significant sources of plastic pollution (e.g., Commission on the Protection of the Black Sea Against Pollution, 2002; UNEP, 2020a; UfM, 2020). Moreover, the contribution of intensive fishing activities, shipping, and coastal cities also substantially contributes to the Black Sea's plastic pollution. Previous studies showed that 70% of the debris item collected via trawling were plastics, constituting 84% of the total waste weight in the Black Sea (Aydın, 2021). According to Stoica et al. (2020), plastic is the most represented item of anthropogenic litter in all the evaluated Black Sea river-influenced beaches. Similarly, according to the Marine Litter Watch (MLW) database (Kideys & Aydın, 2020), which provides data from European beaches, including seas, rivers, and lakes, the Black Sea appears as the most littered beach (652 items/100 m) among the four EU regional seas. The percentage share of plastics on beaches is 79–88%, and the rate of single-use plastics (SUP), with a share of 66.1%, is the highest in the Black Sea. Moreover, Aytan et al. (2020) found that the surface microplastic concentration ranged between 1.783 and 40.03 items/m^3.

The Sea of Marmara connects the Mediterranean and the Black Sea via the Dardanelles and Bosphorus Straits. This connectivity makes the Marmara Sea one of the hotlines for vessel traffic. According to Şirin et al. (2022), between 41.103 and 43.999 vessels passed through the Bosphorus and Dardanelles Straits in 2018. Moreover, approximately 26 million people live in cities, including the megacity Istanbul, around the sea. This makes the Marmara Sea a hotspot for plastic pollution. Şirin et al. (2022) reported the mean litter abundance for the seafloor as 136.7 items/km^2, Gedik et al. (2022) reported the mean abundance of microplastic in wild-caught mussels as 2.06 items/individual, Sari Erkan et al. (2021) reported the microplastics abundance range as 276.1857–3497.02 particle/km^2, and Artüz et al. (2021)

reported the mean number of marine litter as 66.2/m^2 in the beaches around the Marmara Sea.

Türkiye is one of the major plastic pollution sources in the Mediterranean and the Black Sea (Liubartseva et al., 2018; Çevik et al., 2021; Strokal et al., 2022). Inadequate waste management infrastructure makes the Turkish rivers the main source of plastic pollution for the Mediterranean Sea. According to Gonzalez–Fernandez et al. (2021), Türkiye had the highest share (16.8%) of the total floating macro-litter loading to the marine environment (the Mediterranean and the Black Sea). In another study, it was estimated that areas with the highest concentrations of plastics (>20 g km^{-2}) are represented in the Cilician Sea (NE Mediterranean coasts of Türkiye) (Liubartseva et al., 2018). In the same study, it is estimated that three of the top five major sources of plastic pollution in the Mediterranean Sea are Turkish rivers: the Ceyhan (5.1%), Seyhan (3.5%), and Buyuk Menderes Rivers (2.4%). The Seyhan and Ceyhan rivers receive a high amount of wastewater from the recycling industry. More than 170 licensed mechanical recycling facilities (most of them have plastic waste import licenses) are located around the Seyhan River, and most do not have proper wastewater treatment systems inside the facilities (HRW, 2022). According to Suzuki et al. (2022), the annual microplastic emissions from such facilities can range from 0.014 to 5.8 t/year. With a rough calculation based on Suzuki et al. (2022), it is possible to say that around 2.38–986 tons/year of microplastic leak into the wastewater from the area where these facilities are located. This amount can be quite variable depending on the facilities' plastic waste processing capacity and the processing machines' success. The microplastic removal rate of the nearest WWTP (Seyhan WWTP) is around 70% under normal conditions (Gündoğdu et al., 2018). However, considering these microplastics possibly clogging the system and rendering the WWTP inoperable, this rate may decrease further. The effluent of Seyhan WWTP flows into the Seyhan River. Therefore, as stated by Liubartseva et al. (2018), this is an important factor that makes the Seyhan River the river that carries the most plastic waste to the Mediterranean Sea.

Regional Sea Regimes on the Black Sea and the Mediterranean Sea

The Bucharest Convention on the Black Sea and the Barcelona Convention on the Mediterranean Sea have common objectives (preserving the marine environment and preventing pollution), and both target pollution at the source. As a large portion of the pollution at the seas, plastic waste falls under the scope of these regimes. We consider the standards and objectives of these regimes in relation to plastic waste management. Nevertheless, as mentioned above, these conventions and most relevant protocols do not directly address plastic waste. We, therefore, take the overall aim and broad obligations of these agreements on waste management into account and analyze whether the state of the environment in the regional seas and the

practice of Türkiye demonstrate a sufficient level of prevention of environmental harm from plastic wastes. This analysis incorporates protocols to these conventions on pollution from land-based sources and dumping. These two sources are in fact the main sources of plastic waste in the marine ecosystem as explained in section "The Overall State of the Environment and the Contribution of Türkiye to Plastic Pollution at the Black Sea and the Mediterranean Sea". Together, they cover, among others, inadequate waste management and wastewater treatment, illegal dumping of plastic waste, urban activities, transportation, and tourism. The Barcelona Convention also contains a protocol on the transboundary movements of hazardous wastes and their disposal, which specifically targets some types of plastic waste. This protocol is also analyzed due to its direct reference to plastic waste. We lastly consider action plans, strategies, subsidiary bodies, mechanisms, or means to promote the implementation of these conventions only where it is necessary to assess Türkiye's practice in relation to plastic waste.

To combat marine pollution, the UNEP has established the regional seas program in 1974 (UNEP, 2022; Alexander, 1977). The Barcelona Convention was adopted within this program in 1976 (UNTS, 1978a), and it was further amended and renamed in 1995 (UNEP, 2022; Barcelona Convention and Protocols). It aims "to prevent, abate, combat and to the fullest possible extent eliminate pollution of the Mediterranean Sea Area (…)" (Barcelona Convention, 1976, Article 4(1); see also, Preamble). The Barcelona Convention targets pollution from different sources: from dumping from ships and aircraft or incineration at sea (Article 5), ships (Article 6), exploration and exploitation of the continental shelf and the seabed and its subsoil (Article 7), land-based sources (Article 8), and transboundary movements of hazardous wastes and their disposal (Article 11). Plastic waste can be found in most of these sources, especially in land-based sources (Commission on the Protection of the Black Sea Against Pollution, 2002; UfM, 2020).

To reach its aims above, the Barcelona Convention requires its parties "to take appropriate measures" for implementation (see Article 4 in general). The Barcelona Convention has seven protocols giving relatively detailed obligations on its parties; Türkiye is a party to five of these protocols (UNEP, 2022). Below, this analysis considers three protocols to the Barcelona Convention relevant to plastic waste as explained above.

More than 15 years after the adoption of the Barcelona Convention, and soon after the dissolution of the Soviet Union, the Bucharest Convention was adopted in 1992 by riparian states of the Black Sea (UNTS, 1978b). Its overall objective is not very different from the objective of the Barcelona Convention: the prevention of pollution and preserving the marine environment of the Black Sea (Article V(2); see also, Preamble and Article XIII). It also aims at combating pollution at its source through Articles VI–VIII, X–XII, and XIV. Unlike the Barcelona Convention, Article XII to the Bucharest Convention specifically targets pollution from or through the atmosphere. There are four protocols to the Bucharest Convention, Türkiye is a party to all of them (Commission on the Protection of the Black Sea Website). Below, this analysis considers two protocols to the Bucharest Convention relevant to plastic waste as explained above.

Analysis of the Turkish Practice in Light of the Regional Sea Regimes

Both the Bucharest Convention and the Barcelona Convention require adoption of necessary measures for the elimination of marine pollution while they are very broad in scope. Protocols targeting pollution from dumping and land-based sources provide a better guideline for judging the Turkish practice (For Barcelona Convention amendments and other legal documents, Barcelona Convention Website, 2022; For Basel Convention amendments, Basel Convention Website, 2022; For Bucharest Convention amendments and other legal documents, Commission on the Protection of the Black Sea Website, 2022).

The dumping protocols in effect for both conventions use a similar method to the one found under the Basel Convention. Dumping hazardous materials is prohibited (Dumping Protocol to the Bucharest Convention, 1992, Article 2; Dumping Protocol to the Barcelona Convention, 1976, Article 4). Some plastic wastes fall under this category, e.g., the list of hazardous materials in Annex I to the dumping protocol to the Bucharest Convention includes persistent synthetic materials. Dumping of other wastes requires either a special permit (Dumping Protocol to the Bucharest Convention, 1992, Article 3; Dumping Protocol to the Barcelona Convention, 1976, Article 5) or a prior general permit from the competent national authorities (Dumping Protocol to the Bucharest Convention, 1992, Article 4; Dumping Protocol to the Barcelona Convention, 1976, Article 6). Some plastic types also fall under these categories. However, the amendment to the Dumping Protocol of the Barcelona Convention in 1995 takes a different approach. Its Article 4 bans all dumping (with some exceptions); most plastic dumping is therefore prohibited under this amended version. The amendments are not yet in force and therefore many plastics can be subjected to dumping with the required permissions.

In order to evaluate the Turkish practice on the dumping of plastic waste, we need reliable data from monitoring systems. Although there is currently a national program for monitoring marine pollution, there has been no official monitoring program for the seas until 2014 (Aydın, 2021). Prior to this date, the available marine litter information is based on several scientific studies and studies at pilot sites. In addition, the presence of plastic litter on the beaches was included in the monitoring program in 2017. However, the national monitoring program has a very limited number of stations. Therefore, the geographical context of the monitoring program is narrow, and there is still no comprehensive and continuous information on the current status of marine litter. There is very limited information about the pathways and sources of plastic pollution. Overall, what we know is that plastic pollution in Turkish seas and freshwater environments is increasing (Çevik et al., 2021). The common point of all studies is that plastic pollution is alarming (Aydın, 2021). Studies further point out that illegal dumping is still a serious issue at the seas (e.g., for the Black Sea, Ozturk & Pogozheva, 2019). Adding that amendments to the Dumping Protocol to the Barcelona Convention have never come into force since their adoption in 1995, we consider that there is a need of a further focus on plastic

pollution from dumping by parties to the regional sea regimes. Even though it is not possible to reach a clear conclusion without the information from a reliable monitoring system, it is determined that the measures taken are not sufficient for the prevention of dumping of plastics, especially considering illegal dumping.

The land-based pollution protocols that are in effect also have similar mandates. They both aim at the elimination of pollution from land-based sources and activities (Land-Based Pollution Protocol to the Bucharest Convention, 1992, Article 2 (see also Article 4(1)); Land-Based Pollution Protocol to the Barcelona Convention, 1996, Article 1). They cover a significant portion of marine plastic pollution sources that are mentioned above such as agriculture, the recycling industry, incineration of waste and management of its residues, waste and wastewater (municipal and industrial) management, tourism, and transportation (Land-Based Pollution Protocol to the Bucharest Convention, 1992, Annex–I; Land-Based Pollution Protocol to the Barcelona Convention, 1996, Annex–I). The Land-Based Pollution Protocol to the Barcelona Convention Article 5 requires its parties to develop national programs and plans, and the Land-Based Pollution Protocol to the Bucharest Convention Article 1 requires "all necessary measures" to be taken for the prevention, reduction, and control of land-based pollution. Monitoring is also given as an obligation under these protocols (Land-Based Pollution Protocol to the Bucharest Convention, 1992, Article 6, see also Article XV to the Bucharest Convention; Land–Based Pollution Protocol to the Barcelona Convention, 1996, Article 8, see also Article 12 to the Barcelona Convention).

For the monitoring obligations under the land-based pollution protocols, a plastic pollution monitoring program for freshwater ecosystems focusing explicitly on rivers was initiated in 2021, with a very limited geographical coverage. There is still no published information about the results of the program. However, it has long been established that land-based sources constitute a major source of marine pollution (for the Black Sea Krutov, 2019a, for the Mediterranean, UNEP, 2020a). Türkiye is refraining from taking major implementation steps in practice. For instance, studies show that Türkiye's discharge of municipal waste into the Black Sea is increasing (Krutov, 2019b). In order to combat implementation problems, the Strategic Action Plan for the Environmental Protection and Rehabilitation of the Black Sea was adopted under the Bucharest Convention regime (1996, renewed 2009). Several studies, as well as the Black Sea regime commission itself, point to the lack of progress in the actions of the riparian states for this action plan (Commission on the Protection of the Black Sea Against Pollution, 2002; Sofia Deklaration, 2009; Commission on the Protection of the Black Sea Against Pollution & Others, 2007; Oral, 2013; Ediboğlu, 2020). Similar to our observation about the Basel Convention, in practice, Türkiye fails to prevent the environmental hazard resulting from land-based pollution, although studies undertaken by the OECD and the UNEP conclude that the country technically has the legal instruments to address its marine environmental issues (OECD, 2008; UNEP, 2020a; see also, TMEU, 2020). Those same studies emphasize the need for a better implementation of regulations and point out many areas of improvement. For instance, the UNEP study (2020a) provides an analysis on the prospects of countries to reach the UN

Sustainable Development Goals, including Goal 12 relevant to waste issues. Türkiye is categorized under the category "significant challenges remain" for the achievement of Goal 12. Notably, for all 17 goals, Türkiye was categorized as either "significant challenges remain" or "major challenges remain." Even though this study does not cover Turkish regulations on the seas in relation to plastic waste, it is worth noting that there seems to be a pattern in the country. International standards are adopted as domestic regulations, but as in the Basel Convention example, and as the UNEP and the OECD studies mention, these regulations face serious implementation problems. Further research is needed to uncover the reasons for the problem and to suggest suitable improvements or implementation methods.

Lastly, there is a protocol to the Barcelona Convention on the transboundary movement of hazardous wastes (1996). This protocol recognizes the Basel Convention in its preamble. It however does not ban the transboundary movement of hazardous waste but regulates the standards for such wastes and calls for minimization and elimination if possible. Annex I of the protocol classifies "wastes resulting from surface treatment of metals and plastics" and "wastes from production, formulation and use of resins, latex, plasticizers, glues/adhesives" as hazardous. Even though the movement of these plastics was not banned, it is a considerable step, especially for 1996. The lack of data in practice for the implementation of this protocol is identified by the UNEP's analysis on the Barcelona Convention regime (2020a). Nevertheless, regarding the unprecedented plastic waste pollution and the environmental damage in the Turkish regional seas as demonstrated above (Gündoğdu & Walker, 2021), there is room for improvement at the implementation level of the protocol.

The lack of a good monitoring system makes it very hard to point to the exact issues regarding the Turkish practice on marine plastic pollution. We however know, as explained in section "The Overall State of the Environment and the Contribution of Türkiye to Plastic Pollution at the Black Sea and the Mediterranean Sea", that the plastic pollution at both regional seas is increasing and that this situation harms the marine ecosystem significantly. The state of the environment signals that the country is not sufficiently acting toward the achievement of the objectives of the regional sea regimes at the Black Sea and the Mediterranean. We therefore repeat our recommendation that Türkiye has to stop its plastic waste imports. The country needs to focus on managing its municipal waste, which also represents a major marine plastic source (e.g., Commission on the Protection of the Black Sea Against Pollution, 2002; UNEP, 2020a; UfM, 2020). We lastly emphasize that Türkiye needs to strongly prioritize its implementation means for its domestic waste laws, even though they may be designed according to international standards.

Plastic Waste Impacts on the Air

The GHG contribution from the whole lifecycle of plastic is around 3.4% of global GHG emissions (OECD 2022a, b, c). The plastic life cycle could take up to 15% of the global GHG emission budget for keeping the global temperature increase at

1.5 °C by 2050 (UNEP, 2021). This makes the plastic industry directly relevant to the efforts to combat climate change, which is mainly caused by the high concentration of GHGs (for the full list of GHG, see IPCC, 2007b; for the GHG-climate change relationship, IPCC, 2015; IPCC, 1990). For instance, methane, a GHG gas that contributes significantly to global warming, is released during the microbial biodegradation of plastics (IPCC, 2007a). The waste management aspect of plastic waste is a contributor to its emission rate. In fact, the share of plastic waste in the MSW can be up to %20 (Lebreton & Andrady, 2019; Çevik et al., 2021).

The UN climate change regime treaties (UNFCCC, 1992; Kyoto Protocol, 1997; Paris Agreement, 2015) aim at limiting the GHG concentration in the atmosphere. More specifically, the Paris Agreement (2015) Article 2(1)(a) targets to keep the temperature increase below 2 °C in comparison to pre-industrial levels. In order to achieve these aims, the mitigation of GHGs and a global peak of GHG emissions by the second half of the century is necessary (Paris Agreement, 2015, Article 4(1); see also, UNFCCC, 1992, Article 2). The UN Framework Convention on Climate Change and the subsequent Kyoto Protocol acknowledge waste management as a source of GHG emissions (UNFCCC, 1992, Article 4(1)(c); Kyoto Protocol, 1997, Article 2(1)(a)(viii) and Article 10(b)(i)). The Kyoto Protocol specifically lists "waste" in its Annex A as a category of a sector/source for GHGs. Even though the latest agreement to the regime, the Paris Agreement, does not make a reference to waste, waste management and plastic waste are increasingly important topics in the discussions of the parties to the Paris Agreement. For instance, there was a side event at the latest Conference of Parties in 2022 about plastic waste (UNODC, 2022). Below, the effects of plastic waste on the air are explained, and a brief analysis is conducted regarding the GHG mitigation rate of Turkish plastic waste management practices and overall climate change commitments.

Burning plastic with or without MSW is a potential non-point source of emission, which causes serious concerns, especially in the Global South and Türkiye. There are two main effects of plastic waste on air quality. One is related to the chemicals added during the production or released during the burning of plastics, and the second are micro- and nanoplastics. The burning of plastic can release major pollutants (dioxin, furans, polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs) particulate matter, benzene, toluene, ethyl benzene and 1-hexene) and GHG (Petrlik et al., 2021). Moreover, burning chlorinated plastics such as polyvinyl chloride liberates hazardous halogens and pollutes the air (Petrlik et al., 2021). The released noxious substances are posing a threat to human and environmental health. Burning plastics, a common disposal practice of imported plastic waste in the Global South and Türkiye, may hence alter air quality. Therefore, this can result in risks of heart disease, aggravating respiratory ailments such as asthma and emphysema and causing rashes, nausea or headaches, and damage to the nervous system (Halden, 2010; Faroon & Ruiz, 2016; Greenpeace, 2022).

Türkiye's import of plastic waste has led to illegal disposal methods that pose even more serious problems. Indeed, much of the open waste burning occurs in dumpsites that have been filled far beyond their maximum capacity. Dumpsite waste fires are either started intentionally to reduce the waste volume or occur

spontaneously. As stated in Interpol (2020), there is a sharp increase in intentional waste fires in plastic recycling facilities related to waste trade globally. Since 2016, there have been more than 250 open waste fires at plastic recycling facilities (PRFs) in Türkiye, with 121 incidents recorded in 2021. In the media, numerous claims have been stated attributing the cause of the fires to deliberate actions taken by PRF operators to destroy low-value and hard-to-recycle post-consumer plastics, whether they were collected domestically in Türkiye or exported from Western countries. However, the lack of thorough investigation by the Turkish authorities means that these suspicions have yet to be substantiated with conclusive evidence. According to another report from Greenpeace in the UK, Germany, and Türkiye, soil samples taken from areas where waste was illegally dumped or burned contained an alarming level of persistent organic chemicals (Greenpeace, 2021). These hazardous substances can also be released into the air. The report revealed the presence of 16 different carcinogenic PAHs, 18 types of PCBs that exhibit dioxin-like toxicity, 17 types of polychlorinated dibenzo-dioxins/furans (PCDD/F) commonly known as dioxins/furans, and 18 different heavy metals and metalloids. All five locations showed a variety of toxic chemicals, many of which are known to be produced during the burning of plastics. Turkish plastic waste management practice has serious adverse effects for the country's air quality.

Statistics show that Turkish waste management practices also have an effect on the country's emissions. The emissions from the waste industry have been less than 5% of total emissions in the country since the 1990s (TÜİK, 2023). However, within the same timeframe, GHG emissions in the country increased in all sectors and waste emissions have grown more than 30%. Even though we acknowledge that plastic waste emissions are not constituting a significant portion of Türkiye's GHG emissions, they are still considerable and significantly pollute the environment as discussed above.

Looking at the climate change plans and policies of the country, Türkiye's intended nationally determined contribution in 2015 was considered critically insufficient (Climate Action Tracker, 2022a; Republic of Turkey, 2015). In 2021, Türkiye announced its net zero targets for 2053, which was considered poor (Climate Action Tracker, 2022b). Türkiye updated its nationally determined contribution in 2023 and again was considered critically insufficient (Climate Action Tracker, 2023; Republic of Türkiye, 2023). The updated contribution identified the county's emission peak year as 2038. Emissions are therefore expected to increase until 2038. This means an approximately 30% increase in GHG emissions from the 2020 levels in the country, which could be an indicator of the emission rate of the plastic waste industry in the near future. In fact, considering the abovementioned illegal waste imports and illegal burning, it is unlikely that Türkiye can reach an emission peak from waste management in the short term.

When Türkiye's national communications with the climate change regime (TMEU, 2016) and its climate change action plan (TMEU, 2012) are investigated, it is noticeable that the word "plastic waste" is absent. In contrast, the word "waste" is excessively used. Concerning the recent developments under the UN regarding

the adoption of a plastic treaty (UNEA, 2022; Bergmann et al., 2022), Türkiye needs to make plans to specifically target plastic waste.

The country is often criticized about its climate change plans and policies (e.g., Climate Action Tracker, 2023; Ediboglu Sakowsky, 2023). We also underline that plastic waste management practices of Türkiye negatively contribute to its efforts on combating climate change and harm its environment. The country should work on managing its issue of illegal burning of plastic waste, which translates into the adoption of better waste management systems and not overburdening the system with plastic imports.

Prospects and Recommendations

Türkiye ranks second after Germany in Europe and seventh in the world for plastic production (PAGEV, 2021). Yet, current domestic waste management and recycling schemes are insufficient to handle domestic plastic waste generation and do not sufficiently prevent plastic pollution (Gündoğdu & Walker, 2021). This chapter analyzed the impact of imported plastic waste on the environment in Türkiye and concluded that Türkiye's waste import threatens its waste management infrastructure and environment. Furthermore, we conclude that Türkiye fails to comply with the substantive obligations under the Basel Convention relevant to plastic waste and falls short of adopting the necessary standards demanded by the regional seas and climate change regimes in order to protect its environment from the adverse effects of plastic waste.

In terms of prospects, Türkiye's stance toward multilateral agreements has undergone a shift in the last 5 years (Oğuzlu, 2019; Aral, 2022). The country adopted a more unilateral approach. We argue that this approach is likely to extend to the UN Plastic Treaty. The Turkish delegation's poor and superficial preparation, as evidenced by their low-level participation in the first UN Plastic Treaty negotiation meeting held in Uruguay in December 2022, suggests this trend. The delegation's speech centered on the national zero waste action plan, bag fee, and cleaning campaigns. Türkiye's approach to the Plastic Treaty is characterized by two priorities: the intention to gain financial support from the agreement's funding and the desire to lead a regional initiative for the plastic agreement. While these objectives are commendable, the current investments on petrochemistry, waste import, and growth in plastic production render Türkiye's current position questionable. Despite Türkiye's expressed support for the Plastics Treaty, the country's significant investments in petrochemicals and plans for long-term growth in plastic production render this position ineffective. Moreover, Türkiye's coastal areas, particularly on the Mediterranean coast, suffer from high pollution levels, and the country has yet to take significant measures to address this issue, making it less likely for Türkiye to serve as a regional leader in the fight against plastic pollution.

In light of the above, Türkiye should ban the import of plastic waste, which is the subject of numerous illegal activities, while it is not yet sufficiently capable of

managing its own waste. In addition, it should adopt a domestic waste management strategy by ending its investment support for the industry, which is dependent on the import. Türkiye should strongly prioritize its implementation means to comply with its obligations under the Basel Convention concerning plastic waste management and environmental protection. Even though most of the procedural obligations of the Convention were adopted by Türkiye, their implementation is fragile, at a level where they can be seen as absent. Implementation focus is a must for Türkiye.

References

Alexander, L. M. (1977). Regional arrangements in the oceans. *American Journal of International Law, 71*(1), 84–109.

Aral, B., 2022. Turkey's voting preferences in the UN General Assembly during the AK Party Era as a counterchallenge to its 'new' foreign policy. Journal of Balkan and Near Eastern Studies doi: https://doi.org/10.1080/19448953.2022.2143852. Access date: 01.07.2023.

Artüz, M. L., Artüz, O. B., & Artüz, S. D. (2021). First report of quantification and classification of buried litter on the public beaches around the Sea of Marmara, Turkey. *Marine Pollution Bulletin, 165*, 112–117.

Aydın, M. (2021). *Evaluation of the European Union and Turkish Legislation and practice in the context of marine litter problem*. Middle East Technical University.

Aytan, U., Sahin, F. B. E., & Karacan, F. (2020). Beach Litter on Sarayköy Beach (SE Black Sea): Density, composition, possible sources and associated organisms. *Turkish Journal of Fisheries and Aquatic Sciences, 20*(2), 137–145.

Aytan, U., Esensoy, F. B., & Senturk, Y. (2022). Microplastic ingestion and egestion by copepods in the Black Sea. *Science of the Total Environment, 806*, 150921.

Barcelona Convention for the Protection of the Mediterranean Sea Against Pollution. Adopted Feb. 16, 1976, entered into force Feb. 12, 1978. 1102 U.N.T.S. 44.

Basel Action Network Website. (2022). *Turkey import data*. https://www.ban.org/plastic-waste-project-hub/trade-data/turkey-import-data. Access date: 01.07.2023.

Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal. Adopted March 22, 1989, entered into force May 5, 1992. 1673 U.N.T.S. 57.

Basel Convention Website. (2020). *Basel convention national reports – Year 2020*. Türkiye. http://www.basel.int/Countries/NationalReporting/NationalReports/BC2020Reports/tabid/8989/Default.aspx. Access date: 01.07.2023.

Basel Convention Website. (2022a). *Country profiles*: Türkiye. http://www.basel.int/Countries/CountryProfiles/tabid/4498/Default.aspx#. Access date: 01.07.2023.

Basel Convention Website. (2022b). Plastic Waste Amendment, Status of Ratification. http://www.basel.int/Countries/StatusofRatifications/PlasticWasteamendments/tabid/8377/Default.aspx. Access date: 01.07.2023.

Bergmann, M., Almroth, B. C., Brander, S. M., et al. (2022). A global plastic treaty must cap production. *Science, 376*(6592), 469–470.

Berkun, M., Aras, E., & Anılan, T. (2011). Solid waste management practices in Turkey. *Journal of Material Cycles and Waste Management, 13*(4), 305–313.

Blettler, M. C. M., Abrial, E., Khan, F. R., Sivri, N., & Espinola, L. A. (2018). Freshwater plastic pollution: Recognizing research biases and identifying knowledge gaps. *Water Research, 143*, 416–424.

Bucharest Convention Convention on the Protection of the Black Sea Against Pollution. Adopted April 21, 1992, entered into force Jan. 15, 1994. 1764 U.N.T.S. 3.

By–Law on Control of Packaging Wastes. (2021). No: 31523.

By–Law on Organized Landfill of Wastes. (2010). No: 27533.
By–Law on the Incineration of Wastes. (2010). No: 27721.
By–Law on Waste Management. (2015). No: 29314.
By–Law on Zero Waste. (2019). No: 30829.
Çevik, C., Kıdeyş, A. E., Tavşanoğlu, Ü. N., Kankılıç, G. B., & Gündoğdu, S. (2021). A review of plastic pollution in aquatic ecosystems of Turkey. *Environmental Science and Pollution Research, 1*, 1–20.
Climate Action Tracker. (2022a). *Türkiye: Country summary*. https://climateactiontracker.org/countries/turkey/. Access date: 01.07.2023.
Climate Action Tracker. (2022b). *Türkiye: Net zero targets*. https://climateactiontracker.org/countries/turkey/net-zero-targets/. Access date: 01.07.2023.
Climate Action Tracker. (2023). *Türkiye: Country summary*. https://climateactiontracker.org/countries/turkey/. Access date: 01.07.2023.
Commission on the Protection of the Black Sea Against Pollution. (2002). *State of the Environment of the Black Sea: Pressures and trends 1996–2000*. http://www.blacksea-commission.org/_publ-SOE2002-eng.asp. Access date: 01.07.2023.
Commission on the Protection of the Black Sea Against Pollution, BSERP, GEF, UNDP, & UNOPS. (2007). *Black Sea transboundary diagnostic analysis*. https://iwlearn.net/resolveuid/027884cd-d97e-4ec5-ac6b-60f4db3f277f. Access date: 01.07.2023.
Commission on the Protection of the Black Sea Website. Official Documents. http://www.blacksea-commission.org/Official%20Documents/. Access date: 01.07.2023.
Communiqué on Procedures and Principles Regarding the Establishment and Operation of Waste Collection Centers and Zero Waste Practices Waste Collection Centres. (2021). https://cygm.csb.gov.tr/genelgeler-i-442. Access date: 01.07.2023.
Comolli, V. (2021). Plastic for profit: Tracing illicit plastic waste flows, supply chains and actors. *Global Initiative against Transnational Organized Crime*. Geneva, Switzerland. https://globalinitiative.net/wp-content/uploads/2021/10/GITOC-Plastic-for-Profit.pd.
Conference of Parties to the Basel Convention. (1995). Decision III/1.
Conference of the Parties to the Basel Convention. (2019). Decision BC–14/12.
Constitution of the Republic of Türkiye. (1982). No: 2709.
Dehghani, S., Moore, F., & Akhbarizadeh, R. (2017). Microplastic pollution in deposited urban dust, Tehran metropolis, Iran. *Environmental Science and Pollution Research, 24*(25), 20360–20371.
Duis, K., & Coors, A. (2016). Microplastics in the aquatic and terrestrial environment: sources (with a specific focus on personal care products), fate and effects. *Environmental Sciences Europe, 28*(1), 1–25.
Ediboğlu, E. (2020). Karadeniz'deki Ekolojik Krizin Hukuki Analizi ile Türkiye ve Rusya'nın Duruma Etkileri (The legal analysis of the ecological crisis in the Black Sea and the effects of Turkey and Russia on the issue). In E. H. Kılıçbeyli (Ed.), *Yılında Türkiye Rusya İlişkileri: Çok Taraflı Gelişmeler, Karşılıklı Etkileşimler* (Vol. 100, pp. 55–91). NİKA Yayınevi.
Ediboğlu Sakowsky, E. (2023). Türkiye: A climate financing opportunist? In M. Kaeding, J. Pollak, & P. Schmidt (Eds.), *Climate change and the future of Europe* (pp. 163–166). https://doi.org/10.1007/978-3-031-23328-9_37 Springer.
EIA. (2021). *The Truth Behind Trash: The scale and impact of the international trade in plastic waste*. https://eia-international.org/report/the-truth-behind-trash-the-scale-and-impact-of-the-international-trade-in-plastic-waste/. Access date: 01.07.2023.
Faroon, O., & Ruiz, P. (2016). Polychlorinated biphenyls: New evidence from the last decade. *Toxicology and Industrial Health, 32*(11), 1825–1847.
For Barcelona Convention amendments and other legal documents, Barcelona Convention Website. (2022). *Barcelona convention and protocols*. https://www.unep.org/unepmap/who-we-are/barcelona-convention-and-protocols. Access date: 01.07.2023.
For Basel Convention amendments, Basel Convention Website. (2022). *Amendments*. http://www.basel.int/TheConvention/Amendments/Overview/tabid/2759/. Access date: 01.07.2023.

For Bucharest Convention amendments and other legal documents, Commission on the Protection of the Black Sea Website. (2022). Table of Main Legal Documents. http://www.blacksea-commission.org/Official%20Documents/Table%20of%20Legal%20Documents/. Access date: 01.07.2023.

Galloway, T., & Lewis, C. (2017). Marine microplastics. *Current Biology, 27*(11), R445–R446.

Gedik, K., Eryaşar, A. R., & Gözler, A. M. (2022). The microplastic pattern of wild–caught Mediterranean mussels from the Marmara Sea. *Marine Pollution Bulletin, 175*, 113331.

GESAMP. (2015). *Sources, fate and effects of microplastics in the marine environment: A global assessment*. http://www.gesamp.org/publications/reports-and-studies-no-90. Access date: 01.07.2023.

González-Fernández, D., Cózar, A., Hanke, G., et al. (2021). Floating macrolitter leaked from Europe into the ocean. *Nature Sustainability, 4*(6), 474–483.

Greenpeace Malaysia. (2018). *The toxic after–Effects of the imported plastic waste in Malaysia*. https://www.greenpeace.org/southeastasia/publication/4058/the-recycling-myth-2-0-the-toxic-after-effects-of-imported-plastic-waste-in-malaysia/. Access date: 01.07.2023.

Greenpeace UK. (2021). *Trashed: How the uk is still dumping plastic waste on the rest of the world*. https://www.greenpeace.org.uk/wp-content/uploads/2021/05/Trashed-Greenpeace-plastics-report-final.pdf. Access date: 01.07.2023.

Greenpeace UK. (2022). *Game of waste*. https://www.greenpeace.org.uk/resources/game-of-waste-report/. Access date: 01.07.2023.

Gündoğdu, S. (2018). Contamination of table salts from Turkey with microplastics. *Food Additives and Contaminants – Part A Chemistry, Analysis, Control, Exposure and Risk Assessment, 35*(5), 1006–1014.

Gündoğdu, S., & Çevik, C. (2017). Micro– and mesoplastics in Northeast Levantine coast of Turkey: The preliminary results from surface samples. *Marine Pollution Bulletin, 118*(1–2), 341–347.

Gündoğdu, S., & Walker, T. R. (2021). Why Turkey should not import plastic waste pollution from developed countries? *Marine Pollution Bulletin, 171*, 112772.

Gündoğdu, S., Çevik, C., Güzel, E., & Kilercioğlu, S. (2018). Microplastics in municipal wastewater treatment plants in Turkey: A comparison of the influent and secondary effluent concentrations. *Environmental Monitoring and Assessment, 190*(626), 1–10.

Gündoğdu, S., Ayat, B., Aydoğan, B., Çevik, C., & Karaca, S. (2022). Hydrometeorological assessments of the transport of microplastic pellets in the Eastern Mediterranean. *Science of the Total Environment, 823*, 153676.

Güven, O., Gökdağ, K., Jovanović, B., & Kıdeyş, A. E. (2017). Microplastic litter composition of the Turkish territorial waters of the Mediterranean Sea, and its occurrence in the gastrointestinal tract of fish. *Environmental Pollution, 223*, 286–294.

Halden, R. U. (2010). Plastics and health risks. *Annual Review of Public Health, 31*(1), 179–194.

HRW. (2022). *It's as if they're poisoning us – The health impacts of plastic recycling in Turkey*. https://www.hrw.org/report/2022/09/21/its-if-theyre-poisoning-us/health-impacts-plastic-recycling-turkey. Access date: 01.07.2023.

International Court of Justice. Legality of the Threat or Use of Nuclear Weapons. (1996). *ICJ reports 1996, Advisory Opinion*.

INTERPOL. (2020). *Emerging criminal trends in the global plastic waste market since January 2018 – Strategic analysis report*.

IPCC. (1990). *Climate change: The Intergovernmental Panel on Climate Change Impacts Assessment*. Australian Government Publishing Service.

IPCC. (2007a). *Climate change 2007: Mitigation*. Cambridge University Press.

IPCC. (2007b). *Climate change 2007: The physical science basis*. Cambridge University Press.

IPCC. (2015). *Climate change 2014: Synthesis report*. https://www.ipcc.ch/report/ar5/syr/. Access date: 01.07.2023.

IPCC. (2022). *Climate change 2022: Mitigation of climate change*. https://www.ipcc.ch/report/ar6/wg3/downloads/report/IPCC_AR6_WGIII_FullReport.pdf. Access date: 01.07.2023.

Jambeck, J. R., Geyer, R., Wilcox, C., et al. (2015). Plastic waste inputs from land into the ocean. *Science, 347*(6223), 768–771.

Karasik, R. (2022). Plastic pollution policy country profile: Turkey. *Ni Pb*, December 2021. https://nicholasinstitute.duke.edu/sites/default/files/projects/Plastic-Pollution-Policy-Country-Profile-Turkey.pdf. Access date: 01.07.2023.

Kaza, S., Yao, L.C., Bhada-Tata, P., & Van Woerden, F. (2018). *What a waste 2.0: A global snapshot of solid waste management to 2050*. World Bank. https://openknowledge.worldbank.org/entities/publication/d3f9d45e-115f-559b-b14f-28552410e90a. Access date: 01.07.2023.

Kideys, A. E., & Aydın, M. (2020). *Marine Litter Watch (MLW) European Beach Litter Assessment 2013–2019* (ETC/ICM Technical Report 2/2020) (p. 26). European Topic Centre on Inland, Coastal and Marine Waters.

Krutov, A. (2019a). Land Base Sources. In A. Krutov (Ed.), *State of the Environment of the Black Sea (2009–2014/5)* (pp. 46–61). Commission on the Protection of the Black Sea Against Pollution.

Krutov, A. (2019b). Executive summary. In A. Krutov (Ed.), *State of the environment of the Black Sea (2009–2014/5)* (pp. 1–7). Commission on the Protection of the Black Sea Against Pollution.

Kummer, K. (1992). The international regulation of transboundary traffic in hazardous wastes: The 1989 Basel Convention. *The International and Comparative Law Quarterly, 41*(3), 530–562.

Kummer, K. (1995). *International management of hazardous wastes*. Oxford University Press.

Kummer, P. K., Ziegler, A. R., & Baumgartner, J. (Eds.). (2016). *Waste management and the green economy: Law and policy*. Edward Elgar.

Kyoto Protocol. Adopted Dec. 1, 1997, entered into force Feb. 16, 2005. 2303 U.N.T.S. 148.

Law on Environment. (1983). No: 2872.

Lebreton, L., & Andrady, A. (2019). Future scenarios of global plastic waste generation and disposal. *Palgrave Communications, 5*(1), 6.

Lebreton, L. C. M., Van Der Zwet, J., Damsteeg, J. W., Slat, B., Andrady, A., & Reisser, J. (2017). River plastic emissions to the world's oceans. *Nature Communications, 8*(1), 1–10.

Liubartseva, S., Coppini, G., Lecci, R., & Clementi, E. (2018). Tracking plastics in the Mediterranean: 2D Lagrangian model. *Marine Pollution Bulletin, 129*(February), 151–162.

Lusher, A., Hollman, P., & Mendozal, J. (2017). *Microplastics in fisheries and aquaculture: Status of knowledge on their occurrence and implications for aquatic organisms and food safety* (FAO Fisheries and Aquaculture Technical Paper 615).

Lusher, A. L., Hernandez-Milian, G., Berrow, S., Rogan, E., & O'Connor, I. (2018). Incidence of marine debris in cetaceans stranded and bycaught in Ireland: Recent findings and a review of historical knowledge. *Environmental Pollution, 232*, 467–476.

Metropolitan Municipalities Law. (2004). No: 5216.

Municipality Law. (2005). No: 5393

Nizzetto, L., Futter, M., & Langaas, S. (2016). Are agricultural soils dumps for microplastics of urban origin? *Environmental Science & Technology, 50*(20), 10777–10779.

OECD. (2008). *Environmental performance reviews: Turkey*. https://www.oecd-ilibrary.org/environment/oecd-environmental-performance-reviews-turkey-2008_9789264049161-en. Access date: 01.07.2023.

OECD. (2020). *Municipal waste, generation and treatment*. https://stats.oecd.org/Index.aspx?DataSetCode=MUNW. Access date: 01.07.2023.

OECD. (2022a). *Global plastics outlook: Economic drivers, environmental impacts and policy options*. OECD Publishing.

OECD. (2022b). *Plastic leakage and greenhouse gas emissions are increasing*. https://www.oecd.org/environment/plastics/increased-plastic-leakage-and-greenhouse-gas-emissions.htm. Access date: 01.07.2023.

OECD. (2022c). *Greenhouse gas emissions from plastics lifecycle – Projections for all scenarios*. https://stats.oecd.org/viewhtml.aspx?datasetcode=PLASTIC_GHG_V2_1&lang=en. Access date: 01.07.2023.

Oğuzlu, T. (2019). Turkey and the West: Geopolitical shifts in the AK Party era. *Turkey's Pivot to Eurasia*, 15–30. https://doi.org/10.4324/9780429023064-2. Access date: 01.07.2023.

Oral, N. (2013). *Regional co–operation and protection of the marine environment under international law: The Black Sea*. Martinus Nijhoff Publishers.

Ozturk, B., & Pogozheva, M. (2019). Marine litter. In A. Krutov (Ed.), *State of the environment of the Black Sea (2009–2014/5)* (pp. 212–222). Commission on the Protection of the Black Sea Against Pollution.

PAGEV. (2021). *Türkiye plastik sektör izleme raporu 2021*. https://pagev.org/upload/files/Plastik%20%20Sekt%C3%B6r%20Raporu%202021%20%28Ocak%20-Aral%C4%B1k%29.pdf. Access date: 01.07.2023.

Paris Agreement. Adopted Dec. 12, 2015, entered into force Nov. 4, 2016. FCCC/CP/2015/10/Add.1, Annex.

Petrlik, J., Bell, L., Beeler, B., Møller, M., Jopkova, M., & Brabcova, K. (2021). *Plastic waste poisoning food and threatening communities in Africa, Asia, Central & Eastern Europe and Latin America*.

Pokazeev, K., Sovga, E., & Chaplina, T. (2021). *Pollution in the Black Sea: Observations about the Ocean's pollution*. Springer.

Praagh, M., Hartman, C., & Brandmyr, E. (2018). *Microplastics in landfill leachates in the Nordic countries*. Nordic Council of Ministers. https://www.diva-portal.org/smash/get/diva2:1277395/FULLTEXT01.pdf. Access date: 01.07.2023.

Public Expenditures Monitoring Platform. Paris Anlaşması Öncesi ve Sonrası İklim Değişikliğine Yönelik Bütçeler: 14 Büyükşehir Belediyesinin Çevre Koruma ve İklim Değişikliği (ÇKİD) ile ilgili Performans Hedeflerinin Karşılaştırılması: 2021–2022 İzleme Sonuçları (Budgets for Climate Change Before and After Paris Agreement: Comparison of Performance Targets of 14 Metropolitan Municipalities on Environmental Protection and Climate Change (EPCC): 2021–2022 Monitoring Results). (2022). https://www.kahip.org/wp-content/uploads/2022/10/CKID-301022sonsite.pdf. Access date: 01.07.2023.

Republic of Turkey. (2015). *Intended nationally determined contribution*. https://unfccc.int/sites/default/files/NDC/2022-06/The_INDC_of_TURKEY_v.15.19.30.pdf. Access date: 01.07.2023.

Republic of Türkiye. (2023). *Updated first nationally determined contribution*. https://unfccc.int/sites/default/files/NDC/2023-04/T%C3%9CRK%C4%B0YE_UPDATED%201st%20NDC_EN.pdf. Access date: 01.07.2023.

Republic of Türkiye Ministry of Trade. (2020, December 31). Çevrenin Korunması Yönünden Kontrol Altında Tutulan Atıkların İthalat Denetimi Tebliği (Ürün Güvenliği ve Denetimi: 2021/3). Number: 31351 (4. Mükerrer).

Republic of Türkiye Ministry of Trade. (2021a, July 10). Çevrenin Korunması Yönünden Kontrol Altında Tutulan Atıkların İthalat Denetimi Tebliği (Ürün Güvenliği ve Denetimi: 2021/3)'nde Değişiklik Yapılmasına Dair Tebliğ (Ürün Güvenliği ve Denetimi: 2021/36). Number: 31537.

Republic of Türkiye Ministry of Trade. (2021b, May 18). Çevrenin Korunması Yönünden Kontrol Altında Tutulan Atıkların İthalat Denetimi Tebliği (Ürün Güvenliği ve Denetimi: 2021/3)'nde Değişiklik Yapılmasına Dair Tebliğ (Ürün Güvenliği ve Denetimi: 2021/33). Number: 31485.

Republic of Türkiye Ministry of Trade. (2022, December 31). Çevrenin Korunması Yönünden Kontrol Altında Tutulan Atıkların İthalat Denetimi Tebliği (Ürün Güvenliği ve Denetimi: 2023/3). Number: 32060 (4. Mükerrer).

Rio Declaration on Environment and Development. (1992). 31 I.L.M. 874.

Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade. Adopted, Sept. 10, 1998, entered into force Feb. 24, 2004. 2244 U.N.T.S. 337.

Sıfır Atık (Zero Waste). (2017). https://sifiratik.gov.tr/. Access date: 01.07.2023.

Silva, A. L. P., Prata, J. C., Duarte, A. C., Soares, A. M. V. M., Barceló, D., & Rocha-Santos, T. (2021). Microplastics in landfill leachates: The need for reconnaissance studies and remediation technologies. *Case Studies in Chemical and Environmental Engineering, 3*, 100072. https://doi.org/10.1016/J.CSCEE.2020.100072. Access date: 01.07.2023.

Şirin, M., Daban, İ. B., İşmen, A., & Arslan İhsanoğlu, M. (2022). Benthic marine litter in the Marmara Sea, Turkey. *Ege Journal of Fisheries and Aquatic Sciences, 39*(2), 111–119.

Sofia Decleration. (2009). http://www.blacksea-commission.org/Official%20Documents/#RegionalCommittment-Sofia2009. Access date: 01.07.2023.
Stoica, E., Atabay, H., Bat, L., & Ciuca, A. (2020). Marine litter occurrence in the river–influenced Black Sea coast Marine litter occurrence in the river–influenced Black Sea coast. In Ü. Aytan, M. Pogojeva, & A. Simeonova (Eds.). Marine litter in the Black Sea. https://scholar.google.com.tr/scholar?hl=tr&as_sdt=0%2C5&q=Marine+litter+occurrence+in+the+river-influenced+Black+Sea+coast&btnG=. Access date: 01.07.2023
Strokal, V., Kuiper, E. J., Bak, M. P., et al. (2022). Future microplastics in the Black Sea: River exports and reduction options for zero pollution. *Marine Pollution Bulletin, 178*, 113633.
Su, Y., Zhang, Z., Wu, D., Zhan, L., Shi, H., Xie, B. (2019). Occurrence of microplastics in landfill systems and their fate with landfill age. Water Research. 164, 114968. doi: https://doi.org/10.1016/j.watres.2019.114968. Access date: 01.07.2023.
Sun, J., Zhu, Z. R., Li, W. H., Yan, X., Wang, L. K., Zhang, L., Jin, J., Dai, X., & Ni, B. J. (2021). Revisiting microplastics in landfill leachate: Unnoticed tiny microplastics and their fate in treatment works. *Water Research, 190*, 116784. https://doi.org/10.1016/j.watres.2020.116784. Access date: 01.07.2023.
Suzuki, G., Uchida, N., Tuyen, L. H., et al. (2022). Mechanical recycling of plastic waste as a point source of microplastic pollution. *Environmental Pollution, 303*, 119114.
TMEU. (2012). *Republic of Turkey Climate Change Action Plan 2011–2023*. https://webdosya.csb.gov.tr/db/iklim/editordosya/iklim_degisikligi_eylem_plani_EN_2014.pdf. Access date: 01.07.2023.
TMEU. (2016). *Sixth National Communication of Turkey under the UNFCCC*. https://unfccc.int/files/national_reports/non-annex_i_natcom/application/pdf/6_bildirim_eng_11_reducedfilesize.pdf. Access date: 01.07.2023.
TMEU. (2017). Ulusal Atık Yönetimi ve Eylem Planı 2023 (National Waste Management and Action Plan 2023). https://webdosya.csb.gov.tr/db/cygm/haberler/ulusal_at-k_yonetm%2D%2Deylem_plan%2D%2D20180328154824.pdf. Access date: 01.07.2023.
TMEU. (2020). *6th State of Environment Report for Republic of Turkey*. https://webdosya.csb.gov.tr/db/ced/icerikler/tc-dr_2020_-ng-l-zce-20210430143751.pdf. Access date: 01.07.2023.
TMEUCC. (2022). *Turkish Ministry of Environment, Urbanisation and Climate Change, Yönetmelikler (By-Laws)*. https://cygm.csb.gov.tr/yonetmelikler-i-440. Access date: 01.07.2023.
TÜİK. (2021). Atık İstatistikleri, 2020. https://data.tuik.gov.tr/Bulten/Index?p=Atik-Istatistikleri-2020-37198. Access date: 01.07.2023.
TÜİK. (2022). Sera Gazı Emisyon İstatistikleri 1990-2020 (Greenhouse gas emission statistics). https://data.tuik.gov.tr/Bulten/Index?p=Sera-Gazi-Emisyon-Istatistikleri-1990-2020-45862. Access date: 01.07.2023.
TÜİK. (2023). Sera Gazı Emisyon İstatistikleri 1990–2021 (Greenhouse gas emission statistics). https://data.tuik.gov.tr/Bulten/Index?p=Sera-Gazi-Emisyon-Istatistikleri-1990-2021-49672. Access date: 01.07.2023.
UfM. (2020). *Reaching the 2020 Horizon: 14 years of Mediterranean cooperation on Environment*. https://www.h2020.net/resources/final-h2020-report/send/342-final-h2020-report/3400-final-h2020-report. Access date: 01.07.2023.
UNEA. (2022). Resolution adopted by the United Nations Environment Assembly of the United Nations Environment Programme: 5/14: End plastic pollution: Towards an internaional legally binding instrument. UNEP/EA.5/Res.14.
UNEP. (2016). *Marine plastic debris and microplastics – Global lessons and research to inspire action and guide policy change*. https://wedocs.unep.org/handle/20.500.11822/7720. Access date: 01.07.2023.
UNEP. (2020a). *State of the Environment and Development in the Mediterranean*. https://wedocs.unep.org/handle/20.500.11822/38057. Access date: 01.07.2023.
UNEP. (2020b). *Mediterranean Action Plan (MAP)*. https://www.unep.org/unepmap/. Access date: 01.07.2023.

UNEP. (2021). *From Pollution to Solution: A global assessment of marine litter and plastic pollution*. https://www.unep.org/resources/pollution-solution-global-assessment-marine-litter-and-plastic-pollution. Access date: 01.07.2023.

UNEP. (2022). *Mediterranean Action Plan Website*. Türkiye. https://www.unep.org/unepmap/who-we-are/contracting-parties/turkey. Access date: 01.07.2023.

UNFCCC. (1992). The United Nations Framework Convention on Climate Change Adopted May 9, 1992, entered into force March 21, 1994. 1771 U.N.T.S. 107.

Ünker, P. (2022). *14 milyar dolarlık atık nasıl zehirliyor?* DW. https://www.dw.com/tr/at%C4%B1%C4%9Fa-14-milyar-dolar-veren-t%C3%BCrkiyede-denetimler-yeterli-mi/a-62605786. Access date: 01.07.2023.

UNODC. (2022). *COP27 Side Event: Unmanaged Waste – A hidden cause of climate change*. https://www.unodc.org/unodc/en/environment-climate/cop27-unmanaged-waste.html. Access date: 01.07.2023.

UNSG. (1989). *Report of the Secretary-General on Illegal Traffic in Toxic and Dangerous Products and Wastes*, U.N. Doc. A/44/362 and Corr. 1.

UNTS. (1978a). Convention for the protection of the Mediterranean Sea against pollution. .. https://treaties.un.org/pages/showDetails.aspx?objid=08000002800f6a1c. Access date: 01.07.2023.

UNTS. (1978b). Convention on the protection of the Black Sea against pollution. Barcelona. https://treaties.un.org/Pages/showDetails.aspx?objid=08000002800b25b8&clang=_en. Access date: 01.07.2023.

Wan, Y., Chen, X., Liu, Q., Hu, H., Wu, C., & Xue, Q. (2022). Informal landfill contributes to the pollution of microplastics in the surrounding environment. *Environmental Pollution, 293*, 118586. https://doi.org/10.1016/j.envpol.2021.118586. Access date: 01.07.2023.

Zhao, C., Qi, X., Wang, J., Du, F., & Shi, X. (2022). Predicting possible new links to future global plastic waste trade networks. *Sustainability (Switzerland), 14*(8), 4692.

The Waste Trade as a Tool of Colonialism in Our Age: A Sociolegal Analysis for Türkiye

Sezai Çağlayan and Firdevs Yüzbaşi Tobaz

Introduction

Humans consume a great deal of products in this modern era, and their remnants cannot be recycled at a similar rate. The preferred method to eliminate the waste produced is to export it to another country, usually to a less developed one (Wen et al., 2021, pp. 1–9). The global circulation of waste raises questions about whether this is a tool of colonialism.

Türkiye has become one of the leading waste importers since China banned waste imports in 2018 (Gundogdu, 2022, p. 16). This has contributed to economic development in Türkiye but has also had a corresponding negative effect on the well-being of those living in the country (Human Rights Watch, 2022). The sudden increase in waste imports, their uncontrolled processing, and their disposal in public areas in a way that threatens human health are critical problems (Gundogdu, 2022). One may ask whether Türkiye has already set up a legal framework to prevent the unwanted consequences of the waste trade. The answer is, technically, yes. Legal apparatuses exist and can be counted as pillars of the waste trade regime in the country. Yet, the question remains whether the waste trade regime works in practice.

The purpose of this chapter is to question whether the waste trade in which Türkiye is involved as an importer is a tool for colonialism. It is not possible to determine this using the classical definition of colonialism. Instead, it is more appropriate to evaluate Türkiye's waste imports through the lens of neocolonialism. Türkiye has managed to build up the legal framework of her domestic waste regime

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to a certain level. However, the regime is not efficient in resolving judicial disputes. The difference between theory and practice is the main deficiency in this context.

This chapter mainly consists of two sections, excluding the introduction and conclusion. The first section considers the definition and disappearance of classic colonialism and the evolution of new colonial practices in our age. The second section discusses Türkiye's waste trade in terms of colonialism. Under this section, Türkiye's share in the international waste trade; the theory and practice of the domestic legal framework of waste trade; and whether Türkiye's waste trade can be called "colonial" will be discussed.

Colonialism Through the Waste Trade

Colonialism as dominance of one group over another in the most general terms (Butt, 2013, pp. 1–2) was a global reality until the last century. The elimination of colonialism was not on the international community's agenda until the UN system was established after the Second World War in 1945, whereupon it began to disappear. The UN Charter, which is regarded as the international community's constitution, is built on the principle of equality of states and, thereby, their nationals. People who can exercise the right to self-determination can establish a state and technically take part in the international sphere under the sovereignty of that state.

Over the last 30 years, technically there has been no colonial state or any state existing under the supervision of the UN (see Shaw, 2017, p. 931). However, this does not mean that colonialism has disappeared. Some societies continue to be subjected to implicit colonial practices through different means. Globalization is a key term to express the current situation of colonialism in this modern era. Globalization and colonialism are alike and related, as pointed out by Bernard (2020). Both are about the domination of one group by another (Bernard, 2020). In the era of globalization, a new understanding of colonialism has emerged based on the unequal relations between superpowers and their former colonies. Although big claims about the importance of freedom are expressed, colonial practices continue to exist (Watts, 2020).

Neocolonialism can manifest in many different ways, in diverse areas such as economics, politics, culture, and even education (Haag, 2012). The environment is another salient area. Those countries that wish to keep their habitats clean have contributed to neocolonialism by transporting their waste to countries with weak resistance. The environmental justice movement, which asks for the fair distribution of environmental burdens and benefits among people (Caglayan, 2015, p. 84), is one of the responses of waste-based new colonial practices. As far back as the 1970s, Blacks in the American South protested the deliberate use of their local environment as dumping sites (Caglayan, 2015, p. 84). The concept then became popular among scholars, thanks to the academic works of Robert Bullard (2018). It has been observed that environmental injustice continues as a neocolonial practice based on racial and socioeconomic parameters (Mohai et al., 2009, p. 406; Reed, 2009, p. 25).

While it is true that there have been colonial practices based on various factors, each case must be analyzed through specific and quantitative field research (Martinez-Alier et al., 2016, p. 734; Morales Jr. et al., 2012, p. 2).

Environmental injustice was originally an inegalitarian practice by one group within a state toward another. Environmental injustice-like situations caused by waste-related activities gained an interstate dimension, thanks to globalization (Achankeng, 2003). It has been noted that environmental burdens shift from the center to the periphery (Morales Jr. et al., 2012, p. 1). African states, viewed as the periphery, claim they are seen as dumping sites for developed countries (Fuller et al., 2022, p. 539). What is also determinative is the nature of the waste. Dumping sites are, one way or another, built in some regions for domestic waste. However, there may be more dangerous cases, for example, nuclear waste, which is a dangerous waste type that may be stored or buried. Some have even described nuclear-based waste activities as "nuclear colonialism" (Runyan, 2018, p. 25). The combination of insufficient infrastructure and waste facilities may lead to tragic consequences for the country concerned (Pratt, 2010, p. 152). Pratt has labeled this practice in the Cote d'Ivoire as "toxic colonialism" (2010, pp. 149–151). Globally sized waste-based colonial practices have gone beyond racial and economic explanations and led to different concepts, such as "global climate justice" (Mohai et al., 2009, p. 405).

The idea that waste can have a colonial purpose in international trade was acknowledged in the preparatory work of the Basel Convention, one of the essential international regulations on the subject. The Basel working group was the first to express the notion of "waste colonialism" (Fuller et al., 2022, p. 539; Manglou et al., 2022, p. 4). Both these act as evidence that the waste trade is an important part of modern colonialism (Mohai et al., 2009, p. 419). Although the Basel Convention may be deemed a positive international initiative to prevent the waste trade from becoming a form of colonialism, the fact that international agreements depend on states' discretion prevents the formation of a binding international waste trade regime for all, which may therefore result in the creation of colonial practices and render the Convention inadequate.

Does Türkiye's Waste Imports Represent a New Colonial Practice?

Türkiye's Share in the International Waste Trade

A World Bank report of 2018 stated that a person's average waste generation equals 0.74 kg per day and is expected to increase to 1.25 kg by 2050 (Kaza et al., 2018, p. 3). Accordingly, solid waste management is becoming more challenging, particularly for some countries, and consequently they will hope to export their waste abroad.

In recent years, the international waste trade has been experiencing great change. In 2018, China, the biggest waste importer for Europe for a generation, imposed a

ban on imports of plastic waste (Varkkey, 2019). This paved the way for Türkiye to fill this gap in the sector (Gundogdu, 2022, p. 16). In 2019, Türkiye became the number one plastic waste importer (Gundogdu, 2022, p. 16). Türkiye was able to increase its market share in this way through bans and restrictions on plastic waste imposed by other importer countries such as Vietnam, Malaysia, and Thailand (Gundogdu, 2022, p. 16).

Other than economic, there is no specific reason why Türkiye became interested in waste import. Government incentives for plastic recycling facilities in the name of economic growth and employment have accelerated the establishment of new facilities since 2017 (Ministry of Industry and Technology, n.d.). An increase in profit has contributed to the growth of the recycling sector, employing many more people and increasing tax revenue accordingly. There is also insufficient domestic waste for recycling. The Turkish Statistical Institute's (TUIK) data proves this. According to 2021 data, 104.8 million tons of waste were collected in Türkiye in 2020. 16.99% of the waste was sent to municipal dumps and 69.43% to landfill, while the rate of those going to recycling facilities was only 12.83% (TUIK, 2021). Third, the lack of waste management infrastructure and the collection of unseparated waste has increased waste imports (Beyazlı & Aydemir, 2008, p. 93).

Policies are being developed to encourage people to collect household waste separately. People's willingness to comply with such policies has been admirable. For instance, there was a noticeable decrease in the use of plastic bags immediately after the introduction of a regulation that allows the sale of bags in supermarkets for a fee (Onay et al., 2021, p. 38). Furthermore, locally developed practices are also notable. Some municipalities have started the separate collection of waste and developed practices aimed at instilling "zero waste" awareness in children (Onay et al., 2021, p. 8).

Domestic Waste Trade Regime in Theory and Practice

The regulation of the international waste trade requires a multinational effort. Multilateral international agreements are of great importance and can contribute to this. Türkiye is a party to most of these agreements (Ministry of Foreign Affairs, 2022). However, one is particularly important: The Basel Convention (1989), which was opened for signature in 1989 and entered into force in 1992, as it plays a vital role in the codification of the waste trade regime. Türkiye has been a party to this Convention since 1994 (Basel Convention, 1989).

The Basel Convention is updated in line with changes in the sector. The relevant amendments are made at the Conference of the Parties (COP), the Convention's governing body consisting of government representatives of state parties, as articulated in Article 15 of the Convention (Basel Convention, 1989). The COPs, the last of which was held in June 2022, are held periodically every few years (Basel Convention, 1989). The Ban Amendment adopted at the 3rd COP in 1995 and entered into force in 2019 was the first update to the Convention (Ban Amendment,

1995). This sets out that hazardous waste trade among the parties, namely, Liechtenstein, EU, and OECD countries, is prohibited (Ban Amendment, 1995). Another amendment that updates the Convention is the Plastic Waste Amendment, which restricts the plastic waste trade (Plastic Waste Amendments, 2019). This amendment agreed upon at the 14th COP was adopted on May 10, 2019 (Plastic Waste Amendments, 2019). Its aim is to keep plastic waste at a minimum level and to be compatible with the environment (Plastic Waste Amendments, 2019). The amendment is binding for all parties that do not give notice of nonacceptance within the first 6-month period entered into force on January 1, 2021 (Plastic Waste Amendments, 2019). Another development regarding the Convention is the Basel Protocol on Liability and Compensation opened for signature in 1999. The purpose of the protocol is to prevent damages that may occur during illegal trade and establish an effective legal regime to provide the necessary compensation. The protocol, which was planned to enter into force with a number of 20 parties, has 12 parties as of April 1, 2023. Therefore, it has yet to enter into force.

It became a party to the Convention at an early stage. Nevertheless, it has displayed different attitudes toward the Convention. First, it adopted the first update to the Convention by approving the Ban Amendment in 2003 (Ban Amendment, 1995). Following the fulfilment of the 3/4 party ratification requirement on December 5, 2019, the Amendment became binding for Türkiye (Ban Amendment, 1995). Second, it did not remain silent on the Plastic Waste Amendment, which was agreed would become effective on January 1, 2021, for parties that do not submit a notification of non-acceptance. At first, it gave the notification to the Depository of the Convention (Plastic Waste Amendments, 2019). During this time, it was recorded as the only OECD member ratifying the Convention but not adopting the Amendment (Gündoğdu & Walker, 2021; Karasik, 2022, p. 5). On February 10, 2022, it became bound by the Amendment by withdrawing the previous notification (Plastic Waste Amendments, 2019). Third, the Liability Protocol is the latest development determining Türkiye's position on the Convention. It is not yet a party to the Protocol (Liability Protocol, 1999); it has neither commenced the signature nor ratification processes to implement the Protocol.

Türkiye respects international law and tries to fulfil its international obligations. The Basel provisions to which it is bound are among these obligations. Article 90 of the Turkish Constitution is fundamental in incorporating the Basel provisions into the domestic legal order (1982, art. 90). Domestic legal regulations are then made accordingly.

There is no constitutional norm regulating waste import in the Turkish legal system. However, there are provisions in the constitution regarding the prevention of environmental pollution caused by waste import. Article 56 of the Constitution defines the protection of the environment under the title of "health services and protection of the environment" in Chapter III, which regulates the Social and Economic Rights and Duties (1982, art. 56). In the relevant literature, discussion on this article mainly centers on whether it recognizes the right to the environment in the context of collective rights (Ustun, 2021, pp. 2550–2588). The article thus

imposes duties on the state and citizens to prevent environmental pollution that may derive from uncontrolled waste import.

Moreover, the Turkish legal system includes laws and regulations that have been updated and revised during Türkiye's European Union accession process on the subject. Environmental Law No. 2872 is the most crucial one on preventing environmental pollution (The Environmental Law, 1983). This law as a legal framework prohibits the import of hazardous waste (Art. 13). In Article 11, it is explained that waste shall be recycled, and nonrecyclable waste shall be disposed of with the appropriate methods determined in the relevant sub-norms. It is imperative in Article 11 that those who establish and operate recycling and disposal facilities shall have a license from the Ministry of Environment, Urbanisation and Climate Change. In Article 15, it is stated that facilities operating without a license shall be suspended indefinitely. As a result of the inspections made based on this article, the activities of 26 businesses in Adana, a major city in southern Türkiye, that operated without a license and cause environmental pollution have been suspended indefinitely (Boztepe, 2021). The principle adopted by the Law in Article 3/g on liability is the "Polluter Pays" as determined by the OECD. This principle is based on the understanding that the party responsible for environmental pollution bears the cost of its behavior and itself pays for the pollution it has created (Sezer & Dokmen, 2018). In Article 12, the law primarily entitles the Ministry to inspect. However, it states that the Ministry can share its authority with the Turkish Environment Agency, the General Directorate of Security, the Gendarmerie General Command, and the Coast Guard Command (The Environmental Law, 1983, Art. 12). It should be noted that these provisions regarding the importation and recycling of waste in the Environmental Law have been widely criticized, mainly because it favors corporate profit by following the "Polluter Pays" logic (Beyazit & Yarim, 2020, p. 87).

The Environmental Law's comprehensive content plays a role in framing the waste trade. However, waste import principles, management, and procedures are specified by lower legal norms, including regulations that ensure laws and presidential decrees and others such as circulars and communiqués.

The most important is the Regulation on the Regular Storage of Waste 2010, which covers issues such as technical principles regarding landfills, acceptance of waste for storage, and determining precautions, audits, and responsibilities. The Regulation sets a target of 60% profit from recycling by 2035. This is particularly significant in terms of making a long-term program (Turkish Courts of Accounts, 2022, p. 14).

The second most important is the Zero Waste Regulation entered into force on July 12, 2019. Reducing or preventing waste generation and recycling waste is the focus of the Regulation. It also ensures the reduction of recycling costs to maintain the sustainability of waste management (Ministry of Environment Urbanization and Climate Change, 2022).

Another is the Regulation on Packaging Waste Control 2021. It was updated on June 26, 2021, and includes provisions for reuse, recycling, and use of waste in energy generation. According to the Regulation, manufacturers are required to produce in a way that produces the least amount of waste. The Regulation also

introduces the practice of charging for bags to prevent environmental pollution caused by plastic bags.

There is also the Waste Import Implementation Circular published by the Ministry in 2022. The Circular tried to reduce the plastic waste import quota to 80%, increase the amount of domestic waste collection, and prevent environmental pollution (Vardar, 2021). Within a short period, the waste import quota of 80% was not deemed sufficient, and with pressure from non-governmental organizations, the quota was reduced by 30–50% (Turapoğlu, 2020). The Circular was amended by the Ministry and entered into force on December 30, 2022. Unlike in the previous one, setting a fixed quota has been abandoned in the new Circular (Waste Import Implementation Circular, 2021, Art 10). Instead, the quota calculation shall be based on the Temporary Activity Certificate and/or the Capacity Report based on the Environmental Permit and License Certificate. According to Art 10 of the Circular, the quota calculation does not consider collecting, separating, pressing, and breaking operations. The material waste import quota rate shall be calculated over the annual consumption capacity specified in the Capacity Report, over the rate stated in Annex-4/A, which is determined every year by the Ministry to increase the domestic collection rates.

It should be noted that the amount to be imported is determined as 50% of the capacity in Annex 4/A. According to the article, this quota allocated is to be used in equal amounts in quarterly periods, and the quota account is to be re-evaluated in the following years, considering the domestic waste collection rates. Put differently, the Ministry has tried to create a system that can take shape according to the criticisms from the sector by adopting a variable approach rather than establishing a settled regime in waste imports.

Finally, there is the Communiqué on Import Inspection of Wastes under Control for Environmental Protection 2021, which delineates the rules for the importation of various products that are dangerous and need to be kept under control. More importantly, the Communiqué prohibited the import of waste in the ethylene polymer group that has a wide range of uses in daily life and takes up a considerable share of the plastic waste trade (Vardar, 2021). While this legislative change was accepted as a positive development by environmental organizations (Bianet, 2021), sector representatives developed a strong opposition to the change and claimed that the ban on imports of polyethene scrap put the plastics industry in jeopardy and it was therefore necessary to remove the ban (Cumhuriyet, 2021). Thereupon, the ban was lifted with an amendment, and it was decided to impose strict controls on companies in the sector (Euronews, 2021).

The norms explained above are supposed to help all relevant actors implement waste import in a proper way. However, the situation in practice is not straightforward. Failure to enforce the rules on waste trade has brought disputes to court. The courts of first instance, the administrative courts, are places where legal proceedings begin. The place of appeal for cases that cannot be resolved in these courts is the Council of State.

The Council of State's decisions help to understand how waste trade-related cases are decided. This court deals with waste trade-related complaints in the

context of the environment rather than developing unique case law regarding the waste trade. Formerly, the Council of State adopted a broad interpretation that would allow many actors to file lawsuits regarding environmental pollution (Ustun, 2021, pp. 2587–2588). To this end, applications of bars, chambers, residents of villages, and inhabitants of cities encouraged everyone to become more sensitive toward such issues (Ustun, 2021, pp. 2587–2588). Recently, this broad interpretation has been abandoned, and decisions have been made to narrow the concept of interest, which is one of the parameters for filing administrative lawsuits (Dinc, 2008, p. 36).

Is There Evidence of Colonialism?

It is difficult to say that waste trade from developed countries to developing ones is evidence of colonialism. States that import waste consent to conduct this trade. Türkiye, which is subject to modern international law that prohibits colonialism, also imports waste in this manner. However, there are some signs that the waste trade has neocolonial features. First and most obviously, not all waste exported from developed countries to Türkiye is recyclable. In other words, waste exporting countries see Türkiye as their backyard, where they throw unusable garbage. Some quantitative research also proves this. The Chamber of Environmental Engineers of the Union of Chambers of Turkish Engineers and Architects (TMMOB) stated in the World Environment Day Türkiye Report published in June 2019 that not all of the waste imported from the European Union to Türkiye could be recycled; nearly 50% of the waste was unusable garbage.

It is also known by exporting countries that nonrecyclable waste is sent to Türkiye to be disposed of inappropriately. The OECD's determination in the "Environment at a Glance 2020" report (p. 48) shows that Türkiye's recycling rate (10%) remains at a low level compared to other OECD countries. This is so remarkable that Türkiye's waste recycling capacity has been the subject of press interest. British journalists investigating where the waste of a supermarket in England goes tried to determine the final destination of the waste by placing GPS tags in three plastic garbage bags left in containers in London (Chellel & Moskwa, 2022). The journalists identified the final destination of the bags as an industrial zone in Adana (Chellel & Moskwa, 2022). The journalists found no recycling facility near the industrial zone as well as tons of European garbage piled up outside the specific warehouse.

In another investigation conducted by Greenpeace Mediterranean in 2021, the researchers collected soil, ash, water, and sediment samples from five different locations in Adana where plastic waste was mainly imported from England and European Union countries (Gundogdu, 2022, p. 7). Samples were examined in both Greenpeace Research Laboratories and independent laboratories (Gundogdu, 2022, p. 7). It was determined that toxic chemicals were produced while burning plastics that could

trigger tumors and affect hormones and immune systems (Gundogdu, 2022, pp. 8–9).

Exporting countries are not the only responsible parties for the neocolonial features of Türkiye's waste trade. Türkiye also contributed to this. Waste sent to the solid waste warehouses is improperly segregated in unlicensed facilities, and some are even incinerated in open areas, as articulated by Ozturk (2020). This situation causes many problems in practice, primarily adverse effects on human health.

Those who work in the waste disposal sector constitute the first group exposed to the side effects of uncontrolled waste disposal and destruction (Human Rights Watch, 2022, p. 42). Shopkeepers around the waste facilities and even neighboring residents who need to open the windows on warm summer days are negatively affected by the burned plastic smell (Human Rights Watch, 2022, p. 48). They are all directly exposed to pollution, resulting in respiratory distress. The officials do not make public the records or statistics of those who receive medical care for pollution-induced respiratory illnesses such as asthma and chronic obstructive pulmonary disease (Human Rights Watch, 2022, pp. 71–6). The survey conducted by Human Rights Watch reveals that governmental pressures on the healthcare sector, including hospitals and Turkish medical associations, prevent such statistics from being made public. Moreover, stations measuring air quality in Adana are far from the waste disposal facilities, thus preventing the amount of damage to the local people from being revealed, which is among the findings obtained from the study.

It is important to note that people residing near the waste disposal areas do not generally constitute the socioeconomically wealthy segment of society. The low awareness in these areas thus prevents this group from using any judicial remedy effectively. Third parties can of course legally support people who cannot defend their own rights. NGOs are the first to come to mind in this context. However, the narrow interpretation of the concept of "interest" by the administrative courts prevents complaints from being brought to the judiciary (Dinc, 2008, p. 36). This narrow interpretation by the courts results in the applications of third parties being rejected, that is, those who are not directly affected by the waste, on the grounds that their interests are not affected.

Likewise, the uncontrolled disposal of waste in public areas has external effects. Microplastics penetrate foods like sea salt (Gundogdu, 2018, pp. 1006–1014). People in neighboring countries are also affected by these undesirable practices. Studies have proven that Türkiye has severe plastic pollution, so much so that she was recorded as the country that disposed of the most plastic into the Mediterranean after Egypt and Italy (Onay et al., 2021, pp. 7–12). In other studies, it was concluded that the situation in other seas is no different. There is more plastic pollution on the Black Sea, Marmara, and Aegean coasts compared to the coasts of other countries (Onay et al., 2021, pp. 18–20). People's quality of life decreases, as does their health, and even deaths may occur. It may also be possible for people to be affected psychologically, with increasing concerns about food safety causing mental disorders.

Conclusion

This chapter considered whether Türkiye's import-based waste trade amounts to a practice of neocolonialism and whether the domestic waste trade regime effectively impacts on this practice. It can be concluded that the economic benefits of waste import are given greater weight than the welfare of people in the country. That the legal apparatus, both legal norms and their judicial review, establishing the domestic waste trade regime have been shaped in a way that helps to boost economic profit rather than ensuring social good has caused this result. These actions of Türkiye have been effective in making the waste trade take the form of a new colonial practice. However, Türkiye is not the only country responsible for this situation. States that export waste to Türkiye have contributed equally to creating this. Records of international organizations like the OECD, research conducted by NGOs like Greenpeace Mediterranean, and investigations by independent media organizations show that Türkiye has deficiencies in waste recycling. Despite this, exporting states do not refrain from sending their garbage, including that which cannot be recycled, to Türkiye.

References

Achankeng, E. (2003, October). Globalization, urbanization and municipal solid waste management in Africa. In *Proceedings of the African Studies Association of Australasia and the Pacific 26th annual conference* (pp. 1–22).

Ban Amendment. (1995). Retrieved December 27, 2022, from http://www.basel.int/Implementation/LegalMatters/BanAmendment/Overview/tabid/1484/Default.aspx

Barnard, M. (2020). Globalization and colonialism. In *Fashion theory* (pp. 743–756). Routledge.

Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal. (1989). http://www.basel.int/TheConvention/Overview/TextoftheConvention/tabid/1275/Default.aspx

Basel Protocol on Liability and Compensation. (1999). Retrieved December 27, 2022, from http://www.basel.int/TheConvention/Overview/LiabilityProtocol/tabid/2399/Default.aspx

Beyazıt, E., & Yarım, S. (2020). *Kırılgan Dünyanın Küresel Sorunu Çöp* (1st ed.). Gece Kitaplığı.

Beyazli, D., & Aydemir, Ş. (2008). Landfilling with mixed wastes: Environmental effects of wastes and their management in the eastern Black Sea region of Turkey. *Indoor and Built Environment, 17*(2), 92–102.

Bianet. (2021, May 19). *Plastik Atıkların Yüzde 74'ünün İthalatı Yasaklandı*. Bianet. https://www.bianet.org/bianet/cevre/244301-plastik-atiklarin-yuzde-74-unun-ithalati-yasaklandi

Boztepe, S. A. (2021, May 2). *Adana'da çevreyi Kirleten Geri Dönüşüm Tesislerine Rekor Ceza*. Anadolu Agency. https://www.aa.com.tr/tr/turkiye/adanada-cevreyi-kirleten-geri-donusum-tesislerine-rekor-ceza/2227274

Bullard, R. D. (2018). *Dumping in Dixie: Race, class, and environmental quality*. Routledge.

Butt, D. (2013). Colonialism and postcolonialism. In H. LaFollette (Ed.), *The international encyclopedia of ethics*. Wiley-Blackwell. http://onlinelibrary.wiley.com/doi/10.1002/9781444367072.wbiee763/full

Caglayan, S. (2015). A review of the case law of the European court of human rights in the context of environmental justice. *Hacettepe Hukuk Fakültesi Dergisi, 5*, 81–100.

Chellel, K., & Moskwa, W. (2022, March 29). *A plastic bag's 2,000-mile journey shows the messy truth about recycling*. Bloomberg.Com. https://www.bloomberg.com/graphics/2022-tesco-recycle-plastic-waste-pledge-falls-short/

Communiqué on Import Inspection of Wastes under Control for Environmental Protection, RG 31.12.2021/31706. (2021). https://www.resmigazete.gov.tr/eskiler/2021/12/20211231M4-2.htm

Cumhuriyet. (2021, July 9). *Yasak İki Ay Dayanabildi: Plastik Atık İthalatı Yeniden Başlıyor*. Cumhuriyet. https://www.cumhuriyet.com.tr/haber/yasak-iki-ay-dayanabildi-plastik-atik-ithalati-yeniden-basliyor-1851053

Dinç, G. (2008). *Avrupa İnsan Hakları Sözleşmesine Göre Çevre ve İnsan*. Türkiye Barolar Birliği Yayınları.

Fuller, S., Ngata, T., Borrelle, S. B., & Farrelly, T. (2022). Plastics pollution as waste colonialism in Te Moananui. *Journal of Political Ecology, 29*(1), 534–560.

Gundogdu, S. (2018). Contamination of table salts from Turkey with microplastics. *Food Additives & Contaminants: Part A, 35*(5), 1006–1014.

Gundogdu, S. (2022). *Game of wastes: Irreversable impact*. Greenpeace Mediterranean.

Gundogdu, S., & Walker, T. R. (2021). Why Turkey should not import plastic waste pollution from developed countries? *Marine Pollution Bulletin, 171*, 112772–112775.

Haag, D. (2012). *Mechanisms of neo-colonialism: Current French and British influence in Cameroon and Ghana* (Working Paper, (2011/6)). International Catalan Institute for Peace.

Human Rights Watch. (2022). *"It's as if they're poisoning us" The health impacts of plastic recycling in Turkey*. Human Rights Watch. https://www.hrw.org/sites/default/files/media_2022/09/turkey0922web_0.pdf

Karasik, R. (2022, February). *Plastic pollution policy country profile: Turkey* (pp. 1–8). Duke University Nicholas Institute for Environmental Policy Solutions.

Kaza, S., Yao, L. C., Bhada-Tata, P., & Van Woerden, F. (2018). *What a waste 2.0: A global snapshot of solid waste management to 2050*. World Bank.

Manglou, M., Rocher, L., & Bahers, J.-B. (2022). Waste colonialism and metabolic flows in island territories. *Journal of Political Ecology, 29*(1), 1–19.

Martinez-Alier, J., Temper, L., Del Bene, D., & Scheidel, A. (2016). Is there a global environmental justice movement? *The Journal of Peasant Studies, 43*(3), 731–755.

Ministry of Industry and Technology (n.d.). Retrieved December 20, 2023, from https://www.sanayi.gov.tr/destek-ve-tesvikler/yatirim-tesvik-sistemleri

Ministry of Environment Urbanization and Climate Change. (2022). *Sıfır Atık Yönetimi Sistemi Uygulama Kılavuzu*. https://sifiratik.gov.tr/content/files/uploads/24/MAVİ.pdf

Mohai, P., Pellow, D., & Roberts, J. T. (2009). Environmental justice. *Annual Review of Environment and Resources, 34*, 405–430.

Morales, O., Jr., Grineski, S. E., & Collins, T. W. (2012). Structural violence and environmental injustice: The case of a US–Mexico border chemical plant. *Local Environment, 17*(1), 1–21.

OECD. (2020). *Environment at a Glance 2020*. https://www.oecd-ilibrary.org/docserver/4ea7d35f-en.pdf?expires=1672127461&id=id&accname=guest&checksum=B4AEDF6B73CD90CE290E6A58AF9E36B2

Onay, T. T., Küçüker, M. A., Vardar, S., & Yücel, T. (2021). *Türkiye'de Plastik Atık Sorunu ve Politika Önerileri*. WWF Türkiye – Boğaziçi Üniversitesi Çevre Bilimleri Enstitüsü. https://www.wwf.org.tr/?11580/Turkiyede-Plastik-Atik-Sorunu-ve-Politika-Onerileri

Ozturk, M. (2020, July 4). *İngiltere'den Adana'ya Kirli ve Karışık Plastik Atık İthali*. Independent Türkçe. https://www.indyturk.com/node/206221/t%C3%BCrkiyeden-sesler/ingiltere%E2%80%99den-adana%E2%80%99ya-kirli-ve-kar%C4%B1%C5%9F%C4%B1k-plastik-at%C4%B1k-ithali

Plastic Waste Amendments. (2019). Retrieved December 27, 2022, from http://www.basel.int/Implementation/Plasticwaste/Amendments/Overview/tabid/8426/Default.aspx

Pratt, L. A. (2010). Decreasing dirty dumping – A reevaluation of toxic waste colonialism and the global management of transboundary hazardous waste. *Texas Environmental Law Journal, 41*, 147.

Reed, T. (2009). Toxic colonialism, environmental justice, and native resistance in Silko's "almanac of the dead". *Melus, 34*(2), 25–42.
Regulation on Packaging Waste Control, RG 26.06.2021/31523. (2021). https://www.resmigazete.gov.tr/eskiler/2021/06/20210626-18.htm
Regulation on the Regular Storage of Waste, RG 26.03.2010/27533. (2010). https://www.resmigazete.gov.tr/eskiler/2010/03/20100326-13.htm
Runyan, A. S. (2018). Disposable waste, lands and bodies under Canada's gendered nuclear colonialism. *International Feminist Journal of Politics, 20*(1), 24–38.
Sezer, Ö., & Dökmen, G. (2018). Kirleten Öder İlkesi Çerçevesinde Türkiye'de Çevre Vergileri ve Negatif Dışsallık Sorunu. *Dumlupınar Üniversitesi Sosyal Bilimler Dergisi, 57*, Article 57.
Shaw, M. N. (2017). *International law*. Cambridge University Press.
The Environmental Law, Number 2872. (1983). https://www.mevzuat.gov.tr/mevzuat?MevzuatNo=2872&MevzuatTur=1&MevzuatTertip=5
TMMOB Chamber of Environmental Engineers. (2019). *Dünya Çevre Günü Türkiye Raporu*. https://www.cmo.org.tr/resimler/ekler/10504079d7e9ced_ek.pdf?tipi=72&turu=X&sube=0
TUIK. (2021, December 23). *Atık İstatistikleri 2020*. https://data.tuik.gov.tr/Bulten/Index?p=Atik-Istatistikleri-2020-37198
Turapoğlu, A. Z. (2020, September 4). *Atık İthalatı Kotası Yüzde 50'ye İndirildi*. Anadolu Agency. https://www.aa.com.tr/tr/ekonomi/atik-ithalati-kotasi-yuzde-50ye-indirildi/1962949
Turkish Constitution. (1982). https://www5.tbmm.gov.tr/yayinlar/2021/TC_Anayasasi_ve_TBMM_Ic_Tuzugu_Ingilizce.pdf
Turkish Courts of Accounts. (2022). *Plastik Atık Yönetimi Sayıştay Raporu*. https://sayistay.gov.tr/reports/download/3961-plastik-atik-yonetimi
Turkish Ministry of Foreign Affairs. (2022). *Ülkemizin Taraf Olduğu Başlıca Çevre Anlaşmaları*. Retrieved December 27, 2022, from https://www.mfa.gov.tr/data/DISPOLITIKA/Anlasmalar.pdf
Türkiye'de Plastik/Polietilen İthalatına Getirilen Yasak Kaldırıldı. (2021, July 10). *Euronews*. https://tr.euronews.com/2021/07/10/turkiye-de-plastik-polietilen-ithalat-na-getirilen-yasak-kald-r-ld
Ustun, K. T. (2021). Anayasa Mahkemesinin Bireysel Başvuru Kararlarında Çevre Hakkına Yaklaşımı. *Selçuk Üniversitesi Hukuk Fakültesi Dergisi, 29*(3), Article 3.
Vardar, N. (2021). *Plastik Atık İthalatında Büyük Zafer*. Greenpeace Akdeniz Türkiye. Retrieved December 28, 2022, from https://www.greenpeace.org/turkey/basin-bultenleri/plastik-atik-ithalatinda-buyuk-zafer
Varkkey, H. (2019, July 29). *By exporting trash, rich countries put their waste out of sight and out of mind*. CNN. https://www.cnn.com/2019/07/29/opinions/by-exporting-trash-rich-countries-put-their-waste-out-of-sight-and-out-of-mind-varkkey/index.html
Waste Import Implementation Circular, Number 18330076/010.06/2599483. (2021). https://webdosya.csb.gov.tr/db/ced/icerikler/2021-25-sayili-genelge-20220103145138.pdf
Watts, M. J. (2020). Neocolonialism. In *Encyclopedia of human geography* (2nd ed.). Elsevier Ltd.
Wen, Z., Xie, Y., Chen, M., & Dinga, C. D. (2021). China's plastic import ban increases prospects of environmental impact mitigation of plastic waste trade flow worldwide. *Nature Communications, 12*(425), 1–9.
Zero Waste Regulation, RG 12.07.2019/30829. (2019). https://www.resmigazete.gov.tr/eskiler/2019/07/20190712-9.htm

Exporting Pollution, Colonizing Health

The True Costs of Plastic Waste Exports to Malaysia

Pui Yi Wong

Introduction: Plastic Waste Trade in Malaysia

Walking along a jetty with a plastic recycler one afternoon, we spotted the ubiquitous polyethylene terephthalate (PET) bottles littering the river shoreline. We were in Selangor, the most industrialized state in the federation of Malaysia, where infrastructure development is more advance than anywhere else in the country. The recycler shook his head, gave an exasperated laughed, and said, "We need those bottles as our raw materials, but people keep throwing them away." PET, used to make soda and water bottles, is the easiest and most common plastics to recycle due to its low melting temperature and single-layer, mono-material composition. Yet, throughout Malaysia, PET bottles frequently top the list of trash collected in cleanups.

Mobilik, Ling, Mohd Lokman, and Ruhana Hassan (2014) found that clear and colored plastic bottles represented 46.15% of the total common source debris, collected from both marine and terrestrial environments, at four public beaches in the state of Sarawak. 90.7% of the total objects collected was plastic. In 2022, Reef Check Malaysia, a local marine conservation organization that holds annual nationwide beach cleanups, found that out of 300,183 items (24,301 kg) collected across 394km of coastlines, the most common items found were cigarette butts at 55,100 pieces, followed by plastic bottles at 44,706 bottles.[1]

In Malaysia, the *Solid Waste and Public Cleansing Management Act 2007* mandates waste separation at source. Failure to comply can lead to a fine not exceeding

[1] Reef Check Malaysia. (2022, October 11). *Malayians picked up 24,301kg of trash from our beaches*. https://www.reefcheck.org.my/press/malaysians-picked-up-24301kg-of-trash-from-our-beaches

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1000 Malaysian ringgit (approximately 220 US dollars). This Act was established to standardize solid waste management (household, commercial, construction, industry, etc.) and public cleansing across all local authorities regardless of revenue levels. The government announced the implementation of waste separation at source in 2015 under this Act,[2] but until today, there is still no enforcement of this practice (Razali et al., 2020).

This Act also does not cover all 13 states in Malaysia. Some state governments, including in Selangor, have opted not to surrender their power over waste management to the federal government. This have hindered efforts to institute nationwide reforms for waste management.

Aside from enacting legal reforms, the Malaysian government has consistently run public campaigns on recycling. Decades of being subjected to songs about recycling on public service announcements and in schools have not convinced the general Malaysian public to practice waste reduction, separation, and recycling. In addition, many rural areas and islands do not even have waste collection services.

Amid these domestic waste management and public apathy challenges, Malaysia became the world's top destination for plastic waste exports in 2018, receiving more than 800,000 tons of plastic waste that year, including unrecyclable municipal waste. The country which, together with its Asian neighbors, had been blamed by Western scholars and media for plastic leakage into the ocean (Jambeck et al., 2015), became the largest garbage dump of the developed world.

In 2018, China's National Sword Policy came into effect with a ban on 24 types of solid waste imports to the country, including plastic waste, unsorted waste paper, waste textiles, and waste from the manufacture of iron or steel. This disrupted global networks for recyclable material and redirected plastic waste to new markets in Southeast Asia and other developing countries with weaker regulatory frameworks and less technical capacity to deal with the massive amounts of waste. The influx of waste to Malaysia led to a sharp rise in illegal recycling facilities as well as illegal dumpsites, causing land, water, and air pollution that affected communities' health, food systems, and natural environments nationwide.

This chapter highlights how the plastic waste trade impacted the lives of Malaysians, with a focus on the time period from 2018 to 2021. This study aims to unpack the concept of "waste colonialism" by examining the externalities where plastic waste supply chains touch the ground in a waste recipient country, with an emphasis on social, cultural, and political implications. The study explores three key questions: What were the impacts of plastic waste imports on people and their environments? How did the people respond? How did waste colonialism cause harm socially, culturally, and politically?

In-depth interviews were conducted with 40 stakeholders, including politicians, government officials, businesspeople in the private sector, civil society activists, and community group representatives, who were affected by the importing, processing,

[2] New Straits Times. (2015, September 1). ***S****eparation of solid waste from source launched.* https://www.nst.com.my/news/2015/09/separation-solid-waste-source-launched

smuggling, burning, and dumping of foreign plastic waste. The interviews were conducted across field visits to Sungai Petani and Alor Setar (in the state of Kedah), Bukit Mertajam and Georgetown (in the state of Penang), Putrajaya (a federal territory), and Klang and Kuala Langat (in the state of Selangor). Primary data collected was supplemented by secondary data from news articles or other research reports.[3]

Plastic Waste Trade and Colonialism

Waste trade is the international buying and selling of waste or scrap materials, or the offering of waste management, as commodities or service between countries for treatment, disposal, or recycling. The wastes include plastics, papers, textiles, tires, electronics, metals, chemicals, and many more. On the surface, the trade appears to be just another economic transaction where there are willing buyers and willing sellers and profits to be made. However, the export of wastes occurs mostly from economically developed, wealthy, industrialized countries in the Global North to less wealthy and less industrialized countries in the Global South, and takes place to exploit weaker economies through cost externalization. This occurs as the "commodities" are undeniably waste materials and often contain hazardous or difficult-to-recycle compounds. They may end up being dumped or burned, resulting in harmful emissions in the recipient country. The wastes are also often mixed with no-value residual waste that the exporter would have had to dispose of in the country of origin otherwise.

This characteristic of this trade, where waste importers, processers, and workers might welcome the materials and the processing activity despite the risks involved and negative impacts on human and environmental health, indicates some level of control and dependency in the relationships, and has evoked the term "toxic or waste colonialism." It is reminiscent of the colonial area where lands and natural resources were exploited for the profit of colonial masters. In this case, the clean air, water, land, labor, and health of recipient countries are "conquered" and used to process waste from the "colonial masters," a form of "territorial expansion" by more powerful actors, so that wealthier societies can continue to enjoy a certain type of lifestyle, one of wasteful production and consumption, while exporting the true costs of those lifestyles to other territories.

The pollution haven hypothesis predicts a trend of developed countries exporting polluting industries to less developed countries to avoid the costs of stringent environmental regulations (Davis et al., 2019; Puckett & Smith, 2002). While most studies had been focused on electronic waste or e-waste, plastic waste has also been shown to flow from high-income to low-income countries. In the past, cargo vessels had carried China-made consumer goods to developed countries, and instead of returning empty, the liners offered favorable shipping rates to transport low-value

[3] No interviews were secured with parties involved in illegal plastic recycling.

products, including plastic waste and used paper, back to China using (backhaul) empty containers (Tran et al., 2021).[4] Coupled with low labor costs, low environmental standards, and high demand for recycling materials, China was subjected to waste colonization by the more industrialized economies (including the USA, UK, Germany, and Japan) for decades.

China has since grown into an industrialized economic powerhouse, and it similarly became a "colonial master," outsourcing the pollution to weaker economies. The "flying geese" paradigm of economic development had been used to explain the sequential catching-up process of industrialization of latecomer economies, seen as "geese" flying in the wake of a "lead goose" and benefiting from its updraft. However, instead of developing better technologies to deal with waste once it has accumulated more resources, the "lead goose" tends to export waste and pollution to the flock of "geese" following it, while continuing to enjoy the benefits of industrial expansion.

China started regulating solid waste imports through Operation Green Fence (OGF) in 2013, with stricter inspections to stop the illegal trade of hazardous waste and improve the quality of imported waste.[5] In July 2017, China announced the National Sword Policy and implemented a 0.5% contamination limit (down from 1.5% for OGF) for all solid waste imports, in attempts to halt the continued contamination of the country by soiled imported waste which were overwhelming facilities. This was followed by a new waste import inspection program aimed at eradicating trading rings and smuggling channels called Blue Sky 2018. Then, in April 2020, China approved a further revision to its pollution importation crackdown policies, increasing the import ban to cover a total of 32 types of solid waste, with a zero contamination limit imposed (Tran et al., 2021).

The Chinese government had faced difficulties monitoring waste imports, facing smuggling or illegal trading of foreign waste, improper handling of trash, and serious pollution of air, land, and water.[6] In a formal notification to the World Trade Organization (WTO) Committee on Technical Barriers to Trade dated July 18, 2017, regarding the ban of 24 types of waste materials (under the National Sword Policy), the Chinese government provided the following objective and rationale for the urgent measures:

> According to the Special Actions of Strengthening the Supervision and Strictly Striking of Illegal "Foreign Garbage" by the General Administration of Customs of China, Ministry of Environmental Protection of China, Ministry of Public

[4] Penang Port authorities, interview, Butterworth, November 12, 2019.

[5] Investigations by PTASKL around Klang revealed that recycling facilities set up by Chinese businessmen had been in the area since 2013, an indication that the facilities were set up after China's OGF led Chinese waste-related businesses to move to Southeast Asia.

[6] Yen Nee Lee. (2018, April 16). *The world is scrambling now that China is refusing to be a trash dumping ground*. CNBC. https://www.cnbc.com/2018/04/16/climate-change-china-bans-import-of-foreign-waste-to-stop-pollution.html#:~:text=It%20grew%20a%20whole%20waste,country%20into%20a%20major%20polluter.&text=China's%20ban%2C%20they%20said%2C%20would,better%20manage%20their%20own%20trash

> Security of China and General Administration of Quality Supervision, Inspection and Quarantine of China, as well as the Special Actions of Striking of the Illegal Actions of Imported Solid Waste Processing and Utilizing Sectors by Ministry of Environmental Protection of China, we found that *large amounts of dirty wastes or even hazardous wastes are mixed in the solid waste that can be used as raw materials. This polluted China's environment seriously* [emphasis added]. To protect China's environmental interests and people's health, we urgently adjust the imported solid wastes list, and forbid the import of solid wastes that are highly polluted.[7]

China's National Sword ban exposed Western "recycling" programs as being highly suspect and dependent on exports to Asia for partial, and often polluting, recycling. Brooks, Wang, and Jambeck (2018) found that a cumulation of 45% of all plastic waste was imported by China since 1992, and they estimated that 111 million tons of plastic waste will be displaced by the ban by 2030. Even before the ban, only 9% of total discarded plastics globally were recycled. 12% were burned while 79% were sent to landfills or illegally dumped (Geyer et al., 2017).

The National Sword ban had the effect of redirecting plastic waste to Southeast Asia and other developing countries which have even lower capacity to process the massive amounts of plastic waste coupled with lax regulatory frameworks to protect the environment (Wang et al., 2020). In 2015, a study examined countries' annual tons of mismanaged plastic waste and the total amount which ended up in the ocean. Researchers found that, out of the top eight countries globally, five were in Southeast Asia – Indonesia (2nd), the Philippines (3rd), Vietnam (4th), Thailand (7th), and Malaysia (8th) (Jambeck et al., 2015). Yet, these are the very same countries bearing the burden of processing foreign plastic and other wastes following China's refusal to continue that role. After the China ban, Chinese recyclers moved their operations to other countries to receive wastes largely from the West, process the profitable fractions, dump or burn the rest, and then send the recyclables back to China to be fed into their manufacturing processes. These developing economies, like China in the past, are hungry for economic opportunities, regardless of the negative externalities that come with them.[8]

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[7] WTO. Catalogue of Solid Wastes Forbidden to Import into China by the End of 2017 (4 Classes, 24 Kinds). Notification No. G/TBT/N/CHN/1211. 2017. Retrieved from http://tbtims.wto.org/en/RegularNotifications/View/137356, archived at https://perma.cc/3CUT-LEM9. The 24 types of materials were listed at https://members.wto.org/crnattachments/2017/TBT/CHN/17_3218_00_x.pdf, archived at https://perma.cc/35G9-FGNL

[8] Fuller, Ngata, Borrelle, and Farrelly (2022) argued that waste colonialism is not only inherent in the trade of plastic waste but also in the plastic pollution problem, as a form of ecological imperialism rooted in Western industrial capitalist modes of production and consumption.

Plastic Waste Exports to Malaysia

As a result of the tsunami of Western wastes redirected from China, communities in Malaysia, Thailand, Indonesia, and the Philippines have been found living close to mountains of plastic waste or open burning grounds, subjected to toxic fumes and contaminated groundwater.[9] Between January and November 2018, Malaysia received 15.7% of the total plastic waste exports from the top exporting countries: the USA, Japan, Germany, UK, and Belgium.[10] Malaysia has relatively good ports, roads, and industrial infrastructure and a Mandarin-speaking business community ready to form partnerships with businesses from China.

The import of plastic scrap into Malaysia continued to increase in 2020. While most major export markets for scrap plastic saw moderate to significant declines for the first half of 2020 compared to 2019, Malaysia nearly tripled its imports despite enacting stringent scrap plastic import rules.[11] Greenpeace's *Unearthed* analysis released in October 2020 showed that Malaysia was the second largest market for plastic waste from the UK, with exports increasing 81% from January to July 2020 compared to the same period in 2019.[12] Overall, in 2020, UK plastic waste exports to Malaysia increased by 63% from 40,007 tons to 65,316 tons, but the volume remained lower than in 2016, 2017, and 2018.[13]

As a whole, more than 1.206 million tons of HS 3915 plastic scrap were imported by Malaysia in 2018 and 2019 (according to UN COMTRADE data), while data from Malaysia's Department of Solid Waste Management (JPSPN) showed that 2020 saw imports of 478,092 tons, an increase of 43% compared to the year before. This sum only accounts for legal transactions (see Fig. 1). Data on the amount of plastic scrap that has been recycled into resins, for domestic use or export, as well as the amount of unrecyclable or contaminated waste stranded in Malaysia, has not been made available.

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[9] See Petrlik, Ismawati, Arisandi, and Bell (2019), Bueta (2020), Global Alliance for Incinerator Alternatives (2019), Akenji et al. (2019), and Sembiring (2019) for country case studies.

[10] Greenpeace. (2019, April 23). *Data from the global plastics waste trade 2016-2018 and the offshore impact of China's foreign waste import ban, An analysis of import-export data from the top 21 exporters and 21 importers*. https://www.greenpeace.org/static/planet4-eastasia-stateless/2020/06/9858a41c-gpea-plastic-waste-trade-research-briefing-v2.pdf

[11] Staub, C. (2020, August 12). *Plastic exports drop 18% in first half of 2020.* Resource Recycling. publication. https://resource-recycling.com/plastics/2020/08/12/plastic-exports-drop-18-in-first-half-of-2020/

[12] Clarke, J. S. (2020, October 9). *UK still shipping plastic waste to poorer countries despite Conservative pledge*. Greenpeace. https://unearthed.greenpeace.org/2020/10/09/plastic-waste-uk-boris-johnson-malaysia/

[13] Moore, D. (2021, February 17). *'Enormous' increase in UK plastic waste exports to Turkey and Malaysia – Greenpeace.* Circular. https://www.circularonline.co.uk/news/enormous-increase-in-uk-plastic-waste-exports-to-turkey-and-malaysia-greenpeace/. For a response by Malaysian plastic industry players, see Free Malaysia Today. (2021, February 25). *Claims on plastic waste imports rubbished.* https://www.freemalaysiatoday.com/category/nation/2021/02/25/claims-on-plastic-waste-imports-rubbished/

Fig. 1 Import of HS Code 3915 plastic waste to Malaysia, 1997–2020. The quantity of imports in net weight for 2020 was provided by JPSPN. The trade value was not available. (Source: UN COMTRADE data (1997–2019) and Department of Solid Waste Management (JPSPN), 2020)

Exporting the Plastic Waste Burden

Forced into Activism to Protect Their Homes

The export of plastic waste brings with it a host of problems. Since 2017, illegal plastic waste processing facilities had mushroomed in Malaysia's most industrialized state of Selangor, due to its easy access from the largest port in the country, Port Klang. The facilities are considered illegal if they were operating with no prior approval from the federal, state, and local authorities. In addition, to process imported plastic waste categorized as HS Code 3915 plastic scrap, companies are required to hold import licenses called Approved Permits (AP) issued by the then Ministry of Housing and Local Government (KPKT, now known as the Ministry of Local Government Development).

Various terms including "clean, homogenous plastic," "plastic scrap," and "plastic waste" have been used to describe what is allowable under the HS Code 3915. The import of nonrecyclable household waste, municipal waste, or mixed waste is completely banned in Malaysia. Despite the Customs prohibitions, at one point, more than 17,000 tons or 17 million kilograms of unrecyclable plastic trash entered Malaysia and were dumped openly in Jenjarom, a small town in the municipality of

Kuala Langat in the state of Selangor.[14] Greenpeace Malaysia (2018) documented discarded plastic packaging from 106 different brands of consumer household products from at least 19 countries found in four different locations: Pulau Indah (Klang), Telok Panglima Garang (Kuala Langat), Jenjarom (Kuala Langat), and Tasek (Ipoh, in another state of Perak).

In early 2018, a group of residents-turned-volunteer activists from the Sungai Jarom New Village's Village Development and Security Committee (JKKK KBSJ) began mounting an opposition to the increasing levels of pollution surrounding their homes. Plagued by the toxic fumes of burning plastic, community members had been falling ill. Urged on by a chemical engineer, Lay Peng Pua, who has knowledge of toxic compounds and their health impacts, JKKK KBSJ began their own investigations, documenting the locations of illegal factories and GPS coordinates, as the illegal facilities had no signboards nor addresses. They submitted letter after letter, complaining to the local authority, but they were met with lackluster response. Officers from the local authority berated them for being "too free" and having "nothing better to do."[15]

The group soon found mountains of foreign municipal waste hidden within oil palm estates around their homes. They set up the Kuala Langat Environmental Action Association (PTASKL) to consolidate efforts in opposing the illegal plastic waste factories. In the nearby town of Klang, illegal factories were also in operation, but the facilities were more dispersed and less conspicuous. Residents similarly set up the Klang Environmental Action Association (PTASK), and like PTASKL, they traced factories which had stockpiled jumbo bags full of plastic waste, had no signboards, and were emitting noxious fumes. The residents in Klang similarly noted down GPS coordinates and addresses, and took photographs. They lamented that the local authority or local council would not commence investigations unless they furnished sufficient evidence.[16]

Anecdotes in media articles presented hints on how these illegal factories came about. The *Los Angeles Times* reported a consultant for the plastic recycling industry saying, "The previous government was very supportive of China, so some companies found their way in outside the proper channels." [17] Operations were spread out across various small facilities; one facility purchases, dismantles, and crushes large plastic debris into tiny shards, to be packed and trucked to another facility, processed into pellets, and exported to China.

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[14] Tan, Y. (2019, February 13). *Plastic pollution: One town smothered by 17,000 tonnes of rubbish*. BBC News. https://www.bbc.com/news/world-asia-46518747

[15] PTASKL member, several interviews, 2020.

[16] The terms local council, local government, or local authority tend to be used interchangeably, but for this chapter, the term local council (comprising politically appointed local councilors) is used to refer to the policymaking arm of the local government, while local authority is used to refer to the bureaucratic arm.

[17] B.Shashank. (2018, December 29). *How heaps of U.S. plastic waste landed in Malaysia, broken down by workers earning $10 a day*. Los Angeles Times. https://www.latimes.com/world/asia/la-fg-malaysia-plastic-2018-story.html

The government remained unresponsive in the first half of 2018. That same year, Malaysia experienced a watershed moment in its political history. For the first time since the formation of the country in 1963, a new political coalition Pakatan Harapan (PH) was voted into federal power on May 9, 2018, during the 14th General Election (GE14). PH took over from the Barisan Nasional (BN) coalition which had governed the country since independence.

After GE14, complaints by the groups in Jenjarom and Klang finally received attention from the federal government and the newly appointed environment minister Bee Yin Yeo.[18] Local news daily *Kosmo!* broke an award-winning exposé on the illegal factories in Kuala Langat,[19] supported by environmental groups Malaysian Natural Heritage Protectors Society (PEKA) and Greenpeace Malaysia. International media soon took notice. The PH administration sprung into action in July 2018, sealing illegal factories and stopping containers at ports. As the authorities began cracking down on operators in Kuala Langat and Klang, plastic recycling spread to other areas in Selangor. Illegal factories were soon discovered in almost every state in Peninsular Malaysia, and containers of waste were found at the ports in Butterworth, Penang, and in East Malaysia in Kuching, Sarawak.[20]

Up north, when the Penang government began clamping down on these operations in early 2019, factories then appeared in Sungai Petani, Kulim, and Gurun in the neighboring state of Kedah, all of which were relatively close to the Butterworth port.[21] What PTASKL experienced in 2018 began to affect the residents in Sungai Petani in 2019. Air pollution in Sungai Petani intensified, and this caught the attention of former political representative Lydia Ong, medical doctor Sunny Tneoh, and other affected residents, who subsequently established the Sungai Petani Environmental Action Association (PTASSP).

PTASSP organized protests, signed petitions, and made police reports. They banded together and patrolled the factory areas to find evidence of illegal burning and conducted tests on soil samples for pollutants. They plotted GPS coordinates of illegal facilities and submitted memorandums to the Kedah chief minister, the member of parliament for Sungai Petani, and the prime minister. Association members were residents living in affected areas, sacrificing their time in a fight to protect their homes and their health.

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[18] The lack of response from the bureaucracy to public complaints between January to July 2018, and the failure of regulatory oversight which allowed the influx of foreign waste have yet to be addressed.

[19] Bernama. (2019, April 27). *Two Kosmo! journalists bag prestigious Kajai award*. Malay Mail. https://www.malaymail.com/news/malaysia/2019/04/27/two-kosmo-journalists-bag-prestigious-kajai-award/1747448

[20] Chan, D. (2019, February 24). *Illegal plastic recycling plants – 'Operators shifted to other states'*. New Straits Times. https://www.nst.com.my/news/nation/2019/02/463130/illegal-plastic-recycling-plants-operators-shifted-other-states; and information provided by the DOE in July 2020.

[21] Chern, L. T. (2019, July 29). *It's just about moving here to there*. The Star. https://www.thestar.com.my/news/nation/2019/06/12/its-just-about-moving-here-to-thereplastic-waste-factories-relocated-from-penang-to-kedah

Deteriorating Environmental and Human Health

A large portion of pollution stem from illegality surrounding the waste trade. Illicit businesses shipped recyclable plastic, contaminated mixed plastics, and dirty household waste into Malaysia, most notably in 2018. Clean plastic would be processed into pellets or resins, while plastic scrap that was unsuitable for recycling was stockpiled around factories in the open, or illegally dumped and burned in oil palm plantations or former sandmining pits, releasing toxic chemicals into the air, water, and soil. In Klang, secluded industrial parks were laden with abandoned bales and jumbo bags of plastic waste, now overgrown with weeds. Journalists from a Danish television station found municipal waste from Denmark at these sites in September 2019, although their country ostensibly sends its waste to Germany for processing.[22]

Across Peninsular Malaysia, the incineration of plastic waste mostly happened at night to conceal the thick, dark smoke. Residents in the affected areas complained about the smell and reported increasing health issues such as coughing, breathing difficulties, nose bleeds, eye irritation, and skin itchiness. Investigations by PTASKL around Klang revealed that recycling facilities set up by Chinese businessmen had been established indiscriminately in the area since 2013. This ties in with China's OGF which began in 2013.[23] The community in Sungai Jarom New Village, Jenjarom, reportedly noticed a spike in cancer cases among their neighbors since the illegal recycling facilities had been set up.

In Sungai Petani, Kedah, PTASSP noted an increase of up to 30% in reports of respiratory diseases in Sungai Petani from 2018 to 2019.[24] The community resorted to purchasing handheld Air Pollutant Index (API) monitors to get readings on the air pollution.[25] When questioned, a government officer responded that the data given by the community was not valid, as they had not made official reports to the district health office.[26] Dangerous levels of air pollution indicated in their personal API monitors were also dismissed as the official DOE API reading from a station in Sungai Petani did not capture similar data about air pollution.

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[22] Herschend, S. S. (2019, September 29). *TV 2 finder dansk plastaffald på dumpingsite i Malaysia*. https://nyheder.tv2.dk/samfund/2019-09-29-tv-2-finder-dansk-plastaffald-paa-dumpingsite-i-malaysia

[23] Early, C. (2017, July 31). *China renews clampdown on waste imports.* China Dialogue. https://chinadialogue.net/en/pollution/9954-china-renews-clampdown-on-waste-imports/.

[24] PTASSP member, interview, Sungai Petani, January 29, 2020.

[25] Nambiar, P. (2019, July 1). *Sungai Petani residents lodge 10 police reports over air pollution*. Free Malaysia Today. https://www.freemalaysiatoday.com/category/nation/2019/07/01/sungai-petani-residents-lodge-10-police-reports-over-air-pollution/

[26] Air pollution and its direct consequences on public health has been well documented (Mazrura Sahani et al., 2016; National Research Council, 2000; Wong et al., 2008), but the intangible nature of air pollution and changing wind directions also cause air pollution to be extremely difficult to prove.

Table 1 Fires at plastic recycling factories, 2019–2021

No.	Date	Factory
1	April 18, 2019	Plastic recycling factory of Green Mark Technology Sungai Petani, Kedah
2	May 14, 2019	Plastic manufacturing factory in Setapak, Selangor
3	July 5, 2019	Three factories in Pulau Indah Industrial Zone, Selangor
4	July 28, 2019	Recycling factory in Jalan Ayer Hitam, close to Batu 24, Kulai, Johor
5	October 25, 2019	Plastic processing factory in Kampung Permatang Berangan, Sungai Petani, Kedah
6	January 21, 2020	Factory in Bakar Arang Light Industrial Area, Sungai Petani, Kedah
7	March 1, 2020	Recycling factories in Pasir Gudang, Johor
8	March 26, 2020	Two plastic processing factories in Kundang, Selangor
9	April 3, 2020	Plastic processing factory in Ijok, Selangor
10	June 5, 2020	Plastic recycling factory in Taman Ria Jaya, Sungai Petani, Kedah
11	October 31, 2020	Plastic processing factory in Jalan Kampung Orang Asli Kuang contaminated Sungai Kuang in Rawang, Selangor
12	November 21, 2020	Plastic recycling factory in Taman Ria Jaya, Sungai Petani, Kedah
13	February 26, 2021	Paper and plastic recycling factory in a light industrial area in Kampung Jawa, Selangor

Source: Author compilation from media and social media reports

Fires at plastic waste processing facilities became a common occurrence with several fires occurring in plastic factories, as reported in the media throughout 2019 and 2020 (see Table 1 and Fig. 2). According to the Selangor Fire and Rescue Department, there were 14 fires at plastic recycling plants in Selangor alone from March to June 2020.[27]

Plastic is easily combustible. Material recovery facilities, recycling operations, and dumpsites can end up in massive fires, releasing toxic fumes and greenhouse gasses (Hamilton et al., 2019). While the fire department noted that the main causes of fires were due to wiring and equipment failures, arson could not be ruled out – particularly when much of the imported waste was too contaminated to be properly recycled. Within their communities, PTASKL and PTASSP reported insider allegations of trade wars and unscrupulous factory owners trying to dispose waste stockpiles (Fig. 3).

This list in Table 1 does not include the multiple illegal dumpsites that had been set on fire throughout the country, which may have contained foreign plastic waste. Local communities in Sungai Petani and Jenjarom alleged that shredded e-waste was also being dumped and burned, similar to the piles shown in Fig. 4. While it is difficult to ascertain the exact compounds in the shredded material and whether it

[27] Ayamany.K. (2020, June 19). *Incidence of fire at recycling plants spikes during MCO, causing health hazards from toxic fumes*. theSundaily. https://www.thesundaily.my/local/incidence-of-fire-at-recycling-plants-spikes-during-mco-causing-health-hazards-from-toxic-fumes-AY2607057

Fig. 2 Plastic waste facility on fire – Sungai Rambai, Jenjarom, Selangor, January 12, 2019. (Photo credit: Lay Peng Pua)

contained electronic wastes, tests conducted by Greenpeace on samples of similar shredded material from a dumpsite in Seri Cheeding, Kuala Langat, Selangor, revealed relatively high concentrations of metals and metalloids such as copper, lead, zinc, and cadmium, as well as other persistent organic compounds such as brominated flame retardants and phthalates or plasticizers, which could impact the health of flora and fauna negatively or cause secondary pollution to nearby water sources (Greenpeace Malaysia, 2020, p. 12).[28]

Investigators from Greenpeace Italy also found high levels of dangerous chemicals including heavy metals such as cadmium and lead and benzo(a)pyrene, a carcinogen to humans, in plastic, water, and soil samples from various other dumping sites in Malaysia. A prawn farm owner close to Port Klang claimed that his prawns started dying when plastic waste recycling facilities had been set up nearby.[29] However, there has been no official acknowledgment of the toxic pollution caused by plastic waste the authorities. Continuous contestations over data related to air, water, and land pollution have caused much dismay to residents in Kedah, Penang, and Selangor.

Illegal dumpsites expanded in size quickly once large volumes of foreign waste began entering the country. Three major dumpsites were found in Kedah – Pinang Tunggal with hundreds of tons of plastic waste, Kampung Kemumbung with a 6-acre dumpsite on the banks of the Muda River, and Kampung Belida with a 3-acre mining pool full of waste, meters away from the Muda River and surrounded by

[28] More information on toxic additives leached from plastics and the impacts on human health can be found at Azoulay et al. (2019) and Petrlik et al. (2019).

[29] Prawn farm owner, Jenjarom, May 3, 2022.

Fig. 3 Upper left: plastic waste facility on fire – Telok Panglima Garang, Selangor, October 17, 2019. Upper right: plastic waste facility on fire – Sungai Petani, Kedah, November 21, 2020. Lower: shredded waste dumped and set on fire – Sungai Petani, Kedah, January 31, 2020. (Photo credit: Lay Peng Pua, Sunny Tneoh, Pui Yi Wong/C4 Center)

Fig. 4 (**a** and **b**) Illegal dumpsite in a former sand-mining site – Kampung Belida, Kedah, beside the Muda River, January 31, 2020. (**c** and **d**) Illegally dumped shredded waste – Telok Panglima Garang, Selangor, January 12, 2020 and Seri Cheeding, Selangor, September 5, 2020. (**e**) "Cleared" illegal dumpsite still emitting toxic fumes under the sun – Kampung Seri Cheeding, Banting, Selangor, September 5, 2020. (Photo credit: Pui Yi Wong/C4 Center)

agricultural land and a village (see Fig. 4(a, b)).[30] The Muda River supplies drinking water to millions in the states of Kedah and Penang. By 2022, the open dumps in Pinang Tunggal and Kampung Kemumbung have been partly cleared and partly buried, while the one at Kampung Belida had been left uncleared, with weeds reclaiming the space.

Research into marine plastic pollution has shown that plastic can leach toxic substances into the environment and impair the growth of microorganisms.[31] Another study found increasing evidence that black plastics in consumer products contain recycled plastic housings of waste electronic and electrical equipment. These have the potential to contaminate household or food-related items with hazardous substances such as brominated flame retardants and heavy metals (Turner, 2018). Other research has indicated that workers in the plastics industry suffer higher rates of respiratory and cardiovascular disease and cancers, while plastic waste treatment facilities (collection, sorting, processing, recycling, incineration, and landfill) also lead to negative health outcomes (Alabi et al., 2019; Dematteo et al., 2013).

In addition, research showed that the most common plastics, including polyethylene used in shopping bags, produce greenhouse gases such as methane and ethylene when exposed to sunlight (Royer et al., 2018). This is precisely the condition in which much plastic waste was and is kept in Malaysia, exposed to solar radiation within factory grounds, at illegal dumpsites, or in landfills (see Fig. 4(c, d, e)).

Governance Loopholes and Allegations of Graft

When queried about the dumpsites beside the Muda River, a government officers in Kedah denied that the dumpsites were toxic, claiming that most of the wastes were construction waste and that the Department of Environment's (DOE) Water Quality Monitoring Stations show that the Muda River was not polluted.[32] The same government officers also challenged the toxicity of plastic waste, as plastic is seen as a stable and recyclable substance. While scraps of plastic packaging with foreign labels were sighted in visits to the dumpsites, the officers responded that "they could have been blown over from elsewhere." They also repeated industry narratives that

[30] Nambiar, P. (2019, May 10). *Now, world's rubbish fouling up Sungai Petani*. Free Malaysia Today. https://www.freemalaysiatoday.com/category/nation/2019/05/10/now-worlds-rubbish-fouling-up-sungai-petani/; Nambiar, P. (2019, July 28). *Kedah govt seals off huge illegal dumpsite along Sungai Muda*. Free Malaysia Today.

[31] Studies have been conducted on the impact of plastics on photosynthetic bacteria at the bottom of the marine food web, crustaceans, barnacle larvae, and mussel embryos, among others. See Bejgarn et al. (2015), Lithner et al. (2011), Silva et al. (2016), and Tetu et al. (2019).

[32] Government officers, interview, Alor Setar, February 11, 2020, and information retrieved from Chern, L. T., & Sekaran, R. (2019, July 31). *Water in Sg Muda declared safe*. The Star. https://www.thestar.com.my/news/nation/2019/07/31/water-in-sg-muda-declared-safe.

"every piece of plastic can be recycled." Since the government crackdown on imported waste, operators have taken to shredding waste before dumping them, complicating the identification of the type and origin of the waste.

There were serious allegations of graft by the communities and businesses in relation to illegal recycling before the federal government clamped down on the operations. The key potential areas for graft and illegality are at the ports, where smuggling and the false declaration of containers can take place; during the transportation of smuggled goods should the trucks be stopped by law enforcement officers; at the site of the factories, where lax enforcement enables illicit activity in the absence of permits; and at illegal waste dumping sites. On more than one occasion, business owners contacted PTASKL and PTASK after complaints were made in confidence by whistleblowers to the authorities regarding the polluting factories, indicating that the identities of the whistleblowers had been leaked.

Greenpeace Malaysia reported "illicit flows of money to people in key positions and difficulties to get necessary AP without paying higher prices," citing an anonymous and disgruntled solid waste sales manager (Greenpeace Malaysia, 2018, p. 20). In reality, there are no charges for the applications for APs according to a KPKT officer in Putrajaya, unless brokers were hired to prepare the relevant documentation and to submit hard copies to KPKT for approval.[33]

Implicating another politician and furnishing photographic evidence, PTASSP alleged that the CEO of a major plastic recycling company is the corporate advisor of the then Sungai Petani Member of Parliament (MP). This company also provided in-kind donations such as school bags for the MP's community outreach program. When queried about his relationship with the CEO, the then MP said that he accepts advice and in-kind donations from all parties, declaring that "if anyone has evidence of me being involved in corruption, they can take me to court."[34]

The CEO and the company have had their fair share of controversy. PTASSP alleged that this company is part of a syndicate of plastic recyclers with ties to businessmen from China. In 2017, the CEO was charged for harboring undocumented migrant workers.[35] In 2019, a Canadian journalist from CBC Marketplace went undercover in Sungai Petani as plastic waste exporters with a fake company.[36] Their footage captured workers processing plastic with no protective equipment. The said CEO offered to buy dirty plastics from the undercover journalists, encouraging them to lie on shipping labels. He admitted to receiving kickbacks for helping other companies to import the materials, as his company held an AP. No action has been taken against him thus far.

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[33] KPKT officer, interview, Putrajaya, July 1, 2020.

[34] Then MP for Sungai Petani, interview, Sungai Petani, February 17, 2020.

[35] Ahmad, M. R. (2017, October 25). *Recycling company manager fined RM70,000 for harbouring 14 illegal immigrants*. New Straits Times. https://www.nst.com.my/news/nation/2017/10/294989/recycling-company-manager-fined-rm70000-harbouring-14-illegal-immigrants

[36] Szeto,E., Pedersen,K., Common,D. & Denne,L. (2019, September 27) 'Canadians would be highly shocked': Marketplace poses as fake company to expose illegal overseas recyclers. CBC News. https://www.cbc.ca/news/world/plastics-recycling-waste-overseas-marketplace-1.5292512

The issues faced by the residents amid the flood of plastic waste imports are common grouses of petty corruption against local governments and law enforcement agencies. Petty or administrative corruption refers to everyday corruption or the abuse of power by public officials when interacting with citizens, such as bribery linked to law enforcement.[37] A state assembly representative shared that small businesses often opt not to legalize their operations due to high costs, simply because it was cheaper to pay off enforcement officers whenever they conducted inspections.[38]

While PTASKL accused local authorities of malfeasance and abuse of power, particularly in licensing and enforcement, PTASSP offered examples of graft whereby runners from factories would collect payments for various law enforcement agencies. Law enforcement agencies and political representatives have strongly denounced corruption among their ranks, but institutionalized corruption of this sort is not uncommon in Malaysia. Past investigations had revealed the prevalence of corruption within different government agencies, including the Kedah police station.[39]

In addition, PTASSP shared that several raids by authorities found factories devoid of activity, indicating that the operators could have been tipped off in advance. In February 2020, a raid was conducted on an illegal recycling plant deep inside an oil palm plantation in Bedong, a town close to Sungai Petani. Authorities had been gathering evidence on this factory since 2019. However, the place was found empty, with only some laundry that was hung out to dry.[40] Another similar

[37] U4 Anti-Corruption Resource Centre. (n.d.). What is corruption? https://www.u4.no/topics/anti-corruption-basics/basics

[38] State Assembly representative, interview, Bukit Mertajam, 11 February 2020.

[39] The practice of businesses, legal or illegal, paying "fees" to enforcement officers has been reported by the local press. *Malaysiakini* had ran reports on Road Transport Department officers soliciting bribes from transport companies (see Lu Wei Hoong. (2020, February 13). *Institutionalized corruption in RTD grips logistics industry, turns clean firms dirty.* Malaysiakini. https://www.malaysiakini.com/news/510634). In August 2020, a whistleblower complained about police and local council protection for illegal online gambling dens, leading to arrests of enforcement officers (see Anis, M. N. (2020, August 14). *MACC arrests MBSA director over alleged bribery*. The Star. https://www.thestar.com.my/news/nation/2020/08/14/macc-arrests-mbsa-director-over-alleged-bribery). Prior to that, *The Star* exposed corruption among border officers and policemen involved in wildlife smuggling (see Yee, E., Shah, A., & Koonlachoti, C. (2019, September 25). *EXCLUSIVE: R.AGE undercover investigations expose international smuggling ring for endangered pangolins*. The Star. https://www.thestar.com.my/news/nation/2019/09/25/corruption-at-the-border). In addition, they revealed that since 2012, three Malaysian policemen have been arrested for smuggling pangolins across the Malaysia-Thailand border including one officer who was arrested twice. Incidentally, all three policemen arrested had worked, or are still working, at the same police station, the Kedah state police headquarters, where illegal plastic recycling operations have taken root (see Trafficked to Extinction. (n.d.). https://globalstory.pangolinreports.com/#malaysia-thai-border).

[40] Sin Chew Daily. (2020, July 2). Cang you zong yuan nei an zhong cao zuo, fei fa yang la ji chang bei cha feng [Secret operations in oil palm estate, illegal foreign waste factory closed down]. https://www.sinchew.com.my/?p=3010734

case was reported in Klang in 2019.[41] In another incident, a member of PTASKL alleged that foreign workers believed to be working in the plastic recycling factories were found playing basketball in her village on the day of a joint operation by the government. The workers said that they were told not to go to work.

A local news daily, *Malay Mail*, cited industry sources who alleged that illegal plant operators had bribed Malaysian officials at all levels of government (Malay Mail, 26 July 2018).[42] The then Minister of Water, Land and Natural Resources also admitted to the possibility of corruption by the previous administration which led to lax enforcement. He said that he had ordered an investigation. A former local councilor shared that it is common for businesses to offer money in exchange for favors from the local councilors or the local government.[43]

There have been few publicly reported investigations by the Malaysian Anti-Corruption Commission into how unlicensed operators set up their recycling facilities with ease.[44] The only tell-tale sign that may indicate the government's awareness of petty corruption was the change of DOE directors at state and local branches across the country in 2019.[45]

Thus far, no government officer or business owner has been held accountable for the devastating pollution and irreparable damage to environmental and human health caused by the high volume of imported plastics into the country. Corruption, with the exchange of money, is extremely difficult to prove without the assistance of informants or whistleblowers, and in this section, we have only compiled allegations and anecdotal evidence. There remains an urgent need for legal reforms to effectuate whistleblower protection in Malaysia, if institutionalized corruption is to be seriously addressed. This must be a priority of the current federal government, voted into power in November 2022.

[41] Chan, D. (2019, June 3). *MPK, DoE shut down illegal plastic waste plant in Teluk Gong [NSTTV]*. New Straits Times. https://www.nst.com.my/news/nation/2019/06/493628/mpk-doe-shut-down-illegal-plastic-waste-plant-teluk-gong-nsttv

[42] Syed Jaymal Zahiid And Ruban Anbalagan. (2018, July 26). *Graft behind Chinese firms dumping plastic waste here?*. Malay Mail. https://www.malaymail.com/amp/news/malaysia/2018/07/26/graft-behind-chinese-firms-dumping-plastic-waste-here/1656056

[43] Former local councilor in Selangor, interview, Kuala Langat, 2 July 2020.

[44] A report was lodged in 2018 on the alleged illegal operation of a plastic recycling plant at Jenjarom, Kuala Langat, but the Malaysian Anti-Corruption Commission (MACC) found no elements of corruption. Another man was arrested for receiving bribes related to the establishment of a recycling plant, but the outcome of the investigation is unknown. (Bernama. (2019, June 9). *Customs to crack down on illegal plastic waste entry at ports* (https://www.malaysiakini.com/news/478956). Both PTASSP and PTASKL shared that they attempted to lodge reports with MACC. PTASKL was rejected by the MACC officers, saying they had no case, while PTASSP went through an NGO and did not hear from them.

[45] This information was revealed when attempts were made to secure interviews with DOE officers at state and local branches and also shared by local communities.

Criminality and Intimidation of Activists

In Selangor, the community activists faced intimidation from gangsters. After the secretary of PTASKL brought journalists to investigate a factory which was believed to be processing imported plastic waste without an AP, she received death threats and had red paint splashed on her home. The perpetrators were identified as gang members and were arrested and charged in court,[46] but the person who hired the gangsters was never revealed.

PTASK also faced gangster intimidation in Klang.[47] When driving around the factories, their members were harassed by men on motorcycles. When bringing journalists around Klang, the residents-turned-activists reported that workers at a recycling facility snatched their car keys while the boss warned and threatened them not to return. The same person later resorted to offering bribes so that investigations would cease (Greenpeace Malaysia, 2019, p.19).[48]

As with in Selangor, gangsterism appears rife among recycling operators up north in Sungai Petani. The plastic recycling company CEO from Sungai Petani who was captured in *CBC Marketplace*'s footage was implicated in a massive fire which occurred at its factory in early 2019. In another tussle between local communities, plastic recycling operators, and law enforcement officers, individuals linked to PTASSP were arrested late one night over charges of arson.[49] PTASSP maintained that the individuals arrested were innocent and that the arrests made that night were forms of intimidation against the vocal group.

In another case, a factory owner in Sungai Petani was beaten up by illegal recycling plant operators after he filmed them continuing their operations after their factory was sealed by the local authorities. The same people also threatened the then president of PTASSP to stop opposing the factories.[50] Even government officers

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[46] Chan, D. (2019, December 5). *Undeterred by threat, Pua calls for continued action to protect the environment*. New Straits Times. https://www.nst.com.my/news/nation/2019/12/544970/undeterred-threat-pua-calls-continued-action-protect-environment

[47] PTASK member, interview, Kuala Lumpur, 2 January 2020.

[48] See also *Channel News Asia* (30 December 2019), (Mahmud, A. H. (2021, February 4). *Malaysia moves to reap the benefits of processing global plastic waste*. CNA News. https://www.channelnewsasia.com/news/asia/malaysia-world-plastic-waste-recycling-china-11048810)

[49] Tan, G. (2019, November 28). *Activist nabbed over alleged arson*. The Star. https://www.thestar.com.my/news/nation/2019/05/12/activist-nabbed-over-alleged-arson

[50] A factory manager and driver pleaded guilty and were fined RM1,500 by the magistrate court for causing injury to the victim. They were also ordered to pay RM1,000 each as compensation to the victim (The Sun Daily. (n.d.). *Factory manager, driver fined RM1,500 for causing injury to plant owner*. https://www.thesundaily.my/local/factory-manager-driver-fined-rm1-500-for-causing-injury-to-plant-owner-JC1105193). A third person, a security guard, was subsequently arrested (Bernama. (2019, July 16). *Another suspect detained in factory manager assault case*. New Straits Times. https://www.nst.com.my/news/crime-courts/2019/07/504710/another-suspect-detained-factory-manager-assault-case). Gangsterism and the threat of violence surrounding the plastic recycling operations were recurring problems which informants from both Selangor and Kedah experienced.

were not spared, as revealed by SWCorp, the statutory body set up under the solid waste management department to execute policies. Enforcement officers were often threatened when patrolling illegal dumpsites as the site operators are believed to be linked to gangsters and secret societies.[51]

The problems enumerated above are not new – smuggling, illegal factories, institutionalized corruption, gangsterism, political-business nexus, and a lack of public access to information. In this case of the waste trade, petty corruption, malfeasance, and illegality have direct consequences on human and environmental health.

The whole experience from 2018 to 2020 deepened the trust deficit between the affected communities and the government. While the communities were quick to accuse the government of self-gratification and collusion with businessmen and gangsters at the expense of the environment, health, and public interest, the government chastised the community groups as minority voices with political motives, accusing them of over-exaggeration and wrongful blaming of the government. Meanwhile, the government, members of the public, landowners, legitimate plastic recycling businesses, etc., had to go to great lengths and incur high costs in efforts to stem the harm caused by the massive influx of plastic waste to such a small country.

The Important Role of the Government

Malaysia is a party to the 1992 Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal (Basel Convention). The DOE under the federal ministry for environment is the competent authority of the Basel Convention. However, monitoring and regulating plastic waste imports is very complex in Malaysia, not only because of the issues outlined above. Enforcement efforts cut across several government agencies under different ministries and across various levels of government, each with varying degrees of concern for the environment and international law.

The executive arm of the Government of Malaysia is made up of three levels: federal government, state government, and local government. The important role played by the local government in protecting the right to a healthy environment was brought to the forefront in the plastic waste importation crisis. All complaints made by the communities to the Chief Minister's Office at the state level, or to JPSPN or the DOE at the federal level, were often referred back to the local government. However, while the local government deals with issues on the ground, both the local and state governments are subject to policies made by the federal government.

The government has indeed taken action to solve the problems caused by imported plastic waste. Table 2 presents major announcements made by the federal

[51] The Star Online. (2020, June 23). *SWCorp in battle against secret societies and gangsters*. https://www.thestar.com.my/news/nation/2020/06/23/swcorp-in-battle-against-secret-societies-and-gangsters

Table 2 Key policy decisions taken by the federal government

Date	Government action
July 23, 2018	KPKT (ministry for local government) revoked APs on the import of HS Code 3915 plastic waste for 114 factories for 3 months
	JPSPN (solid waste management department) would form a task force to review the procedures on the import of items under this code, chaired by the Director General and consisting the DOE, Customs, Malaysian Industrial Development Authority, and SWCorp
August 16, 2018	KPKT agreed to lift the suspension of APs for HS Code 3915 plastic waste (homogenous, clean waste) for facilities at free trade zones (FTZ) and licensed manufacturing warehouse (LMW)-status plants, with immediate effect, after appeals from importing companies
September 25, 2018	KPKT minister chaired a coordination meeting at Kuala Langat District Council on the issue of illegal factories
	AP holders were discovered to have rented out their import licenses to other parties including illegal factories that processing plastic waste without proper equipment, which was admitted by the businessmen to the government
	The government will impose a levy of MYR15 per ton on the import of plastic waste by local industry players beginning next month
	There were 54 plastic waste factories in Kuala Langat. Thirteen factories were legalized by the state government and given licenses. Seventeen were ordered to close. Among future plans was to relocate plastic waste processing factories to heavy industrial zones
October 16, 2018	Establishment of a Joint Ministerial Committee to tackle the issue – KPKT (chair), natural resources ministry (KATS), international trade ministry (MITI) and environment ministry (MESTECC)
	KPKT froze the import of plastic waste with HS Code 3915
	MESTECC froze license issuance for plastic recycling factories. The import of all nonrecyclable mixed solid waste will be banned
	The government closed more than 30 factories in Kuala Langat
	Confiscated plastic waste from illegal factories to be auctioned to legal players. Contaminated and nonrecyclable wastes to be landfilled
October 26, 2018	KPKT announced a permanent stop on the issuance of APs for contaminated plastic waste after a Joint Ministerial Committee meeting, where the Malaysian Plastic Manufacturers Association shared their views
	APs would still be approved for the import of clean, quality plastic under strict conditions. Only eight companies comply with the current eight criteria
	The local plastic industry was encouraged to stop dependency on materials from abroad. The country would phase out the import of all types of plastic including "clean" plastic within 3 years
October 17, 2018	MESTECC launched the Roadmap Towards Zero Single-Use Plastics 2018–2030. The Malaysia Plastic Pact was proposed, as an industry-driven multistakeholder initiative toward a circular plastic economy
November 1, 2018	KPKT proposed that APs for the import of plastic waste be resumed for companies that fulfil certain AP conditions, which will be increased and made more stringent

(continued)

Table 2 (continued)

Date	Government action
November 15, 2018	KPKT told Parliament that a committee had been set up within the ministry to check all 114 plastic recycling factories with approval to conduct plastic waste imports
	KPKT sent a circular to all local authorities to shut down illegal factories
	Applications by factories for business licenses to process plastic waste will require a consent letter from KPKT, which will only be approved once the applicants meet the new 18 conditions stipulated
January 5, 2019	KPKT had yet to approve any APs since July 2018
	114 companies held APs for plastic waste but only 54 were active. Eight complied with previous conditions stipulated. All must reapply for the AP according to the new procedures. Nineteen companies have applied
January 15, 2019	Town hall session on plastic waste with Malaysian Plastics Manufacturers Association (MPMA) and PTASKL, among others. KPKT will train customs officers to identify clean plastic from mixed plastic waste
	19 out of 114 plastic waste AP holders passed the requirements to import plastic scrap into the country
June 8, 2019	62 Malaysian companies thus far held APs to import and process plastic waste
	These companies are continuously monitored to ensure that the regulations are followed
	A company based in Johor which imported contaminated plastic waste and made a false declaration in import documentation to evade checks by the authorities had its permit suspended. JPSPN warned that subsequent offences could lead to revocation of the permit
January 4, 2020	MESTECC had shut down the operations of 170 plastic recycling factories for violating the Environmental Quality Act 1974

Source: Author compilation from media reports and Department of Environment (DOE), July 2020

government to deal with the influx of plastic waste, however, with the changing stance on APs observed between October and November 2018. Table 3 summarizes the roles of various institutions, legislation, and mechanisms adopted by the government to address the plastic waste issue across federal, state, and local levels., while Table 4 shows the number of returned containers of plastic waste to the countries of origin. The full report by C4 Center (2021) presented an in-depth discussion about the various enforcement efforts by the different government agencies.

Despite implementing one of the best efforts in the region to tackle the imported plastic waste crisis, loopholes still exist. Then KPKT minister informed Parliament in November 2018 that "the plastic that come are the homogenous and pellet types. We are controlling this (plastic waste import) very thoroughly, to ensure the plastic waste that comes is of good quality, and processed to be used by consumers."[52] In January 2019, she reiterated at a town hall that the government had never approved

[52] Chow, M. D. (2018, November 15). *Plastic waste a RM30 billion industry, Dewan Rakyat told*. https://www.freemalaysiatoday.com/category/nation/2018/11/15/plastic-waste-a-rm30-billion-industry-dewan-rakyat-told/

Table 3 Interagency cooperation to solve the plastic waste crisis

Government action	Mechanism
Ministerial-level taskforce	*Joint ministerial committee*:
	KPKT (chair), natural resources ministry (KATS), international trade ministry (MITI), and environment ministry (MESTECC)
Inter-ministry coordination (ports)	*JPSPN, KPKT (local government ministry)*:
	Grant or reject Approved Permits for HS Code 3915 plastics
	Customs, Ministry of Finance:
	Allow or stop foreign cargo from entering the country
	DOE, MESTECC (environment ministry):
	Ensure compliance with the Basel Convention. Organize government-to-government arrangements to repatriate dirty municipal plastic waste
Inter-ministry and federal-state-local governmental regulation of licensing for premises and businesses (factories)	*MIDA, MITI (international trade ministry)*:
	Standards-setting and policymaking for the whole country
	DOE, MESTECC (environment ministry):
	Ensure compliance with environmental laws and environmental impact assessments (EIA) before giving approval for the factory
	Monitoring of compliance with environmental laws
	State Executive Councils:
	Policymaking for the state. Decisions on freezing or allowing the approval of licenses to plastic recycling facilities
	Local Government Committee:
	The executive committee for local government (made up of elected state representatives) meets with the mayor or presidents of local councils in the state several times a year to enhance policy implementation and coordination
	Local Authority (bureaucracy):
	Approval of licensing for premises and businesses. Enforcement against unlicensed operators
Federal-state-local governmental committee to continuously monitor the issue	*District Development Action Committee*:
	The district officer meets monthly with members of parliament, state assembly representatives, state exco, the police, and officers from local branches of federal agencies. This is the main problem-solving body at the district level, coordinated by the National Development Action Council as part of the national policy implementation coordination mechanism
	Meeting of Environment Ministers and State Executive Councilors Responsible for the Environment (MEXCOE):
	The environment minister meets with the excos for environment from all states to heighten and facilitate enforcement activities against environmental pollution

Source: Author compilation from media reports and interviews

Table 4 Return of containers with contaminated plastic waste as of June 2020

No.	Port	Origin	No. of containers	Weight (kg)
1	Port Klang, Selangor	UK	1	22,000
		Bangladesh	1	20,710
		Spain	10	237,220
		Australia	3	68,440
		Singapore	1	22,000
		Japan	5	390,770
		USA	1	28,000
		Belgium	7	152,820
		Germany	2	45,360
		Taiwan	1	21,050
		Poland	1	18,900
		South Korea	2	30,790
		Hong Kong	14	290,788
		China	3	58,000
		Sri Lanka	1	21,284
2	Senari Port, Kuching, Sarawak	USA	31	429,760
		France	48	991,373
		Singapore	3	71,886
3	Penang Port	USA	17	334,103
		Vietnam	2	38,195
		Portugal	3	73,647
		Canada	11	189,201
		Lithuania	1	20,300
		Saudi Arabia	1	22,300
		UK	46	981,278
		Hong Kong	9	147,000
Total			225	4,727,175

Source: Department of Environment (DOE), July 2020

the import of plastic rubbish, just clean plastic scrap.[53] However, in 2019, Australian journalists easily intercepted a container full of mixed waste, as shown in Fig. 5. When queried, the factory owner receiving the container revealed that he could easily access supplies of mixed plastic waste from smugglers.

Aside from smuggling at the ports, illegal plastic recycling facilities also pose a problem. In February 2020, MESTECC launched a "National Action Plan on Enforcement on the Import of Plastic Waste" and targeted a total of 30,000 enforcement actions in 2020, compared to 18,314 enforcement actions in 2019 and 7194 in

[53] Bedi, R. S. (2019, July 29). Zuraida: *Imports of clean, recyclable plastic allowed, never plastic 'rubbish'*. The Star. https://www.thestar.com.my/news/nation/2019/01/15/zuraida-imports-of-clean-recyclable-plastic-allowed-never-plastic-rubbish

Fig. 5 Australian journalists intercepting a mixed waste container – Pulau Indah, Selangor, March 15, 2019. (Photo credit: Lay Peng Pua)

2018.[54] From January 1 to September 20, 2020, a total of 17,445 inspections on various premises had been conducted under the EQA.[55] These enforcement efforts are time-consuming and labor-intensive. Joint enforcement operations were organized across various states, involving federal agencies, state governments, and local authorities, along with much coordination among multiple agencies.

Table 5 shows enforcement action as compiled by the DOE since 2019. In mid-2019, two plastic recycling factories in Selangor were charged in court and fined a total of MYR120,000 for processing plastic waste without DOE approval, failure to install air pollution control systems, and failure to install systems to manage industrial effluents.[56] This was a slap on the wrist as processing waste without DOE approval is punishable by a maximum of MYR500,000 fine, or a maximum five-year jail term, or both, under the environmental law.

At the state level, in Selangor, a special task force with monthly meetings was formed to solve the plastic waste problem, co-chaired by the Environment, Green

[54] Mestecc launches national action plan on enforcement against plastic waste imports. (2020, February 10). The Sun Daily. https://www.thesundaily.my/local/mestecc-launches-national-action-plan-on-enforcement-against-plastic-waste-imports-CA1992073#:~:text=Mestecc%20launches%20national%20action%20plan%20on%20enforcement%20against%20plastic%20waste%20imports,-10%20Feb%202020&text=The%20plan%2C%20also%20known%20as,said%20in%20a%20statement%20today

[55] Yunus, A., & Hana Naz Harun and Teh Athira Yusof. (2020, November 4). *Drop it! 61 premises charged over water pollution.* New Straits Times. https://www.nst.com.my/news/nation/2020/11/637913/drop-it-61-premises-charged-over-water-pollution

[56] Lim, I. (2019, May 17). *Court fines two Selangor factories RM120,000 for illegal plastic recycling*. Malay Mail. https://www.malaymail.com/news/malaysia/2019/05/17/court-fines-two-selangor-factories-rm120000-for-illegal-plastic-recycling/1754010

Table 5 DOE operations against illegal factories

Year	No. of Operations	Enforcement action					Overall actions
		Notice of orders	Compounds	Seizure of operating facilities	Prohibition order	Investigation papers opened	
2019	275	119	86	186	11	74	476
2020, January 1 to July 17	41	17	66	18	1	7	109
Total	316	136	152	204	12	81	585

Source: Department of Environment (DOE), July 2020

Technology and Consumer Affairs Committee chairman and the Local Government, Public Transportation and New Village Development Committee chairman, and involving representatives from local councils, the DOE, the District and Land Office, the police force, and the Immigration Department.[57] On occasion, Tenaga Nasional Berhad (power service provider, with approval from the Energy Commission of Malaysia),[58] Air Selangor (water service provider), National Water Services Commission, and Customs would join the operations where the supply of utilities to the factories would be disconnected.

From 2018 to 2020, the state government took action against 113 factories in Klang alone, with 37 shut down, and another 34 illegal factories in Jenjarom, Kuala Langat, were closed.[59] Similar actions were taken in Penang and Kedah, with the Kedah state government stopping all issuance of business licenses for plastic recycling in 2019. This left certain businesses who had invested in building new facilities in a quandary.[60] Seberang Perai in the state of Penang reportedly had as many as 404 plastic recycling facilities and factories, with 14 found to be operating without license.[61]

[57] Chan, D. (2019, February 23). *Selangor gets tough on illegal factories [NSTTV]*. New Straits Times. https://www.nst.com.my/news/nation/2019/02/462869/selangor-gets-tough-illegal-factories-nsttv

[58] Rajendra, E. (2019, November 28). *MPK cuts off electricity supply at illegal plastic waste processing plant*. The Star. https://www.thestar.com.my/metro/metro-news/2019/06/24/mpk-cuts-off-electricity-supply-at-illegal-plastic-waste-processing-plant

[59] Martin Vengadesan & Low Choon Chyuan. (2020, August 20). *The Selangor gov't and scourge of plastic waste*. https://www.malaysiakini.com/news/539196

[60] Kedah state officer, interview, Alor Setar, February 11, 2020.

[61] Chern, L. T. (2019, July 29). *Illegal plastic factories booming*. The Star. https://www.thestar.com.my/news/nation/2019/05/18/illegal-plastic-factories-booming/

Conclusion: Counting the True Costs of Plastic Waste

Waste management should not be viewed purely from an economic lens. It is a governance, human rights, and environmental justice issue. The nations exporting the most plastic waste are also the world's largest consumers of plastics (the beneficiaries of the products). They should manage their own plastic waste with an urgent focus on reducing plastic production and consumption, rather than exporting the waste, even when they are allegedly exported for recycling.

We have learned that the recycling of plastic waste is partial at best and highly hazardous to workers and surrounding communities, polluting their water and air, with a large portion dumped or burned. Wastewater from recycling facilities leave a legacy of contamination and, as scientists have proven, the effluent of microplastics (Go et al., 2022). "Economic progress" as historically defined by the Global North has led the planet into an ecological crisis – the type of progress that has existed at the expense of other global neighbors – as it necessitates the offshoring of negative externalities to others far away in order to offer luxury and convenience to a wealthier minority.

This chapter showed how the plastic waste exported to Malaysia has impacted people and their communities not only environmentally, but also socially, culturally, and politically – affecting the relationships between people, the government, and businesses; worsening the culture of graft and illegality; and sowing distrust in political leaders and conflict with bureaucrats. The costs of "waste colonialism" go beyond the toxicity of plastic pollution. Plastic is certainly not a "cheap material," if one were to consider the true costs of its production, consumption, waste, and pollution, especially on peoples and environments far from the minds of the finance executives in business offices.

Today, the Malaysian government remains reluctant to ban the import of plastic waste for economic reasons, opting to focus on enhancing enforcement efforts, as many major business interests continue to profit from the trade. Yet, there are signs that enforcement of the Basel Convention's newly adopted controls is not being realized. Affected communities remain distrustful of the government, which to them, appeared to be more concerned with the health of plastic industry players than that of the people. The plastic manufacturing industry is well established in Malaysia with the association MPMA set up in 1967. In 2018, MPMA had several engagements with the ministers overseeing environment (MESTECC), local government (KPKT), and international trade (MITI) (Malaysian Plastics Manufacturers Association, 2019, pp. 33–34), while affected communities had to struggle to get a meeting with the ministers.

An Advanced Plastic Recycling Industry for Malaysia: A White Paper by MPMA and MPRA stated that the plastics recycling industry is worth MYR4.5 billion in revenue, and it supports the MYR31 billion local plastics conversion industry (Malaysian Plastics Manufacturers Association & Malaysian Plastics Recyclers Association, 2019, p. 8). However, before one can assume even the direct economic benefits of importing foreign wastes, what needs to be clarified is how much

recycled plastics are beneficial to the midstream plastic conversion industry, and how much resins from the imported plastic waste are actually destined to be wholly exported to China, therefore providing no value to the domestic plastic industry.

When queried why China banned the import and processing of waste amid industry claims that it is lucrative, a government official opined that it was because China wanted to move up the value chain toward higher-value products.[62] This was inaccurate, as China clearly imposed the ban to rehabilitate its polluted environment. The WTO submission by the Chinese government provided strong evidence that the concerns of the local communities in Malaysia about the overall impacts of plastic waste imports on human and environmental health are valid, despite the government and businesses claiming otherwise. Another interviewee further supported this point by sharing that the Chinese government had sought international assistance to curb smuggling in the illegal waste trade.[63]

In addition to pollution, environmental degradation, and social costs, the administrative hidden costs incurred by the government in terms of enforcement, monitoring, cleaning up, and rehabilitation of polluted environments must also be considered, alongside the burden on public healthcare. Illegal businesses and smuggling activities that plague the waste trade contribute nothing to the local economy (Sembiring, 2019) and are extremely difficult to monitor. When viewed from a true cost, ecological economics perspective, it is logical that Malaysia should follow the example of China and ban the trade outright as it creates a net economic deficit for the country.

Finally, the ease of securing plastic waste via importation disincentivizes the need for local businesses and governments to enhance domestic plastic waste segregation and collection (Environmental Investigation Agency, 2023), particularly for commercial and household wastes. This is yet another serious consequence of the waste trade, leading to ever more plastic leakage and pollution.

The Malaysian government has gone to great lengths to seek solutions to the plastic waste import crisis. But while government officers in the federal and the state governments we interviewed observed that the problem has largely been addressed, ongoing complaints by the communities about dumping, open burning, and air pollution indicate that the picture remains ugly. The difficulties of monitoring and enforcement remain. In addition, more illegal recycling factories of other types of waste materials have emerged.

Meanwhile, Malaysia is worryingly accepting another form of waste colonialism from the Global North – allowing the installation of waste-to-energy incineration facilities as a "solution" to waste problems. There are serious concerns that these incinerator schemes would require more imported wastes as fuel to fill the capacity of the burners. This presents a whole new set of environment justice problems, including exacerbating the climate crisis by incinerating converted fossil fuels and introducing the carbon into the atmosphere, when our planet desperately needs to sequester it.

[62] Government officer, interview, Shah Alam, September 14, 2020.

[63] International officer, interview, teleconference, June 4, 2020.

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References

Akenji, L., Bengtsson, M., Kato, M., Hengesbaugh, M., Hotta, Y., Aoki-Suzuki, C., et al. (2019). *Circular economy and plastics: A gap-analysis in ASEAN member states*. Mission of the European Union to ASEAN and Association of Southeast Asian Nations.

Alabi, O. A., Ologbonjaye, K. I., Awosolu, O. A., & Olufiropo, E. (2019). Public and environmental health effects of plastic wastes disposal: A review. *Journal of Toxicology and Risk Assessment, 5*(1). https://doi.org/10.23937/2572-4061.1510021

Azoulay, D., Villa, P., Arellano, Y., Gordon, M., Moon, D., Miller, K., & Thompson, K. (2019). *Plastic and health: The hidden costs of a plastic planet*. Retrieved from https://www.ciel.org/wp-content/uploads/2019/02/Plastic-and-Health-The-Hidden-Costs-of-a-Plastic-Planet-February-2019.pdf

Bejgarn, S., MacLeod, M., Bogdal, C., & Breitholtz, M. (2015). Toxicity of leachate from weathering plastics: An exploratory screening study with *Nitocra spinipes*. *Chemosphere, 132*, 114–119. https://doi.org/10.1016/j.chemosphere.2015.03.010

Brooks, A. L., Wang, S., & Jambeck, J. R. (2018). The Chinese import ban and its impact on global plastic waste trade. *Science Advances, 4*(6). https://doi.org/10.1126/sciadv.aat0131

Bueta, G. R. P. (2020). *Waste trade in the Philippines: How local and global policy instruments can stop the tide of foreign waste dumping in the country*.. Retrieved from Quezon City: https://storage.googleapis.com/planet4-philippines-stateless/2020/03/da311344-waste-trade-in-the-philippines-report-v2.pdf

C4 Center. (2021). *Malaysia is not a "Garbage Dump": Citizens against corruption, complacency, crime, and climate crisis*. Center to Combat Corruption and Cronyism (C4 Center).

Davis, J.-M., Akese, G., & Garb, Y. (2019). Beyond the pollution haven hypothesis: Where and why do e-waste hubs emerge and what does this mean for policies and interventions? *Geoforum, 98*, 36–45. https://doi.org/10.1016/j.geoforum.2018.09.020

Dematteo, R., Keith, M. M., Brophy, J. T., Anne, W., Watterson, A. E., Beck, M., Rochon, A., et al. (2013). Chemical exposures of women workers in the plastics industry with particular reference to breast cancer and reproductive hazards. *New Solutions: A Journal of Environmental and Occupational Health Policy, 22*(4), 415–417. https://doi.org/10.2190/NS.22.4.d

Environmental Investigation Agency. (2023). *Plastic waste power play: The offshoring and recycling displacement involved in trying to recycle EU plastic waste*.. Retrieved from https://eia-international.org/wp-content/uploads/EIA_UK_Plastic_Waste_Trade_Report_0123_FINAL_SPREADS.pdf

Fuller, S., Ngata, T., Borrelle, S. B., & Farrelly, T. A. (2022). Plastics pollution as waste colonialism in Te Moananui. *Journal of Political Ecology, 29*(1), 534–560. https://doi.org/10.2458/jpe.2401

Geyer, R., Jambeck, J. R., & Law, K. L. (2017). Production, use, and fate of all plastics ever made. *Science Advances, 3*(7). https://doi.org/10.1126/sciadv.1700782

Global Alliance for Incinerator Alternatives. (2019). *Discarded: Communities on the frontlines of the global plastic crisis*. Retrieved from https://wastetradestories.org/wp-content/uploads/2019/04/Discarded-Report-April-22.pdf

Go, S., Natsuyo, U., Le, H. T., Kosuke, T., Hidenori, M., Tatsuya, K., Shin, T., Pham, H. V., Hidetoshi, K., & Masahiro, O. (2022). Mechanical recycling of plastic waste as a point source of microplastic pollution. *Environmental Pollution, 303*. https://doi.org/10.1016/j.envpol.2022.119114

Greenpeace Malaysia. (2018). *The recycling myth: Malaysia and the broken global recycling system*. Greenpeace.

Greenpeace Malaysia. (2020). *The recycling myth 2.0: The toxic after-effects of imported plastic waste in Malaysia*. Greenpeace Malaysia.

Hamilton, L. A., Feit, S., Muffett, C., Kelso, M., Rubright, S. M., Bernhardt, C., … Labbé-Bellas, R. (2019). *Plastic and climate: The hidden costs of a plastic planet*.. Retrieved from https://www.ciel.org/wp-content/uploads/2019/05/Plastic-and-Climate-FINAL-2019.pdf

Jambeck, J. R., Geyer, R., Wilcox, C., Siegler, T. R., Perryman, M., Andrady, A., et al. (2015). Plastic waste inputs from land into the ocean. *Science, 347*(6223), 768–771. https://doi.org/10.1126/science.1260352

Lithner, D., Nordensvan, I., & Dave, G. (2011). Comparative acute toxicity of leachates from plastic products made of polypropylene, polyethylene, PVC, acrylonitrile–butadiene–styrene, and epoxy to *Daphnia magna*. *Environmental Science and Pollution Research, 19*(August), 1763–1772. https://doi.org/10.1007/s11356-011-0663-5

Malaysian Plastics Manufacturers Association, & Malaysian Plastics Recyclers Association. (2019). *An advanced plastics recycling industry for Malaysia*.. Retrieved from http://mpma.org.my/v4/wp-content/uploads/2019/09/White-Paper-FINALR.pdf

Mazrura Sahani, M., Khan, F., Mahiyuddin, W. R. W., Latif, M. T., Ng, C. F. S., Yussoff, M. F., et al. (2016). Air pollution and health in Malaysia. In D.-C. Shin (Ed.), *Hazardous air pollutants: Case studies from Asia*. CRC Press.

Mobilik, J.-M., Ling, T.-Y., Husain, M. L., & Hassan, R. (2014). Type and abundance of marine debris at selected public beaches in Sarawak, East Malaysia, during the northeast monsoon. *Journal of Sustainability Science and Management, 9*(2), 43–51. Accessed at: https://jssm.umt.edu.my/wp-content/uploads/sites/51/2015/02/4.pdf

National Research Council. (2000). *Waste incineration and public health*. The National Academies Press.

Petrlik, J., Ismawati, Y. D., Joseph, Arisandi, P., & Bell, L. B. Björn (2019). *Plastic waste poisons Indonesia's food chain*.. Retrieved from https://ipen.org/sites/default/files/documents/indonesia-egg-report-v1_9-web.pdf

Puckett, J., & Smith, T. C. (Eds.). (2002). *Exporting harm: The high-tech trashing of Asia*. Basel Action Network and Silicon Valley Toxics Coalition.

Razali, F., Daud, D., Choong, W.-W., & Jiram, W. R. A. (2020). Waste separation at source behaviour among Malaysian households: The Theory of Planned Behaviour with moral norm. *Journal of Cleaner Production, 271*. https://doi.org/10.1016/j.jclepro.2020.122025

Royer, S.-J., Ferrón, S., Wilson, S. T., & Karl, D. M. (2018). Production of methane and ethylene from plastic in the environment. *PLoS One, 13*(8), e0200574. https://doi.org/10.1371/journal.pone.0200574

Sembiring, M. (2019). *Global waste trade chaos: Rising environmentalism or cost-benefit analysis?* (NTS Insight, No. IN19-02). Centre for Non-Traditional Security, S. Rajaratnam School of International Studies, Nanyang Technological University.

Silva, P. P. G. E., Nobre, C. R., Resaffe, P., Pereira, C. D. S., & Gusmão, F. (2016). Leachate from microplastics impairs larval development in brown mussels. *Water Research, 106*(December), 364–370. https://doi.org/10.1016/j.watres.2016.10.016

Tetu, S. G., Sarker, I. S., Verena, Pickford, R., Elbourne, L. D. H., Moore, L. R., & Paulsen, I. T. (2019). Plastic leachates impair growth and oxygen production in *Prochlorococcus*, the ocean's most abundant photosynthetic bacteria. *Communications Biology, 2*, *184*. https://doi.org/10.1038/s42003-019-0410-x

Tran, T., Goto, H., & Matasuda, T. (2021). The impact of China's tightening environmental regulations on international waste trade and logistics. *Sustainability, 13*(937), 1–14. https://doi.org/10.3390/su13020987

Turner, A. (2018). Black plastics: Linear and circular economies, hazardous additives and marine pollution. *Environment International, 117*, 308–318. https://doi.org/10.1016/j.envint.2018.04.036

Wang, C., Zhao, L., Lim, M. K., Chen, W.-Q., & Sutherland, J. W. (2020). Structure of the global plastic waste trade network and the impact of China's import ban. *Resources, Conservation and Recycling, 153*(104591). https://doi.org/10.1016/j.resconrec.2019.104591

Wong, C.-M., Vichit-Vadakan, N., Kan, H., Qian, Z., & PAPA Project Teams. (2008). Public health and air pollution in Asia (PAPA): A multicity study of short-term effects of air pollution on mortality. *Environmental Health Perspectives, 116*(9), 1195–1202.

On the Plastic Waste Route: Latin America Is the New Port of Destination

Ela Zambrano and Magdalena Donoso

Introduction

Trade between peoples, countries, or continents has a long history that shows the need to exchange goods and services. Thus, we know of such important routes as the Silk Route, the Incense Route, and the New Spain Route, in which ways were found to cross complex geographies to obtain what was needed by some in exchange for what was surplus to others. However, neither ancient China nor the gold-hungry Spanish usurpers could have imagined the route of plastic waste or absurdity. In recent years, civilizations have left behind spices, precious metals, and cultural exchange for ships with containers full of plastics sailing the seas and looking for a port where to leave our waste.

The route of the absurd was unveiled in 2018 after China said "Enough!" to the tons of dirty and contaminated plastic imported from the United States arriving in its territory with the label of "recyclable." With the Asian giant's borders closed and its plastic waste up to its neck, the country with the stars and stripes has once again become the uncomfortable and abusive neighbor for Latin America: its plastic waste is not swept under the carpet; it is literally put in its neighbor's backyard. The Global Alliance for Incinerator Alternatives (GAIA) denounced that by 2020, it had distributed 44,173 tons of plastic waste to 15 South America countries. "That meant the shipment of approximately 35 plastic waste containers daily to the region." ("La-basura-plástica-llegó-a-América-Latina.pdf", 2021, 2).

GAIA indicates that what the United States used to export to China is now shipped to countries like Ecuador, Mexico, Argentina, and Chile and constitutes

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waste impossible to recover for the circular economy. It is distributed abusively under the label of "recycling," and it is not possible to establish with certainty the conditions under which it reaches customs in order for it to be effectively recoverable for any industry.

Between 2014 and 2020, plastic waste shipments came from 37 countries from three continents: America, Europe, and Asia; 36% of the total coming from the United States, making it the world's leading supplier of this plastic waste (Íbid, 10). The connections in the new route of the absurd have counted on the complicity and sufficient opacity of the Latin American governments that – as always – "keep a silence quite similar to stupidity."[1] On the contrary, the different organizations that makeup GAIA in Latin America and the Caribbean declared their rejection by an international public statement and awakened a state of alert before this threat "that turns our region into an emerging destination of the world's plastic waste" (Elevation, 2021).

Such a new type of trade has raised several questions: In what state is this plastic waste entering? Where exactly is it coming from? Under what headings or subheadings is it entering? What supervision is there from the ministries of the environment? What industries are being fed with imported dirty plastic? Furthermore, the most disturbing of all questions: Do Ecuador or Mexico really have a greater recycling capacity than the United States?

The Audacity of the United States

Regarding multilateral environmental conventions, it is common knowledge that the United States remains the world's most noncommittal power. It has not acceded to the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, nor the amendments on plastics, and for a few years, it stayed distant from the Paris Agreement (2019–2021), the international tool that aims to limit greenhouse gas emissions. National Geographic points to it as the world's second-largest emitter of greenhouse gasses and reports from Greenpeace and GAIA place it as the world's largest exporter of plastic waste.

In addition, the United States has become incapable of processing all the plastic waste it produces, which should entail changes in population consumption and the extended responsibility of the companies that produce plastics. According to the Greenpeace report Circular Claims Fall Flat Again, in 2021, the country barely managed to recycle the 4.7% (2.4 million tons) of 51 million tons of plastic waste generated by households, which makes it desperate to search for a way to get rid of it.

[1] "We have kept a silence quite similar to stupidity," proclaimed insurrection of the Junta Tuitiva de los derechos del rey y del pueblo, in La Paz, on July 16, 1809. Quoted by Eduardo Galeano in The Open Veins of Latin America.

According to the Greenpeace report, "the recycling rate in the United States is estimated to have declined to 5.6%, previously at 9.5% in 2014 and 8.7% in 2018." To improve their figures a bit, "the export of millions of tons of plastic waste to China was registered as recycled," even though the final destination of those plastics is unclear, as they may well have ended up incinerated or dumped as waste ("Circular Claims Fall Flat Again", 2022, p. 3). The conclusion Greenpeace states, and is obvious, is that the US recycling capacity continues to decline.

To the lack of a good Integrated Solid Waste Management (ISWM) system, not only in the United States but also in Latin America, it is added that "hundreds of different types of synthetic plastic materials produced are fundamentally non-recyclable." Besides, as Greenpeace explains, a large plastic industry in the world has generated a scenario in which plastic is one of the easiest wastes to collect and put back into circulation.

In recent history, the COVID-19 pandemic and social restrictions led to lax controls at bureaucratic levels, allowing the United States to get rid of its waste. While the whole world's attention was on COVID-19's victims and overwhelmed hospitals, "in August 2020, the U.S. registered an export record to four countries, including Ecuador, which received 1100 tons of this type of waste. That meant the shipment of seven containers per day" (Soliz et al., 2021, p. 20). A year later, Latin America became the first-choice destination for plastic waste, even though, at the same time, the Basel Convention's Plastics Amendment came into force.

Among the information that environmental organizations in Latin America were able to gather, the state of California is the largest exporter of plastic waste to Ecuador and Malaysia. Thus, Greenpeace mentions: "While other countries now restrict imports of plastic waste to countries that do not belong to the Organization for Economic Cooperation and Development (OECD), the flow of U.S. plastic waste to countries with high rates of waste mismanagement continues at a scandalous level. In March 2021 alone, California exported 7.4 million kg of plastic waste to non-OECD countries, including 3.8 million kg to Malaysia (equivalent to 24 TEU shipping containers daily)" ("Acceptance of Unrecyclable Plastic Products and California's Continued Exports of Plastic Waste Exports to Non-OECD Countries", 2021).

The "the more trade, the more economic growth" maxim falls out and rolls off the floor on this plastic trash route: "More than any other state, California's recycling facilities continue to accept plastic waste that is exported to developing countries that have weak labor regulations in terms of wages, age, and limited environmental protections" (Ibid) (Fig. 1).

"Plastics export is always a false solution because they are so pervasive that they are extremely tough to collect, virtually impossible to sort, harmful to the environment, expensive to reprocess, and they often contain toxic materials," mentions The Guardian in October 2022, the same newspaper which, in its digital version, unveiled what many would have preferred to keep silent (Lakhani, 2022).

Fig. 1 US states' recycling facilities continue to accept plastic waste that is exported to developing countries that have weak labor regulations in terms of wages, age, and limited environmental protections. (Source: https://www.ban.org/plastic-waste-project-hub/trade-data/usa-export-data)

Latin America: The "Greenwashing" Servant

It was 2019 when the article "Where does your plastic go? Global investigation reveals America's dirty secret," published in The Guardian digital version, raised the alarms of environmental organizations regarding the route of plastics from the United States to developing countries like Turkey, Senegal, Bangladesh, Thailand, Vietnam, Indonesia, Cambodia, Hong Kong, Malaysia, and Ecuador. All of them have problems managing their waste.

Ecuador

Why would Ecuador, one of the largest importers of plastic waste, have a better technical capacity to recycle than California if, according to figures from the National Institute of Statistics and Census (INEC), the Andean country barely manages to recover 4% of its waste? In addition, this is mainly due to grassroots recyclers' work.

The research "La Partida 3915, Importación de desechos plásticos en Ecuador," conducted by the Universidad Andina Simón Bolívar, GAIA, Alianza Basura Cero, and VLIR-UOS, reveals that the plastics Ecuador bought and which were mentioned in the investigation by The Guardian were "plastic hoses that used in irrigation and that (…) arrive full of soil. A recipe for biological invasions" (Soliz et al., 2021, p. 9).

Within the framework of the discussion of amendments to the Basel Convention, The Institute of Scrap Recycling Industries has reportedly warned that this new approach of asking importing countries for their consent "will create an administrative burden that will make it more difficult for countries without recycling capacity to export plastics to countries with available infrastructure" ("Más de 180 países acuerdan restricciones para la exportación de desechos plásticos", 2019, p. 1).

As it turns out, in the eyes of the United States, Ecuador has "available infrastructure" willing to wash its waste. In fact, the previously mentioned investigation exposes companies such as Productos Paraíso,[2] a polyethylene and mattresses business that "can process 40 tons per day of recycling. Between 2016 and 2020, it acquired 17,783 tons of plastic waste from US agricultural companies from which they buy plastic pipe waste used for irrigation." The absurdity is self-explanatory. Quito, the capital of Ecuador, generates a thousand tons of waste per day (without considering organic waste), and its sanitary landfill is on the verge of being declared in a state of emergency, once again, by the newly elected local authorities.

Productos Paraíso, a well-known business in the Andean market for its mattresses, now has a product line called "Greenbag," providing "eco-friendly flexible packaging," and in an institutional video, it announces that it has the largest post-consumer recycling plant in the country.

Another source, Datasur, also states that between 2019 and November 2020, a total of 14,988 tons arrived in Ecuador. That means the shipment of 2820 containers for maritime transport in that period, of which 1552 arrived in 2020, a higher volume than that recorded in 2019 (Basura plástica, 2021, p. 9).

Ecuador is a demonstration of the ups and downs of plastic waste, with no customs controls or strong ministries to exercise control. According to data from the Central Bank of Ecuador, in 2022, Ecuador imported 3255.2 tons of ethylene polymers from the United States. That same year, it exported 501.4 tons of poly(ethylene terephthalate) bottles to the United States.

[2] https://www.paraiso.com.ec/empaques-flexibles/linea-industrial/

In Ecuador, it is established that the Ministry of the Environment must authorize the importation of "hazardous, special, or non-hazardous" waste. However, the government institution has reports that do not account for what enters through customs. According to customs records, the Andean country has received mostly "plastic waste," a classification that is too broad and "does not allow to know what type of plastics or their condition they bring through customs" (Íbid, 9).

Alianza Basura Cero and environmental defense organizations, with the support of academia, have put the cat out of the bag and conducted an in-depth investigation, "La Partida 3915 Importación de desechos plásticos en Ecuador," in which they contrast information from the Ministry of Environment, Water and Ecological Transition (Maate), the Ministry of Foreign Affairs, and the National Customs Service of Ecuador (Senae), among other institutions.

The conclusions report, "Besides the inconsistencies between the figures, at least 10,000 tons of plastic waste enter Ecuador annually. This number equals the total plastic waste production from 40 cities, with an average population of 266,688" (Soliz et al., 2021, p. 151).

One of the most revealing details of the investigation is that despite being a signatory to the Basel Convention and the Plastics Amendment, in Ecuador, the corresponding authority, the Ministry of Environment and Water (Maate), is in the dark about whether or not the waste arrives contaminated or if it is hazardous. Their supervisory role was entrusted to customs officials, who obviously do not fulfill it.

Mexico

After The Guardian's article, obtaining information was one of the major difficulties for environmental organizations, civil society, and academia. Despite all the difficulties facing the state mechanisms that cover up the commercial and toxic absurdity of the twenty-first century, there is no way to hide that much waste.

Through their website, the collective Malditos Plásticos provides "A radiography of Plastic Waste Colonialism in Mexico, a tool for consultation and information dissemination on the pollution and the problems caused by the export of plastic waste to Mexico, and its use as fuel in incineration, pyrolysis, co-processing, and other forms of energy or thermal use in the country."

This enterprise provides information on the colonialism of waste, the origin of plastic waste, the case of the United States, where the waste, where the waste goes, case studies, and recommendations. Organizations such as GAIA, Acción Ecológica, Fronteras Comunes, Asociación Ecológica Santo Tomás, GeoComunes, Fondo Acción Solidaria, A.C., Geografía Septentrional, and Break Free From Plastic joined the communicational effort.

Among the most relevant data that Malditos Plásticos succeeds in exposing is that according to Mexico's Tariff Information System (Siavi), from 2015 to 2021, the country would have received 662,518 tons of plastic waste, with 94% coming from the United States and 3% from Italy, Germany, Netherlands, and China. The

remaining percentage is from other countries. The highest volume of incoming plastic waste is evident between 2020 (38,528.965 tons) and 2021 (67,863.037 tons).

Mexico registers 200 authorized recycling plants and companies, of which México Tóxiico could map and visualize 165. However, nine companies control – or, more accurately, contaminate – the plastic waste import market: "Geocycle Mexico (993 thousand 700 tons, 14%); Johnson Controls Enterprises Mexico (590 thousand 085 tons, 8.3%); Lim del Puerto, Logística, Ingeniería y Mantenimiento del Puerto (500 thousand tons, 7.1%); and Sociedad Ecológica Mexicana del Norte (356 thousand 500 tons, 5%)."

Based on data from Malditos Plásticos, cement companies such as Cemex have set the ambitious goal of incinerating 19 million tons of plastic waste by 2030. Across the sea, in 2018, the European Union stopped subsidizing incinerator construction and issued a warning to Germany for preferring incineration since it is a false solution: it is not recycling; it is not a circular economy; and it does not reduce the demand for plastic usage. The editorial by José Luis Gallego, published in La Vanguardia's digital version, refers to Directive 2018/852 of the European Parliament and of the Council of 30 May 2018 on packaging and waste, sets a common target for recycling 65% of packaging waste by 2025 and 70% by 2030 ("La UE critica la incineración de residuos en países que se dicen avanzados como Alemania", 2019).

Argentina

Even the great trade routes, despite their implications for the usurpation of resources, allowed the exchange of products for human use or consumption. In the case of Argentina, we should question the purpose of the entry of sewage sludge, a problem detected in 1988.

The country's resistance started before Mexico and Ecuador, and its prompt action succeeded in limiting the entry of hospital waste, deceitfully labeled as "sanitary aid, humanitarian aid, or raw material for the manufacture of fertilizers" (Basura plástica, p. 3).

The Basel Convention, which aims to regulate transboundary movements of hazardous wastes and their disposal, served as the foundation for Argentina's 1992 enactment of National Hazardous Waste Law No. 24,051. This law allowed the country to refuse any "sanitary assistance" or batches of plastic waste without a port.

The plastic waste import issue is so pathetic that the same agencies representing the heart of imperialism, such as Interpol, have submitted reports on the "Emergence of criminal trends in the plastic waste market since January 2018."

"The international organization reported that in Argentina and Mexico, there are growing investments to install recycling plants, which would mean a new destination for plastic waste from the United States," according to GAIA's report, Plastic Waste Has Arrived in Latin America.

The southern cone country once implemented severe restrictions in Decree 181/92, which prohibited "the transportation, introduction and definitive or temporary import into the Territory, the Special Customs Area, and Free Trade Areas Created or to be created, of residue, waste or scrap from other countries." However, they were modified in 2019 by Mauricio Macri's government (Decree N. 591/2019), 1 month before the end of his term, arguing that "waste is resources and the need for a solution for the industries that require them."

The Argentine Federation of Cardboard and Recyclers (FACyR) and environmental organizations quickly rejected the decree for "putting at risk their work" since they are the leading suppliers of recycled materials for the Argentine industry (FACyR, 2019). "But the change lasted only six months because the government of Alberto Fernández reinstated Decree 181/92" (Basura-plástica, p.12).

The threats to Argentina's sovereignty are still in force, prompting environmental organizations to demand permanent monitoring as there remains a possibility that someone may intend to open the borders and transform the country into a "waste dump of the world," terms with which the FACyR questioned Macri and his then Minister of the Environment, Sergio Bergman.

The Myth of Recycling and Plastic

While developing countries in Latin America have been making modest improvements in their recycling capacities, industrialized countries, such as China and the United States, have taken advantage of this progress to justify exporting plastic waste to these nations. However, these very industrialized countries are also establishing recycling plants in developing countries.

Camila Aguilera, GAIA's Communications Coordinator in Latin America, who has been close to citizen actions, does not speak of a "recycling myth" as Greenpeace refers. However, she does question "abuse" based on the positive connotations of the term "recycling," a label under which the waste that enters through customs is being camouflaged.

"If Customs tells you that a container arrives for recycling, the word recycling has such a positive connotation that no one will question the quality of the plastic that enters. There is no strong legislation nor sufficient coordination between the Ministries of Environment and Customs to catalog or question what type of recycling these plastics are going for. Recycling of what?" observed Aguilera in a personal interview.

For its part, Greenpeace questions plastic recycling:

> Will we allow companies to continue promoting the failed myth of recycling toxic plastics, or will we demand a pivotal opportunity that drastically reduces the production of single-use plastics? Instead of continuing down this false path, companies in the U.S. and worldwide must urgently eliminate single-use plastics by replacing their packaging with reuse and refill systems and offering packaging-free products. ("Circular Claims Fall Flat Again", 2022, 7)

The Greenpeace report cites five reasons why plastic is falsely a recyclable product: "(1) it is extremely difficult to collect, (2) virtually impossible to sort for recycling, (3) its co-processing is dangerous for the environment, (4) it is often made of or contaminated by toxic materials, (5) its recycling is not economical" ("Circular Claims Fall Flat Again", 2022, 6).

The Basel Convention is a legally binding instrument created as a global response to the alarming increase in international trade in toxic wastes. It seeks "to protect, through strict control, human health and the environment against the adverse effects that may result from the generation and management of hazardous and other wastes." In addition, the Plastics Amendment aims to address the high pollution generated by this type of waste on a global scale. However, trade continues to spiral out of control and escalate, and the generation of plastics continues to increase. For this reason, we urgently need a legally binding International Plastics Treaty that covers the entire life cycle of plastic, addressing its impact on both terrestrial and marine environments, as well as the local populations of the poorest countries affected by the shipment of this waste.

A Bit of History

The waste route history is not recent. In 1992, the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal was hosted in Switzerland and subsequently approved there. Eight years later, 175 countries adhered to this international instrument; by 2021, the figure will have risen to 187 countries, except for the United States, which still needs to ratify it. This is summarized in the Executive Summary Plastic Waste (Basura-plástica, p. 2).

The Basel Convention aims "to protect human health and the environment against the adverse effects of hazardous wastes," according to the document. In addition, "The provisions of the Convention center around the following principal aims: the reduction of hazardous waste generation and the promotion of environmentally sound management of hazardous wastes, the restriction of transboundary movements of hazardous wastes, and the implementation of a regulatory system for the permissible movements of hazardous wastes" (Basel Convention, 2023).

One year later, on January 1, 2021, the Plastics Wastes Amendment came into force. It obliges countries that "wish to export contaminated or mixed plastics, or that do not have environmentally sound recycling as their main destination, to request prior consent from the receiving country; however, a substantial decrease in the flow of plastic waste has not yet been observed, which is an alarming sign regarding the compliance of each country with its international commitments." The purpose of the amendment is to "improve the control of transboundary movements of plastic waste and to prevent, among other things, industrialized countries from flooding poor countries with their waste" (Basura-plástica, p. 4).

The amendment was welcomed in Latin America: by 2020, three Latin American countries reported the entry of plastic waste through their customs: 32,650 tons in

Mexico; 4054 tons in El Salvador; and 3665 tons in Ecuador, according to data compiled by The Last Beach Cleanup (LBC).[3]

Deal with Your Waste

The Global Alliance for Incinerator Alternatives (GAIA) in Latin America and the Caribbean rejected the threat that makes the region an emerging destination for the world's plastic waste. They cite several factors, but above all, they emphasize "that trade in plastic waste is carried out through broad and ambiguous tariff headings, subheadings and fractions, which do not allow these materials to be tracked until their final use. From the experiences of Asian countries, there is ample evidence that this waste arrives contaminated or is difficult to recycle, which has an environmental impact on the receiving countries."

This impact is evident not only in the contamination of nature but also in "the violation of communities' rights to live in an environment that is safe for their health and that of their territories," the press release mentions, without delving into the health effects caused by microplastics.

"The transboundary trade of plastic waste is perhaps one of the most nefarious expressions of the mercantilization of common goods and the colonial occupation of the territories of the geopolitical south to turn them into sacrifice zones. Latin America and the Caribbean are not the backyards of the United States, we are sovereign territories, and we demand the fulfillment of the rights of nature and our peoples," Fernanda Soliz, director of the health area of the Simon Bolivar University, Ecuador.

Because of the unknown state in which thousands of tons of plastic waste, mainly from the United States, enter through ports and borders, environmental organizations in Mexico demanded that the waste "must be treated in places close to where they are generated," rejecting its imports "as a final or transit destination" (Basura plástica, p. 5).

Greenpeace urges to stop the greenwashing of nonrecyclable plastic products and the export of plastic waste, which is demonstrated to cause plastic pollution in the ocean and cause severe social and environmental damage in the receiving countries (Acceptance of Unrecyclable Plastic Products and California's Continued Exports of Plastic Waste Exports to Non-OECD Countries, 2021).

[3] An independent US initiative that seeks to reduce plastic pollution; its source is the US Trade Online records.

Conclusions

Ships entering and leaving the borders, crossing from one continent to another with plastic waste, expose an obvious need for control and regulation, which is clearly insufficient nowadays.

We warn that we are facing an imminent danger of contamination of nature and the violation of communities' rights to live in an environment that is safe for their health and that of their territories. Representatives of different organizations have expressed their support and concern, stating that we are "facing a waste crisis that reveals that to achieve success we must prioritize reduction policies, and then ensure the reuse and recyclability of packaging, ensuring recycling is carried out in places nearby where they are generated. We categorically repudiate the fact that high recycling figures shown by rich countries are being at the cost of turning our continent into a waste dump" (Elevation, 2021).

If Latin America accepts to become the destination of the world's plastic waste, it would be granting the consumerist waste of countries like the United States, but, above all, it would be mistaking the disease for the cure when it comes to the treatment of plastic waste.

We have mentioned some trade routes whose impact on the spreading of lifestyles was positive, but history also records routes of shame, one of them being the Slave Route. In the twenty-first century, will Latin America assume the consequences of this absurd route for its territories and communities?

References

"Acceptance of Unrecyclable Plastic Products and California's Continued Exports of Plastic Waste Exports to Non-OECD Countries". (2021). Greenpeace USA. Accedido julio 9. https://www.greenpeace.org/usa/research/letter-to-ca-recycling-commission/

"Cartoneros y recicladores argentinos rechazan el nuevo decreto que permitirá la "importación indiscriminada" de residuos". (2019). Residuos Profesional. Septiembre 5. https://www.residuosprofesional.com/argentina-decreto-importacion-residuos/

"Circular Claims Fall Flat Again". (2022). Greenpeace USA. Accedido julio 3. https://www.greenpeace.org/usa/reports/circular-claims-fall-flat-again/

"Convenio de Basilea sobre el Control de los Movimientos Transfronterizos de los Deshechos Peligrosos y su Eliminación | Observatorio del Principio 10". (2023). Accedido junio 19. https://observatoriop10.cepal.org/es/tratado/convenio-basilea-control-movimientos-transfronterizos-deshechos-peligrosos-su-eliminacion

Elevation, Development. 2021. "Declaración Pública: América Latina No Es Un Basurero. Rechazamos El Comercio Transfronterizo de Desechos Plásticos En Nuestro Territorio – GAIA". GAIA – octubre 6. https://www.no-burn.org/declaracion-publica-rechazamos-comercio-transfronterizo-de-desechos-plasticos/

"Estados Unidos abandona oficialmente el Acuerdo de París. ¿Qué significa?". (2020). *National Geographic*. Noviembre 6. https://www.nationalgeographic.es/medio-ambiente/2020/11/estados-unidos-abandona-oficialmente-acuerdo-de-paris

Greenpeace. 2021. Acceptance of Unrecyclable Plastic Products and Californinia's Continued Exports of Plastic Waste Exports to Non-OECD Countries.

"La UE critica la incineración de residuos en países que se dicen avanzados como Alemania". (2019). La Vanguardia. febrero 20. https://www.lavanguardia.com/natural/ecogallego/20190220/46585655213/union-europea-critica-incineracion-residuos-reciclaje-alternativa-economia-circular.html

"La-basura-plástica-llegó-a-América-Latina.pdf". (2021). Accedido junio 18. https://www.no-burn.org/wp-content/uploads/La-basura-pla%CC%81stica-llego%CC%81-a-Ame%CC%81rica-Latina.pdf

Lakhani, N. (2022). "Only 5% of plastic waste generated by US last year was recycled, report says". *The Guardian*, octubre 24, sec. US news. https://www.theguardian.com/us-news/2022/oct/23/us-plastic-waste-recycled-2021-greenpeace

"Más de 180 países acuerdan restricciones para la exportación de desechos plásticos". (2019). *National Geographic*. mayo 13. https://www.nationalgeographicla.com/planeta-o-plastico/2019/05/mas-de-180-paises-acuerdan-restricciones-para-la-exportacion-de-desechos-plasticos

Soliz, M. F., Morán, S.; Alianza Basura Cero, y UASB Área Salud. (2021). *La Partida 3915: importación de desechos plásticos en Ecuador* (1. ed.). Universidad Andina Simón Bolívar, Sede Ecuador: GAIA: Alianza Basura Cero Ecuador: VLIR-UOS.

"Where does your plastic go. Global investigation reveals América's dirty secret". (2019). *The Guardian*. 17 de junio. https://www.theguardian.com/us-news/2019/jun/17/recycled-plastic-america-global-crisis

A Story of Waste Colonialism: An Italian-Tunisian Case

Semia Gharbi and Nidal Attia

Introduction

The Italian waste affair took on two dimensions, Tunisian legal dimension which deals with corruption and Tunisian-Italian that falls within the framework of the Basel International Convention. The Collective of experts Réseau Tunisie Verte and civil society organizations based in Tunisia were mobilized against waste colonialism because of 282 containers of waste from Italy, carrying tons of mixed and inappropriate wastes. The trade of mixture waste entered under code Y46 and includes hospital waste, which does not comply with national and international laws. The representative of the Ministry of Environment of Tunisia indicated that the containers did not include recyclable material but only "urban and mixed waste, impossible to differentiate" and therefore were destined for disposal in landfills or incineration.

The collective strongly denounces the illegal importation by a Tunisian company of mixed waste from Italy and is indignant at the lack of firm enforcement of international laws on the transport of waste from Italy to Tunisia. It is well known to all party members of international conventions in relation to the protection of the environment and the health of citizens and their right to live in a healthy environment as provided by the Tunisian Constitution of 2020, to ensure that exceedances of laws are not observed.

Taking into account the chaotic waste management in the Mediterranean region and facing this new ecological crime, our Collective:

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1. Calls on the Tunisian authorities to return the containers to their country of origin, to identify the culprits, to strictly apply the law, and to stop any future attempt to import waste into our country in accordance with the Tunisian constitution and legislation and international conventions ratified by Tunisia. Indeed, marketing waste under the pretext of recycling is actually a common practice in several developed countries to avoid the disastrous costs and environmental impacts of their local treatment.
2. This act confirms the violation of a long list of international conventions ratified by Italy and Tunisia and the regional conventions to which Tunisia is a signatory. We mainly quote:

   The Basel Convention and the Ban "Ban Amendment" which blocks any export of hazardous waste from an EU, OECD country to a developing or transition country. In this act, article 9 of the Basel Convention should be applied, which considers this transboundary movement of wastes to be "illegal traffic."

The MARPOL Convention prohibits the shipment of hazardous wastes.

The Barcelona Convention on pollution resulting from the transboundary movements of hazardous wastes and their disposal: the Contracting Parties shall take all appropriate measures to prevent, abate, and to the fullest possible extent eliminate pollution of the environment which can be caused by transboundary movements and disposal of hazardous wastes and to reduce to a minimum, and if possible eliminate, such transboundary movements. Article 3 (a) and (b) relates to medical waste Y1, Y2, and Y3 and household waste Y46 waste collected, including sewage and sewage sludge as in the Annex I of the Convention.

The BAMAKO Convention was ratified by Tunisia in 1992 and entered into force in 1998: on the ban on importing hazardous wastes into Africa and on the control of transboundary movements and the management of hazardous wastes produced in Africa.

Bilateral Agreements with Italy and the Association Agreement between the European Union and its member states including Italy and Tunisia establish the rules of cooperation between the parties which aims to prevent the degradation of environment and improvement of its quality, protection of human health, and the rational use of natural resources with a view to ensuring sustainable development.

Waste Colonialism

The Tunisian authorities received 70 containers of the waste at the Port of Sousse and an extra 200 containers including thousands of tons of waste. In total, there are 283 of containers of illegal waste. The Tunisian company at the origin of this import had concluded an agreement with an Italian company for the import of 120,000 tons of waste per year, at a cost of 48 euros per ton. The total amount of the contract is around 18 million dinars per year. The affair was discovered by the customs services in July 2020, but it was only after its media coverage that the government decided to take it up.

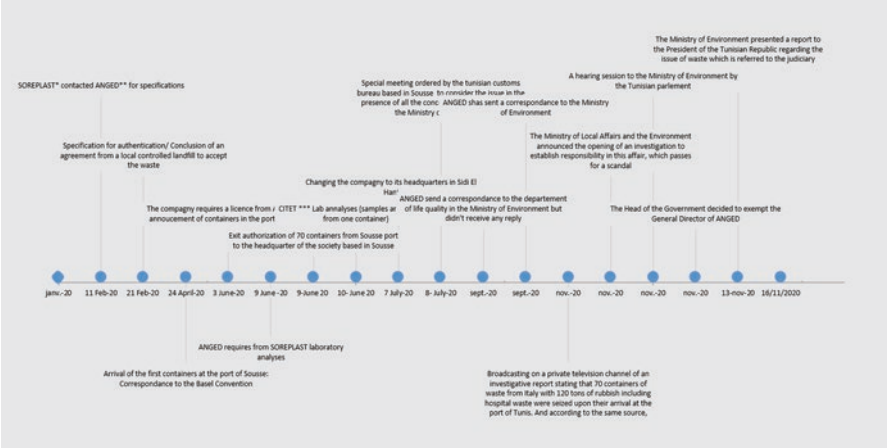

Fig. 1 The chronology and facts during the Italian-Tunisian case

The Ministry of Environment reiterated that it did not issue a license for the import of waste from abroad and announced the opening of an investigation into the issue. The Ministry notified the Italian authority of illegal trade activities and shipping the containers back.

According to environmental organizations, this export action violates European Union law, Tunisian law, as well as international treaties on the trade of waste – the Basel Convention, the Bamako Convention, and the Izmir Protocol of the Barcelona Convention.

This group of organizations has shown, in a brief report, how weaknesses in EU regulations have contributed to the export of this waste for disposal under the guise of recycling.

Réseau Tunisie Verte militated for the return of the waste to support Tunisian government. It was almost 2 years of nonstop work (Fig. 1).

Tunisian Law on Waste

The import of waste is not authorized by the Tunisian law. The Tunisian law clearly regulates the field of waste disposal, under the constitution, international agreements ratified by Tunisia, and the legislative and regulatory texts enacted for this purpose, in particular the framework law No. 1996-41 of June 10, 1996, relating to the waste and monitoring of its elimination and removal.

Therefore, it is strictly prohibited to import hazardous waste into Tunisia.

The import of nonhazardous waste is also ruled by laws and regulations, mainly Law No. 41 of 1996 of June 10, 1996, on waste and disposal control.

This law represents a general framework which defines the methods and conditions for the disposal of all waste in Tunisia.

Under Article 45 of Law No. 96-41 of June 10, 1996, relating to waste and the control of its management and disposal, "if the waste has been imported or exported against the provisions of this law or of the special regulations referred to in the preceding article, relevant authorities shall order their keeper, their carrier or their producer to return them to the country of origin within a timeframe it determines."

Law No. 95-63 of July 10, 1995, authorized the accession of the Republic of Tunisia to the Basel Convention on the control of transboundary movements of hazardous waste and their disposal.

If the offender does not comply, relevant authorities may take all necessary measures to ensure the return of this waste at the expense of the participants in the operation.

Moreover, Tunisia has a list of laws to regulate the waste, but the management is very weak.

The Agreement Violations

- The shipment is registered under code Y46 which is not allowed if we consider Basel Convention.
- The PIC documents contained inaccurate info; therefore, the Tunisian authorities can credibly argue they were misled.
- R3 code is from Basel and the EU. It is for recycling and reclamation of organic materials other than solvents. It is distinguished from metal recycling, incineration, or waste to energy but should not be confined to composting.
- Italy's shipments of municipal waste to Tunisia in 2020 shine a spotlight on persisting abuses in the global trade in plastic and other wastes. In particular, this scandal highlights the role of problematic EU waste code 19 12 12 in these illegal shipments. The waste was classified as "19 12 12," which corresponds in the European waste catalogue to "wastes (including mixtures of materials) from mechanical treatment of wastes." 19.12.12 is typically exported for "recovery" – as RDF in co-incineration. The fact that 19.12.12 exports are legal in Italy/Europe does not mean that they are unproblematic. These waste shipments may have breached Tunisian law. Code 19 in the EU refers to "special" waste, which apart from other industrial wastes, also includes waste from waste treatment sites.
- The use of code 19 12 12 appears to have introduced ambiguity about whether the waste exported was truly household or municipal waste. However, this EU waste code should not have been used for a waste shipment outside the EU: only the internationally agreed code for these wastes, listing Y46 under Annex II of the Basel Convention (household waste), should have been used. Because the EU has banned the export of all Basel Convention Annex II wastes, including household waste (Y46) to non-OECD countries, that ban should have been clearly imposed in this case (Puckett, 2021).
- The laboratory analysis is different from what was announced in the agreement and contains toxic elements

Flagrant Violation of International Agreements

Tunisia is part of the Basel Convention, Bamako Convention, MARPOL Convention, and Izmir Protocols.

The Basel Convention

As stressed in the article 6 of Basel convention, the state of export shall notify or shall require the generator or exporter to notify, in writing, through the channel of the competent authority of the state of export, the competent authority of the States concerned of any proposed transboundary movement of hazardous wastes or other wastes.

Tunisia notified the secretariat of Basel Convention on October 23, 2020. Even in cases where they are not going to pursue criminal charges, Article 8 applies when things are not done according to the contract. In that case it is 90 days from the time the importing state informed of the case to the exporting country and the secretariat of the Convention. Therefore, they have 90 days to send it back to the state of export or agree on an alternate arrangement (Article 8 Duty to Re-import). The Basel Convention is considered as a loophole because the industry is taking advantages of the vagueness of the convention in terms of the unclear meanings of the text such as for the amendement on the exported plastic waste which must be "exclusively pure" and the words exclusively can has different interpretation meanings (Merelle, 2021).

The Bamako Convention and Izmir Protocols

The competent authority of Italy should have known that they had an import ban in place for these Y46 wastes (or Bamako, Izmir listing for same) that the export is illegal traffic and is illegal on the part of the exporter.

In such cases Italy needs to take the waste back within 30 days after they have been informed of the problem by Tunisia (or other time that the two countries might agree) (Article 9 Illegal Traffic).

The Human Rights

The illegal entry of such waste into Tunisian territory is a violation of constitutionally protected rights to health and the environment.

The presence of waste is also a violation of the integrity of Tunisians and of their right to live in dignified and satisfactory sanitary conditions as enshrined in the international conventions ratified by both Italy and Tunisia.

The current situation causes great fear to the inhabitants of the affected region (namely, the neighbors of the port of the city of Sousse) who are beginning to feel the impact of such a threatening presence on their health and that of their children.

Particularly fragile people fear the presence of waste, and we know that environmental problems threaten the rights of the most fragile population in particular, namely, sick people, people in precarious situations, and in particular port workers who are close to thousands of tons of waste.

The Tunisians are invaded by thousands of tons of waste illegally entered the Tunisian territory; it is they who are confronted with the dangers and risks caused by such a scourge.

Reactions of National and International Civil Society

Réseau Tunisie Vert consider the Italy case as a criminal act. Illegal shipments due to the fault of the exporter, as in the case of the Italian waste exported to Tunisia, must be taken back by the exporting state within 30 days from the moment when the Exporting State has been notified of the illegal shipment, or otherwise disposed of in an environmentally sound manner under the direction of the Exporting State. Unfortunately, it has took almost 2 years to reship 212 containers. Through our NGO Réseau Tunisie Verte, we contacted the special rapporteur of human rights which reacted very well to our request and we provided to his secretariat with the necessary details about the illegal shipment. The special rapporteur visited Italy in their mandate and reported the issue of the waste with recommendations as mentioned in the document (UNDOC, 2022):

> Italy was informed of the illegal shipment by the Tunisian government on December 9, 2020. They are therefore almost two months late to act in accordance with the law. This is unacceptable. We call on the European Commission to take the necessary measures to ensure compliance. (Jim Puckett of the Basel Action Network (BAN), quoted by the same source) (Puckett, 2021).

> Italy should take responsibility for preventing and managing its own municipal waste, rather than exporting its problems to Tunisia. Each additional day of delayed repatriation adds to this injustice. (Sirine Rached of the Global Alliance for Alternative Incinerators (GAIA)) (Rached et al., 2021).

> This type of trade is immoral and destructive to the environment; it is not acceptable to import waste from Italy to Tunisia for landfill. Landfilling waste can generate toxic leaching and contribute to the degradation of human health and the environment. (Mohammed Tazrout, campaigner for Greenpeace Middle East and North Africa) (Mohamed, 2021).

Pierre Condamine, Head of Waste Policy at Zero Waste Europe (ZWE, 2021) went so far as to say that:

> This is another stark example of a weakness in EU law and enforcement causing ethical and environmental harm to others.

Media Reactivities to the Italy Case

Réseau Tunisie Vert didn't stop making press releases supported by many journalists and specifically the National Agency of Press. Radio and TV channels national and private have shown their willingness to battle Italy waste. Additional to national mass media, the international journalism reacted making the Italy case as a scandal (Chabane, 2015; Common, 2021; Orsi et al., 2021; Bongarra, 2022; Gorman, 2022).

Arguments of the Health Impacts of Landfills in Tunisia

Tunisia is facing a huge problem to manage its own wastes and doesn't have the appropriate management to treat hazard wastes. Although there is a big lack of studies to relate the landfills that causes many diseases such cancers, an investigation was done on the subject and related the realities (Chabane, 2015).

Updates

After all the series of activities implemented by both Tunisian government and Réseau Tunisie Vert and all its related international and regional contacts, Tunisia succeed to reship 212 containers on February 18, 2022. Unfortunately, 70 containers were affected when a fire broke out in December 2021 in the warehouse of Tunisian company Soreplast where the Italian waste subject to customs control was stored. An investigation is initiated to determine the circumstances of the fire. Lesson learned from this case which highlighted the growth of the global waste trade despite the strict regulations at the international and EU level which aimed at preventing rich countries from dumping their hazardous wastes in poor countries.

Recommendations

The Italian-Tunisian municipal waste scandal has already had far-reaching consequences in Tunisia, with an ongoing court case against whom facilitated the illegal entrance of waste. Nevertheless, countries have to comply with their obligations under the Basel Convention on wastes. Meanwhile, this scandal has revealed the problematic effect of European Waste Catalogue code 19 12 12 in creating confusion about the nature of wastes being traded and facilitating breaches of EU and international law. Other recommendations were made to EU countries as: provide reparations for any harm to the environment or human health or other damages resulting from the wastes and take administrative/legislative actions to ensure that

waste exports to countries where such imports are banned are never considered or undertaken again (Puckett, 2021).

The dramatic case of illegal transboundary movement of waste can continue because they are other breaches which can facilitate the export. We list one of the main important points that increase the waste colonialism as the customs codes. This latter isn't transparent regarding the waste and the nature of waste; we need urgently the international organization of customs to review deeply their codes and delete totally those harming the countries particularly the developing countries which don't have the capacities to manage their proper waste.

References

Bongarra, F. (2022). *Italy to take back tons of waste sent illegally to Tunisia*. https://arab.news/vd7ka. Last access: 3 Aug 2023.

Chabane, N. E. H. (2015). *Investigation into the landfill at Borj Chakir: Causes and effects of poor waste management*. https://nawaat.org/2015/05/17/the-landfill-at-borj-chakir-a-serious-threat-to-a-decent-life-and-clean-environment/. Last access: 3 Aug 2023.

Common, P. (2021). *Italian waste traffic in Tunisia, containers are still in Sousse*. https://www.enicbcmed.eu/common-project-italian-waste-traffic-tunisia-containers-are-still-sousse. Last access: 3 Aug 2023.

Gorman, S. (2022). *Tunisian NGOs triumph in David-vs-Goliath toxic waste battle with Italy*. https://www.france24.com/en/africa/20220221-tunisian-ngos-triumph-in-david-vs-goliath-toxic-waste-battle-with-italy. Last access: 3 Aug 2023.

Merelle, L. (2021). https://euranetplus-inside.eu/eu-waste-exports-go-to-waste-part-i/

Mohamed, L. B. (2021). https://thesubmarine.it/2021/03/03/traffico-illecito-rifiuti-italia-tunisia/

Orsi, G., Forti, C., Farina, A., & Martinelli, F. (2021). https://www.rai.it/programmi/report/inchieste/Terra-felix-f4a19e8d-70f1-4fa7-b515-4a7796a5cf1a.html

Puckett, J. (2021). https://www.no-burn.org/wp-content/uploads/2022/05/2021-03-02-Italy-Tunisia-short-report.pdf

Rached, S. (GAIA), Gharbi, S. (Réseau Tunisie Verte), Favoino, E. (Zero Waste Europe), & Puckett, J. (Basel Action Network). (2021). *Illegal shipments of Italian municipal waste to Tunisia*. Global Alliance for Incinerator Alternatives 1958 University Avenue, Berkeley, CA 94704, USA.

UNDOC. (2022). https://documents-dds-ny.un.org/doc/UNDOC/GEN/G22/405/46/PDF/G2240546.pdf?OpenElement

ZWE. (2021). *Italian company caught illegally dumping plastic and other municipal waste in Tunisia*. https://zerowasteeurope.eu/press-release/italian-company-caught-illegally-dumping-plastic-and-other-municipal-waste-in-tunisia/. Last access: 3 Aug 2023.

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S. Gündoğdu (ed.), *Plastic Waste Trade*, https://doi.org/10.1007/978-3-031-51358-9