

An Imported Problem?



Plastic Waste Effects on Türkiye's Environment with Specific Emphasis on Relevant Multilateral Environmental Agreements

Ezgi Edibođlu Sakowsky and Sedat Gündođdu

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

E. E. Sakowsky
Max Planck Institute for Innovation and Competition, Munich, Germany

S. Gündođdu (✉)
Faculty of Fisheries, Department of Basic Sciences, Çukurova University, Adana, Türkiye
e-mail: sgundogdu@cu.edu.tr

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

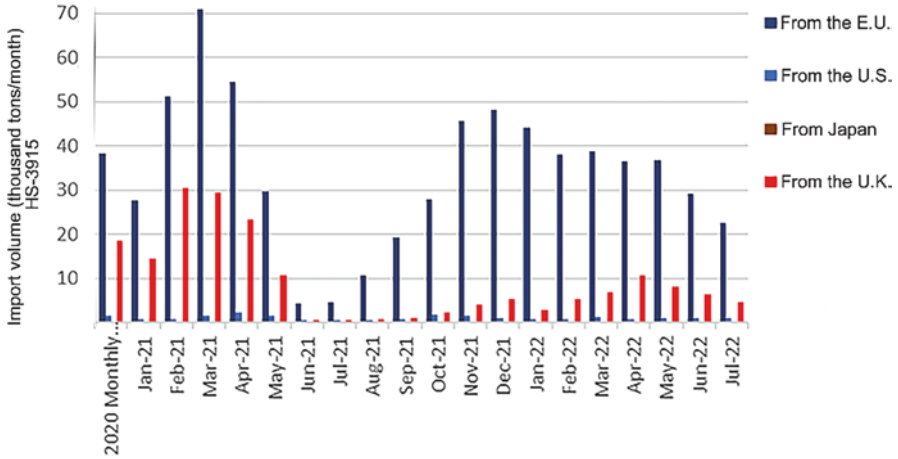


Fig. 1 The monthly plastic waste export to Türkiye in the period of 2020 to July 2022. (Source: <https://www.ban.org/plastic-waste-project-hub/trade-data/Türkiye-import-data>)

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)

^aFor 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/m³.

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/km², 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/km², and Artüz et al. (2021)

reported the mean number of marine litter as 66.2/m² 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 Büyük 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 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., Kideys, 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/resolueuid/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.pdf>.
- 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.), *Yıllında 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., & Kıdeys, 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/syrl>. 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., & Mendoza, 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., Möller, 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 Declaration. (2009). <http://www.blacksea-commission.org/Official%20Documents/#RegionalCommitment-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_reducedfile-size.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_yonetim%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 international 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/uneppmap/>. 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.