

**Landfill Earth:  
A Global Perspective  
on the Waste Problem**



***-Master's Thesis-***

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## OUTLINE

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## LIST OF ABBREVIATIONS

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ABBREVIATION	CONCEPT
CE	Circular Economy
EEA	European Environmental Agency
ESM	Environmentally Sound Management
EU	European Union
IMPEL	Implementation and Enforcement of Environmental Law
ISO	International Organization for Standardization
MSW	Municipal Solid Waste
OECD	Organisation for Economic Cooperation and Development
PIC	Prior Informed Consent
UK	United Kingdom
UN	United Nations
UNEP	United Nations Environmental Program
US	United States
WCO	World Customs Organization
WHI	Waste Hierarchy Index

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## INTRODUCTION

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The 20<sup>th</sup> century's increase in waste generation has caused waste management to emerge as one of the greatest challenges of the 21<sup>st</sup> century. As countries have found themselves overwhelmed with the task of managing the waste they produce, they have resorted to trade as a cheap management practice (Asante-Duah & I.V.N., 1998; European Environment Agency, 2019; Lipman, 2002; Sembiring, 2019). The biggest importer of waste in recent decades has been China (Greenpeace, 2019); however, the country has recently begun to impose regulations and bans on the waste trade (Mosbergen, 2018; SRS Media, 2019; Zhao, 2017). This has had a huge impact on the global waste management system, pushing many countries' domestic recycling facilities close to collapse and altering the direction of international waste flows, since most countries' response is still to look for alternative dumping places instead of improving their own waste management systems (Media, 2019; Katz, 2019; Anthesis, 2019; Ross, 2018; European Environmental Agency, 2019; Greenpeace, 2019).

Many recent studies have focused on the impact that the waste trade has had on the environment, since importing countries tend to have lower environmental standards and management capabilities. Sembiring (2019) does not seem to condemn it: she sustains, after having analyzed the industry from an economic and environmental perspective, that this system seems to be the most effective way to allocate resources to manage waste. However, other researchers in the field such as Asante-Duah & I.V.N. (1998) and Lipman (2002) tend to take a sharply critical approach to the waste trading and denounce the implications it has for human health and the environment. Furthermore, Lipman (*idem*) refers to the “polluter pays” principle to assert that countries should solve their waste problems themselves as it is their responsibility to deal with their own waste, rather than exporting it to industrializing countries in an even worse position than themselves to solve it. This is a view shared by many environmental and trade academics.

All in all, there is a quasi-consensus that the current waste trade has a short-termist approach to waste management and is based essentially on economic principles that disregard environmental issues. However, few researchers have proposed long-term sustainable solutions to the problem or addressed its root —the overproduction of waste. On this note, it is worth mentioning the contribution by Singh (2014) who points to the lack of a holistic approach to the waste management system that aims at reducing waste from the start point of product creation, rather than only after the waste has already been produced. She claims that our practices should focus on preventing the problem rather than finding solutions to it. In practice, while there exists some international regulation for waste trading, there is an absence of a collective, holistic and long-term approach to solving the global waste problem. Starting from the hypothesis that the existing legal definitions of waste complicate waste minimization, this paper aims at addressing the aforementioned issues. In other words, by analysing the current global waste management system, this paper also intends to show how the lack of a more holistic approach to the management system thwarts any effort at managing, and more importantly, reducing waste.

The main sources employed in this research have been academic papers from renowned scholars; reports from international organizations and international non-governmental

organizations; and databases from the United Nations and other institutions such as Verisk Maplecroft.

The present paper is structured into two sections. The first part will outline the functioning of the waste management system. It will trace the background of developed countries policies' regarding waste trading as well as examine existing regulations. It will also evaluate the effects of the industry on the environment and human health, and study in more detail the case of China: how waste imports were a mutually beneficial business for over a decade and how the changing circumstances almost brought exporter countries' waste management systems to a halt. The second part of the paper will focus on the underlying problems of the system, discussing first the notion of responsibility in regards to the role of states, companies and individuals in the production chain; and second the vagueness and unclear definitions of the concept of "waste": particularly, how it affects the efficient implementation of waste minimization policies and the transition to a circular-based economy. Last of all, the document sets out a list of recommendations to governments, companies and individuals on measures to take to overcome the problems discussed in the paper.

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# I. WORLD WASTE MANAGEMENT

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## 1. WORLD WASTE

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The rise in waste generation rates is becoming one of the greatest challenges for both the preservation of the natural environment and human health (Nichols & Smith, 2019). This section will consist of an overview of the global generation and management of waste.

In the first sub-section, the main legal definitions of waste will be discussed together with an explanation of the existing loopholes in them.

In the second sub-section, quantitative data on the amount of waste traded globally will be provided, as well as the main exporter and importer countries, the relationship between income levels and waste generation rates and types of waste, among others.

In the third sub-section the mechanisms that states have for waste management will be outlined, followed by a description of the environmental impacts of said mechanisms in the fourth sub-section. Finally, the current state of the world waste trade will be discussed in the fifth sub-section.

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### 1.1. Definition and types of waste

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Definitions of “waste” have long been criticized for being unclear, and efforts to amend them have been unsuccessful (Póngracz, 2002, p.66). Definitions are of particular importance in the field of law, where regulations rely on specific delineations of what can and cannot be controlled. As will be discussed later on, ambiguous definitions of the term “waste” can lead to breaches of the legal framework dealing with the trade in waste worldwide (UNEP, 2015).

There are three main legal and institutional definitions of waste:

<b>EU</b>	Waste shall mean any substance or object in the categories set out in Annex I which the holder discards or is required to discard (European Council 1991a)
<b>OECD</b>	Wastes are materials other than radioactive materials intended for disposal, for reasons specified in Table 1 (OECD 1994)
<b>UNEP</b>	Wastes are substances or objects, which are disposed of or are intended to be disposed of or are required to be disposed of by the provisions of national law (UNEP 1989)

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It can be observed that, on the one hand, the definition provided by the European Union (EU) consists of a list of activities or materials that come within the range of the definition. In contrast, the Organization for Economic Co-operation and Development (OECD) and United Nations Environmental Program (UNEP) define waste with respect to what will be done with it, which, ultimately, is the purpose of the regulations.

In addition, one thing in common that can be seen in the three definitions would be that waste is something “to be disposed of”. Tellingly, none of the definitions describes what is waste in its essence, that is, what waste is in itself and not in relation to its coming utility. How this affects the basic purposes of waste management will be covered in the second part of this paper (see *Does waste exist?*, p. 30)

Besides these three, each country has its own definition of “waste”. This lack of consensus between countries’ legal definitions and requirements gives rise to differences in the interpretation of international laws on the labelling and managing of waste (Kaza, et al., 2018; Pongrácz, 2002). An example of this is the lack of a precise distinction between waste and second-hand materials. Countries such as Vietnam, which want to allow for the supply of raw materials while banning waste destined for dumping, are often victims of organized criminal groups. Such groups export waste illegally by exploiting the lack of differentiation between allowed second-hand materials and waste (Kaza, et al., 2018). This is an important grey area that China, for example, has attempted to address by setting criteria for the percentage of waste contents – permissible percentage of contamination – in shipments. But then again, the absence of a consensus between exporter countries, which may have a higher allowance, and the receiving ones can give rise to illegal shipping, and even interstate disputes<sup>1</sup>.

The analysis of this paper will be based on the definition provided by UNEP, delineated in the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (Basel Convention), the first international agreement to regulate the waste trade, with 187 parties. The Basel Convention differentiates, additionally, two types of waste: hazardous waste and other waste. Hazardous waste is defined in Annexes I, III, VIII and IX of the Convention, based on its origin and/or composition and its characteristics (UNEP, 2015). Here, too, the convention leaves space for the parties to define additional waste as “hazardous” under national legislation. Other waste is listed in Annex II of the Convention.

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<sup>1</sup> 2,400 tons of Canadian illegal waste – mislabelled as plastic for recycling – has been returned to Canada after diplomatic tension escalated over the waste import. (Bautista, 2019)



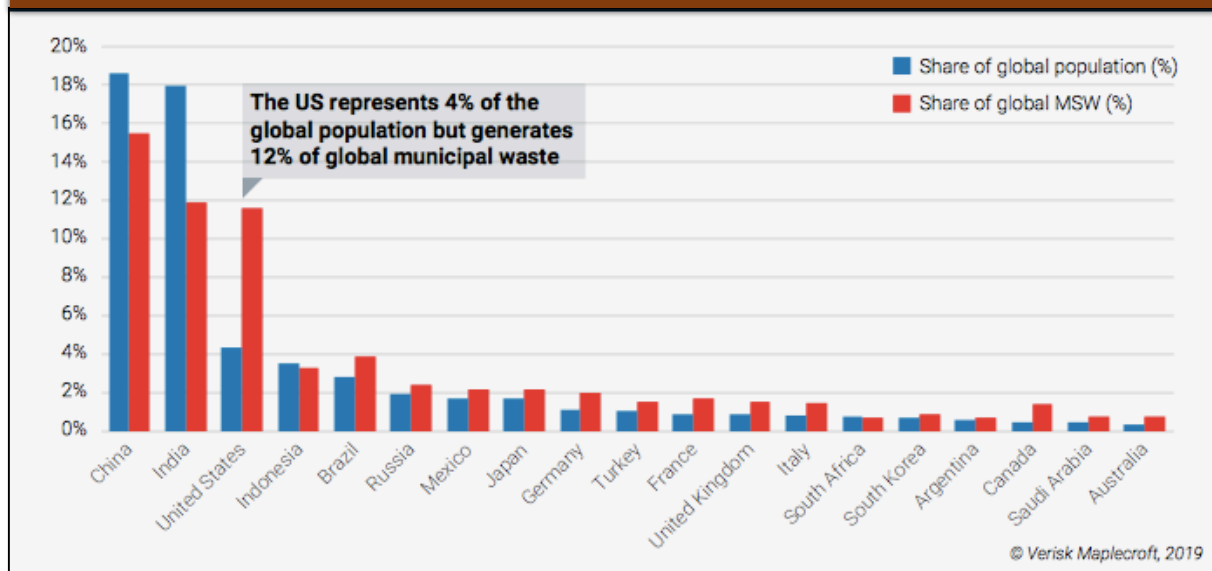
## 1.2.A global picture of waste management

Knowing the quantity and types of waste generated allows governments to design suitable and efficient waste management systems (Kaza, Yao, Bhada-Tata, & Van Woerden, 2018). The data provided in this section will give a global picture of waste generation, waste trade flow and recycling performance.

The sources used are the Verisk Maplecroft<sup>2</sup> Environment Dataset's Waste Generation Index<sup>3</sup> and Recycling Index<sup>4</sup>, the World Bank Group's "What a Waste 2.0" report and the United Nations Comtrade Database. It should also be mentioned that the reliability of the data provided is influenced by inconsistent definitions, different methodologies and a shortage of statistics in some countries, among other factors.

According to the Verisk Maplecroft<sup>5</sup> Environment Dataset (Verisk Maplecroft, 2019), 2.01 billion tons of municipal solid waste (MSW) are being generated each year, which is 0.74kg of waste per capita per day. Of all this waste, however, only 16% - 323 million tons – is recycled, while 46% is disposed of unsustainably (idem).

FIGURE 1 Share of Global Population and Municipal Solid Waste (MSW) For G20 Countries



Source: Verisk Maplecroft, 2019

*Waste generation per country.* Figure 1 above shows the share of global population and municipal solid waste for G20 countries. If looked at solely in terms of global MSW, China, followed by India, are the main producers of waste, accounting for more than 15% of the global share. But if per capita rates are considered, it can be seen that the United States, while accounting for only 4% of the world's population, generates 12% of global MSW. So US global

<sup>2</sup> Verisk Maplecroft is a research and consultancy firm specialising in global risk data and country risk analysis. (Verisk Maplecroft, n.d.)

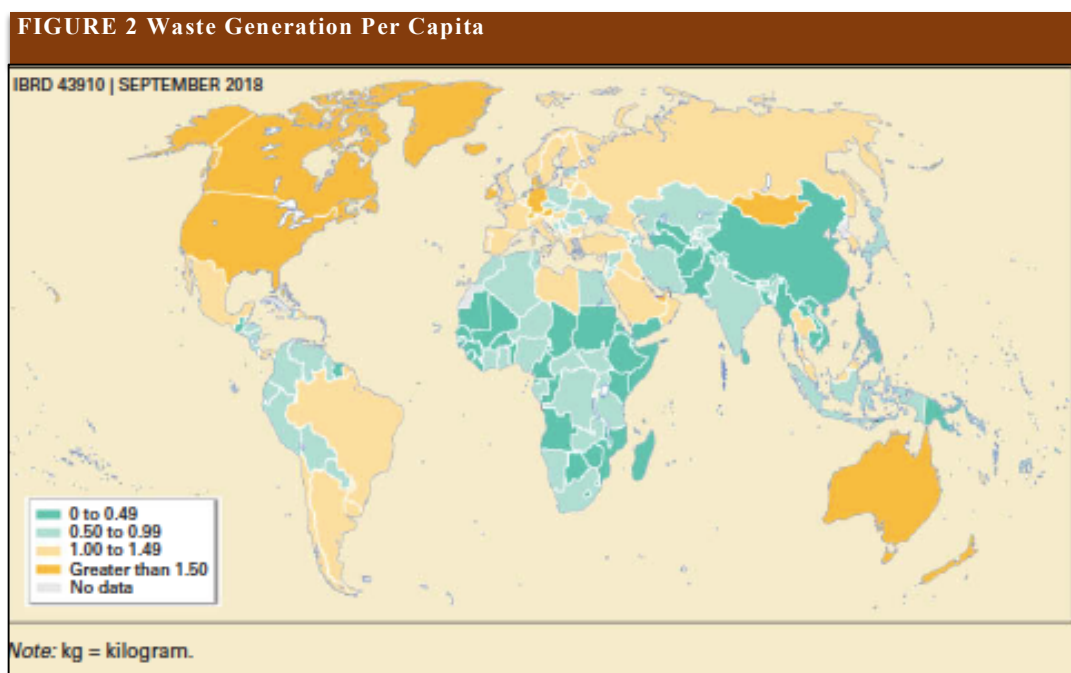
<sup>3</sup> The Waste Generation Index "provides a quantitative assessment of the rate of waste production by country, considering a selection of key waste types including municipal solid waste, hazardous waste, food waste and plastic waste". (Nichols & Smith, 2019, p.3)

<sup>4</sup> The Recycling Index measures national rates of recycling, collection and adequate disposal and government commitment to international treaties on waste. (ibidem, p.4)

waste accounts for over three times its share of the global population, positioning it as the largest contributor to MSW, plastic, food and hazardous waste production.

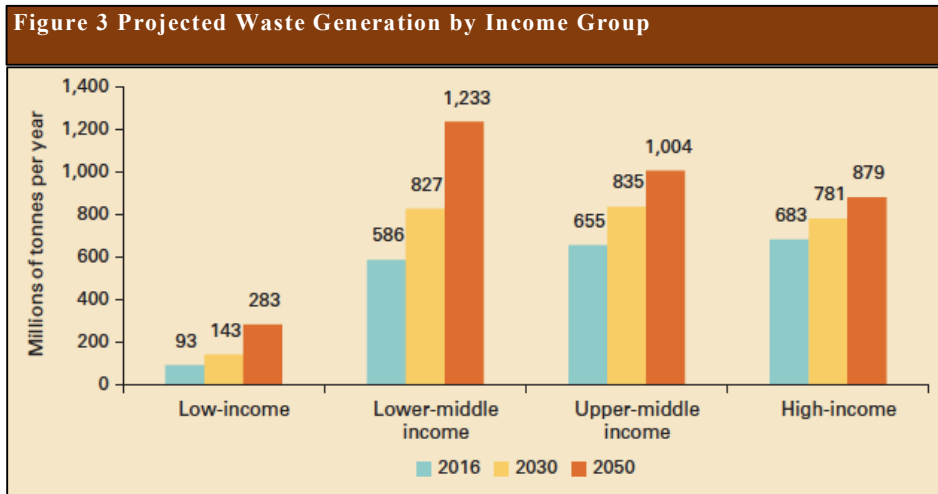
The same phenomenon happens in the rest of the highly developed countries on the list –mainly in Europe and North America– which have disproportionate levels of waste generation in relation to their population size. This is further developed in the “What a Waste 2.0” report by the World Bank Group (Kaza, Yao, Bhada-Tata, & Van Woerden, 2018). The report reveals that national rates fluctuate from 0.11 to 4.54 kg/capita/day and this is highly related to the country’s income levels and urbanization rates.

In Figure 2 we can see that the countries that produced the highest average amount of waste per capita in 2018, at 2.21kg per day (Kaza, Yao, Bhada-Tata, & Van Woerden, 2018, p. 20), were Bermuda, Canada and the US, all of which are high-income countries. In contrast, low and middle income nations generate the lowest amount of waste per capita: Sub-Saharan Africa averages 0.46 kg per day (idem). This demonstrates a positive correlation between economic development and the waste generation rate. This is explained by the fact that industrialisation brings with it an increase in products, services and consumption, thus generating more waste.



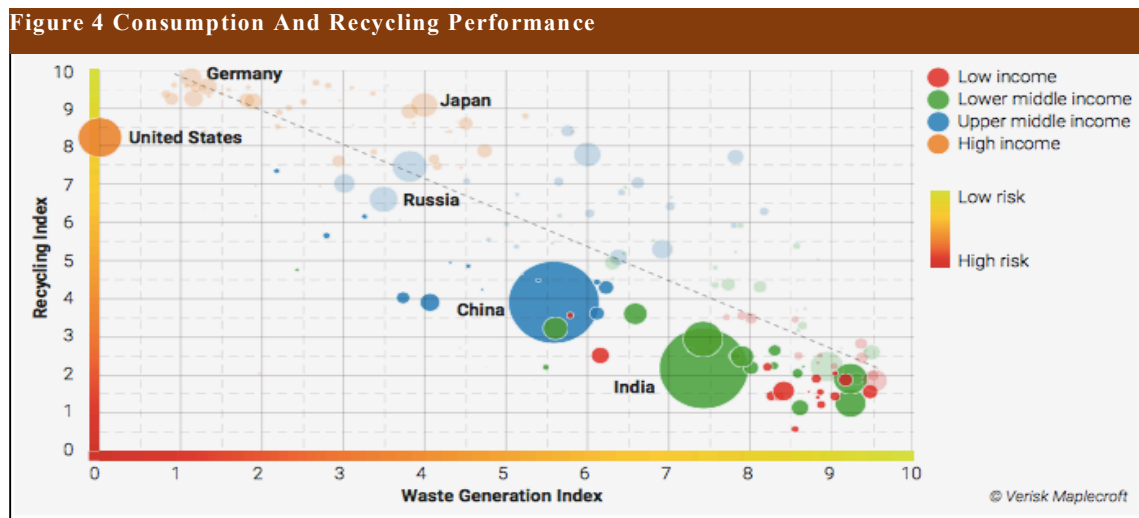
Source: Kaza, et al., 2018

*Future prospects of waste generation.* Global waste generation is forecasted to reach 3.40 billion tons of waste annually by 2050, which will outpace population growth by more than double (Kaza, et al., 2018, p.24). Moreover, given that industrializing countries have much more scope for economic development and population growth, they are expected to experience the greatest amount of waste generation: lower middle-income countries could see waste levels double or triple in the next three decades. High income countries will also see an increase, but at a slower pace (Figure 3).



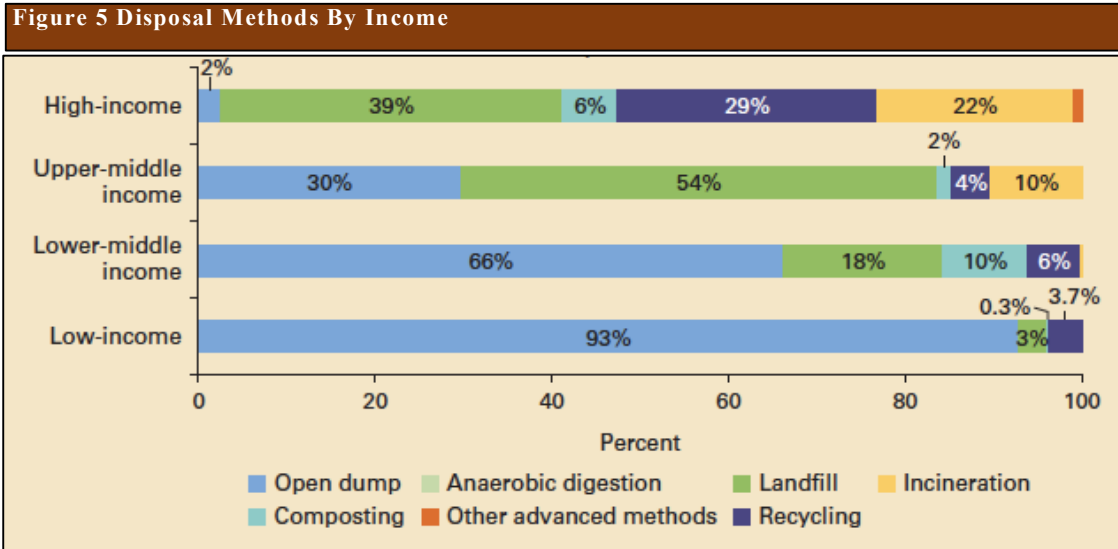
Source: Kaza, et al., 2018

With regard to recycling capacities, the Verisk Maplecroft’s Recycling Index (Nichols & Smith, 2019, pp. 5-7) shows that the US, besides being the major waste producer, possesses a fairly inefficient recycling system: only 35% of all the MSW is recycled, making it the only developed nation with a waste generation rate that outstrips its ability to recycle. However, there’s a general lack of recycling capabilities in countries worldwide: Germany, which according to Figure 4 has the most efficient waste management system, recycles no more than 70% of its MSW.



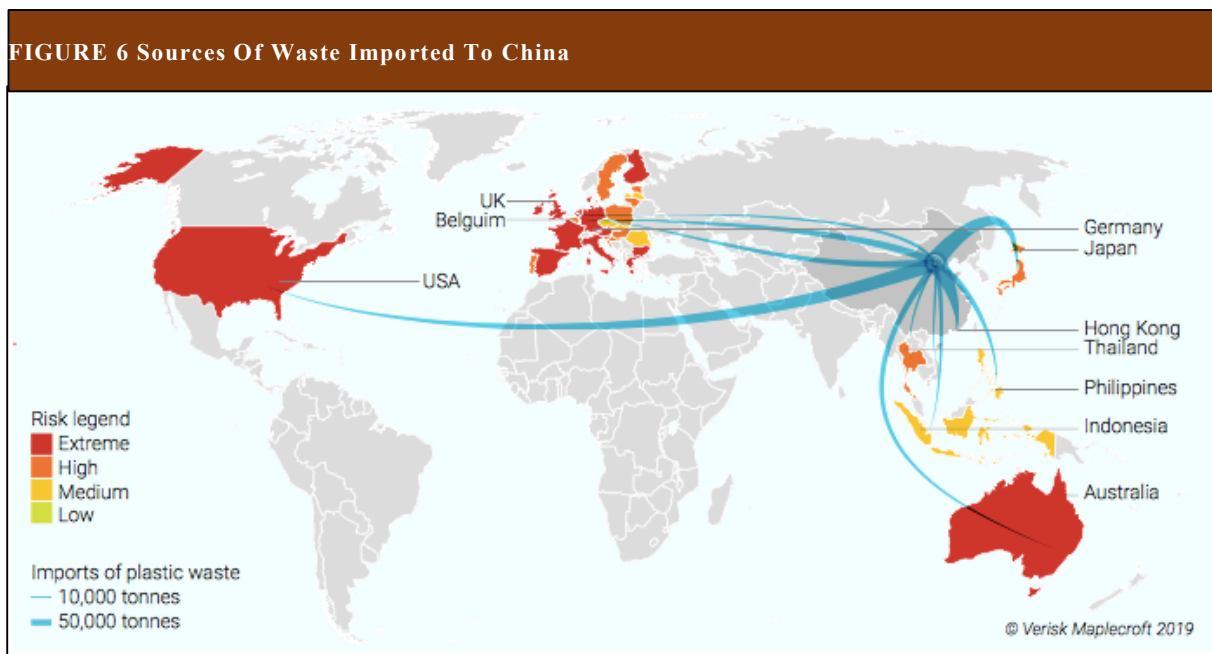
Source: Verisk Maplecroft, 2019

Developing countries, on the other hand, often lack the resources to recycle efficiently. Lower-income countries rely primarily on open dumping as landfills are not available: 93% of waste is burned or dumped, either on roads, open land or in waterways, impacting significantly on the environment (Figure 5). Wealthier countries not only have a higher percentage of waste deposited in landfills, but there is also a much greater focus on materials recovery.



Source: Kaza, et al., 2018

*Global waste trade.* Even though lower-income countries have far inferior management capacities and infrastructure, developed states (Figure 6) still prefer sending their waste overseas to these countries as a result of their low operational costs, cheap labour force and loose environmental regulations. The United States generates approximately 34.5m tons of plastic waste each year. In 2015, only 9% was recycled, and more than half of that was handled in China (idem).



Source: Verisk Maplecroft, 2019

The inefficiency of the US recycling facilities and the existence of these tendencies in global waste trade are not unconnected: as long as developing countries are willing to buy waste exports, developed nations will have no incentives to invest in their own treatment facilities (ibidem, p.11). The trade dynamic, including the central role of China (and the subsequent

repercussion of its ban on waste imports) will be further explored in the following sections (see The Case of China, p. 17).

In summary, the data presented in this section reveals that:

- Developed countries' contribution to waste generation is disproportionate to their share of the global population
- Economic development levels correlate positively with waste generation rates
- As a result, a significant increase in the generation of waste in middle-income countries can be expected in the coming decades
- All countries present insufficient recycling capabilities, and lower-income countries over-rely on burning and dumping waste
- A global trade in waste exists between developed countries (exporters of waste) and developing countries (importers of waste), most notably China.

### **1.3. The waste management system**

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Having a sustainable and efficient waste management system - collection, transport, treatment and disposal of waste – is crucial in minimizing the impacts that waste might cause on the environment and human health. While each country has its own waste management strategy, it is nonetheless possible to outline the most common and basic forms of treatment:

The first and most critical step in managing waste is its collection. Once waste is collected, it can go to three kinds of facilities: *the recycling facility*, where trash is repurposed for other uses; *the waste-to-energy facility*, where trash is converted into energy used to light homes and heat buildings for instance; and *landfills*, where it will be compacted (Waste Management, n.d.). Local public entities directly oversee 70% of this process, and the remaining is administered through public-private entities, inter-municipal arrangements and/or private companies, although partnerships with the latter succeed only if there are incentive structures (Kaza, Yao, Bhada-Tata, & Van Woerden, 2018, pp. 1-8).

The cost for waste management diverges greatly from high-income countries to low-income ones. In low-income countries, waste management can be the single highest budget item for many local administrations, comprising nearly 20% of municipal budgets. In contrast, in middle-income countries, it accounts for a bit more than 10% and it reaches only 4% in high-income countries (idem). Nonetheless, the operational costs are much higher in high-income countries, where the integrated operating process, from collection to disposal, exceeds \$100 per tonne whilst it only costs about \$35 per tonne in lower-income countries. But in spite of the relatively lower costs, these lower-income countries experience much more difficulty in recovering their costs and providing adequate waste services. This is caused by a series of factors including weak planning, poor service operation, and a lack of funding for investments (idem). Among the challenges low-income countries face in managing waste, the World Bank (Kaza, Yao, Bhada-Tata, & Van Woerden, 2018, p. 88) highlights the following:

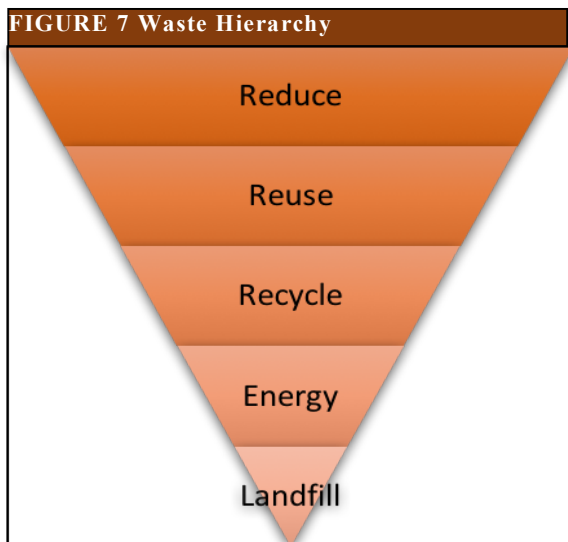
- Shortage of financial resources caused by lack of revenues
- Lack of budget and funding in local governments
- Complexity of designing and decentralized managing
- Lack of land and resistance from local population
- Limited institutional capacity for planning, monitoring, and enforcement

○ Ambiguity around organizational structure and responsibility

This is the reason why, as seen in the previous section, adequate waste treatment such as controlled landfills or recycling facilities are virtually exclusively found in high and upper-middle-income countries.

As will be discussed later on in this paper (see *Minimizing Waste*, p. 38), waste management efforts can also include or be related to waste minimization. This allows for countries to not only develop an efficient waste management system but also a more resource-efficient economy. Illustrative of this is the principle of the Waste Hierarchy (Figure 7), which is already being incorporated into some countries' waste legislation (Nilsen, 2017).

The theoretical background to the term 'waste hierarchy' is provided by the founders of the field of Ecological Economics (*ibidem*, p. 2). In 2008, the concept was included in the European Waste Framework Directive 2008/98/EC (WFD) (European Parliament and Council, 2008); and in 2016 the UN incorporated it in its 2030 Agenda for Sustainable Development,



concretely in the 12<sup>th</sup> Sustainable Development Goals (SDG) named "Responsible Consumption and Production", target 12.5: "by 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse" (United Nations (UN)). The Waste Hierarchy classifies the different activities of "resource use" by preference. The treatment order recommended by the hierarchy is as illustrated in Figure 7:

1. Reduce the use of raw materials
2. Reuse the already extracted raw materials
3. Recycle them for as long as possible<sup>6</sup>
4. Energy recovery, such as incineration<sup>7</sup>
5. Landfill

Source: Nilsen, 2017. Graphic by author

It can be observed, therefore, that the hierarchy integrates policies aiming at waste minimization (1,2) and those classifying waste treatment methods (3,4,5). At the bottom of the hierarchy, are landfills: here, the resource inevitably becomes waste and turns into the largest man-made source of methane, with serious environmental impacts. In spite of all of this, landfill is still the most widely used option for waste treatment. (Nilsen, 2017, p. 8)

Many European countries have enshrined the principle into their national law. However, the lack of appropriate indicators makes it difficult to monitor its actual implementation. The most widely used indicator to quantify the performance of the specific waste operations is the recycling rate. Nevertheless, this indicator has many limitations: first, the national recycling rates of European countries are not necessarily based on the same definition of recycling. Second, a high rate of recycling does not always translate into a sustainable and efficient

<sup>6</sup> The reason why reuse is in a higher order than recycling is because recycling requires more use of energy than reuse, in general. (Nilsen, 2017, p.7)

<sup>7</sup> Recovered energy can only be used once. Incineration can emit harmful pollutants and contribute to climate change, however, it can also destroy toxic substances. (*idem*)



management system (Pires & Martinho, 2019, p. 298). This is because the indicator only measures recycling operations and leaves out the other activities of waste management in the hierarchy. As a consequence, countries can sometimes have a simultaneously high recycling rate and high incineration or landfill rate, which is contrary to the aim of the waste hierarchy principle.

To fill this gap, Pires & Martinho (2019) have developed a waste hierarchy index (WHI): a new indicator that can relate available waste operations and in which their potential to empower Circular Economy (CE) is considered in the formulation (ibidem, p. 299). In other words, an indicator that considers all waste operations while using circular economy principles. Pires & Martinho conducted a test on the WHI rate for the 28 members of the EU. In general, the EU-28 showed a negative WHI of between -4% and -9% (ibidem, p. 301), which indicates that the waste hierarchy was not being implemented in a way that could promote the CE. In addition, as mentioned earlier, many countries with high recycling rates presented an overall negative WHI rate due to the amount of waste sent to landfill. Examples of this are Italy (with a recycling rate of 42%) and the United Kingdom (43%).

In summary, there is still a high reliance on incineration and landfills for waste management, which besides having a significant impact on the environment (discussed in the following section), also constitutes an obstacle to the implementation of the waste hierarchy.

#### **1.4. Environmental impacts**

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This section will consider the environmental impacts of different waste management and disposal practices.

As stated earlier, environmentally irresponsible practices prevail in waste management. From the 2.01 billion tons of municipal solid waste generated annually, at least 33% was not managed in an environmentally safe manner (Kaza, Yao, Bhada-Tata, & Van Woerden, 2018). Furthermore, we are generating so much waste that it cannot even be dealt with in a sustainable way anymore: approximately 1.6 billion tons of CO<sub>2</sub> equivalent greenhouse gas emissions were generated from solid waste management in 2016 (idem). Poor waste management and ill-equipped infrastructure can cause serious environmental problems such as air pollution, as well as water and soil contamination, which in turn harm ecosystems and affect human health (Asante-Duah & , 1998; European Environment Agency, 2019; Lipman, 2002; Sembiring, 2019; Friends of the Earth International, 2019).

Even before it ends up in landfills, the process of transporting and treating waste already contributes to air pollution. In waste-to-energy facilities, the burning of waste releases carbon dioxide and air pollutants into the atmosphere -particularly in the case of plastic products, which often produce toxic substances when they are incinerated. (European Environmental Agency, 2014)

Landfill, however, is the most environmentally harmful practice in waste management. Firstly, waste in landfill sites may generate methane gas, which can form an explosive compound and also contributes to the greenhouse effect. Secondly, depending on the way landfills are built, waste can leak into the environment and cause soil and water pollution: a wide range of pollutants such as plastic, radioactive waste, and wastewater thereby end up in the Earth's lakes, rivers, streams, groundwater and oceans. Looking at wastewater alone, over 80% of it flows back into the environment without being treated or reused, and the contaminants

it contains can persist in the environment for thousands of years (Nunez, 2010). Water pollution can cause infection and transmit diseases to local residents (UNEP, n.d.), harm marine species and threaten the sources we rely on for drinking water and other critical needs (Nunez, 2010). This is the case in Shanghai, the Chinese economic capital: the dumping of untreated wastewater into the rivers has turned 85% of the water undrinkable in 2015 and 56,4% unfit for any purpose. (Tingting, 2017)

Thirdly, some waste cannot be properly recycled because it is not biodegradable<sup>8</sup>, so it ends up filling landfills and polluting oceans. One of the most concerning materials would be plastic. According to the European Environmental Agency (2019), less than 10% of the 6,300 million tons of plastic waste generated between 1950 and 2015 has been recycled, and over 60% of it is in landfills or in natural environments, including the oceans. Leaked plastic in the environment takes hundreds of years to break down, causing damage, harming biodiversity and depleting the ecosystem services needed to support life (idem).

“Environmentally sound waste management touches so many critical aspects of development (...) Yet, solid waste management is often an overlooked issue when it comes to planning sustainable, healthy, and inclusive cities and communities. Governments must take urgent action to address waste management for their people and the planet.” Silpa Kaza, World Bank Urban Development Specialist (The World Bank , 2018)

### **1.5. Waste Trade**

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As mentioned earlier, an important component of waste management strategies is waste trading. The current global trade in waste emerged as a result of a combination of different circumstances in developing and developed countries.

In developed countries, as industrialization and urbanization increased during the last century, the amount of daily waste produced grew as well, along with the need to create space for its disposal. Together with a lack of efficient infrastructure to deal with the growing amounts of recyclable materials, the introduction of progressively more stringent environmental laws increased the cost of waste disposal in developed countries (Asante-Duah & I.V.N., 1998; European Environment Agency, 2019; Lipman, 2002; Sembiring, 2019).

At the same time, developing countries were in need of a supply of raw materials to support their growing manufacturing sector. Their costs for waste processing were much cheaper: according to a study by Katharina Kummer in “International Management of Hazardous Waste: The Basel Convention and Related Legal Rules” (cited in Lipman, 2002), disposal costs for hazardous waste in developing countries in 1988 ranged from US \$2.5 to \$50 per ton, compared with costs of US\$100 to US\$2000 in OECD countries. Moreover, developing countries had much lower regulations on health/environmental risks (Asante-Duah & I.V.N., 1998). All these factors appeared very beneficial to developed countries, and thus they started to export their waste and have it processed overseas. From an economic perspective, the global trade in waste is a multi-billion-dollar industry. According to the UN Commodity Trade Database, the world’s plastic waste export and import in 2017 was valued at US\$4.5 billion and US\$ 6.1 billion respectively (cited in Sembiring, 2019). Nonetheless, both the European

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<sup>8</sup> Something biodegradable is capable of being completely or partially converted to water, CO<sub>2</sub>/methane, energy or new biomass by microorganisms (bacteria and fungi), through a biological process of organic matter. (UNEP, 2015, p.10)



Environment Agency (2019) and Lipman (2002) affirm that this business is not possible without disregarding the recipient country's human rights and environment.

Developed countries were fully aware that overseas treatment caused higher environmental pressures than treatment in the home country, as there were practically no regulations in the former (European Environment Agency, 2019). But this fact did not become an ethical concern: although dealing with waste domestically in safer conditions was affordable for developed countries, lower costs abroad were exploited for their convenience and economic benefit. Lipman (2002) goes even further to argue that one of the reasons these countries exported their waste was because they discovered the damage hazardous waste could cause to the environment, and took advantage of the importer countries' lack of awareness on this matter. As an example, Friends of the Earth International (2019) denounces that much of the plastic that citizens throw into recycling bins is in such a state that it cannot be recycled, so it is simply incinerated, landfilled or leaked into the environment.

Moreover, the absence of regulations and deficient infrastructure in recipient countries often cause serious health and safety concerns to the workers, who often lack the essential equipment needed for working with hazardous materials. The defective waste management conditions in these countries can lead to additional environmental and health hazards that would have been avoidable if exporting countries managed their own waste. Such disasters include, among others, the risks of getting poisoned and falling from high fixtures for ship breaking workers (one of the most dangerous sectors of waste management), high rates of thyroid dysfunctions in women as well as damage to the central nervous system of children caused by lead from electronic waste, and the creation of garbage villages. (Asante-Duah & I.V.N., 1998; European Environment Agency, 2019; Lipman, 2002; Sembiring, 2019; Friends of the Earth International, 201; Varkey, 2019)

## 2. THE CASE OF CHINA

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This section will cover China's role in the global trade of waste. China has been by far the main importer of recyclable waste from developed states. However, in light of increasing environmental costs, the country has recently decided to implement a series of bans and restrictions on waste imports. This section will discuss how China ended up in this position, the development of and reasons behind the recent restrictions, and the consequences this can have on the general configuration of the global waste trade. Finally, it will reflect briefly on how this ban is indicative of a general problem with waste management.

### 2.1. China: the world's wastebasket

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For more than twenty years, China has been the main importer of recyclable waste from nations worldwide, mainly the United States, Canada, Japan, Australia and several European countries. In 2016, it processed at least half of the world's exports of plastic, paper and metal waste, with the US alone exporting 16 million tons of waste, worth about US\$5.2 billion. Britain sent China "enough garbage to fill up 10,000 Olympic-sized swimming pools"; Ireland sent 95% of its plastic waste, Canada has been sending half its plastic waste and all its mixed paper to China, and Europe sent up to 300,000 tons monthly (Mosbergen, 2018; European Environment Agency, 2019). But, despite the startling amount of waste exported to China, according to some authors, this was a mutually beneficial exchange: China needed a large supply of raw materials for its growing manufacturing sector, and developed countries lacked the facilities and the labor force that China had (Mosbergen, 2018; Mak, 2018).

The waste business was not, however, free of problems. In the 1990s, with the rise of illegal shipments and exports of hazardous substances or waste that was difficult to recycle, the Chinese government began to regulate foreign waste flows. Some initial regulations were the following (Yoshida, 2005, p. 37):

- "Notice of Strict Regulations Governing Trans-boundary Movements of Hazardous Waste Destined for China" (1991)
- "Interim Regulation Concerning the Strict Control of Waste Imports from the European Commission" (1994)
- "Law on the Prevention and Control of Environmental Pollution by Solid Waste" (1995)
- "Interim Provision on the Administration of Environmental Protection in the Importation of Waste Materials" (1996)

As a result, China has sent back numerous ships from countries around the world for attempting to export prohibited materials falsely labeled as "plastic waste" or "used papers" as well as for failing to conform to Chinese standards (which is an example of the problem mentioned in earlier sections about the discrepancies between different countries' standards). It is worth mentioning the case of Japan: in March 2004, after 4,000 tons of toxic waste were found concealed under a small layer of high-grade waste plastics, the Chinese government decided to block all imports of plastic waste from Japan (ibidem, p. 40).

In the following years, as the number of imports continued to increase -and with it, the number of illegal shipments- import restrictions were repeatedly discussed and enacted. But it wasn't until 2013 that waste-exporting countries started to fear the global effects that the increasingly strict measures could have on the waste trade. In February 2013, China launched

“Operation Green Fence”, a series of intensive inspections of imported waste in an effort to enforce the regulations passed during the previous years. This was complemented with the 2017 “National Sword Policy”, a crackdown on waste smuggling that tightened supervision at ports to halt illegal permits to import materials. During the policy’s enforcement, 100,000 metric tons of materials were seized and several smuggling groups were arrested. Later that year, China notified the World Trade Organization that it would ban 24 types of recyclables from imports, including post-consumer plastics, unsorted mixed paper, textiles and select trace metals, among others. It also set a maximum contamination level of 0.3% for the imported materials, a level which would be further lowered in March of the following year to 0.15%. Simultaneously, the country announced the “Blue Sky 2018” program, a follow-up measure to the two previous policies, followed by an additional ban on another 32 recyclable materials. Finally, in July 2018, the Chinese government proposed a complete ban on solid waste to be implemented in 2020 (Resource Recycling, 2018).

The reasons for this path of action are manifold. Politically, the ban on foreign garbage aligns with President Xi’s “Beautiful China 2035” policy, a push towards a greener economy<sup>9</sup> (Nichols & Smith, 2019, p.11). From an economic perspective, importing recyclables was no longer profitable for China, since in the last decades the cost of labor had gradually increased while the demand for raw materials had gone down (Mosbergen, 2018). Moreover, China’s domestic consumption market is producing increasingly more domestic waste that also needs to be treated: according to SRS Media (2019), China faces a solid waste treatment backlog<sup>10</sup> of approximately 60-70 billion tons. This has contributed to the rising awareness of the business’ environmental costs, which is the main driver for this shift in policy.

Moreover, many public health issues had emerged as a consequence of this incredible influx of waste. First, a lot of imported waste ended up filling China’s landfills or polluting the country’s soil and waterways, as it was too contaminated to be recycled. In 1996, for example, China accidentally imported 100 tons of radioactive metal from Kazakhstan and Kyrgyzstan. (Mosbergen, 2018). Second, the waste industry generated the so-called “garbage villages”<sup>11</sup>: towns entirely dedicated to recycling. These towns’ harsh working conditions and the inhabitants’ exposure to toxic chemicals caused serious health hazards to workers, who, in addition, were often minors (Mosbergen, 2018). “Plastic China” (2014), an 81-minute documentary portraying in detail the tough living conditions of two families from a garbage village uncovered the dark side of the industry (Zhao, 2017) and spurred public anger in China, which also contributed to forcing the central government to rethink the waste trade industry.

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9 See China Council for International Cooperation on Environment and Development (CCICED), 2019. *Goals and Pathways for Environmental Improvement by 2035*. Available at: <https://www.iisd.org/sites/default/files/publications/cciced/agm/cciced-sps-2-3-beautiful-china.pdf>

10 A waste backlog refers to an amount of build-up waste that is waiting to be treated.

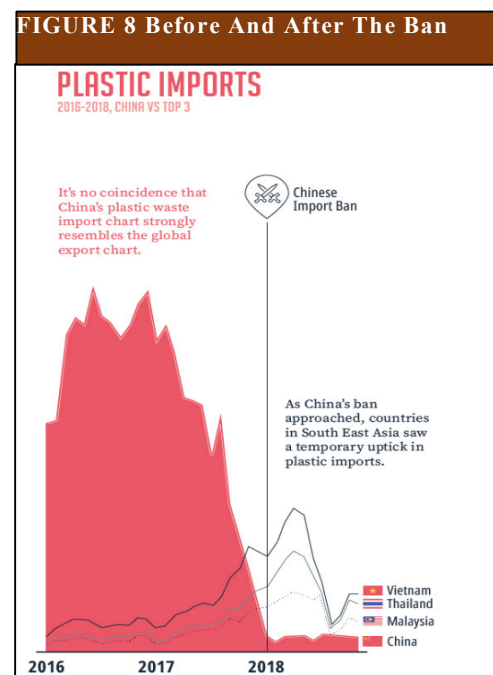
11 See the case of Guiyu village in TIME, n.d. *China’s Electronic Waste Villages*. Available at: [http://content.time.com/time/photogallery/0,29307,1870162\\_1822156,00.html](http://content.time.com/time/photogallery/0,29307,1870162_1822156,00.html).

## 2.2. Impacts of the ban on waste imports

China's move has halted the global waste trade. In regard to the impacts that this ban has had on the world waste industry, there are mainly two trends. On one hand, decades of dependency on China discouraged exporting countries from developing their domestic infrastructure for waste management and market for recycled materials (Katz, 2019). As a consequence, their lack of capacity to respond to China's ban led them to a near-crisis. A large amount of recyclables had to be dumped in landfills and/or directly incinerated due to a lack of storing space and an unwillingness to pay higher rates for recycled materials, which caused many states to halt their recycling programs (Media, 2019; Katz, 2019). For instance, in the US, many states, such as Massachusetts and Oregon decided to curtail or halt their recycling programs (United Nations Environment Programme, n.d.); Minneapolis stopped accepting some types of plastic like disposable cups, and Philadelphia started burning the materials at a waste-to-energy plant, raising environmental concerns (Katz, 2019). In a study carried out by the University of Georgia, scientists stated that 111 million metric tons of plastic waste would be displaced by 2030 (United Nations Environment Programme, n.d.).

On the other hand, exporting countries have been looking for new places to dispose of or process their waste: numerous plastic recycling facilities were reported to be setting up in Southeast Asia, and low-income countries with few legal barriers such as Malaysia, Vietnam and Thailand have seen a dramatic increase in waste imports (Resource Recycling, 2018). Figure 8 illustrates this.

However, these countries have poor infrastructure to deal with the large quantities of recyclable materials they are being sent, which often are also low-quality materials. As a result, a big fraction of these imported materials end up being dumped in illegal sites and landfills (Anthesis, 2019). This was confirmed by an investigation lead by "Unearthed" (Ross, 2018), which found UK household plastics in illegal dump sites in Malaysia. As explained in earlier sections, this industry inflicts serious damage on the local environment as the poor management of waste pollutes the waterways and plastic contributes to greenhouse gas emissions (European Environment Agency, 2019).



The problem is further exacerbated by the fact that Asia already has some of the most polluting countries with regards to marine littering (United Nations Environment Programme, n.d.). For all of these reasons, the new waste destination countries also began to establish import restrictions by mid-2018, after which the trade was redirected to Indonesia and Turkey, which are currently the two major importers globally (Greenpeace, 2019). All the same, as seen with Southeast Asian countries, Indonesia and Turkey are likely to follow the same steps once they see themselves overwhelmed by an incredible influx of waste that they are not actually able to process in its entirety, and which instead contributes to the pollution of their country.

### 2.3. China's lesson

According to the EEA (2019), 6,300 million tons of plastic waste were generated between 1950 and 2015, but less than 10% has been recycled. More than half has ended up in landfills or dumped in nature, with the remaining being incinerated. The waste that eventually leaks into the environment, especially plastic, takes a long time to break down, and in the meantime causes irreversible damage to biodiversity. The main waste importing countries, just like China when it first started importing, lack a developed waste management system, and thus waste is often processed in unregistered facilities or directly dumped or burned. Mismanaged waste is, in short, polluting land-based ecosystems, marine biodiversity and contributing to the growth of greenhouse gas emissions (European Environment Agency, 2019).



Source: Collection of newspaper headlines by author

Exporting countries have been accusing China<sup>12</sup> of causing a global crisis in waste management and an increase in greenhouse gas emissions due to the displaced waste now being mismanaged as a result of its ban (RT, 2018). But exporting countries should neither blame China, nor seek to solve the problem by shifting waste exports to other developing countries. In relation to blaming China, some countries alleged that the biggest issue was that China gave them very little time to adapt to the ban (idem), but as observed earlier, China had been imposing restrictions and bans since the 1990s and these have been getting progressively more stringent until eventually reaching a total ban in 2020. The transition, therefore, was foreseeable if attention was paid to China's waste import policies, which in turn were influenced by the country's economic growth and rising environmental concerns.

More importantly, however, is the fact that from the very start countries should not have relied on exporting waste abroad as part of their waste management system: developing

<sup>12</sup> Words of a US spokesperson at the WTO Council for Trade in Goods session in Geneva: "China's import restrictions on recycled commodities have caused a fundamental disruption in global supply chains for scrap materials, directing them away from productive reuse and toward disposal". (RT, 2018)

countries are neither their dumping grounds nor their scapegoats. It is ironic, for instance, for the United States' President Donald Trump to hold Asian countries responsible for "making our oceans their landfills" (Parker, 2018) while his country is home to one of the least self-sufficient recycling systems, and knowingly relies on nations with scarce resources to take US waste off their hands. On this account, and in regards to the second statement, simply shifting waste exports to other developing countries should not be seen as the solution: it is clear that the receiving countries will most likely follow China's path in relation to their import policies, so to continue looking for the next willing importer may temporarily cure the symptoms, but not the disease.

In short, shipping waste abroad is a short-term solution to a global waste problem that is in dire need of a global and far-sighted approach. The problem doesn't start with China's ban, but rather, the ban has simply demonstrated the deep flaws in the global waste management system. Therefore, for starters, and following the Polluters Pay Principle<sup>13</sup>, developed countries should begin to make an effort to enhance their own processing capacities and manage the waste they produce. This, on the one hand, will reduce the risk of mismanagement that comes with the lack of knowledge of what happens to exported waste; and on the other, it will give developing countries the time and space required to improve their waste management systems, process their own waste properly and improve their environmental conditions. China's ban should serve as a lesson to the world: a lesson that makes us reflect on the global waste problem and start thinking about more sustainable ways to deal with waste than to simply ship it away.

Having seen the current outlook of waste flows on the international market, and specifically the central role of China in it, both in the past and in the future; the following section will delve into existing regulations on international waste trade.

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<sup>13</sup> According to the ABC of SCP (UNEP, 2010, p.39), the Polluters Pay Principle (PPP) is an environmental policy principle "which requires that the costs of pollution be borne by those who cause it. In its original form the PPP aims at determining how the costs of pollution prevention and control must be allocated: the polluter must pay. Its immediate goal is that of internalising the environmental externalities of economic activities, so that the prices of goods and services fully reflect the costs of production".



### 3. REGULATIONS

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This section will consider the existing regulations on the waste trade. During the 1970s and 1980s, the upsurge in waste generation raised a general awareness of the negative impacts of waste, which led to the proliferation of regulations on waste disposal in developed countries (Andrews, 2009). As discussed before, a stricter domestic regime meant a decrease in availability of disposal sites and an increase in disposal costs, which together incentivized countries to export their waste to developing countries with lower disposal costs and a lack of enforcement mechanisms. In this context, a great number of incidents occurred that generated huge public outrage and numerous international campaigns calling for restrictions on the international trade of some of the most hazardous waste materials. One of the major disasters was the Koko Incident in Nigeria<sup>14</sup>: in the mid 1980s, two Italian firms managed to store 18,000 drums<sup>15</sup> of hazardous waste in the village of Koko by covering them up as building materials and paying the residents \$100 per month. The scheme was discovered after toxic substances within the drums had already started leaking into the environment and which lead to people suffering from paralysis, premature births and cancer.

In 1987, negotiations on an international treaty regulating the trade in hazardous waste gave birth to the Basel Convention (Secretariat of the Basel Convention, n.d.). The Convention, in turn, set the path for a series of regional treaties on waste, which strengthened the original treaty and combined to establish much more favorable trade conditions for the recipient countries. Nonetheless, the Basel Convention also suffered from a number of short-comings. The Basel Convention, including its failures and limitations, will be examined in the first sub-section. The second sub-section will cover other regional agreements on this topic and finally, the last sub-section will explore illegal shipments arising from the shortcomings of the existing regulations.

#### 3.1. The Basel Convention

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The Basel Convention was concluded on 22 March 1989 and entered into force in 1992. Today, it is a key international regulation mechanism on trans-boundary shipments of hazardous waste, comprising 187 parties and 53 signatories<sup>16</sup>. The Convention sets out three main goals: the reduction of hazardous waste generation; the restriction of hazardous waste trade; and the promotion of a regulatory system applying to cases where transboundary movements are permissible.

In relation to the first aim, it establishes a framework of action in accordance with the principles of Environmentally Sound Management (ESM). For the restriction of hazardous waste trade, the Convention prohibits the export to Antarctica, to a non-Party and to a party once it has banned the import of hazardous waste (Article 4, Basel Convention). However, the

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<sup>14</sup> See the Koko Incident at Buck, S., 2017. *In the 1980s, Italy paid a Nigerian town \$100 a month to store toxic waste—and it's happening again*. Available at: <https://timeline.com/koko-nigeria-italy-toxic-waste-159a6487b5aa>

<sup>15</sup> Container

<sup>16</sup> See the detailed list of Parties and Signatories in Secretariat of the Basel Convention, n.d. *Parties to the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal*. Available at: <http://www.basel.int/Countries/StatusofRatifications/PartiesSignatories/tabid/4499/Default.aspx>

ban is not absolute: Parties may enter into bilateral or multilateral agreements with (non) Parties, provided that they are based on the principles of ESM and the exporting state does not have the technical capacity and suitable disposal sites, or if the waste is required by the importing state as raw materials for recycling or recovery industries. (Article 11). The regulatory system is based on the Prior Informed Consent (PIC) procedure, by which the receiving State must have been notified by the exporting state with detailed information of the trade and have given prior consent before the export takes place (Article 6).

However, despite these accomplishments, the Basel Convention has some weaknesses that have hindered implementation and allowed for illegal shipments. Some of these shortcomings are:

*Failed enforcement.* In what is considered the biggest failure of the Convention, the Parties were unable to place a complete ban on the trade of hazardous waste destined for final disposal between developed and developing countries (known as “the Ban”), because the decision’s ratification fell short of the required three quarters of the Parties. Those that haven’t ratified the Ban include major producers of hazardous waste - such as the US and Japan - as well as developing countries who are major importers of hazardous waste - such as India and Pakistan. Similarly, the Basel Protocol on Liability and Compensation - a framework for liability against the exporter or generator for any damage caused by the shipment of hazardous waste - was adopted on 10 December 1999 but is still not in force because developing countries feared the loopholes it contains would allow developed countries to escape liability.

*Persistence of illegal traffic.* Under the Basel Convention, any movement that takes place (i) without prior notification and consent, (ii) where consent is obtained through fraud or misrepresentation or (iii) where the waste does not conform in a material way with the documents, is considered illegal traffic. However, illegal traffic continues to occur, usually by taking advantage of loopholes within the Convention, such as unclear definitions and obligations as well as the lack of harmonization between the codes of different countries, and between the different requirements with respect to the conditions under which a substance or object must be disposed of and thus considered waste (UNEP, 2015).

*Poor assessment mechanisms.* The PIC procedure fails to ensure that the importing country has the adequate waste management facilities. The Convention does not have any assessment mechanisms to ascertain the information provided by the parties, who often overstate their capacity to deal with hazardous waste imports if the economic incentives are high enough. This happens mainly in the case of trade between developing countries, where the PIC procedure is susceptible to corrupt officials or where the countries lack the capacity to conduct an accurate assessment of the level of risk posed by a particular shipment<sup>17</sup>. (Andrews, 2009)

*Insufficient guidance.* The Convention also provides for the establishment of regional or sub-regional centres for training and technology transfers, which are known as the Basel Convention’s Regional Training Centres for the Transfer of Technology. These Centres would deal with the minimization of waste generation according to the specific needs of different regions and sub-regions (Article 14). However, some (Andrew, 2009) fear that insufficient guidance in terms of governance, institutional structure, management and programming, and

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<sup>17</sup> See the Abidjan disaster, the case of Guinea Bissau at BBC News, 2012. *Ivorian minister sacked over toxic waste fund scandal*. Available at <https://www.bbc.com/news/world-africa-18173363>



the financial model will fail to provide the Centres with the necessary resources for capacity-building in developing countries.

*Exclusion of plastic waste.* Plastic waste, despite being one of the main exported and most polluting materials, was not a category controlled by the Convention. One can see the consequences of this shortcoming with the case of China: after the Convention failed to ensure compliance with its trade regulations and guidelines, causing ongoing harm to human health and the environment, the government decided to implement a series of national bans to strengthen trade controls and restrict the import of plastic waste. This brought into question the effectiveness of the Convention to address by itself the human and environmental impacts of plastic waste in particular, but also of the waste trade in general. On this point, however, it is worth mentioning that in May 2019, at the 14<sup>th</sup> meeting of the Conference of the Parties to the Basel Convention, the Parties reached significant agreements, including the ban on most end-of-life<sup>18</sup> plastics in the Norwegian Amendment, a.k.a. the Basel Plastics Ban (Garcia, 2019).

Despite the aforementioned shortcomings, due to the increasing number of bans in Asian countries following China's steps, along with the new plastics ban from the Basel Convention, exporting is becoming less of a viable option and individual nations are being forced to find domestic recycling solutions to deal with their own waste. While this should be considered a good development, one should not however assume that domestic management will necessarily lead to more sustainable waste management: the pressure on developed nations increases as local recyclers are raising prices, and municipalities are reducing recycling programs due to their inability or unwillingness to pay for domestic recycling services. Further efforts, both political and regulatory, will be required to improve our collective management of waste. And such regulation, in order to be effective, should always start from the assumption that where economic incentives are high, compliance will be low.

### **3.2. Regional Agreements**

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Aside from the Basel Convention, there are multiple other legal frameworks regulating the cross-border movement and management of waste. One important international agreement is the OECD Decision ("Decision of the Council C (92)39/Final Concerning the Control of Trans-Frontier Movements of Waste Destined for Recovery"). Adopted on March 30<sup>th</sup> 1992, it "aims at facilitating trade of recyclables in an environmentally sound and economically efficient manner by using a simplified procedure as well as a risk-based approach to assess the necessary level of control for materials". It is based on two types of procedures: the Green Control Procedure, for waste that is not subjected to strict controls, and the Amber Control Procedure, for waste presenting sufficient risk to justify its control (OCED, n.d). The controls are carried out by national competent authorities and Customs Offices through notification and movement documents. In 2001 it was amended to harmonize it with the Basel Convention and to eliminate duplicative provisions (EPA). The United States, while not a party to the Basel Convention, is one to the Decision, which constitutes a significant accomplishment of this Agreement as the US has been the major exporter country as well as the major waste generator.

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<sup>18</sup> According to the ABC of SCP (UNEP, 2010, p.12), end-of-life is a "stage in the life cycle of a product when it becomes obsolete or has reached the end of its useful life".

Many regional regulations seek to improve on the Basel Convention, and create better enforcement mechanisms. This would be the case of the European Union Regulation on Shipments of Waste (Regulation (EC) N° 1013/2006); the Bamako Convention on the Ban of the Import into Africa and the Control of Transboundary Movement and Management of Hazardous Waste within Africa (Bamako Convention) and the Convention to Ban the Importation of Hazardous and Radioactive Waste and to Control the Trans-boundary Movement and Management of Hazardous Waste within the South Pacific Region (the Waigani Convention). All three have incorporated the Ban in their legislation, with the last two conventions also prohibiting radioactive waste. It is worth mentioning that the Waigani Convention covers the Exclusive Economic Zone of each party, instead of limiting the territorial coverage to the outer boundary of the territorial sea as is the case under the Basel Convention (SPREP, n.d.).

### **3.3. Illegal Waste Shipments**

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There is a significant amount of international, regional and national legislation dealing with the trans-boundary movement of waste, which is amended in a timely manner to encompass new problems and threats as they arise. However, these have all been unable to definitively halt the illegal trafficking industry. While difficulty in obtaining accurate figures on illegal trade makes it hard to know the actual volume of hazardous and other banned types of waste currently being transported, there is no doubt about the persistence and gravity of the issue: in 2005, with the ban on hazardous waste already in place, a joint enforcement operation carried out by the European Union's Network for the Implementation and Enforcement of Environmental Law (IMPEL) inspected 140 waste cargos: of those, 68 contained illegal hazardous waste destined for developing countries (Basel Action Network, 2005). Almost ten years later in 2014, a joint operation initiated by China Customs and organized by the World Customs Organization (WCO) named "Demeter III" found more than 7,000 tons of illegal waste (UNEP, 2015).

One method for smuggling illegal waste is that of loading, that is, hiding illegal materials among legally exported waste or having them well hidden so that they cannot be found (UNEP, 2015). Some of the types of waste most often detected in the inspections are electronic waste, mixed municipal waste, paper, plastics, metals and waste batteries. The most common method for waste trafficking, however, is false classification. Waste streams are commonly coded under two functions, one based on its nature and the other for customs purposes. In order to conceal hazardous and other regulated waste, exporters misreport the nature of the waste or use customs codes for non-regulated goods. For instance, electronic waste is falsely declared as second-hand goods; waste batteries as plastic; and in the case of some hazardous or contaminated waste, it is declared as non-hazardous. Second-hand goods are a particularly important grey area: as mentioned earlier, specific requirements for distinguishing second-hand materials from waste are lacking, and so once products are classified as second-hand goods they can be traded with developing countries and avoid being regulated by international legislation (WCO Secretariat, n.d.). These loopholes in control regimes and control capacities are taken advantage of by the different actors in the informal sector to make profits, which is ultimately the main objective and driver of illegal waste shipments (UNEP, 2015).

Unfortunately, measures to counteract these activities have not been very successful. Enforcement of strict port controls and inspections such as the Green Fence Campaign in China

did not halt illegal shipments, but only altered their traditional routes. Nonetheless, efforts continue in the struggle against waste trafficking: at the 11<sup>th</sup> Conference of the Parties of the Basel Convention, the Environmental Network for Optimizing Regulatory Compliance on Illegal Traffic (ENFORCE) was established to enhance the national implementation and enforcement of laws against illegal trafficking. The above mentioned IMPEL has been running inspection projects within the European region since 2003; joint operations are being organized by exporter and importer countries, and the International Criminal Police Organization (INTERPOL) is also launching criminal investigations into companies involved in illegal trading. Concerning future initiatives to tackle this problem, UNEP (2015) has outlined some recommendations, which include:

- 1) Strengthening awareness of waste crime as an important threat to security, people and the environment;
- 2) Strengthening national legislation and enforcement capacities by cooperating at a multi-agency level, building capacities to address the crime and promoting the identification of tariff codes;
- 3) Strengthening international treaties and compliance measures by sharing tools, practices and intelligence and
- 4) Promoting prevention measures and synergies by tracking the value chain until the end of its cycle.

For the WCO (n.d.), on the other hand, data collection from Customs administrations is the biggest challenge. The organization has stressed the importance of registering seizures in the enforcement database to get a record of the illegal waste flows in order to then be able to refine enforcement operations.

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## II. REVALUATING WASTE

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The first part of the paper has provided a general outlook on the current state of affairs with regards to waste management and trade. It has argued that the problem of waste needs a global, expansive and long-term approach. In the second half, it will try to take such an approach: first, it will reflect on the notion of responsibility in waste management, and second, on the notion of waste itself. This will help to think about the issue on a wider scale when considering solutions to the waste problem, in other words, going beyond waste management and towards waste minimization.

### 1. THE NOTION OF RESPONSIBILITY IN WASTE MANAGEMENT

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Ecological problems -especially those occurring on a global scale, such as climate change and international waste management- raise questions about responsibility. Who is to be held accountable for waste generation and its subsequent management? What is the extent of this responsibility? Beyond legal definitions, one can also consider ethical perspectives in relation to responsibility in what has been called a globalized and “anthropogenic” era of human history.

New concepts of responsibility are particularly important and necessary as a result of man’s increasing impact on the world, which has reached a point whereby an entire geological era is now defined by that power, namely the Anthropocene<sup>19</sup>. This, combined with the ecological realities of our planet (mainly, a finite amount of resources available and a human dependence on the environment) leads us to the need to establish a broader and more demanding understanding of the concept of responsibility, proportional to the reach of our power (Jonas, 2008). Moreover, the interdependent and collective nature of both human activity and its consequences (in our topic, both the creation and management of waste as well as its environmental consequences can occur on a global scale) necessitates a reconsideration of collective conceptions of responsibility. This chapter will discuss the notion of responsibility of states, corporations and individuals in terms of waste management, applying some of the types of responsibilities laid out by Jonas in his book “The Principles of Responsibility” (2008).

The analysis will begin by looking at conceptions of responsibility appropriate to the state or other administrative levels. On the one hand, there is what Jonas calls the *responsibility for what has to be done: the duty of power*. With this, he basically means the duty of actors in power to seek the best course of action in order to achieve the common good: not only limiting oneself to assessing one’s own actions, but to conceiving the best possible way to contribute. Many developed countries have the capacity and resources to establish an environmentally sound management infrastructure to cope with their waste. Nonetheless, they still rely on exporting it mainly as a result of convenience and economic incentives. One could argue that the management of waste by those producing it would be a better policy for the overall goal of

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<sup>19</sup> Anthropocene: “the period of time during which human activities have had an environmental impact on the Earth regarded as constituting a distinct geological age”. (Merriam-Webster, n.d.)

improving waste management globally, as one of the main flaws of trans-boundary movements would be avoided -namely, the unknown destination of the exported waste, which may end up being incinerated or dumped.

On the other hand, Jonas talks about the *responsibility from man to man*, the responsibility that stems from our coexistence and interdependence due to living in a community. However, as said before, in our current world, this conception of collective responsibility is expanded far beyond older conceptions of community. There are two main forms of expansion: first, our responsibility is expanded intergenerationally, that is, the state has responsibility not only for their current citizens, but for future generations<sup>20</sup> – this is because, due to increased capacities, the state’s current actions on ecological issues can and will have enormous effects on future generations. Second, our responsibility is expanded to the whole of humanity and the planet. Ecological issues have raised the scale of power and responsibility for our actions to a global scale, so states should not conceive of their responsibility separately, but as connected and interdependent actors in a shared world. An example of this, as said before, is the practice of shipping waste. While not necessarily a malpractice<sup>21</sup>, exporting should not be conceived of as a way to manage waste locally (that is, making it disappear from your territory). Adequate and sustainable waste management should be understood as a global good and therefore a global responsibility. Therefore, and following the principle of the duty of power previously mentioned, what is required is to reinforce international regulatory systems for such activity, to ensure that if waste is exported it is done so in order to ensure its better management.

In addition, Jonas introduces another important principle in relation to the concept of collective responsibility: *responsibility is not a reciprocal relation*. This means that our participation and fulfilment of duties ought not to be dependent on other actors (here, states) doing so themselves. Thus, regardless of waste management practices in other countries, each state has, as a member of the collective, the responsibility to fulfil its duties. This stems from the global nature of the consequences, a fact also true of the global waste problem: while, admittedly, soil, water and air pollution have a strong local impact; polluting emissions contributing to climate change, marine littering and the indirect effects of local environmental deterioration brought about by global interconnectedness, make the effects of deficient waste management truly global in scope.

Both principles (*responsibility of man to man and responsibility as a non-reciprocal relationship*) are also applicable to a human-scale of responsibility. Individual-level contributions should be understood from the awareness that our waste can harm others in our global community, either directly or by damaging their environment. Even though the measures at a personal level are a small part of the whole endeavour of global waste management, it is no less important to promote the reduction of consumption, recycling habits and the reutilization of materials.

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<sup>20</sup> The principle of intergenerational equity developed by E. Brown Weiss states that “every generation holds the Earth in common with members of the present generation and with other generations, past and future. It is based on the concept of fairness among generations in the use and conservation of the environment and its natural resources”. (Oxford Public International Law, 2013)

<sup>21</sup> For instance, if a particular state or region specializes in managing certain types of waste, the waste trade can contribute to a better management of such.

Lastly, the philosopher talks about responsibility as *a causal imputation for committed acts*, that is, the legal or moral liability of someone that has committed a harmful act which must be repaired. This conceptualization of responsibility can be linked to industry malpractice: dumping waste in illegal sites, falsely declaring something hazardous as not or exporting waste without the consent of the recipient country are all prohibited by law as they can cause serious environmental and health problems, so their violation entails moral and legal responsibility.

Beginning in the mid-1990s, companies have started to act more warmly towards environmental regulations, partly as a response to consumer and public demand as well as to shareholders' rejection of environmental risks. There have been many voluntary programs developed, such as the European Eco-Management and Audit Scheme (EMAS)<sup>22</sup> and the 1400 environmental series of the International Organization for Standardization (ISO)<sup>23</sup>, as well as the eco-labelling programs that aim at informing consumers about the environmental impacts of products (R.J, 2001). Also, in 2000, the United Nations launched a corporate sustainability initiative – United Nations Global Compact – that called companies “to align strategies and operations with universal principles on human rights, labour, environment and anti-corruption, and take actions that advance societal goals” (United Nations, n.d.). The initiative has more than 12,000 signatories in over 160 countries. Nonetheless, the pacts between the organization and the corporations are non-binding, which together with the lack of effective monitoring and enforcement provisions makes it difficult for corporations to be truly held accountable. This can lead to such voluntary schemes being used as marketing tools while resulting in no significant improvements in corporate environmental practices.

Finally, it is worth mentioning that in regard to the aforementioned concept of *duty of power*, some argue that both states and corporations should go beyond managing existing waste to reducing it at the point of product creation. Hart (1997) stresses the need for corporations to develop pollution minimizing strategies that reduce the environmental costs of the entire life cycle of products, not only during the manufacturing process; while Singh (2014) argues that administrations should focus on preventing the problem rather than finding solutions to it, that is, taking measures to reduce: a) the quantity of waste, b) the adverse impacts of the generated waste on the environment and human health and c) the content of harmful substances in materials and products. This line of criticism relates to the the lack of a holistic approach to the waste management system. Proposals on this matter will be discussed in the following section (p. 39).

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<sup>22</sup> The EMAS is a management instrument developed by the European Commission for “companies and other organisations to evaluate, report, and improve their environmental performance”. (European Commission, s.f.)

<sup>23</sup> The ISO is a non-governmental international organization aimed at facilitating trade by establishing world standards for products, services and systems, to ensure quality, safety and efficiency. (ISO, s.f.)



## 2. DOES WASTE EXIST?

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### 2.1. The shortcomings of existing definitions

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In the first section of this paper, the author offered three definitions of waste used in international treaties. While precise legal definitions are important to define what is and what is not under legal control, it has been shown throughout the discussion that existing definitions of waste are rather flexible and unclear, so much so that many problems arise as a direct result of these ambiguities.

The usual method used to define waste is listing the activities or substances that each country considers to fall within the range of the definition, while what the three definitions have in common is that waste is something *to be discarded or disposed of* (for the complete definition, see p. 6). By contrast, Eva Pongrácz (2002) questioned the reason why waste is defined with respect to what is going to be done with it instead of how the material became waste in the first place. She states that this goes against the principle of waste minimisation, as the legal definition presupposes that it is something already existing to be disposed of by its holder, leaving no space for waste to be reused or to avoid it from ever being created. Thus, the limitation imposed by the definition of waste not only leaves the discarding of materials as a matter of course, but also hampers any prevention efforts (Ewijk & Stegemann, 2020, p. 3). Pongrácz attributes the inability to distinguish waste material from non-waste material - which, as has been shown, gives rise to illegal trafficking - to the failure of states to define waste with precision; but in turn, she affirms that there is no such thing as "universal waste". For her, waste is a *value concept, culturally construed and subjective to the individual, be it the observer or the disposer* (Pongrácz, 2002, p. 69). It is not possible to define waste objectively if it is associated with humans, in other words, it is a very relative notion:

"The notion of waste is relative in two main respects. First, something becomes waste when it loses its primary function for the user, hence someone's waste output is often someone else's raw material input. Secondly, the notion of waste is also relative to the technological state of the art and to the location of its generation. Waste is therefore a very dynamic concept". (ibidem, p. 70)

Ewijk & Stegemann (2020, p.4) go further to posit the notion of waste as a "transient", and "temporary attribute": it can be defined in terms of its economic value, the technical capabilities needed to process with it, the negative impacts that it may cause to the environment or as a social construct. Additionally, these terms may vary through space and time. In this manner, whether a material is or is not regarded as waste is largely determined by context, which is overlooked in our legal definition. To give an example: an item of clothing that is being discarded by its owner –and thus reduced to "waste"– because it is not considered stylish anymore might have lost its value in the social setting, but still keeps at least its functional, technological and economical resource value. Should a substance or object that has not lost every single value it has as a resource be considered waste just because it is considered no longer to be useful by its current owner? In existing definitions, great emphasis is placed on the holder of waste, considering his intention, obligation or act of discarding. There is no mention, in contrast, of possible waste users nor their acts of revaluing the materials (idem). Following a resource-efficient approach, to recognize the potential usage of waste is essential, but in the current legal understanding, a death sentence is passed on waste without room for maneuver.

It should also be noted that an important factor affecting the generation of waste is the negative stigma it holds in our present society. The label of "waste", once attributed to a product,

incites such a repulsion that the object in question will generally be kept as far away as possible, and any action other than doing away with it would be considered inappropriate (Ewijk, 2018). In other words, our current cultural reaction to “waste” is to get rid of it, not to reuse it or revalue it. This is a deep-rooted value judgement that has nothing to do with the inherent properties of particular materials. To address this issue, a change in perceptions will be needed so as to stop careless discarding and bring about the potential to see the value of what is currently termed “waste”.

While impractical for everyday matters, taking this rather radical position of questioning the very existence of waste is informative when we examine the basis of our behaviour as individuals and the policies of our governments. A great potential for resource usage lays within waste, and existing legislation is missing out on this reality by regulating waste as an inevitable residue. This negligence fails to provide a solid basis for a sustainable and efficient waste management system and hampers any prevention or waste minimisation efforts. Therefore, it is pertinent to remind ourselves of the relativeness of the concept of “waste” in order to approach the problem with greater creativity and increase our abilities to use ‘waste’ as well as reduce its prevalence.

## **2.2. Minimizing waste**

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Waste can be seen as a two-fold challenge (Ewijk & Stegemann, 2020, p. 1): on the one hand, waste in itself and the process of managing it produce negative impacts both on the environment and on human health. On the other hand, waste supposes a loss of resources in a world where there is a limited amount of them. This approach to waste presents it not as an inevitable consequence of living, but as the consequence of an inefficient economic system –a system based on extraction and intensive usage of resources, which also follows a linear logic: from extraction, to production, then usage and finally disposal of products. Two related concepts have emerged in criticism of this system: resource efficiency and the circular economy.

Resource efficiency<sup>24</sup> is about ensuring that natural resources<sup>25</sup> are used in a more efficient way over a product’s full life cycle, from production to consumption (UNEP, 2010, p. 22). This implies achieving the same or greater economic growth with less resource input, thus balancing development with environmental protection, and, most importantly, guaranteeing resource security<sup>26</sup>, which is vital for human development (UNEP, 2017; Ewijk & Stegemann, 2020). In practice, resource efficiency would entail the lowering of residual waste down to almost zero. The concept has already been promoted by organizations such as the UN<sup>27</sup>, the

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<sup>24</sup> The term encompasses a number of ideas: “the technical efficiency of resource use (measured by the useful energy or material output per unit of energy or material input); the resource productivity, or extent to which economic value is added to a given quantity of resources (measured by useful output or value added per unit of resource input); and the extent to which resource extraction or use has negative impacts on the environment (increased resource efficiency implies reducing the environmental pressures that cause such impacts). Resource intensity is the inverse of resource productivity, and is therefore measured by resource use per unit of value added”. (UNEP, 2017, p.16)

<sup>25</sup> Natural resources are “those provided by nature before their extraction or processing by humans”. (idem)

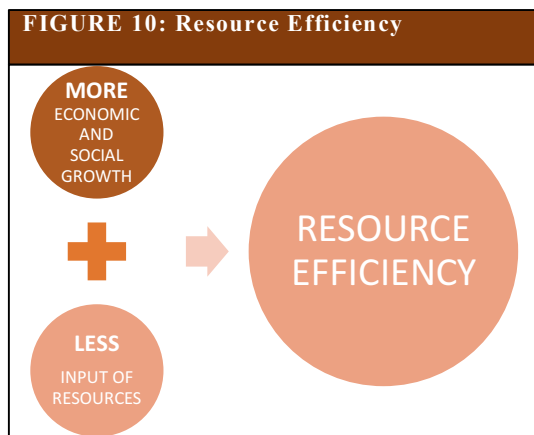
<sup>26</sup> Resource security is the availability of natural resources for all people.

<sup>27</sup> A report on “Resource Efficiency: Potential and Economic Implications” has been published analysing the paths that countries should take from now on to combine economic growth with a sustainable use of resources. It is available in UNEP (n.d). *Resource efficiency*. United Nations: <https://www.resourcepanel.org/reports/resource-efficiency>



OECD<sup>28</sup> and the EU, which launched a “Roadmap to a Resource Efficient Europe” in 2011 (European Commission, 2011).

Resource efficiency (as well as waste minimization) is included in our second concept,



the circular economy. The concept emerged in response to the increasing waste generation and the simultaneous growth in resource scarcity. The concept of the circular economy stands in contrast to our current linear system in that it is an economic model that is regenerative by design (Ellen MacArthur Foundation, 2017). It consists of a set of principles and tools that aim at keeping products and materials in the economy so they can be reused, repaired and remanufactured instead of continuously producing and disposing of them (Ellen MacArthur Foundation, 2017; Ewijk, 2018).

In cases where whole products cannot be reused, their valuable materials are taken back to be regenerated. In this way, “waste” is no longer an inevitable residue that has no further value, but something that is reintroduced into the industrial system as a primary resource (Ewijk, 2018). In Figure 9 below, the UNEP (n.d.) portrays the processes through which circularity can be achieved, classified from most to least impactful:

1) *Reduce by design*: designing products that use less materials for their production and have a long life cycle with much less impact and less waste. Reducing the amount of extracted resources is a guiding principle in this system.

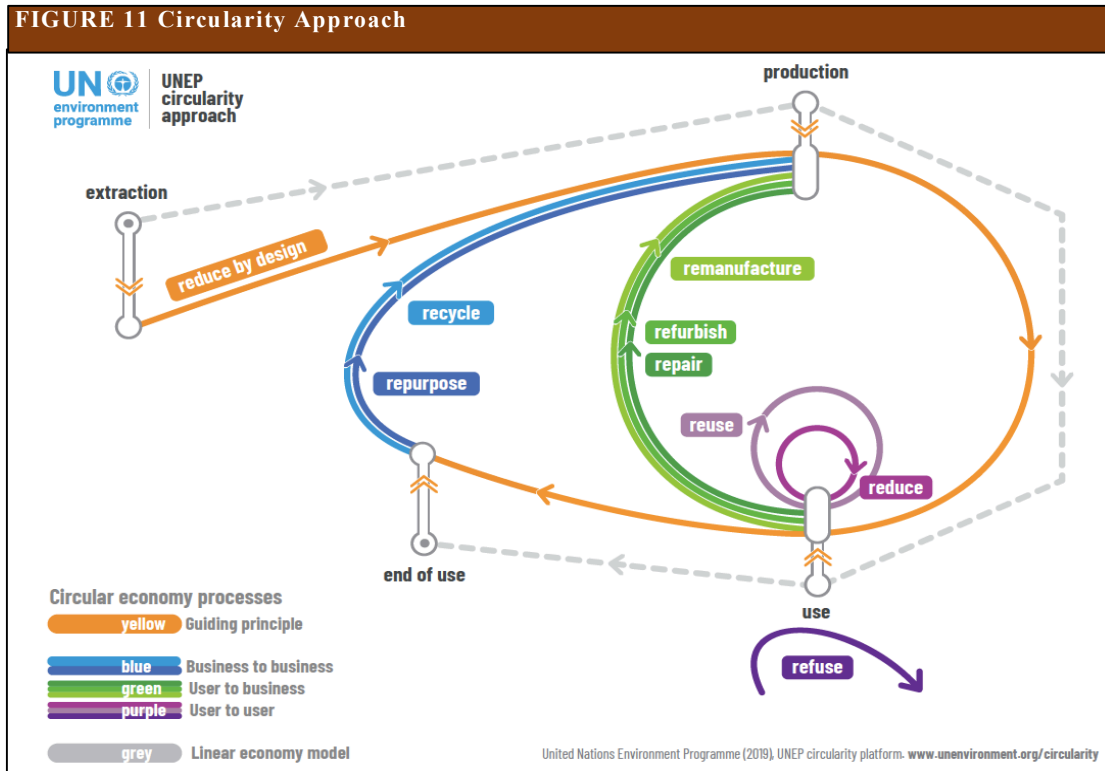
2) From user to user: *refuse* to buy unnecessary and single-use products, *reduce* our consumption and waste generation rates and *re-use* products if possible.

3) From user to business intermediary: provide channels to *repair*, *refurbish* and *remanufacture* products so that product life cycles are lengthened and waste reduced.

4) From business to business: *repurpose and recycle* materials and out of use products as source materials for new products.

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<sup>28</sup> The OECD council has launched two recommendations on the issue: the “Recommendation on Material Flows and Resource Productivity” adopted in 2004 and the “Recommendation of the Council on Resource Productivity” adopted in 2008. <http://www.oecd.org/environment/indicators-modelling-outlooks/resourceefficiency.htm>



One can see, therefore, that the idea of a circular economy incorporates within it resource efficiency and sustainable waste management practices. In a circular economy, the system puts “waste” at the beginning of the production chain, valuing reuse above all else, and as a consequence is always systematically working towards waste minimization.

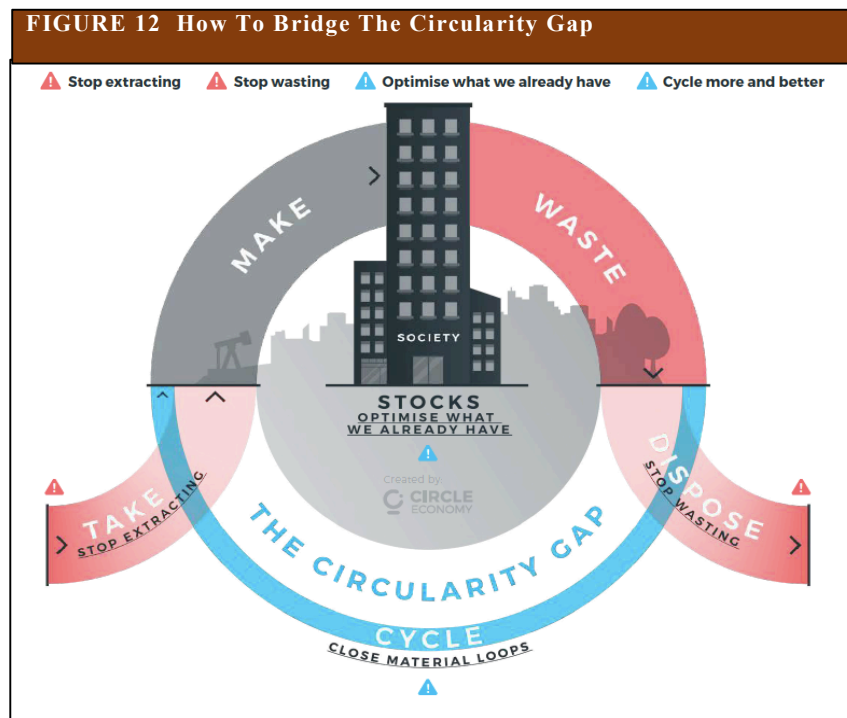
A circular economy is defined by the UNEP as “an economy that balances economic development with environmental and resource conservation”<sup>29</sup> (UNEP, 2010, p. 15). Indeed, the implementation of a resource efficient circular economy would (i) relieve the waste management system of unnecessary burdens through material circulation, (ii) avoid the exhaustion of natural resources by reducing extraction and (iii) assist in achieving social and economic development within the limits of the Earth’s capacities (Ewijk & Stegemann, 2020). According to the Ellen MacArthur Foundation<sup>30</sup> (2017), this system would save \$700 million annually in material costs, reduce carbon dioxide emissions by 48% by 2030, reduce health care costs associated with pesticide use by US\$550 billion in 2050 and increase the disposable income for EU households by €3000 per annum.

<sup>29</sup> The full definition given by UNEP, 2010 is: “[...] an economy that balances economic development with environmental and resource conservation. It puts emphasis on environmental protection and the most efficient use of and recycling of resources. A Circular Economy features low consumption of energy, low emission of pollutants and high efficiency. It involves applying Cleaner Production in companies, eco-industrial park development and integrated resource-based planning for development in industry, agriculture and urban areas”.

<sup>30</sup> The Ellen MacArthur Foundation is a charity launched in 2010 advocating for a transition to a circular economy. It brings together governments, businesses, universities and NGOs, and establishes the transition to a circular economy into their agenda. <https://www.ellenmacarthurfoundation.org/our-story/mission>

The idea of transitioning to a circular economy is not new. In fact, it has been embraced quite extensively. The UNEP has launched a circularity platform, which promotes the concept while providing measures towards sustainable consumption and production patterns (UNEP, n.d.). The EU launched its first Circular Economy Action Plan in 2015 and in March this year adopted a new Circular Economic Action Plan with the aim of achieving “climate-neutrality<sup>31</sup>” by 2050 (European Commission, 2020). China included the concept of the circular economy for the first time in its 2001-2005 five year plan as the development model to follow, and later, in 2009, in a law on circular economy promotion, becoming the third country to take this step after Germany and Japan. This was further detailed in the 2013 “Circular Economy Development Strategies and Action Plan” and the 2015 “Circular Economy Promotion Plan” (Thieriot, 2015).

However, despite these initiatives, according to The Circularity Gap Report<sup>32</sup> of 2020, the global economy today is only 8.6% circular, and this actually represents a 0.7% decrease from two years ago when it was 9.1% (Circle Economy, 2020, p. 8). Bridging the circularity gap, as illustrated in Figure 10, is as essential as it is difficult, and a task that requires systematic changes in our society. Indeed, the negative trend of the world’s circularity is attributed to three phenomena characteristic of the take-make-waste tradition of the linear economy: the continuing high rates of extraction; the continuous stock accumulation and the low levels of recycling and “cycling” (Circle Economy, 2020, p.8). Working against a transition to a circular economy are some of the problems discussed earlier in this paper: among others, the



Source: Circular Economy, 2018

<sup>31</sup> Climate neutrality means striking a balance between greenhouse gas emissions and our capacity to remove them from the atmosphere.

<sup>32</sup> “The Global Circularity Gap Report is an annual report measuring the state of circularity. Its goal is to inspire action and lead to a global circular economy. It is launched annually during The World Economic Forum’s Annual meeting in Davos”. (CGRi, n.d.)

identification of any products that are discarded as waste and the disregard of their potential value as resources.

However, perhaps the biggest obstacles stem from the lack of interest by governments and corporate stakeholders to take stricter measures. Our current society is deeply embedded in the traditional linear economic model, and the shift to a circular one requires major efforts to transform the way of production and consumption. Nonetheless, the scope of the endeavor should not distract us from its necessity, not only in relation to the global waste problem – but also as a solution to the deep-seated unsustainability of our current society. For millions of years humanity developed within the limits of nature, even if such development was comparatively slow. Only since the Industrial Revolution, with its unprecedented increases in production and consumption (extraction of resources, for example, increased from 7 billion tons in 1900 to 84.4 billion tons in 2015 (Wit, Hoogzaad, Ramkumar, Friedl, & Douma, 2018, p. 26)) has there been an accelerating deterioration of the environment. It is hard not to see that the problems discussed in this paper –from resource exhaustion to the increase in waste generation and the resulting pollution– are not accidents but by-products of our consumerist and linear economy, that in less than two centuries has managed to push the Earth to its limits.

In this line of thinking, it is also worth noting another important incompatibility between the sustainable goals of waste minimization and the inner logics of our current system, namely, the idea of growth. While conducting research on the circular economy, the author has found that an important incentive in integrating the concept into national legislation is the potential for economic benefits it is expected to bring: as can be seen below, in the EU's action plan on a circular economy, great emphasis is put on job opportunities and economic growth (European Commission, 2015):

“The circular economy will boost the EU's competitiveness by protecting businesses against scarcity of resources and volatile prices, helping to create new business opportunities and innovative, more efficient ways of producing and consuming” (idem, 2015, p.2)

However, a number of authors question the compatibility between sustainable measures and the continued incremental economic growth pursued by governments. Growth is presented by politicians as both a solution to sustainability concerns (green growth, sustainable growth) and as a priority (a prerequisite, even) in respect to environmental issues. With regards to the first point, while growth could certainly bring about the economic and technical solutions needed to mitigate the effects of climate change and help economies adapt to new circumstances, it would also, overall, contribute to an increase in greenhouse gas emissions and the overexploitation of resources - thereby reversing any benefits (Nilsen, 2017, p. 9). This is why, also responding to the second view, Kate Raworth (2018) proposes instead to be sceptical about endlessly pursuing economic growth, and to ask ourselves “what growth, what for, who for, who pays the costs, how long can it last, what is the cost for the planet, and how much would be sufficient” (ibidem, p. 50). She points out that although consumerist societies tend to assume that the more the better, more economic growth does not necessarily translate into greater prosperity and human well-being: as global GDP has become larger, the share of wealth has grown increasingly polarised and the environment more and more degraded. And while, ironically, solutions offered by politicians are still growth (balanced growth, green growth, sustainable growth, but still growth) she argues that our focus should instead be on ensuring proper redistribution. The world has enough resources for everyone's basic needs to be met, and yet more than 700 million people live in conditions of extreme poverty and are deprived of

basic resources such as health, education and access to water (United Nations, n.d.). Our economic model, Raworth suggests, should work towards achieving the maximum human well-being within the ecological limits of our planet. And said ecological limits may require, as in the case of waste, some degree of de-growth: a reduction in production, consumption, and consequently in economic growth (Raworth, 2018).

The discussion on sustainability and growth is too broad to be covered here: for our purposes, the important idea is that a reduction in waste generation conflicts with the widespread goal of economic growth. An efficient implementation of a resource efficient circular economy is not solely limited to a reduction in resource extraction and increased reuse of existing materials, but also to a reduction in production (and consumption) per se, which directly reduces the amount of stocks accumulated that will eventually become waste (see Figure 10). In summary, insofar as it implies a reduction of both consumption and production, waste minimization is incompatible with long-term sustained economic growth.

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## CONCLUSIONS

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This paper has explored the global problem of waste. Ever since the Industrial Revolution, the rate of waste generation has been increasing along with production and consumption rates, and its management is rapidly becoming one of the greatest challenges for the environment and human health. Currently, China is the main waste producer in quantity while US citizens produce the most per capita, which is indicative of the disproportionate levels of waste generation of developed countries in general. The vast majority of waste is not disposed of in an environmentally safe manner and only a small portion is recycled, due to high operational costs and a general lack of ability for countries to deal with their own waste. This causes a big burden on the environment, as poor waste management and ill-equipped infrastructure cause air, water and soil contamination, which can in turn affect human health.

A sustainable and efficient waste management system is, thus, crucial in minimizing its negative impacts. Generally speaking, there are three possible destinations for waste after collection: the recycling facility, the waste-to-energy facility and landfills. Multiple public administrations have incorporated the Waste Hierarchy principle, which ranks management options from least to most impactful. However, there is a lack of indicators to measure its effective implementation. The recent Waste Hierarchy Index developed by Pires has shed some light on the underperformance of European countries, who continue to rely on incineration and landfills. Instead of developing their domestic infrastructure in order to manage waste in the most environmentally safe way possible, developed countries have been exporting their waste to developing states. This was initially a mutually beneficial business as exporters could handle waste at much lower costs while importers obtained raw materials to supply their growing manufacturing sectors. Nonetheless, this exchange operates in blatant disregard of the recipient country's human rights and environment, sometimes even taking advantage of the importer's ignorance of the impacts of hazardous waste. Many materials imported are too contaminated to be recycled and so they end up being incinerated, landfilled or leaked into the environment. Moreover, local workers often lack the essential equipment needed for working with hazardous materials.

In the global trade of waste, China has been the world's wastebasket for more than 20 years, importing more than half of the world's waste. But recently, in view of lower profitability and higher negative environmental and health impacts, China has started to issue import restrictions culminating in a total import ban in 2020. This move has pushed exporting states' recycling systems to near collapse, with some of them resorting to incineration of recyclable materials. Many shifted their destination to other South Asian countries willing to receive their waste, but shortly afterwards these countries, on seeing their systems overwhelmed, also started to impose restrictions on imports. In the long term, the solution for developed countries is to enhance domestic infrastructures and processing capacities in order to manage their own waste in a sustainable manner. Such an approach would ideally be implemented not as a domestic policy but as part of a collective response to the global waste problem, understood from an ethical perspective of collective responsibility brought on by the historical realities of global interdependence and the increased impact of human activity.

Disasters arising from the global waste trade led to the creation of the Basel Convention 1989, a treaty regulating trade in hazardous waste. However, the Convention presents some limitations, mainly the failure to place a complete ban on the trade of hazardous waste. This



Ban was later enforced by some regional treaties. Moreover, one criticism cast at existing regulations of waste management and trade is their definitions of waste. Current legal definitions present many loopholes, mainly (i) defining waste in regards to its coming utility instead of its inherent properties and (ii) the absence of consensus between national legislations. This gives rise to a series of problems:

First, the persistence of illegal flows of trans-boundary waste movements. On the one hand, the lack of a concrete differentiation between second-hand materials and waste is an important grey area taken advantage of by exporters. On the other hand, traffickers make use of the lack of consensus on the definition and the different requirements for labelling and managing waste among countries. Measures have been taken to counteract illegal shipments, but as long as the definition is not updated to be more comprehensive and precise and consensus is not reached among countries, the problem is likely to remain.

Second, the fact that the definition presupposes that waste is something to be discarded, leaves the generation of waste as a matter of course and hampers any prevention efforts. Legal definitions mention waste holders, and their actions or intentions to discard items, but not potential waste users, nor the potential usage and revaluing of waste. In order to minimize waste, our cultural value judgment of waste - also present in the legal perspective - must change.

Furthermore, the shortcomings of the legal definition hamper the transition towards a circular based economy. Despite the efforts taken to implement it into national and regional legislations, circularity remains at low percentages of incidence. Our economy, society and culture are deeply wedded to the linear economic model, and deep changes in the political attitudes and economic behaviours of corporations and individuals will be needed to successfully transition. One of these changes is our perception of waste: first, if the perception of waste as an inevitable consequence of human activity persists, it is unlikely for it to be identified as a consequence of an inefficient and unsustainable system. And second, if waste continues to be defined as something to be disposed of, its potential value as a resource will not be accounted for.

In summary, proper management and reduction of waste generation are central to any initiatives geared towards creating a more sustainable society: a society where the generation of waste itself is avoided, single-use products are reduced, and recycling programs are central to production. Where corporations develop pollution minimizing strategies that reduce environmental costs of the entire life cycle of their products and are held accountable if they fail to do so, and products are designed to be regenerated. Where individuals strive to reduce their own waste generation. And where governments truly aim at human development within ecological limits instead of endless production, consumption and economic growth.

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# RECOMMENDATIONS

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The author identified a range of areas in need of attention in relation to the waste management system regarding, firstly, management practices, and secondly, waste reduction practices.

## **1. WASTE MANAGEMENT**

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### **1.1. At the state level**

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1. Create, improve and enforce proper regulations on waste management as the primary basis for effectively and efficiently controlling and handling waste. This includes:
  - a. The broadening of the concept of "waste management" to include the control of the spread of hazardous and polluting particles in the environment during the whole production chain, from extraction to consumption.
  - b. A clear delineation of the categories of substances that constitute waste, particularly one that draws the line between non-waste and second-hand materials and enables the treatment of materials without risk to the environment. The challenge would be to exclude substances or objects that are still usable and to overcome the legal and philosophic difficulties of defining waste in such a way that encompasses all the policies that are engaged in the waste management process, ensuring the minimum level of pollution possible to the environment.
2. Supervise and impose strict environmental standards on corporations. If implemented, there is the possibility that some companies will choose to relocate to another country without strict legislation. To prevent this from happening, states can, on the one hand, provide incentives as well as sanctions according to the levels of environmental impact; the incentives consisting in lower environmental taxes for those businesses that operate in an environmentally friendly way. Companies should be reviewed annually, and if the overall trend is positive they could be exempt from taxes. Otherwise, the corporation should be given one year to remodel its operations. If their performance evaluation is negative, they should be held accountable, with sanctions ranking from payments up to shut-down according to the seriousness of the violations. On the other hand, on the international platform, states should emphasize international cooperation on environmental protection, and particularly the establishment of a universal minimum environmental standard, so as to avoid relocations that exploit differences in legislation (see point 8.b).
3. As for education and information:
  - a. Gather and publicize data on the negative impacts that waste has on the environment and human health.
  - b. Cultivate environmental awareness in the educational system. Children are the stakeholders of the future; it is of primary importance to incorporate environmental awareness as part of the school curriculum and encourage them to be engaged with their surroundings and to learn how to properly manage waste. A possible way to ensure their engagement would be through rewards:



- awards and recognitions should be given to those children that are performing well in this regard. Another option would be a visit to the local waste management facilities, an effective method for them to comprehend the scope of the issue.
- c. Promote the importance of reusing, recycling and composting among the general population. This can be achieved by organizing regular awareness raising activities in each neighbourhood, publicizing the practice through media platforms, providing each household with recycling bins, ensuring the installation of recycling bins in each neighbourhood and creating spaces for the exchange and disposal of reusable objects, such as second-hand materials repositories or what are known as “object libraries”.
  - d. Engage the population in the policy making process in order to draft measures according to the social context. The problem of waste affects people from all social levels so it is important to ensure their engagement and cooperation to find a workable solution. Policies should be enforced by the people and for the people. Thus, a bottom-up approach is necessary to design feasible policies from a social perspective.
4. Further apply the waste hierarchy principle and establish an indicator to effectively measure its implementation. Without a reliable indicator, countries tend to fall back onto the false assurance that it is well implemented as recycling rates are high, failing to take into account the fact that rates for the actual management processes might be far lower. The Waste Hierarchy Index by Pires would settle the issue and display the real state of implementation, thus assisting states to face the problem and find adequate solutions to reduce the dependence on incineration and on landfills.
  5. Following the polluter-pays principle, industrialized countries should develop their domestic infrastructure and enhance their processing capacity in order to gradually discontinue waste exports and manage their own waste at home. In this manner, there is certainty of the way in which waste is finally treated, the environmental impacts can be improved and the risks caused by illegal shipments disappear. Despite this, new industrializing countries might still want to import second-hand materials to supply their industry. In this case, countries should enforce strict procedures to ensure that the materials sent are in accordance with the necessities of the importing countries.
  6. Industrializing states should strengthen their domestic environmental regulations as well as standards and controls on waste import. Only by enhancing their waste management systems and infrastructures will they be able to cope with their own waste alongside imported waste -to supply their manufacturing sector- without compromising the environment and their workers’ health. In case of a shortage of financial resources, a lack of administrative capacity or any other difficulty laid out in the paper, developed countries should provide support and facilitate technology transfers.
  7. Toughen the implementation of the regulations, looking for the legal vacuums where the informal sector continues to flourish and drafting more thorough legislation in accordance with the social conditions of the country. For this, states should strengthen multi-agency cooperation at the international level to join operations in tackling waste smuggling, as well as to lead to the arrest and punishment for the heads of criminal groups (see point 8.b).

## 1.2. At the international level

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8. Set up an international platform (International Platform on Waste) to discuss and produce recommendations on issues related to the waste trade and waste management. This would be composed of representatives from the competent national authorities from all member state, corporations, industry sectors concerned, environmental NGOs, consumer organizations, etc. Its official goals should include:
  - a. To reach a consensus for the definition of waste, non-waste, second-hand materials and recyclables, which later need to be reflected in countries' national legislations. In regards to the difficulty to reach a total consensus, there should be at least some basic common criteria for the classification of waste and trade provisions.
  - b. To set a common environmental standard for corporations around the world to avoid relocations that exploit differences in legislation. Example corporations could be given a voice in the international platform.
  - c. The ban of waste export to countries with loose environmental regulations and/or a weak managing system, as a measure to avoid environmental and health disasters. In this way, industrializing countries that need raw materials will be forced to first make improvements to their national waste management capabilities to be able to import waste, which will be treated in a much safer manner.
  - d. To provide financial support and facilitate knowledge and technology transfers to industrializing countries that struggle to set up better environmental and health conditions for managing waste.
  - e. The gradual ban of any type of waste trade for final disposal. The platform should have as its ultimate goal the complete termination of world trade in waste for final disposal, as a measure for countries to take responsibility for their own waste production.
  - f. The surveillance of illegal waste trade. The informal sector needs to be discontinued through joint ventures and strict measures.

## 2. WASTE MINIMIZATION

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### 2.1. At the state level

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9. Refine the legal definitions of waste, recognizing the potential use of waste as a resource and diminishing the role of the holder by elucidating a possible waste user. Harmonise the definitions with the decisions of the International Platform for Waste (IPW).
10. Issue a total ban on single-use plastics. China is an example of this: as one of the biggest producers of plastic bags, it has launched a plan to ban all non-degradable bags in major cities by the end of 2020 and the rest of the country by 2022. The replicability of this scheme is limited considering that the People's Republic of China has an authoritarian regime for which implementation of major measures is much easier than in democratic countries. A gradual ban would work for countries already enjoying environmental awareness among citizens, while difficulties could arise in those where populations, businesses or governments hold prejudices against environmental concerns as frivolous and secondary in contrast to economic or developmental issues.
11. Reduce excessive packaging on products and promote eco-friendly ones. In many developing countries, there are still traditional selling and purchasing practices and spaces where no packaging is required, while most products in developed countries include packaging, often made of plastic, even when it is not indispensable. Packaging should be used only when necessary and with recyclable or biodegradable materials if possible. States should establish standards for this area of production for businesses to comply with and penal regulations for those in violation of the standards. In a related measure, shops should be encouraged to take on packaging reduction methods. Examples of this are bulk sales and allowing customers' recipients instead of providing plastic bags.
12. On a wider level, begin a real transition towards a circular economy. As the primary basis for the efficient and effective implementation of a resource efficient circular economy, states need to:
  - a. Improve the availability of consistent and informative data on the whole of the supply chain, for governments to design suitable policies and effectively monitor their implementation.
  - b. Set feasible and gradual objectives and assess the progress periodically in order to identify the sources of misuse of resources. For the assessment, appropriate indicators should be identified.
  - c. Put a stronger emphasis on waste prevention. This includes both incentivizing circular and resource-efficient designs as well as banning one-use-only products.
  - d. Increase the number of recycling facilities. This will work towards turning the largest possible amount of waste into new resources, thus placing the recycling process in the central position it needs to have in a circular economy. To further work towards achieving this goal, states should also ban or discourage (through high taxation, for example) the use of landfills and incinerators.
  - e. Support and collaborate with businesses in their transition to circular and/or resource-efficient models through the exchange of information and best practices. Monitor the effective establishment of such programs.

- f. Promote awareness of the importance of sustainable consumption through education and public activities.

## **2.2. At the international level (IPW)**

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13. Refine the definitions of waste held by international or supranational institutions, recognizing the potential resource use of waste and diminishing the role of the holder by elucidating a possible waste user.
14. Establish a common and rich database on waste generation and management worldwide. For the data to be reliable, the interpretation of each step of the waste management process should be harmonised.
15. Establish a committee of experts to investigate, collect data and develop a common policy agenda to serve as a guide during a transition to a circular economy and supervise its implementation through annual reviews. The committee should also facilitate the exchange of information and practices between different state and/or sub-state level administrations.

## **2.3. At the corporation level**

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16. Develop pollution minimizing strategies that reduce environmental costs throughout the entire life cycle of products. This includes the reduction of the harmful content of substances, the use of which should be justified through reports on the utility of the produced material.
17. Create partnerships with retailers and/or administrations to collect old products as a source of raw material and reintroduce them into the production chain. For this to be possible, consumers must be engaged in the process: this can be achieved through incentives such as rebates to encourage people to bring back old products. In the long-term, corporations should develop a sustainable culture and brand of reducing, reusing and recycling to raise consumers' awareness of the issue. This would work towards both reducing the cost of production and building consumer loyalty.
18. As part of a new corporate culture, products should be designed with promising quality and durability and should be offered without unnecessary packaging or in a refillable composition. Furthermore, product repairs if broken, or remanufacturing for improvements, should be available to consumers.
19. Engage in multi-agency cooperation and facilitate the transfer of information, data and good practices for the purpose of mutually assisting in the other's progress towards a resource efficient and/or circular model.
20. Promote good practices among employees and encourage them to reduce their own waste and ecological footprints. One example of a resource-efficient policy is allowing partial or total work from home.

#### **2.4. At the individual level**

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21. Learn about the environmental impacts of waste and discover ways to reduce one's personal generation of waste. This includes:
  - a. Changing one's consumption patterns and encouraging others to do so:
    - i. Avoid buying new products.
    - ii. Avoid products with excessive or plastic packaging.
    - iii. Avoid single-use products.
    - iv. Buy second-hand products when possible.
  - b. Reusing and repairing products when possible, and if not, recycle waste properly. As for food waste in particular, learn how to compost it.
  - c. Becoming informed about the local administration's facilities for waste (for instance, specific collecting points for hazardous waste).
22. Propose waste reduction and recycling practices at one's workplace.
23. Get involved in the local and regional policy-making process to make one's voice heard on environmental issues and to contribute to the developing of suitable policies in accordance to local conditions.
24. Demand and/or support environmental programs related to waste minimization and management from politicians, such as an effective transition to a circular economy in local or national levels of administration.

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