

## WASTE MANAGEMENT IN TERRITORIAL PROFILE CASE STUDY: SECTOR 3 OF BUCHAREST?

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### ABSTRACT

*We often wonder where our planet will end up, if this linear path to self-destruction will continue. Many are trying to save a mountain, turning it into a Natural Park, a water or forest called a Protected Area, a rock that becomes a Geological Reserve or an animal or plant that becomes a Monument of Nature. However, there are more and more people who do not respect this and who, in their ignorance, slowly and surely destroy this world of contrasts of which we are all sometimes so proud. The general evolution of human society was based on the exploitation of natural resources, and the exploitation of these resources could be done due to the creation of more and more advanced tools, more and more powerful machines, more and more complex installations and more and more advanced technologies. The human-nature relationship has evolved in the sense of diminishing the relationship of human domination by nature, man managing to achieve his own environmental and socio-economic environment, seminatural. Waste is one of the most pressing problems in the activity of environmental protection, respectively in ensuring a sustained development.*

**KEYWORDS:** *management, resources, sustainable development, waste.*

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### 1. INTRODUCTION

Life, in its form that we all know, exists due to air, water and earth, these being the main elements that underlie it (Sarbu et al., 2021). When one of these elements is disturbed by man and can no longer follow its natural cycles, the balance is destroyed, and we look, sometimes without the right of reply, to real ecological disasters (Bran et al., 2020).

The basic objective of the current European waste policy - to prevent the formation of waste and to promote the concept of reuse, recycling and recovery in order to reduce the negative impact on the environment- are still the main pillars of the policy being strengthened by the current strategy (Radulescu et al., 2021). The long-term goal is to transform the EU into a society based on recycling, to try to avoid as much as possible the creation of waste and its use as resources (Lavigne et al., 2019). In order to achieve these objectives and to ensure a high level of environmental protection, the proposal is to modernize the legal framework by clarifying and simplifying the European law on waste (Profiroiu et al., 2020).

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Waste policy will have an increased emphasis on the environmental impact aspect, thus becoming much more relevant in terms of cost-effectiveness (Bottausci et al., 2022).

Provisions related to waste management activities will be improved, leading to cost reductions and the elimination of barriers related to waste recycling and recovery activities. Waste prevention policies will be implemented at the national level, providing the highest level of economic efficiency and environmental protection (Bodislav et al., 2020).

Increasing the degree of waste recovery will reduce the emissions generated leading to benefits in the field of environmental protection such as reducing the greenhouse effect (Di Foggia & Beccarello, 2021).

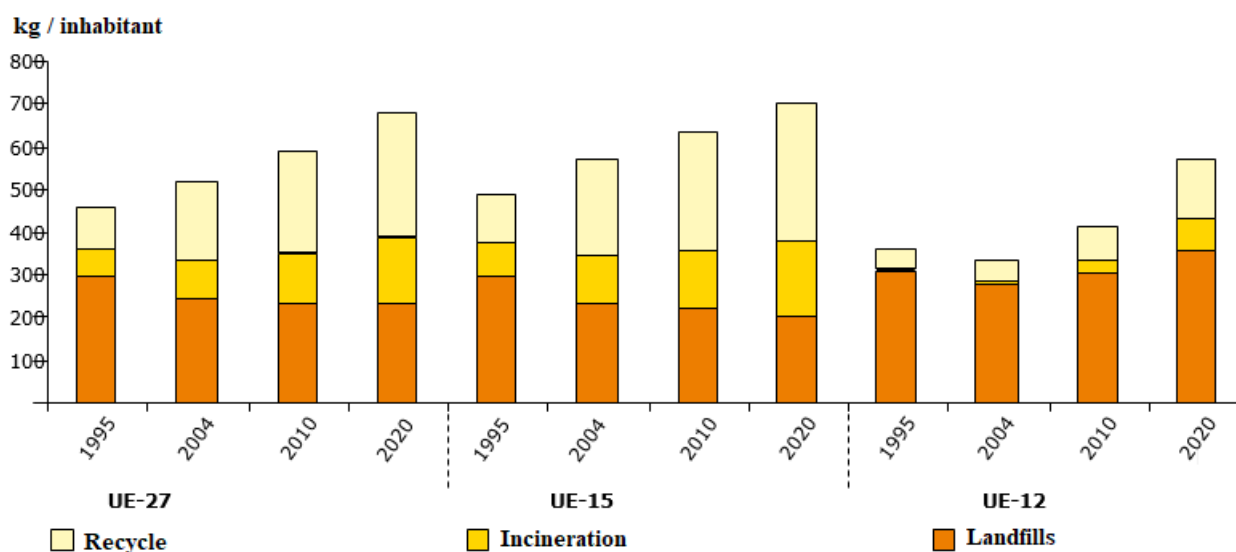
The presence of these discarded objects and many others is unfortunately also found in meadows mountains, and on the banks of rivers or on the sea coast (Agovino & Garofalo, 2016), almost everywhere where the citizen escapes in the middle of nature, without giving up even for a short time the comforts of home and the reflexive gesture of throwing away the debris (Karak et al., 2012).

## 2. INTERNATIONAL WASTE FLOWS

The European economy is based on a high level of resource consumption: raw materials (such as metals, minerals or wood for construction), energy and soil (Burlacu et al., 2021). The main driving forces of resource consumption in Europe are economic growth, technological developments and changing patterns of production and consumption (Fabrizi & Sospiro, 2017). About a third of the resources used are transformed into waste and emissions (Balu et al., 2021).

On average, each European citizen produced 460 kg of municipal waste in 1995. This amount increased to 520 kg per person in 2004, and by 2020 it had reached a quota of 680 kg per person. In total, this corresponds to an increase of almost 50% in 25 years .

This expected continuous increase in the volume of waste is mainly due to a supposedly sustained increase in individual final consumption, ie an average increase in the EU-15 (Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, etc.) and the EU-12 of 2% and 4, respectively % per year until 2020 and the continuation of current trends in consumption patterns.



**Figure 1. Waste generated by the 3 categories of actions (1995-2020)**

Source: INNSE, 2021

However, as shown in Figure 1, there are significant differences between EU-15 and EU1-2. While an EU-15 citizen produced an average of 570 kg in 2004, for an EU-12 citizen, the figure remained at only 335 kg.

Nevertheless, as EU-12 economies continue to grow and consumption patterns evolve, the volume of waste is likely to increase over the next 15 years and move closer to current EU-15 levels. Looking ahead, the volume of municipal waste in the EU-15 and EU-12 is estimated to increase by 22% and 50%, respectively, by 2025.

Over the entire period, over 80% of all municipal waste is produced in the EU-15. These results indicate that waste prevention efforts need to be significantly strengthened if a significant reduction in the volume of waste is to be achieved (Kirchherr et al., 2018).

Historically, waste disposal at landfills has been the predominant method of municipal waste treatment, but in the last two decades, there have been considerable reductions in the use of this method. In 2004, 47% of the total amount of municipal waste in the EU was deposited (Figure 1). This percentage is expected to decline further to about 35% by 2025. Recycling and other materials recovery operations are expected to increase from the current level of 36% to about 42% by 2025.

Finally, incineration was used for 17% of municipal waste in 2004 and it is possible that this percentage will increase to about 35% by 2025. These past and expected trends are partly the result of specific policies aimed at increasing recycling and recovery of packaging waste and diversion of municipal biodegradable waste from landfills (Belostecinic et al., 2022). Overall, a greater reduction in the amount of municipal waste destined for landfills is expected, which reflects the efforts made at national and European level, among others, to achieve, of the objectives set out in the Sixth Environmental Action Program (Profiroiu et al., 2020).

Reducing the volume of waste will bring benefits, such as reduced costs for waste management, a reduction in air pollution (with particles and nitrogen oxides) and a reduced noise pollution in connection with the collection and transport of waste (Fritsche, U., et al., 2020). Otherwise, the costs associated with waste management can increase significantly as their volume increases (Mogos et al., 2021; Popescu et al. 2021). The costs associated with waste collection and treatment are particularly onerous, and waste production is, by definition, an unprofitable activity (Ladaru et al., 2022).

The high consumption of resources in Europe creates pressures on the environment not only in Europe, but also in other regions of the world (Hemidat, et al, 2022). These pressures include the depletion of non-renewable resources, the intensive use of renewable resources, transportation, high emissions of water, air and soil from mining activities, and the production, consumption and production of waste (Burlacu et al., 2021). It is generally accepted that there are physical limits to the continued increase in resource use. Housing, food and mobility justify the highest share of resource use and pressure on the environment (Kumar & Samadder, 2017).

### **3. INTEGRATED WASTE MANAGEMENT IN SECTOR 3 OF BUCHAREST**

Waste management means the management, administration and systematic control of the activities of pre-collection, selection, actual collection, transport, treatment, recovery, disposal and storage of waste (Mitrita et al., 2019).

The general objectives of waste management in sector 3 are, in order of priority, the following:

- reducing at source the quantities of waste generated and their harmfulness;
- selective collection of waste for recycling and recovery at a maximum possible level from a technical-economic point of view;
- waste treatment through various and specific technologies, as complementary as possible, controlled storage of waste to ensure a minimum impact on the environment and public health.

**Table 1. Types of waste - by origin**

Name of the type of waste	Origin
Household waste	Housing Social administrative institutions
Waste assimilated to household waste	Local industry, workshops, etc. Industrial enterprises
Road waste	Sanitation of public roads (streets, alleys, sidewalks)
Animal waste	Slaughter Slaughtering the territory Zootechnical units
Hospital waste assimilated to household waste	Hospitals, polyclinics, dispensaries, research institutes with medical profile, etc.
Garden waste	Gardens, parks, landscaped green spaces, etc.
Agricultural waste	Agro-industrial activity
Sludges	Wastewater treatment plants Hasnale, septic tanks, etc.
Construction waste	Demolition Construction repairs New constructions
Bulky waste	Housing Social - administrative institutions

Source: INSSE, 2020

In 2015, in Sector 3, 183,568.54 tons of household waste were generated, of which 69427.41 tons represent recyclable materials (paper, cardboard, plastic, wood, etc.). At the level of Sector 3, it is estimated that with the increase of the population, the quantities of household waste generated will also increase. The National Waste Management Plan estimates an average increase of 2.8% per year in the amount of household waste generated by 2025. The evolution of the amount of household waste generated in Sector 3 in the next five years is presented in table 2:

**Table 2. Evolution of the amount of household waste 2015-2020**

Year	Amount of waste	U.M.
2015	183.568	tons/year
2016	194.557	tons/year
2017	195.553	tons/year
2018	196.557	tons/year
2019	197.570	tons/year
2020	198.591	tons/year

Source: INSSE, 2021

The sanitation service (pre-collection, collection, transport and storage of municipal waste) is carried out under the control, management and coordination of the local public authorities (Negm, A.M., Shareef, N., 2020).

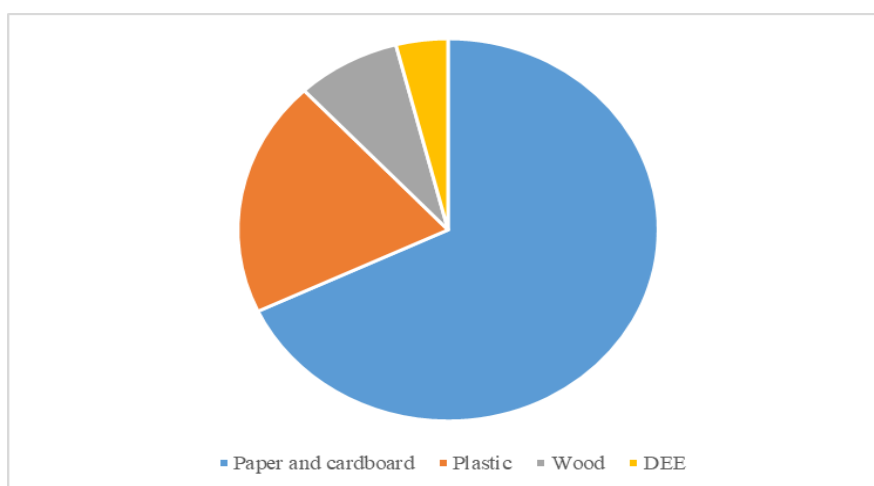
The sanitation activity is performed by delegated management- the local public administration authorities call for the provision of services to a public service operator, which entrusted (based on a

management delegation contract) the actual management of services, as well as the administration and operation of systems technical-urban public works necessary in order to achieve them.

### 3.1 Selective collection

Selective waste collection is the solution available to all and is the process of municipal waste management through which household materials (domestic) that have a potential for recycling (paper, cardboard, glass, plastic and metal) are recovered and directed to the supply chains. recycle. According to GD 621/2006, public institutions, associations, foundations, individuals are obliged to selectively collect packaging waste in different containers, properly inscribed and placed in special places accessible to citizens.

Every citizen must be aware that if they do not act in the direction of separate collection of waste that is generated daily (paper and cardboard packaging, plastic, glass or metal containers, electrical waste and even batteries) and throw them mixed in the trash or in garbage containers, this will soon be reflected in the high degree of pollution, and in the price they have to pay for the sanitation service.



**Figure 2. Recyclable waste collected in 2020**

*Source: INNSE, 2021*

The population, large waste generators must know that the better the selective collection at source, the lower their capitalization effort - and thus the operating costs. In addition, as it is known, sanitation services are paid per cubic meter of waste collected.

## 4. CONCLUSIONS

The ever-increasing complexity of problems and standards in the field of waste management leads to the increase of the requirements regarding the recycling, treatment and / or disposal installations. In many cases, this involves facilities for recycling, treatment and / or disposal of larger and more complex waste, which may involve the cooperation of several regional units on the establishment and operation of these facilities.

As a result of advances in industry, agriculture and technology, increasing amounts of new waste result. Gases, liquids, solid waste, household waste and wastewater pollute the environment and, in some places, pollution levels are dangerously high. In an ecologically balanced environment, waste rots, producing new, useful materials: fallen leaves create a natural fertilizer that enriches the soil:

animal excrement is broken down by insects and smaller organisms, again removing important elements in the air and soil.

Such an environment, in which many life forms thrive, should be a model for modern life. We, the consumers, are all responsible for these problems and each of us will therefore have to make efforts in the future to manage limited resources and reduce waste.

It is indisputable that, today, we produce a lot of waste that contains recoverable materials and problematic substances. All the factors responsible in waste management must admit this finding and assume responsibility. Mankind can no longer afford, as it has been until now, to negligently throw away recyclable materials and problematic and dangerous substances, putting them in the gray bin, such as residual or uncomfortable waste.

We must therefore, in the future, improve this situation and take concrete measures to avoid both the production of waste and to recycle waste. This is based on two fundamental arguments:

First, it is necessary, from an ecological point of view, to take exact measures to avoid and recycle waste. The results of an analysis showed that the volume of secondary raw materials, potentially usable and, at the same time, eliminated, is very important. This leads to a waste of raw materials and energy resources.

In fact, hazardous substances in household waste should be reduced, as these substances impede the proper functioning of waste disposal facilities, despite the seemingly weak part they represent and even constitute a not inconsiderable danger to humans and the environment. Given the increase in waste disposal costs, it is imperative that, from an economic point of view, precise measures be taken to avoid and recycle waste. For a number of wastes there are recycling conditions, but they must be correlated separately, to be recycled separately and to present advantageous recycling costs. Although waste is a useful source of materials and energy, the large volume of manual labor involved in collecting it makes the operation very expensive. In developed countries, household and store waste is usually stored in garbage bags or crates and is taken weekly by a team with a collection truck. But some have a pneumatic storage system, which transports household waste through tubes to a local storage point. In another system, household waste goes into a sub-collection room under each building. A tanker, equipped with a pump that sucks the waste, periodically targets the area.

Separating materials for recycling is another costly process, so residents are encouraged to do some of the work themselves. In some regions, local authorities require citizens to deposit their waste paper in a separate stack and there are centers for storing glass from where it is transported to a factory where it is crushed and used to produce new items. The usual household and industrial waste is decomposed in contact with the ground. But many waste materials do not disappear so easily.

Therefore, many countries now monitor dangerous substances on land and check the level of these substances in plant tissues, in the body of animals, in food and in the animal body. Waste, inevitable, should not all be considered garbage. It is our task to sort them in such a way as to obtain raw materials from which to be able to manufacture products of excellent quality (recycling).

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