

## HISTORY OF WASTE MANAGEMENT AND THE SOCIAL AND CULTURAL REPRESENTATIONS OF WASTE

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### Summary

The history of waste mirrors that of the societies that produced it, and their relationship with the environment and the resources they mobilized. Until the industrial revolution, the management of urban excreta was predominantly linked with urban salubrity, from the Roman *cloaca maxima* to the Parisian *motta papellardorum*. The quantity of waste produced remained small and the methods for collection and discharge often unsatisfactory, which led to frequent denunciations of urban dirtiness.

Neo-Hippocratic medicine, which considered the tainted environment and air to be the principal causes of urban excess mortality, prompted the implementation of new policies and management techniques in Europe to clean up the cities. In addition, the value of most urban excreta intended either for agriculture or industry increased. Thus, from about the 1770s to the 1860s, salubrity and excreta recovery went hand in hand.

From the 1870s onward, the fertilizer revolution, the rapid development of coal and, later, that of the petroleum industry and the search for more convenient and plentiful materials, undermined the recycling industry. Although some cities at first tried to fight

the devaluation of urban by-products, they gave up during the interwar years. What was once a source of profit became a cost to society, and, until the 1960s, the aim of waste management was to reduce this cost. The environment became the receptacle for waste.

The 1960s and 1970s were marked by an environmental crisis, a growing concern for the limits of the planet and a criticism of the industrial city. In this context, waste was regarded as the symbol of the aberrations of a consumer society. The production of waste continued to grow and the sanitary accidents as a result left a deep impression. Waste policies were implemented with mixed results. Developing countries also began to suffer from this curse of developed countries.

## 1. Introduction

The histories of waste, and of the words that have been used and continue to be used to describe it, are inseparable from one another. Indeed, a quick survey shows that three different types of vocabulary have emerged to describe what we now call waste. In the first category, terms are associated with the themes of loss and uselessness: *déchet* in French from the verb *choir* (to fall), *refuse* and also *garbage* in English (which primarily refers to animal offal), *rifiuti* in Italian, *residuo* in Spanish, *Abfall* in German. In the second category, terms emphasize the dirty or repulsive nature of these particular materials: *immondice* in French, *immondizia* in Italian, from the Latin *mundus* which means clean; *ordure* in French from the Latin *horridus*, meaning horrible. Finally, terms in the third category describe the materials that make up the waste: *boues* in French, *spazzatura* in Italian, *Müll* and *Schmutz* in German, *rubbish* in English derived from *rubble*.

The word *waste* belongs in the first category. From the old French *vastum*, which means empty or desolate, it was first used to depict a desolate, ruined or neglected region. Later, the term was used to describe a wasteful expenditure (and, in this sense, it had the same meaning as *déchet* in French). It finally acquired its current meaning in the 15<sup>th</sup> century. The fact that the original meaning of *waste* has a spatial dimension in that it described a place, similarly to *spazzatura* from the verb *spazzare* (to make room, remove clutter), is likely not neutral. It is also undoubtedly the case with the rich vocabulary, which has only been touched on lightly here, used to describe various wastes. Indeed, the issue of waste has long been closely linked to (even confused with) both the issue of salubrity and sanitizing of urban space and the management of urban urine and excrement.

After a quick overview of the period between Antiquity and the eve of the Industrial Revolution, we will focus on the period between 1770 and 1860, during which the value of excreta, particularly urban excreta, thanks to its agricultural and industrial importance, increased. Next, the birth of waste in the form of abandoned junk and materials from the 1870s to the 1960s will be presented. Finally, we will show that since the 1960s and 1970s, the environmental crisis has translated into a waste crisis for which only imperfect solutions have been found. The story of waste is an international one, however, here we focus on the history of waste in Europe and North America (with the exception of the last chapter) and do not address its history in the former East Bloc.

## 2. From Antiquity to the Eve of the Industrial Revolution

Streets, and more generally open spaces in cities, have often been used as receptacles for urban waste: human and animal urine and excrement, other organic materials from domestic or artisan activities, rubble from demolitions, various mineral debris, etc., such that the composition of these soils provide an account of a city's history. The impregnation of waste into the soil was particularly significant because streets and squares were not always surfaced and could absorb much rainwater or because urbanized areas were built on low, even marshy, ground.

The need to clean up polluted urban space was at the root of the famous Roman *cloaca maxima*, built under Tarquin the Proud (7th- 6th century BC) to drain the Velabrum and the lowlands located between the Capitoline Hill and Palatine Hill. First through an uncovered canal network, then with a subsurface sewage system, it collected urban refuse and materials from latrines and drained them into the Tiber.

Subsidiary lines, such as ditches originating from houses, led to the *cloaca maxima* and contributed to the cleaning up of Rome. Thus perched on these subterraneous passages, Rome was described as a “hanging city” (*urbs pensilis*) by Pliny the Elder. The maintenance and cleaning of sewers, a job given to convicted criminals, was the basis for the *cloacarium* tax. Many cities at that time were equipped with similar community facilities.

The use of these underground pipes to drain and clean urban areas declined in varying degrees during the Middle-Ages in Europe and was replaced by surface runoff for rainwater and drainage waters. Urban brooks (still identifiable today in France by the name *Merdereau* or *Merderet*) and moats acted as sewers. Many cities diverted, canalized and created networks of drainage systems in order to allow for the development of their artisan activities (at the time this water played a mechanical role, later, according to its composition, it took on a chemical and biological role). Because these canals contributed to drainage, they were simply considered sewers; however, they had a much more significant role in that they founded urban prosperity.

Furthermore, the status of human excremental materials varied in space and time. Some cities retained a combined sewerage system used since Roman time; many cities adopted, during the Middle Ages or the Renaissance, pit privies, which were at first simple holes and later underground reservoirs placed under dry latrines. The growing use of these cesspools led to the development of a new profession: the cesspool emptier (although in some cities local growers did this job).

Moreover, the necessity for salubrity led many cities to prohibit the disposal of human waste into sewers and rivers - this was the case in Paris where, since the 13<sup>th</sup> century, the Great Sewer (“Grand Égout”), a former backwater of the Seine River, drained the Right Bank. However, these bans, as well as possible sweeping and cleaning obligations, were often ignored by urbanites.

In these cities, where only a few streets were paved, where the slope of streets was not regulated, where both human and animal populations were extremely dense and where

cart and other tipcart traffic contributed to the formation of a putrid mud, a significant elevation of the ground led to ground floors, even second floors, of houses to become buried.

This partly unintentional elevation of the ground level was the result of an accumulation of urban waste and rubbish at the surface. It occurred at varying rates and often accelerated following demolitions in times of conflict. It also tended to increase as a result of artificial embankment construction which transformed marshy areas into developable land and where construction material often was itself a type of waste: excavated material from moats, demolition rubble and urban mud.

During the Middle Ages, dumpsites, formed from bulky refuse and the drainage of pit privies or through the deployment of street cleaning services, could be found in some cities. These dumps, originally established at the city gates, then later surrounded by the growing city and replaced by sites outside of the new urban limits, often grew into real hills. This is the case in Paris where these mounds have been completely integrated into the urban landscape; because they are raised above the general ground level, they can accommodate more efficient windmills (Figure 1). The labyrinth of the Jardin des Plantes is another example of a historical dumpsite that is still visible today. Other mounds have disappeared: this is the case for the *motta papellardorum*, located on the western point of the Île de la Cité and for the *Monceau Saint-Gervais*, located behind the city hall (Hôtel de Ville).

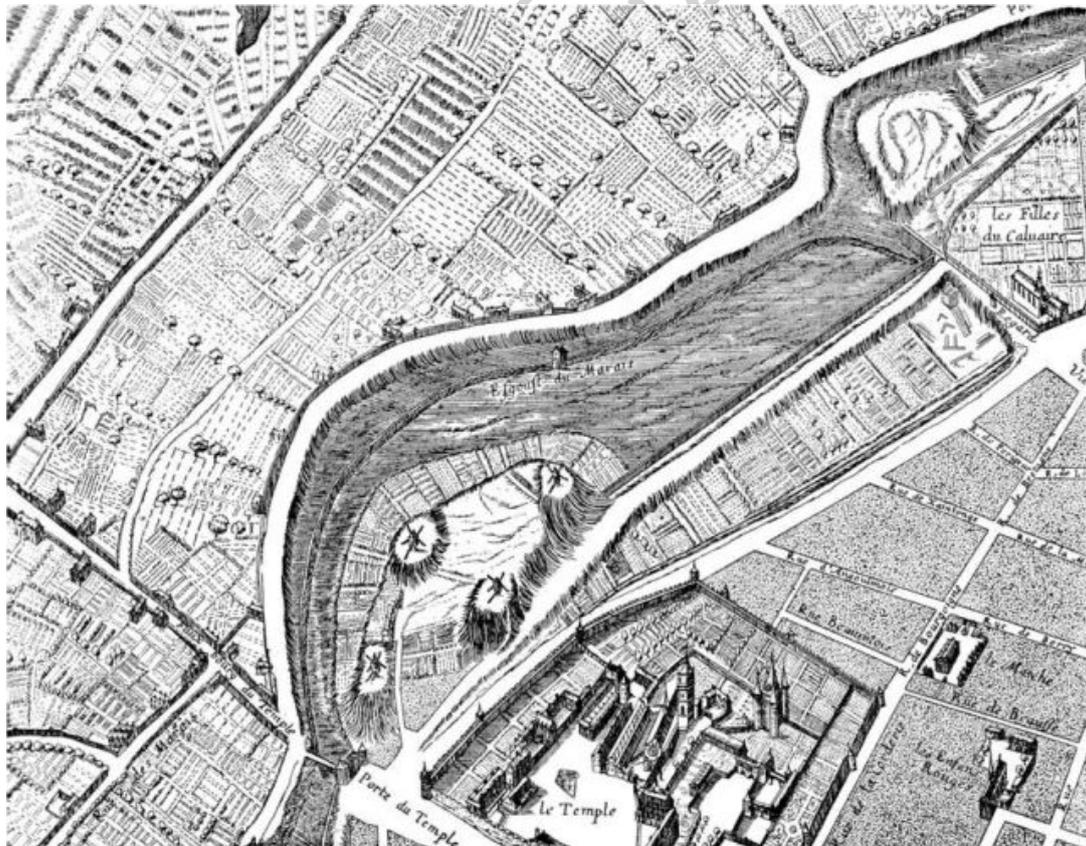


Figure 1. Paris, map of Jacques Gomboust (partial), 1653.

Generally speaking, salubrity levels dropped in European cities from the 15<sup>th</sup> to 18<sup>th</sup> century. It was during the 18<sup>th</sup> century that two movements were set in motion that eventually resulted in a reassessment of the management of urban excreta.

### **3. 1770s-1860s**

#### **3.1. Neo-Hippocratism and Hygienics**

During the 18<sup>th</sup> century in Europe, medical thinking was characterized by a growing interest in Hippocrates' theories. In particular, his treatise "Airs, Waters, and Places", in which he emphasized the primary role of the environment in health, was frequently referenced. Many doctors followed his recommendations and looked to the environment to explain morbidity and mortality. Many of them considered air, and its intimate and frequent contact with the body, a transmission medium for miasma or sulfurous pollution whose fumes were often considered morbid, even deadly. Their analysis was confirmed by the high frequency of intermittent fevers in wetlands where a generalized weakening of the body shortened the life of its residents.

Eighteenth century doctors paid particular attention to cities whose statistics – which at that time were being developed extensively – revealed excess mortality: not only was the natural balance negative (more deaths than births), but the life expectancy of their residents was lower than in the neighboring countryside. It became the natural tendency for doctors to view these environments through this neo-Hippocratic lens and to consider them as extreme and artificial types of marshes. Thus, the belief was that urban excess mortality was due to the cumulative effects of a contaminated ground saturated with putrefying waste and of the human and animal density. Indeed, discoveries by Priestley and Lavoisier showed that respiration permanently tainted the air by consuming oxygen and producing CO<sub>2</sub> (then called phlogisticated air) in a process characteristic of combustion.

These analyses led the medical establishment and, in large part, the scientific, political and intellectual communities to establish new requirements to correct and rectify the deleterious conditions of these cities. They recommended airing cities and decreasing their putrefaction through improved ground covering, better management of human and urban excreta, universalized sweeping and cleaning, and improved distribution of these services. These types of projects were developed throughout the 19<sup>th</sup> century.

#### **3.2. Urbanization, Industrialization and Recycling**

Both industrialization and urbanization separately raised the issue of food resources and raw materials required for industrial use. Demographic growth, the increase in the number of urbanites, required a concurrent increase in agricultural production. According to future agronomists, one way this could be achieved was by improving yields through improved fertilization of croplands. By the late 18<sup>th</sup> century, a shortage in farm manure prevailed, leading to a search for other fertilizing materials. Indeed, the numerous studies on putrefaction during the 18<sup>th</sup> century and the identification of the great material cycles by early chemistry showed that death was critical to life and that human and animal excreta, as well as food residues, could be used as fertilizers. As

these wastes were most concentrated in cities, it was there that mud from streets, drainage of pit privies, beef blood, old shoes, indeed any organic waste was collected. Throughout Europe, scientists and intellectuals stressed the need for cities to return their food as fertilizer to the countryside. It was the only way to ensure both salubrity (through an efficient collection of organic materials scattered throughout cities) and food production. Throughout the 19<sup>th</sup> century, the chemists Jean-Baptiste Dumas, Jean-Baptiste Boussingault, Justus von Liebig, Alexander Müller (among others), the lawyer and social reformer Edwin Chadwick, all promoted human and urban fertilizers. Later, even public figures addressed the issue, such as Victor Hugo in *Les Misérables*.

Furthermore, an important part of emerging industry was reliant on using raw materials that could be supplied only by cities. This is the case, for example, with vegetable rags used for papermaking for several centuries, but became much more needed once the papermaking machine was developed. In the 19<sup>th</sup> century, rags became a strategic industrial issue (1.5 kg of rags were needed to produce 1 kg of paper), such that France banned their export from 1771, followed by Belgium, Holland, Spain, Portugal and a few other countries during the first half of the 19<sup>th</sup> century. Great Britain and North America fought over the international markets, their local resources insufficient to meet the growing industrial demand, forcing them to look for rags in countries that did not produce or produced little paper. Rag collection was therefore an urban activity: an urbanite produced on average more rags than a rural resident which, in addition to the typically more concentrated population of cities, made the collection of urban rags more profitable. Thanks to urban rag collection, production doubled during the first half of the 19<sup>th</sup> century (Table 1).

Country	Production (tons)
England	62,960
Scotland	14,300
Eire	3,310
France	41,680
Zollverein	37,200
Austria	22,320
Denmark	1,680
Sweden	1,530
Belgium	6,132
The Netherlands	4,200
Spain	5,310
Italy	7,992
Switzerland	13,000
Turkey	180

Table 1. World production of paper and cardboard in 1850.

Similarly, there was a growing industrial use of animal bones (figure 2), which were also concentrated in urban areas since slaughtering took place in the city (in butcheries then later in specialized slaughterhouses). Bones were increasingly needed for their classical use – the manufacture of objects, grease, glue –as well as for new market

opportunities: from the 1820s, phosphorus was used to make matches ignited by friction; animal charcoal to refine sugar whose consumption was growing; gelatin (identical to glue except for its use) for food preparation and later for photographic negatives; and later, superphosphates for agricultural fertilization (first in England and Germany then in France). Other butchery by-products found market opportunities in the manufacture of candles and later of stearic candles, Prussian blue, glue, ropes, combs, etc.

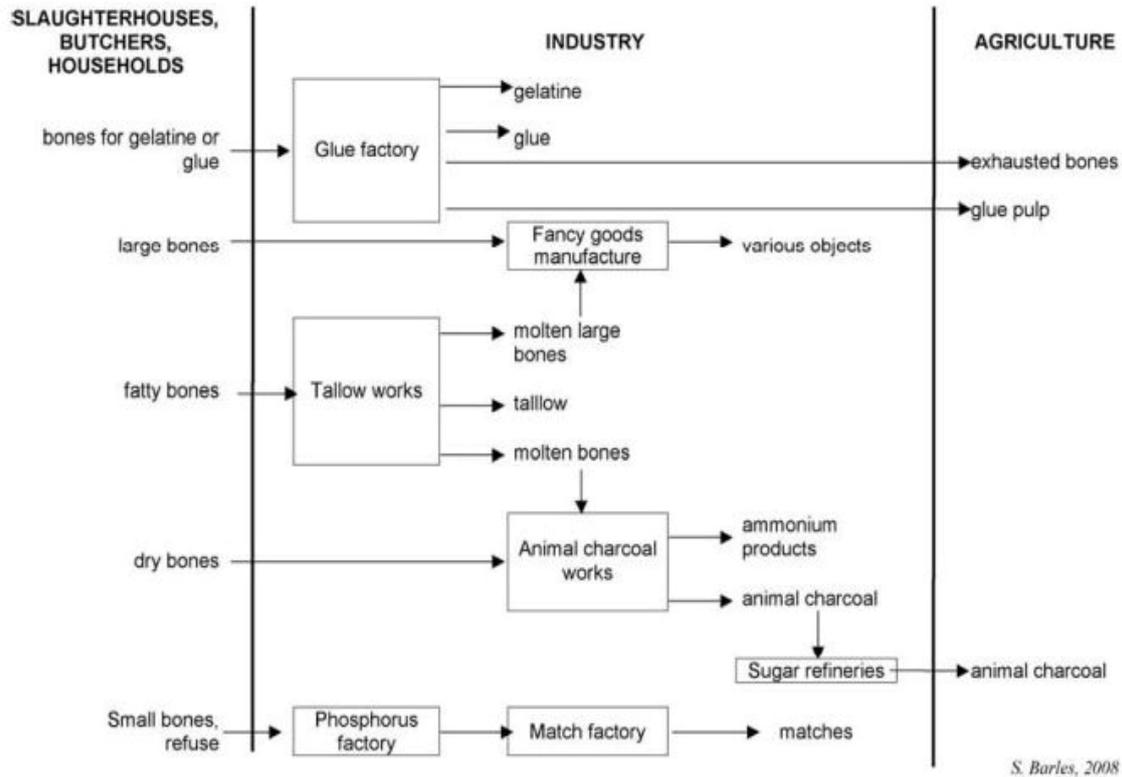


Figure 2. Life cycle of animal bones, second third of the 19<sup>th</sup> century.

Urban by-products emerged from these new industrial products and led to other market opportunities: used paper gave rise to cardboard industries, tin cans to metal toys, town gas (obtained from the distillation of coal) to tar which was used in the manufacture of numerous chemical compounds and, soon after, for surfacing sidewalks and later streets. Many other examples of the city as a source of raw materials for industry and for agricultural fertilizers exist.

To multiply their profits, manufacturers sought out market opportunities in products with no value, *i.e.* waste from their primary operation. Animal charcoal dirtied during the clarification of sugars could not be revived endlessly: it was considered a waste up until 1810 when it began to be used as a fertilizer (containing a high concentration of phosphorus). In such a way, used animal charcoal soon became more expensive than unused animal charcoal. Cotton waste from textile mills – particularly in Manchester – began to be used, like rags, for papermaking. As late as 1882, the hygienist Henri

Napias summarized the goal: “In industry, there must not be any actual scrap, and everything must be used either for industry itself or for agriculture [translation]”.

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