

GONE TO WASTE: THE QUALITY OF HAZARDOUS WASTE MANAGEMENT IN SPAIN

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Introduction

On April 24, 1997, over 300,000 gilthead bream died at a fish farm near the Valencian city of Puzol. The investigation by the Spanish environmental police body SEPRONA found that the incident was a result of constant toxic discharges from a gas heater factory nearby. Four years later, in January 2001, the Provincial Court of Valencia sentenced the businessman who owned the gas heater factory to one year in prison and imposed a one-year ban on participating in the industry and a fine of 11,000 euro.

At first glance, the Puzol case represents the triumph of justice. Yet, upon closer inspection, the case can be viewed as a failure of the Spanish authorities to act upon a nation-wide problem. The Puzol case belies the problem of the management of hazardous waste affecting Spain: the gas heater factory had illegally managed its waste for several years, but the envi-

ronmental authorities knew this and failed to act.

The environmental authorities knew that the factory failed to make a required annual declaration of hazardous waste production for three years, from 1994 to 1997. During this time, the factory produced an estimated 460,000 kg of hazardous waste, of which it properly managed a mere five percent. The rest, 436,000 kg, had been disposed of in two different ways. One part was mixed with inert waste and was then transported and discharged in the fields surrounding the factory by a company employee. This was a relatively sophisticated procedure, for it was scheduled to occur once a month, the amount of waste discharged per trip was kept relatively constant, and the fields were cleared and covered with rubble prior to the disposal. The greater part of the hazardous waste was discharged directly into the sewer, and this is what caused the deaths of so many fish. The Department of the Environment for

the Valencian Autonomous Government knew of the direct disposal of waste because, in an inspection made on April 11, 1995, an executive of the company openly declared that hazardous waste had been discharged directly into the sewer. During the following inspection in November 1997, it was established that the factory still had not installed a filter system, and great amounts of hazardous waste were being discharged without any treatment.

The Puzol case is not a single incident, but it serves as a good indicator of the “typical” improper handling of hazardous waste in Spain. The culprit was a businessman running a small factory while trying to minimize the costs of production. Another important point is the fact that there seems to be no apparent corruption of official bodies. Yet, blame can be placed on the environmental administration for its remarkable passiveness in dealing with the crime by allowing the factory to forgo annual declarations and by disregarding the factory’s claims of improper handling of hazardous waste. (Roca et al., pp. 82–83)

The unfortunate case of Puzol clearly illustrates the governmental concern regarding the management of hazardous waste in Spain and suggests that improper handling of waste materials may be a common occurrence. Although some level of illicit activity regarding waste disposal is inevitable, Spain seems to experience particular difficulty with managing waste. In 2002, the European Commission placed Spain at the top of its “shame list” as the member state with the most illegal waste disposal and dumping sites in the European Union. (“Commission Exposes Illegal...”) Therefore, the lack of Spanish concern for the issue is stunning, particularly because collection and treatment of waste impose great economic and environmental costs on society. Waste represents losses of natural resources and energy and serves as an indicator of inefficient production processes, low durability of goods, and unsustainable consumption patterns. More importantly, waste has an adverse effect on the environment and on human health. Improper waste management may result in unpleasant odors, emissions of greenhouse gases into the air, pollution of soil, and

contamination of waters. (“Waste Generation and Management,” p. 151) Incorrect use of landfills and incinerators represents a serious risk to human health because the emission of organic micro-pollutants and volatile heavy metals, such as dioxins, furans, methane, hydrogen chloride, and ammonia, may cause severe injury or infection. (“Waste Generation and Management,” p. 160) Thus, there is a need for widespread recognition of waste as an important environmental problem in Spain. Management of hazardous waste, especially, should be made a priority by the Spanish environmental bodies. Although hazardous waste represents approximately one percent of all waste generated in Europe, it has the greatest potential to be harmful to the environment and human health. (“Waste Generation and Management,” p. 155)

In this article, I examine the current situation regarding hazardous waste management in Spain. I maintain that, although much has been done to promote proper management techniques on paper, in actuality the problem is often ignored. I then discuss the complex legal framework that surrounds the issue, describe general trends in waste generation and management, and assess the possibility of the existence of illegal waste management techniques in Spain. Finally, I propose several solutions to improve the situation and discuss how effective these solutions have been in one of Spain’s neighbors — Italy.

Legislation Concerning Waste

In Spain, public interest in the quality of the environment is a rather new phenomenon. Awareness of environmental issues arose only after the first environmental groups were established after the end of the Franco dictatorship in 1975. Environmental legislation was introduced into the political domain much later, in 1986, when Spain was admitted into the European Union and was required to adopt the European environmental policy. (Roca et al., p. 89) Since then, Spanish environmental legislation has been driven primarily by EU policies and environmental directives.

What Is Waste?

The questionnaire that the OECD (Organisation for Economic Co-operation and Development) biennially sends to all European countries includes the following definition of waste:

Waste refers here to materials that are not prime products (i.e. products produced for the market) for which the generator has no further use for his own purpose of production, transformation or consumption, and which he discards, or intends or is required to discard. Waste may be generated during the extraction of raw materials, during the processing of raw materials to intermediate and final products, during the consumption of final products and during any other human activity. ("Section: Waste," p. 7)

Recycled or reused materials and waste materials that are directly discharged into ambient water or air (water and air pollution, respectively) do not constitute "waste." This definition of waste in some form is generally adopted by all the European countries. Spain is not an exception.

In Spain, Ley 10/1998, de 21 de Abril, de Residuos, referred to in this article as the Law on Wastes, is a central piece of legislation regarding waste management. Article 3.a of the Law on Wastes establishes the legal concept of waste and uses a definition of waste remarkably similar to the one formulated by the OECD.

On the national level, Spanish legislation recognizes two classes of waste: hazardous and municipal. Hazardous waste is defined by Article 3.c of the Law on Wastes in accordance with the definition given in the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal, which came into force in May 1992. Hazardous waste includes such items as old vehicles, sludge from waste-water treatment plants, construction and demolition waste, used batteries, electronic waste, mining waste, and animal waste from slaughter houses. (Roca et al., p. 69)

All waste that is not classified as hazardous is grouped into the municipal waste category. Thus, municipal waste is waste "generated in homes, commerce, offices and services, as well as all waste that has no qualification as hazardous and, because of its quality or composition, can be assimilated with that produced in previous places or with other activities." (Roca et al., p. 67)

Autonomous communities have individual legislation on waste that often includes more numerous categories for waste classification. This arises as a direct result of the Spanish Constitution of 1978, which distributes responsibilities of waste management among the Spanish government, autonomous communities and the local administrative bodies, as presented in Table 1. (Roca et al., p. 64) Article 149 of the Constitution states that the Ministry of the Environment (Ministerio de Medio Ambiente) is required to provide environmen-

Table 1
Division of Responsibilities in Waste Management in Spain

| |
|--|
| National Government |
| – Development of a national waste plan |
| – Authorization and inspection of waste material movements to or from non-EU countries |
| Autonomous Communities |
| – Development of a regional waste plan |
| – Authorization, surveillance, inspection and sanction of waste production and management activities |
| – Authorization of waste movements to or from EU countries and inside Spanish territory |
| Local Administrative Bodies |
| – Enforcement of the environmental law |

Source: Roca et al., p. 64.

tal legislation on the national level. Yet, according to Article 148, the implementation of the environmental law is delegated to the seventeen autonomous regions, with the enforcement of the law falling on the shoulders of the local administrative bodies. ("Managing across Levels...")

Fragmentation of responsibilities is problematic because it leads to dissimilar standards of policy enforcement across the nation and often impedes prompt execution of the newly implemented environmental laws. Despite the fact that Spain has implemented most of the EU environmental directives, Spanish policies concerning waste remain complicated and inconsistent. ("Environmental Market...")

Hazardous Waste

Because hazardous waste has the greatest potential to cause environmental damage and impact human health, Chapter 4 of the Law on Wastes establishes proper management procedures for the handling of hazardous waste. According to the document, waste producers are required "to separate appropriately and not mix waste; pack and label waste containers; record information regarding waste production and management; and present an annual report of this record to the Environmental Administration specifying the quantity of produced hazardous waste." (Roca et al., p. 65) The Law on Wastes also demands that movement, management, collection, and storage of hazardous waste be subject to authorization by the competent Environmental Administration and require registered documents. Moreover, Article 23 of the Law on Wastes places the responsibility on individuals or companies that collect and store hazardous waste to establish safety, self-protection measures, and a risk-prevention plan. (Roca et al., p. 65) However, cases such as the incident in Puzol discussed in the introduction demonstrate that little is done to enforce the established law.

Environmental Crime in Spain

The Spanish Constitution of 1978 recognizes the basic right of individuals to a clean environment. Article 45 of the Constitution

declares that "everyone has the right to enjoy an environment suitable for the development of the person." ("Spain: Constitution") The protection of this right is delegated to the public authorities, who can impose penal or administrative sanctions on those who commit environmental crime. ("Spain: Constitution")

The concept of environmental crime is dealt with in Chapter III of the Spanish Penal Code Reform of 1995. According to Article 325 of the Penal Code, environmental crime is defined as anything that "contravenes environmental protection laws or dispositions of a general character, directly or indirectly causing emissions, dumping, radiation, extractions or excavations, noises, vibrations, injections or deposits" into the atmosphere, soil, or water, such that these activities have the potential to "gravely harm the balance of natural systems." (Roca et al., p. 64) Based on this definition, the right to a clean environment in Spain is not considered to be a fundamental right because only a weak guarantee exists for its protection. Although the right is recognized by the Spanish Constitution, the wording of the Penal Code ensures that Article 45 of the Constitution cannot be infringed unless there exists proof of a specific act such as dumping, radiation, or emission that accompanied the crime. If no proof of environmental damage exists, the behavior can only be punished with administrative action and not penal sanctions. (Roca et al., p. 64) Thus, for instance, the transport of hazardous waste without proper documentation is not considered to be an example of environmental crime in Spain.

In a case where Article 45 of the Spanish Constitution is infringed, Article 325 of the Spanish Penal Code imposes a prison sentence of six months to four years and bans the offender from the profession for eight to twenty-four months. (Roca et al., p. 64) The first sentence issued for an environmental crime came in 1996¹ and marked the turning point in the behavior of environmentally-damaging industries, which now understand that illegal activ-

¹A factory owner, Jose Puigneró, was sentenced by a Barcelona court to four years in prison and fined approximately \$50,000 for dumping chemical dyes and detergents into a river in the town of Sant Bartomeu del Grau during the period 1994-95. (Simons)

ities could have penal consequences. (Roca et al., p. 89)

In the case of improper hazardous waste handling, the penalties are harsher and include fines ranging from 300,500 to 1,202,000 euro, a ban from the offender's profession for one to ten years, and total or partial closure of the offender's facilities and machinery. (Roca et al., p. 65) The threat of a fine for improper waste management in Spain is very new and did not exist prior to the adoption of the Law on Wastes in 1998. This shows just how far legislation on waste management in Spain has progressed in the past decade and that Spain is moving in a positive direction with regard to establishing the right to a clean environment for its citizens.

Hazardous Waste Management in Spain

With legislation and the Penal Code in place, how does Spain measure up in hazardous waste management? Before this question can be answered, it is important to note that the Basel Convention broadly defines hazardous waste as any substance that possesses one or more of several hazardous characteristics, such as flammability, corrosiveness, or eco-toxicity. ("Waste Generation and Management," p. 155) However, the exact definitions implemented in countries across Europe often differ significantly from the one given in the Basel Convention. Moreover, definitions of hazardous waste change with time as countries adopt new legislation, making it even more difficult to compare data on waste generation and treatment and to identify trends. Available data are published by the OECD; however, they are often incomplete and not very useful for comparison, because detailed information about the composition and generation of waste is absent. The data are often not adjusted to fit the classifications established by the Basel Convention; and even if they are, the process of assigning data to the categories is often subjective. (Fischer, p. 8) Nonetheless, the following section of the article focuses mostly on waste management trends in Spain and how they have changed through time.

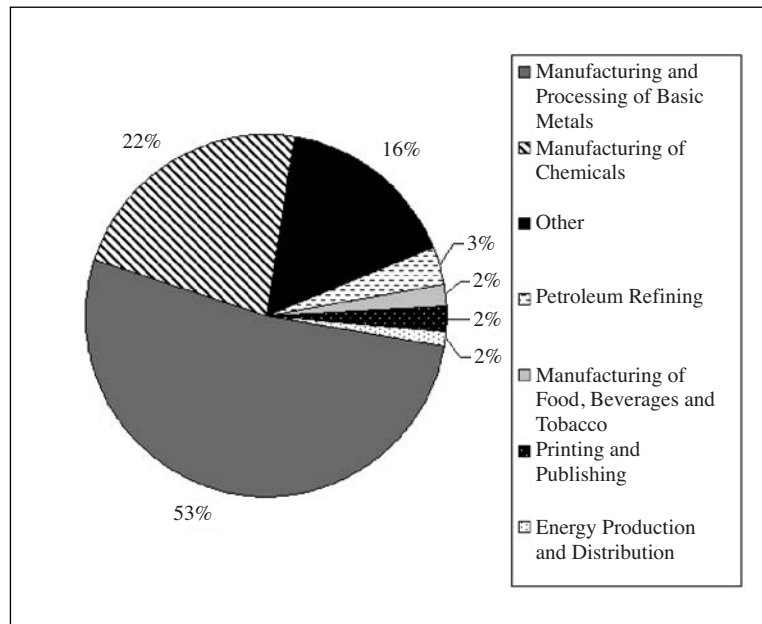
Generation

Although recent trends in hazardous waste production across the world are difficult to discern, the amount of hazardous waste generated is growing ("Waste Generation and Management," p. 151), with projections indicating that the growth rate of hazardous waste generation is roughly equal to a country's economic growth. ("Households...," p. 237) On average, hazardous waste accounts for about 3–4 percent of the total waste generated in Europe, but the specific amounts produced vary greatly from one country to another. Since most hazardous waste is produced by industry, the industrial structure of a region is an important factor in explaining variations in hazardous waste generation. (Fischer, p. 6) Because waste generation and treatment depend heavily on a country's industrial structure and not its population, the data in this article are presented in absolute terms and not on a per capita basis.

In Spain, hazardous waste production grew significantly from 1990 to 2000, increasing by almost 80 percent over the decade. However, there was an improvement in the trend: from 1995 to 2000, hazardous waste generation declined slightly, falling from 3,394,000 tons to 3,063,000 tons. This decline may be attributed to the Plan Nacional de Residuos Peligrosos (National Hazardous Waste Plan) that was in effect during the same period. The plan aimed to reduce hazardous waste production by 40 percent over its five-year implementation period, as well as to promote recycling and reuse, requiring that 20 percent of all hazardous waste be recycled. (EIONET) Although it did not succeed in its original goal, the stabilization of the hazardous waste generation rate during this period was a step in the positive direction.

There are several sources that contribute to hazardous waste production. Households produce hazardous waste when they dispose of such items as aerosol cans, paint, household and automobile batteries, and home and yard chemicals. However, municipal hazardous waste generation in Europe is usually insignificant, constituting a very small part of the total

Figure 1
Hazardous Waste Generation by Industry, Spain 2001



Source: "ISWA National Waste Management Profiles."

hazardous waste produced. ("Households...", p. 202) Sewage sludge is a more significant source of hazardous waste. In 1998 Spain generated 600,000 tons of sewage sludge, the 4th highest rate among European countries as reported by the European Commission Questionnaire of 1999. Alarming, projections for sewage sludge production in Spain do not bode well, as the annual rate is expected to increase to 1,100,000 tons by 2005. (Brodersen et al., "Review...", p. 7)

As was mentioned before, generation of hazardous waste is closely linked to industrial activity; therefore, it is not surprising that industrial hazardous waste accounts for the largest part of hazardous waste production in any given country. In Spain, industry produces 50–90 percent of hazardous waste, with rates differing greatly among its seventeen autonomous communities. (Brodersen et al., "Hazardous...", p. 26) Figure 1 shows the breakdown of industrial hazardous waste generation by industry in Spain in 2001 and indicates that the production of hazardous waste is dominated by manufacturing and processing of basic metals and chemicals. In fact, these two indus-

tries account for 75 percent of all industrial hazardous waste generated in Spain.

In absolute terms, industrial waste production (hazardous and non-hazardous) for the OECD countries averages 60 kg/\$1000 of GDP.² Spain is well below the OECD average at 30 kg/\$1000 of GDP. ("Selected Environmental Data") Although this is an encouraging indicator, the possible prevalence of a high rate of hazardous waste dumping in Spain, as discussed later in the article, may indicate that the production rate may actually be much closer to the OECD average.

Overall, the present rate of hazardous waste generation in Spain is on a par with the rest of Europe. Some problematic indicators include the fairly high rate of sewage sludge generation and the inability of the National Hazardous Waste Plan to reach its objective of dramatically reducing the production of hazardous waste. More importantly, the question remains whether or not Spain continues to be dedicated to the reduction of hazardous waste generation even though its National Hazardous Waste Plan expired in 2000.

²GDP measured in U.S. dollars.

Treatment

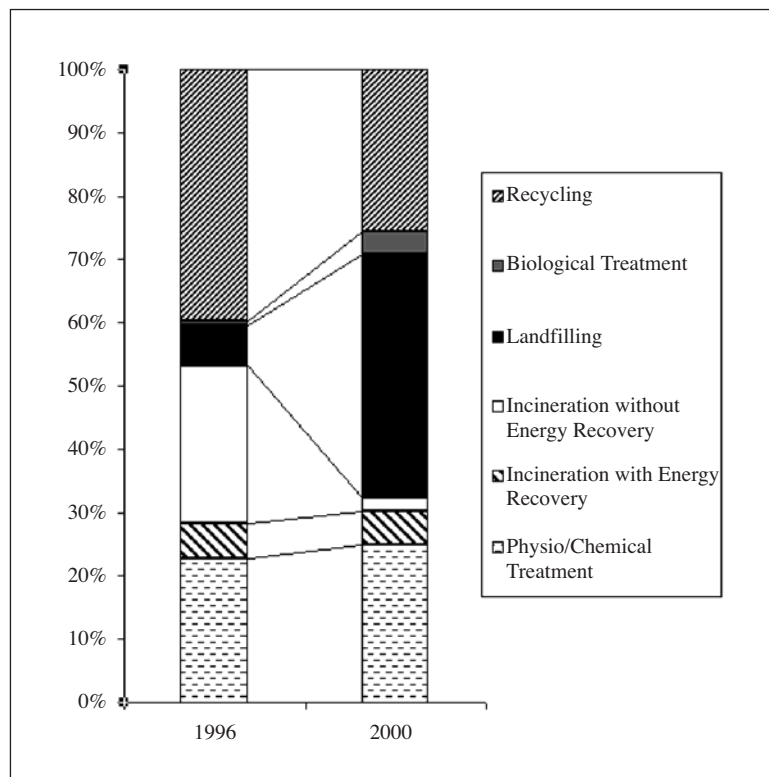
Although Spain is doing fairly well in managing the growth of its hazardous waste generation, the situation is dramatically different when it comes to treatment of hazardous waste. Before discussing waste treatment, however, it is important to briefly review the available hazardous waste treatment procedures and their effectiveness in reducing the amount of waste.

Hazardous waste disposal routes include landfilling, incineration, physical or chemical treatment, and recycling and recovery. Recycling and recovery is the most desirable treatment route for hazardous waste and involves the treatment and reprocessing of discarded waste to generate materials suitable for subsequent reuse, whether of similar or different purpose than the original product. Incineration, which can be broken down into

two categories — incineration with energy recovery and incineration without energy recovery — significantly reduces the volume of waste, and the resulting ash is often suitable for recycling. The reduction of waste volume is also the general principle behind physical and chemical treatment of waste. Direct landfilling, although carried out in carefully managed sites, is the least desirable option for the management of hazardous waste. Unfortunately, it is also the most widely used one in the EU. (EIONET)

In Spain, disposal routes for hazardous waste have changed dramatically over a short period of time. Figure 2 shows the breakdown of treatment routes for the years 1996 and 2000. The figure shows that the proportions of hazardous waste incinerated with energy recovery and subjected to physical or chemical treatment remained roughly constant between 1996 and 2000. Biological treatment of waste

Figure 2
Hazardous Waste Treatment Routes, Spain 1996 and 2000



Source: EIONET.

increased from less than one percent to over three percent of total hazardous waste treated, and incineration without energy recovery dropped dramatically from 25 percent in 1996 to only two percent in 2000. However, the most notable change occurred in recycling, which dropped from 40 percent to 26 percent, and in landfilling, which increased from a mere 6 percent in 1996 to over 38 percent in 2000. This is an ominous sign, because ideally the amount of waste landfilled should be minimized, and the amount of waste recycled should be maximized. This is especially critical because an estimated 90 percent of the existing landfills in Spain do not comply with EU regulations. ("Environmental Market...") Thus, Figure 2 clearly indicates that the Spanish National Hazardous Waste Plan did not fulfill its objective of promoting recycling and reuse; and, although the level of recycling stayed above the required 20 percent mark, total recycling of hazardous waste decreased significantly. (EIONET)

On a positive note, the quantities of hazardous waste treated in Spain have increased dramatically. In 1990, Spain treated a total of 1,708,000 tons of hazardous waste — all of the hazardous waste produced by the country in the same year. However, in 2000 Spain treated 3,832,000 tons, or almost 800,000 tons more than it produced. (EIONET) This is a favorable indicator for Spain, since it suggests that Spain is beginning to treat at least some of its hazardous waste that was previously untreated. Generally, however, Spain's performance in the treatment of hazardous waste is extremely unsatisfactory. Further emphasis should be placed on directing waste away from the landfills and toward more environmentally friendly disposal routes.

Crime

The data presented in the previous two sections of this article serve as an important indicator of the state of waste management in Spain. However, without the consideration of improper management and illegal activity associated with hazardous waste, the numbers presented may be naively optimistic. By their nature, the exact figures describing illegal activ-

ity are difficult to obtain. However, there are several factors suggesting that the potential for environmental crime in Spain exists and that such crime has been rising since 1992.

There are two main avenues of waste generation that carry a high risk of potential illegal disposal due to the high economic benefit associated with them. First, a need to dispose of a specific type of waste repeatedly may result in the decision to hide it from the law. Secondly, if waste materials represent an unknown part of a manufacturing process, there exists a great incentive to avoid the declaration of this type of waste to the proper environmental authority. Avoiding the declaration of these two types of waste minimizes treatment costs, resulting in a considerable difference between legal and illegal management costs, which some may find attractive. (Roca et al., p. 81) Therefore, actors involved in the hiding or camouflaging of waste do so primarily to save on costs of proper treatment.

With the adoption of the Basel Convention in 1992, the National Hazardous Waste Plan in 1995, the Law on Wastes in 1998, and the Directive on the Landfill of Waste in 1999 (which requires all waste to be physically or chemically treated prior to the landfilling), the number of legal routes for disposal of waste in Spain dramatically decreased. At the same time, the prices for the treatment of waste rose, making uncontrolled disposal a lucrative option. (OECD Working Party..., p. 223) On the other hand, the enforcement of the adopted legislation weakened. A 1996 study on the implementation of the Basel Convention found that, four years after the adoption of the legislation, nearly a third of the countries that signed the convention had not implemented its legislation. (Roca et al., p. 16)

The factors listed above strongly support the potential existence of illegal activity and environmental crime in the management of waste in Spain. In fact, it is estimated that over 5 million tons per year, or 0.8 percent of all waste produced in the country, are insufficiently treated. (Roca et al., p. 69) Improper management of hazardous waste comprises a large portion of the total environmental infractions. Of more than 42,000 environmental infractions recorded by the government in the

year 2002, 26 percent dealt with hazardous waste. Considering that from 1994 to 2002 administrative infractions concerning general waste grew at a rate of 34 percent per year while penal infractions grew at the rate of 14 percent over the same period (Roca et al., pp. 78–79), it is reasonable to conclude that infractions dealing with hazardous waste grew at a rate somewhere between the two values.

Improper management of waste in Spain is a small-scale phenomenon, with the majority of infractions detected dealing with the direct dumping of waste by the producer. Only a single case of illicit waste leaving the Spanish border was recorded between 1998 and 2003. (Roca et al., p. 76) This suggests that it may be difficult to detect and, therefore, reduce this type of crime.

The arguments presented above indicate that the adoption of legislative measures without proper enforcement has possibly encouraged the emergence of environmental crime in Spain over the last decade. Lack of awareness of this trend in Spain further complicates the problem. In part, the phenomenon of dumping and improper waste management in Spain has not been carefully studied, perhaps because it is considered to be relatively unimportant and because there is no social perception of its existence. As a result, there are no groups lobbying for the solution to the problem. To further exacerbate the growth of environmental crime, the many existing environmental groups in Spain are small and tend to be active only in their individual geographical territories. Because this makes the exchange of information difficult, the ability of environmental groups to coordinate the detection of illicit waste traffic is diminished. (Roca et al., pp. 89–90) Thus, Spain is potentially dealing with a serious problem of illegal waste disposal.

Problems and Suggested Solutions

In the previous two sections, I have discussed the management of hazardous waste in Spain. In this section, I review the important problems encountered in the management of waste and offer some possible solutions.

Reliable data are necessary to evaluate the state of waste management and to implement

necessary legislation that could be specifically focused on the problem at hand. However, throughout this article, I have stressed the fact that there is a lack of reliable data on waste statistics. Because reliable data are necessary for the development of plans for prevention of illegal activity, the result could be poor policy-making decisions and the establishment of improper infrastructure. (“Waste Generation and Management,” pp. 159–60) Data on environmental crime rates for Spain are available, but they are not very comprehensive. Moreover, no analysis and interpretation of data have been performed to date. (Roca et al., p. 92) Thus, Spain should establish an information exchange within the country and with the rest of the world. The introduction of a monitoring system that could extend over the entire cycle of waste production, transport, and treatment would greatly aid in the data-collection process. Finally, the promotion of research by governmental and independent agencies could also facilitate the process of gathering data.

Spain has a relatively complex way of distributing responsibilities of regulating and managing of waste (see Figure 1). Although a single administrative body cannot assume the entire burden of this difficult task, it is generally a good idea to have a single national waste plan, which should be uniformly adopted throughout the nation.

Even though proper legislation is in place, enforcement of the newly-implemented laws and regulations is weak. Although Spain has progressed considerably in reducing the quantities of hazardous waste generated, the targets set by the National Hazardous Waste Plan have been widely missed. Also, there is “a trend of ignoring certain illegalities” (Roca et al., p. 83), as environmental crimes are recognized but are often not investigated and pursued with the necessary intensity. (Roca et al., p. 89) The reason is that environmental crime cases are “not perceived as a current problem worth investigating.” (Roca et al., p. 90) Yet, hazardous waste generation comes from relatively few sources. Therefore, if environmental policing bodies could focus on the sources responsible for the generation of hazardous waste, its management, prevention, and recycling, then programs implemented could be successfully executed.

("Waste Generation and Management," p. 155)

From a broad perspective, one can see that underlying all of the above-listed problems is a single factor: public unawareness. Since in Spain there is a lack of social perception of the problems facing the management of waste, there exists only a low level of awareness of the threats posed by dumping, as opposed to other environmental problems such as water and air pollution. Spaniards possess only a limited perception of the extent of the problem because their assessment is colored by the existence of a culture of dumping inherent in southern European countries. The existence of this culture of dumping may be observed through the percentage of waste collected separately (such as paper, glass, and plastic) relative to total waste collected, which is indicative of the level of recycling taking place. The average rate in the EU is 13 percent, but large variations are observed among the member states, with 20 percent of waste collected separately in the northern and only five percent in the southern member states. ("Waste Generation from Household...", p. 3) In Spain specifically, the recycling culture is virtually absent, and there is a widespread belief that it is much easier merely to dump waste instead of minimizing, recycling, and reusing. (Roca et al., p. 61) To address the problem of improper waste management, then, it is important to change the Spanish culture from one of dumping to one of prevention. Because the public is largely uneducated about the problem, the national government considers waste management issues to be relatively unimportant and does not strongly pursue those who commit environmental crimes. A quick and inexpensive solution to this problem could be to raise public awareness with specific campaigns on the issue directed toward citizens, schools, and local and police authorities.

The effectiveness of the solutions proposed above can be demonstrated by their effect on the illegal disposal of hazardous waste in Italy, since Spain and Italy share similar histories with regard to developments in hazardous waste management. In both countries, illicit waste disposal peaked after the adoption of environmental regulations and the establishment of specialized environmental police bodies

(SEPRONA in Spain and Legambiente in Italy) in the mid-1990s. However, a crucial difference between the two countries was the level of awareness of illegal disposal of waste, both at the institutional and societal levels.

Since the mid-1990s, Italy has set up a continuous monitoring system for the generation and treatment of waste, has presented constantly-updated analyses of data, has gathered a wealth of information on the subject, and has created a high level of societal awareness of the dangers posed by the illegal disposal of hazardous waste. Italy also publishes a detailed annual report that contains updated information on current trends in hazardous waste generation and illegal activities surrounding the issue. This has greatly increased the knowledge of waste management practices not only among the general public, but also within political and institutional spheres. As a result, Italy has experienced effective preventive measures, a falling rate of generation of hazardous waste, and better treatment techniques. (Roca et al., p. 91) Spain could learn a valuable lesson from Italy and could achieve a similar level of success in dealing with hazardous waste management if it implements the suggested changes.

Conclusion

Spain's rapid economic development in recent decades has made it the eighth largest economy among the OECD countries. (OECD Working Party..., p. 220) However, this growth has been accompanied by an even greater increase in the pressures exerted on the environment. Although Spaniards are becoming more and more conscious of the importance of a clean environment and look toward it as an important part of the country's future, waste management remains a subject that consistently receives less public attention than other environmental issues. For most, waste is what leaves their household every week and goes somewhere to an unknown location. Doubtless, very few Spaniards have actually seen a landfill site, an incineration plant or a recycling center. This veil of the unknown is the driving force behind the lack of public interest in the issue and, at the same time, the greatest sign of possible future environmental catastrophes like the