

A novel initiative for recovery and restoration of illegal dumps in rural areas

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Abstract

In the whole territory of Castilla y León (Spain) there are currently more than 2,000 waste dumps that will be restored through a novel programme in the period 2017-2019 with an investment of more than 10 M€.

Castilla y León regional government is currently implementing this programme in the province of Valladolid for the environmental recovery of areas heavily degraded by the deposit of inert waste, which entails the restoration of illegal dumps in the province bigger than 1000 m², a total of 133. The program also includes the implementation of an alternative and legal system for the management of construction and demolition waste, among other waste streams.

The sealing of landfills and tailings is encompassed within the actions that the regional government is developing in the field of integrated management of waste for their prevention, recovery, recycling and disposal in all the provinces of the Community, framed within the line established in the 7th Environmental Action Program of the European Union. The situation of illegal deposits must be corrected both, through direct situations on the affected areas, and through measures aimed at ensuring proper management of construction and demolition waste and pruning. This paper shows the first results obtained after the implementation of this regional initiative.

Keywords

Degraded areas, illegal dumps, inert waste, rural communities.

Introduction

Illegal dumping of waste has been a serious environmental concern of most countries in the world [1]. Surrounding areas are heavily affected by dumps in terms of quality of life and liveability decrease. Illegal dumping of garbage, used tyres, furniture, discarded appliances, yard debris and other waste streams can threaten human health, wildlife and the environment. Illegal dumps can pollute water sources, including groundwater and cause flooding by blocking creeks and ravines. Some dumps become home to rodents, mosquitoes and other noxious insects. Furthermore, illegal dumping also results in lowering real estate values, limits tourism, and compromises the safety of communities [2].

Some information sources that provide an indication of the extent of illegal dumping of waste in all EU Member States are available. However, these tend to be rather informal in nature since they rely on the engagement of individual citizens which may be more extensive in some countries than in others. These sources do, however, give an overall sense of the extent of the problem within the EU [3]. For example, one source indicates that on an annual basis, around 2,871,186 tonnes of waste are illegally dumped in the EU-28 (ranging from 2,174 tonnes in Luxembourg to 371,119 tonnes in Poland) [4]. Another source, which collates real-time information from citizens on waste dumping, reported that around 12,628 incidents of this nature had been observed in the EU-28 at the end of December 2014 [5].

Illegal dumping is hypothesised to be associated with disposal costs [6-7], fines [6-7], disposal restrictions [8], accessibility [2, 9], population density [2, 9], surveillance [6, 9, 10], unemployment [10], income [9] and disposal fees [7]. Illegal dumping is a complex social, economic, and environmental issue which can most effectively be addressed through identification of its root causes [11].

This undesirable practice is more likely to occur in areas that are easily accessible by roads, with low population density and little surveillance [12], e.g., rural areas with low visibility.

Removal of illegal dumps bears a cost [13] and makes it necessary to carry out remediation [14]. Hanfman [12] estimated in 2009 that there was approximately 100 million tons of illegally dumped waste worldwide. The cost of clean-up of illegal dump sites is high, especially if this involves multiple countries. For example, approximately 134,000 tons of waste were illegally dumped in a large gravel pit in North East Europe, and the extraction and transport of this waste costed 160 euros per ton which added up to over 21 million euros each year. It is even more costly when the waste is considered to be hazardous. The costs then rise to about 300 euros per ton [1].

In order to optimize the process of illegal dumps reclamation it is necessary, firstly, to classify them by location based on the criterion of the greatest potential environmental risk for the surrounding natural, technogenic and social environment [15]. Also the knowledge about the morphological composition of wastes dumped on illegal landfills is crucial. Ciura et al. [16] analysed 28 illegal landfill sites localized in the area of Olsztyn district (Poland). The results reveal that debris constituted the largest share (21.8%), followed by plastics (19.3%), used electrical equipment (8.7%), glass (7.9%), textile (6.5%), packaging (6.3%) as the main streams. It was found that morphological composition of wastes differs in relation to the distance from buildings. Morphological composition of the wastes on dumpsites whose area did not exceed 1 m² contained the wastes which should get to a selective waste collection. On the other hand, debris was mainly found on dumpsites with the area exceeding 5 m².

Nowadays, administrations of many countries are considering programs to fight against illegal dumping since it is clear how the ecological situation in some areas is deteriorating precisely because of the dump [17]. Australia is a good example. Many local councils around this country have adopted a strategy including community education, clean-ups and regulatory enforcement to combat illegal dumping. While the strategy may vary depending on the extent of the problem and local conditions, it involves educating the community about the impacts of illegal dumping, warning of penalties and suggesting ways of disposing of unwanted materials. New South Wales Illegal Dumping Strategy 2014-16 is one such initiative [18]. In this case, thanks to public involvement, infractions reporting in project areas have increased by 39% from 2015-16 to 2016-17.

The City of Oakland is another example. The city government has implemented a Reward for Reporting Illegal Dumping Program that provides rewards to witnesses who identify people dumping in Oakland neighbourhoods. Witnesses who report critical information to catch illegal dumpers can receive up to half of all penalties collected in successful enforcement actions based on the witness's reports. The measure has dramatically reduced the occurrence on new dumpsites.

In the case of Spain, the measures taken into practice in the past to close, seal and ecologically restore illegal landfills, as laid down by EU waste legislation, has failed.

Spanish national authorities are responsible for setting out waste laws and plans, while Autonomous Communities and Provincial Councils hold out the responsibility to establish their own laws and plans tailored to their region and/or province. This is why, trying to act proactively to get rid of the problem of illegal dumps, the Provincial Council of Valladolid (Castilla y León region, Spain), launched in 2012 a debris collection plan at provincial level, managed by the Provincial Environmental Consortium, with the aim of stopping proliferation of illegal dumps in the municipalities of the province and to close and restore the existing ones. This paper considers

the methodological and practical aspects of the provincial strategy implemented and its fitting in the regional waste management system.

Baseline situation

In the province of Valladolid, dumpsites have historically proliferated as places to deposit any type of waste, in general, inorganic. When these dumps reached appreciable dimensions, some of the municipalities where they were located requested to regional administrations its sealing and restoration.

In this sense, the Provincial Council of Valladolid developed from 2000 to 2010 a "Reforestation Program of illegal dumps" that consisted in the separation and reuse of the debris in each dump, the addition of topsoil, and planting of arboreal and shrub species to recover the entire environment (Figure 1). In total, 75.35 ha were restored distributed along 66 locations, with a budget of 0.7 M€.



Figure 1. Illegal dumping site in Valladolid province: Left: initial situation; Right: after restoration.

In 2008, national legislation (Royal Decree 105/2008) was approved, regulating the production and management of construction and demolition waste, and as a result, the private initiative created three waste treatment plants in the province of Valladolid.

In a practical way, these three plants had to receive all the construction waste generated in the entire province. However, being located far from many population centres, and charging a price for receiving the debris, they received very little inert waste, and the dumpsites continued proliferating in the rural areas.

After this negative experience, the Provincial Council of Valladolid determined that it was useless to seal dumpsites and reforest its surfaces, if a real alternative for waste disposal was not given to the inhabitants of rural areas. Therefore, and having in mind that a responsible approach to environmental protection by regional authorities is to promote the enforcement of municipal policies assuming the residents' improved awareness and deliberate participation [1], after months studying the situation, the Provincial Environmental Consortium of Valladolid, participated in more than 50% by the Provincial Council of Valladolid, took out a tender for the installation of containers for the collection of debris (exclusively) in any municipality of the province that requested it, with an available budget of 650,000 euros per year, and a maximum duration of four years, formalising the contract on August, 2012. The object of the contract was the following:

- Transfer and permanent installation throughout the period of validity of the contract of waste containers (average 5.48 m³), in number and capacity as requested by any municipality of the province of Valladolid.
- Collection of the containers, once they are full, and after notice by the municipality to the contractor, to proceed with the removal.
- Transportation to the facilities of an authorised waste manager. After the container withdrawal, it has to be replaced by another empty container with the same capacity as the one removed. The contractor is not obliged to carry out the loading of the waste deposited on the land outside the container.
- Installation, in the enclosure where the containers are located in each of the municipalities, of a metallic sign indicating the different waste that can be deposited inside them.

Proposed methodological concept and first results

The service was initially only contracted for the collection of debris, and the start of collection was complex due to the lack of knowledge and distrust that existed between the municipalities and neighbours, especially due to the cost of it.

The beginning of the provision of the service was also complex since the municipalities needed to have a fenced enclosure, with enough pavement to be able to support container trucks. Therefore, during the first months of the programme, containers were hardly filled as many of these municipalities needed this time to build the site. At the end of the second year of operation, the service began to have a greater demand, increasing considerably the number of services provided.

However, in spite of being a service designed for the collection of debris, the reality was that the containers were used to deposit other types of waste such as mattresses, sofas, chairs, furniture, and remains of pruning (Figure 2).



Figure 2. Containers filled with unsuitable material.

The price for the service was 202.39 euros (VAT included) for each container removal. The cost for the municipalities that requested the service was 40% of that price, that is, 80.96 euros. The remaining 60% was paid by the Consortium. In this way, it was intended to give a boost to the implementation of this service and enhance its use by subsidising part of the cost.

From January 2013 to November 2016, the program provided 3,956 services, managing 21,679 tons of waste, with a total cost of 0.8 M€.

When the contract ended in 2016, the Consortium put out a new tender, with similar conditions to the previous one, but for the installation of independent containers for the collection of debris, furnishings and pruning in any municipality of the province upon request, with an available budget of 0.4 M€ per year and a maximum duration of four years, formalising the contract on November, 2016. The containers installed by the new contractor had a variable volume (from 3.2 to 30.96 m³).

The provision of the service was awarded in the following amounts:

- Debris: 27.36 euros m⁻³ of container box.
- Appliances / furnishings: 32.70 euros m⁻³ of container box.
- Pruning: 25.23 euros m⁻³ of container box.

The Table 1 gathers the summary of the activity from the beginning of the contract to the present date.

Table 1. Result of activity.

Month	COST (€)			Nº OF SERVICES			WEIGHT (kg)			VOLUME (m ³)		
	DEBRIS	APPLIANCES	PRUNING	DEBRIS	APPLIANCES	PRUNING	DEBRIS	APPLIANCES	PRUNING	DEBRIS	APPLIANCES	PRUNING
Dec-16	3,162.03	4,543.97	1,978.94	25	25	14	148,140	22,270	15,620	116	138	78
Jan-17	4,215.26	10,650.67	3,372.15	34	57	23	176,820	62,230	23,900	154	326	134
Feb-17	7,172.25	10,412.90	2,732.43	54	50	19	294,580	58,170	14,460	262	318	108
Mar-17	9,503.76	21,616.01	12,027.74	75	92	54	393,080	93,220	48,640	347	661	477
Apr-17	6,385.36	11,887.67	3,375.53	53	59	19	217,060	53,660	25,260	233	364	134
May-17	7,903.05	21,823.15	10,904.11	65	98	46	311,640	110,600	69,080	290	661	432

Jun-17	7,255.80	25,669.71	6,927.25	59	126	32	282,160	139,890	43,700	265	785	275
Jul-17	9,262.68	23,592.09	9,082.89	75	124	39	367,220	152,000	61,040	339	721	360
Aug-17	10,256.51	36,058.29	13,630.55	81	148	55	331,320	170,420	78,040	375	1,103	540
Sep-17	6,858.27	32,954.35	10,859.08	55	132	51	250,520	151,540	67,440	252	1,008	431
Oct-17	9,612.37	23,371.85	18,688.91	75	99	82	349,200	133,240	101,620	351	715	741
Nov-17	17,528.35	25,686.42	17,538.29	122	110	104	725,340	141,620	110,200	641	785	695
Dec-17	5,802.70	14,163.83	7,461.09	48	69	34	250,460	79,740	52,660	212	433	296
Jan-18	11,310.08	16,056.18	10,396.93	69	77	40	458,560	131,500	82,380	413	491	412
Feb-18	8,553.93	16,277.35	8,206.06	71	78	32	362,580	94,750	47,080	313	498	325
Mar-18	8,859.64	12,355.46	7,529.26	64	59	26	315,840	81,900	49,960	324	380	298

Table 1 shows that the number of services provided during the year 2017 was 2,518, which represents a strong increase in the demand for this service. Currently the service is being provided in 107 municipalities of the 225 that form the province of Valladolid (222 below 20,000 inhabitants). The destination of the collected waste is as follows:

Debris: Construction and demolition waste treatment plant.

Discarded appliances and furnishing: All metal parts are used. The rest is transported to the corresponding authorised managers depending on the type of waste.

Pruning: it moves to a bio-composting plant where it is crushed and transformed into compost.

In order to control the type of waste that is collected and transported, the operators always take a photograph of the container in the collection point, another photograph of the container loaded on the truck, and another one of the waste disposed in the treatment plant (Figure 3).



Figure 3. Monitoring of the waste collection process.

In parallel to the development of this service, the Provincial Council of Valladolid adopted the agreement to elaborate, within a period of six months, through the Provincial Environmental Consortium and in collaboration with the Castilla y León regional government, a detailed map of illegal landfill already existing in the province of Valladolid, with a detailed description of the status of each dumpsite, as well as a plan of actions for the restoration of the affected areas. On the other hand, it was proposed to intensify information and environmental awareness campaigns.

The local government provided the Provincial Council with a list of the illegal dumps existing in the province of Valladolid with an area of more than 1,000 square meters. From the whole list, the Provincial Council selected, in a first phase, those located on public owned land to make identification plans for all of them (Figure 4).

This action has allowed the detailed registration of 133 illegal landfill sites with a size greater than 1,000 m², distributed in 90 municipalities of the Province of Valladolid and affecting a total area of 113.3 ha.

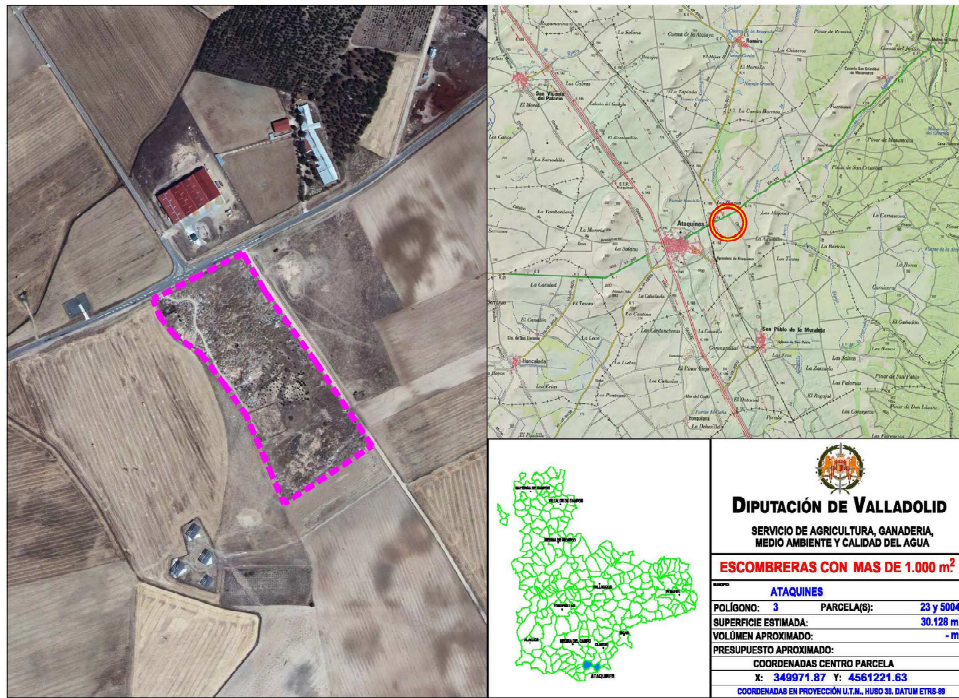


Figure 4. Illegal dumpsites identification and register.

To implement an action plan aimed at the elimination of these dumps, a collaboration agreement was signed on February 15, 2017 between the Ministry of Environment of the regional government (Junta de Castilla y León), the Provincial Council of Valladolid (in charge of rural areas management in the Province) and the Provincial Environmental Consortium of Valladolid (in charge of waste management in rural areas of the Province), for the environmental recovery and restoration of these 133 degraded areas in the period 2017-2019. Also the municipalities hosting the illegal dumping sites to be removed supported this agreement.

As it can be seen, the proposed concept gathers the collaboration of four administrative entities with the common aim of recovering the areas degraded by the deposit of inert waste in the province of Valladolid.

The commitment acquired by the regional government consists of contracting restoration works for the dumpsites that include both, the work and the necessary technical assistance, with a maximum budget of 1,375,000 euros in the period 2017-2019. This agreement also includes the implementation of an alternative and legal system for the management of construction and demolition waste and the provision of advice and accurate information on waste management both, to the Provincial Council and the Consortium and to the municipalities where the waste is located. Finally, a campaign aimed at raising awareness among the population about the adequate management of will be promoted.

Meanwhile, the Provincial Council of Valladolid is committed to facilitate the provision of the land where the dumps are located and inform the municipalities where the service of collection, transport and treatment of waste is provided on its obligation to demand the establishment of a bond prior to the granting of the work license. Finally, this entity collaborates so that the municipalities adopt measures of surveillance, inspection and control of the recovered dumps.

Finally, the Provincial Environmental Consortium of Valladolid assumes to provide, in co-financing with the municipalities, the service of collection, transport and treatment of domestic construction and demolition waste from minor works, as well as discarded appliances and pruning, with a budget of € 1,300,000 also in the period 2017-2019. This will be done by the placement of specific containers for these specific waste streams in areas of contribution or “clean points”.

The main lines of action will be the execution of the restoration works of the 133 existing waste dumps in the province, which are part of the Inventory of Illegal Landfills for Construction and Demolition Waste, taking priority on the works related to the waste dumps included by the European Commission. Likewise, actions will also be taken to prevent the appearance of illegal deposits of construction and demolition waste with actions aimed at improving the environmental behaviour related to this waste, all with the implementation of an alternative and legal system for the management of this waste streams.

In the near future, similar collaboration agreements will be processed with the other provincial councils.

Conclusions

The Valladolid Provincial Environment Consortium launched in 2012 a debris collection plan with the aim of reducing the proliferation of illegal dumps in the municipalities of the province. The ultimate objective of this plan is the sealing of landfills and waste dumps existing in the region, so that compliance with the Regional Integral Waste Plan, as well as the detection and eradication of mini-landfills. The assistance begins with the transfer and installation of a metal container to the municipality associated to the service. Subsequently the collection of the container full of debris is carried out and the waste is transported from the containers to any of the authorised managers in valorisation of this kind of waste streams. The town councils that use this service contribute in their financing with the payment of the applicable public prices. On the other side, the Consortium pays the entire amount of the service to the company awarded with the contract.

In the first four years, the service was provided in 88 municipalities, with an investment of 0,8 M€, recycling approximately 20,000 tons of waste through 3,956 interventions. Currently, there are 107 municipalities that have this benefit. In 2016, a total of 1,734 container collection services were carried out and at the end of that year the conditions for the collection of debris were modified, expanding to the collection of discarded appliances and pruning. In this way, in 2017 a total of 2,518 services were carried out, recycling around 6,000 t of waste which, without the implementation of this program, would probably have ended up in illegal dumps.

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