The effect of a dynamic waste management system in remote rural areas

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Keywords: remote areas, rural communities, mobile systems, waste management.
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According to the peripherality analysis conducted by the European Commission, 35% of the European regions are classified as remote areas. The exposure of these communities to illegal waste dumping practices associated with poor waste collection schemes prior to the closure of dumpsites and the role of collection efficiency afterward in reducing this critical environmental threat constitutes a key issue in the EU.

The improvement of collection efficiency, better surveillance of environmental authorities together with educational and environmental awareness of the general population are necessary steps to combat this bad practice. A circular economy paradigm must be enacted in remote regions through separate collection schemes, involving locals as a key player in the whole process and taking measures to promote in-situ recycling and, thus, improve cost-efficiency in waste management.

The LIFE PAVEtheWAySTE project works on this line, proposing the implementation of a circular model based on the belief that many of the waste produced in remote areas can be a source of secondary materials capable of replacing traditional raw materials in local production processes, thus avoiding their potential disposal on the environment and the unnecessary consumption of natural resources.

The main objective of the LIFE PAVEtheWAySTE is to develop, build, test, demonstrate and evaluate a prototype recycling system called "Green Kiosk" that works at the neighbourhood level and can receive different types of recyclable waste that are sorted in local homes and businesses.

In July 2018, this recycling scheme was implemented in the Local Communities of Schinousa, Donousa, Iraklia and Koufonisi Islands. Those four islands form the Small Cyclades complex. Initially, the separation is done domestically in five main flows: cardboard / paper, metal, glass, plastic and some special flows (such as batteries, lamps, used cooking oils, etc.). Once the waste is deposited in the "Green Kiosk" an operator makes a fine separation of the waste materials into twelve subflows before temporary storage (PET, white and coloured, HDPE, LDPE, PP/PS, ferrous and non-ferrous metals, transparent and coloured glass paperboard, print paper and mixed paper.

To effectively carry out the identification of waste origin and encourage locals to participate in the project, an identification card was given to potential users in a way that allows to collect reward points and relevant informational material.

So far, the results obtained from Small Cyclades have been particularly encouraging. Purity rates of waste materials are very high, ranging from 86-97%. The most common waste streams delivered to the Green Kiosks are PET bottles, glass bottles, and cardboard owing to the lack of drinking water, the large number of restaurants/hotels/cafeterias and large quantities of imported packaged goods.

The second step in the LIFE PAVEtheWAySTE project is to implement replication studies for transferring the project findings in follower Municipalities. Valladolid Province (Spain) is one of them. This Spanish province has already implemented a mobile "clean point" with the same philosophy that the "Green Kiosk" (Figure 1) that can be adapted following the guidelines established in the project to increase recycling rates in target areas.

Figure 1. Mobile "Clean Point" in Valladolid rural areas.

The mobile Clean Point is intended for the collection of waste whose separation is not carried out regularly by the inhabitants of the rural municipalities since in most of the localities there are no individualized containers for the collection of this type of waste. The waste collected at the mobile clean point is mostly recoverable for its incorporation back into the production chain.

In this case, the waste streams selected for collection have been those more abundant in illegal dumping sites and those specially harmful for the environment if they are not properly disposed of. To this group belongs automotive waste (oils, filters, etc.), cooking oils, paints and varnishes, clothing, medications and radiographs, appliances, large household goods (furniture, mattresses, etc.), phytosanitary containers, glass, fluorescent lamps and light bulbs, electrical appliances and batteries. The reason for this selection is the current fight of the provincial government of Valladolid against illegal dumping of waste, because it is demonstrated how the ecological situation in some areas, especially rural areas, is deteriorating precisely because of the dump.

The provision of the service consists of the transport of the mobile Clean Point, composed of different containers for selective collection of waste, to the municipality that requests it, the unloading and placement of the container in the place indicated by the municipality and the collection and removal of the container once the period of permanence agreed (usually one week) has been completed. In the (frequent) event that the waste received exceeds the capacity of the mobile Clean Point, the excess waste is removed by using a 25 m^3 capacity truck. This withdrawal is considered as the provision of a new service.

The municipalities of the Province of Valladolid requesting the mobile Clean Point are obliged to pay a subsidized price for the provision of the service amounting 108 € per service.

107 and 122 services were given in rural locations of the Province in 2018 and 2019 respectively, collecting more than 6.000 m^3 of waste. This waste has been delivered, up to know, to an authorized manager but, in the frame of the PAVEtheWAySTE project, the option of recycling some of these waste streams in situ is being studied, in order to favour local business activity. Furthermore, the implementation of an identification card for users is also being analysed in order to establish an access control system to the clean point to improve the separation and to have information that will allow to establish a reward system.

Acknowledgment

The authors gratefully acknowledge support of this work by the LIFE Programme of the European Commission through the grant agreement LIFE14 ENV/GR/000722-LIFE PAVEtheWAySTE.