

Mapping municipal solid waste to boost circular valorization practices in Łódzkie

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ABSTRACT: Geographic Information System (GIS) is a powerful instrument that can be used for the spatial representation of waste and by-product flows at various levels, allowing to improve municipal solid waste (MSW) management. The mapping obtained can be advantageously targeted to build a regional network of technological, economic, social and environmental linkages and to boost circular economy practices. In this work, the data on MSW produced in the Łódzkie region, Poland, during 2021 were used to generate a geolocalized database and an interactive web map, using ArcGIS software. The geodatabase and the map visualization were organized in three layers of information with increasing detail to foster a map-driven symbiosis between waste suppliers and waste recipients, paving the way for a more circular regional economy.

1 INTRODUCTION

Circular economy is a model of production and consumption, which involves sharing, leasing, reusing, repairing, refurbishing and recycling existing materials and products as long as possible (Morone & Yilan, 2020). Boosting circular economy practices through mapping on digital platforms has the potential to enable the creation of a network of technological, economic, social and environmental linkages at the regional level. Thereby advantageous synergies can be identified between suppliers and receivers of resources, products, by-products and waste, in order to facilitate regional logistics planning and the implementation of circular economy circuits.

The access to geospatial data has increased greatly using internet services, which have made interactive online maps available to interested parties. A mapping tool was developed to characterize the baseline situation in 17 European regions in terms of existing technological, industrial, research and innovation, and education capabilities, as well as emerging circular economy initiatives (Volkers 2018). The objective was to define a replicable and scalable approach, to support European regions in the transition to new circular economy cross-regional value-chains. Similarly, DigiPrime Pilot 5 “Cross-regional value chains’ identification” identified cross-sectorial and cross-regional circular economy value-chains through mapping activity. The original methodologies and tools were conceived as a powerful instrument for supporting regional officers to have an overview of the existing and potential value chains, as well as to be notified about possible new cross regional or cross sectorial synergies and value chains (Mossali et al. 2020). The service enabled the use of the lean management method of value stream mapping in the context of circular economy processes.

The market uptake of sustainable bioenergy in Europe using marginal, underutilized, and contaminated lands for non-food biomass production through the provision of a web-based platform as decision support tool was also envisaged. This Web Platform tool combined the GIS maps with the Sustainability for Europe and Neighboring countries (STEN) tool, to assess the sustainability of selected bioenergy investments on marginal and underutilized lands in Europe and Ukraine (Hirschmugl et al. 2021, Khawaja et al. 2021). Other advances were directed at providing local and regional authorities with an innovative transdisciplinary open source Geodesign Decision