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Application of geographic information systems to the analysis of the solid waste production on the city of Bogotá (Colombia)

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One of the main environmental issues to address in the Capital City of Bogotá (Colombia) is the increasing production of solid waste. Despite significant efforts have been made to implement an integral solid waste system management, the current management methods do not provide a permanent alternative to minimize waste production. According to the most recent data, Bogotá is producing almost 2,7 Mt/year of solid waste and only 17,12% of this amount is reused. This means that 82,88% of the waste production has to be disposed on the municipal landfill which has an estimated life of 7,6 years [1]. Bogotá is nowadays running the so-called Zero Waste Program, which tries to run an adequate solid waste management scheme while updating the most recent Integral Solid Waste Management Plan (ISWMP). However, various strategies and methodologies are still needed to fulfill their objetives. The analysis of the solid waste production inside the city using geographic information systems (GIS) is one of the available strategies that may contribute to the environmental impacts minimization, acting at the same time as a decission support tool. These techniques have already been used to the analysis and optimization of the waste collection routes and the location of waste disposal sites. They allow to visualize the critical urban zones with increasing waste production so the next steps of the management process can be properly designed (collection, trasnport routes design, location of treatment facilities and final waste disposal sites).

The estimation of the urban solid waste generation is done applying different mathematical and statistical methods, which are based on the relation between the total population of the city and the per capita waste production. GIS methods allow i) to determine the total amount of waste generated as a function of the population increasement and ii) provide a full view of the zones where priority actions are needed as they take into account both the geographical and spatial component. The behaviour of the waste generation is explained considering also the socieconomic stratiphication.

Results show in this research are obtained using ArcGIS considering the official 2005 census population, the population estimation in 2020, the amount of waste recycled and disposed on the municipal landfill and the socioeconomical of the different urban areas following the local waste management plans and programs.

[1]Technical Support document, Solid Waste Management Plan of Bogotá D.C. Alcaldía Mayor de Bogotá, November 2016.