EVALUATION OF THE SPATIAL AND TEMPORAL TRENDS IN HOUSEHOLD SOLID WASTE DISPOSAL IN SRI LANKA USING GEO-INFORMATICS AND STATISTICAL TOOLS

N.W.B.A.L Udayanga*, K.A.R.K Kodituwakku

Department of Zoology, Faculty of Science, University of Kelaniya, Kelaniya, Sri Lanka

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Corresponding Author: udayangaln@gmail.com

ABSTRACT

Generation of solid waste in large quantities and their improper disposal associated with the accelerated economic and technological advancement and population growth have raised growing concerns throughout the world including Sri Lanka. The complication of the composition and the quantitative increase of household waste have become a major issue in Sri Lanka. Localized trends in solid waste disposal play a critical role in drafting of policies and management plans for effective management of solid waste. Thus, a statistics and geoinformatics based analysis of the recent trends in household solid waste disposal was carried out to identify the characteristic disposal methods of household solid waste of each district, and to evaluate both spatial and temporal trends in household solid waste disposal patterns in Sri Lanka in order to facilitate the effective management of solid waste. Commonly practiced household solid waste disposal methods and percentage contribution of each method in each district in 2006-2007, 2009-2010 and 2012-2013 were obtained from the Department of Census and Statistics, Sri Lanka. The data were then subjected to Principal Component Analysis (PCA) to identify the major characteristic household solid waste disposal methods and the temporal variation of the household solid waste disposal methods in each district, by using PRIMER V 5.2.9. software package. Characteristic disposal method(s) of household solid waste in each district during the study period were recognized based on the scores of the Principal Components and districts that exhibit similarities in the disposal methods were grouped into clusters. Spatial maps of above recognized clusters that exhibit similar characteristic disposal methods were prepared using Arc GIS 9.2 and the spatial and temporal variation of such clusters were analyzed to identify the recent trends in household solid waste disposal.

Significant temporal variations in household solid waste disposal practices could be identified in many districts including Colombo, Galle, Kandy, Polonnaruwa, Anuradhapura where several districts including Gampaha and Batticaloa exhibited unchanged characteristic disposal practices throughout the years. The utilization of geo-informatics and statistical tools facilitate the identification of characteristic solid waste disposal methods and their temporal and spatial trends. Hence, the geoinformatics and statistical tools could be utilized by the government sector to evaluate the effectiveness of existing solid waste management plans and practices as well as in drafting new policies and plans for solid waste disposal, rather than relying on the traditional approaches.

Key words: Household solid waste, disposal practices, GIS, temporal, spatial, trends