Designing A Sustainable Solid Waste Management System For Habiganj Pourasava

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ABSTRACT

Municipal solid waste management is considered as one of the most serious environmental and social problems challenging municipal authorities in developing countries. One of these impacts is raised from location of dumping site in unsuitable areas. Solid Waste Management (SWM) is an integral part of public health and environmental control. Improper SWM leads to both economical and environmental sufferings. SWM includes control of generation, storage, collection, transfer/transport, processing and disposal of waste. Almost all factors related to SWM has both spatial and non-spatial components, thus, traditional ways of storing and analyzing data keeps data in isolated form, which results in inefficient management system. This study will introduce a design of overall solid waste management system using Geographical information system for Habiganj pourasava. In Habiganj, number of industry and high rise building has been increased day by day which is producing a great number of waste. Due to lack of management system these wastes are polluting the surrounding environment. In this design landfill area will be determined as well as its storage capacity for the household. Nevertheless, it will also identify transfer route proximity and disposal of this household waste. This model will provide significant waste management system as well as simple, easy and effective. This will allow people for regular dumping, employees for regular collection and authority for management.

INTRODUCTION

An inevitable putrescible and non-putrescible product, which is generated from human consumption in different activities, is known as waste (Islam et al., 2016). One of the most critical and environmental problem faced by municipality In developing countries is municipal solid waste management (Shoba & Rasappan, 2013). In the stable environmental perspective, urban development is one of the recent aspects, which is needed to be acknowledged (Olapiriyakul, 2017). The rapid growth of urban population and urbanization due to increase in per capita consumption is the main reason for this problem (Berisa & Birhanu, 2016). Population increase is highly correlated with increase in solid waste generation. The higher urban population the greater production of solid waste (Shoba & Rasappan, 2013) . The increase of waste than managing capacity of waste and inefficiency in solid waste management affects socio-economic development, environment and living standard of the people in a municipality (Islam et al., 2016). This issue has greater risk on human health and environmental sustainability (Berisa & Birhanu, 2016). Common problems such as diseases spread, fire exposures, odor pollution, water pollution, air pollution etc. are related with ineffective waste management system (Berisa & Birhanu, 2016)So effective and efficient solid waste management system is a mandatory need in the urban area. SWM includes control of generation, storage, collection, transfer/transport, processing and disposal of waste(Singh et al., 2014). Almost all factors related to SWM has both spatial and non-spatial components, thus, traditional ways of storing and analyzing data keeps data in isolated form, which results in inefficient management system (Taleb, 2007). In effective management system of solid waste Geographical Information System is playing a very vital role. The progression of GIS

made this sector considerably easier and controllable (Berisa & Birhanu, 2016)In understanding the existing conditions of solid waste and designing route through mapping, site selection of ultimate disposal etc. GIS has greater potentiality (Shoba & Rasappan, 2013), (Berisa & Birhanu, 2016). GIS major outcome is based on spatial choice provision system, which include query analysis, buffer analysis, overlay analysis, neighborhood analysis and network analysis. Combinations of these analyses mainly produced the final output during the geographical data analysis process

This study will introduce an innovative solid waste management system using Geographical information system for Habiganj pourasava of Sylhet. As in Habiganj, number of industry and high-rise building has been increased day by day, which is producing a great number of wastes. Due to lack of management system these wastes are polluting the surrounding environment. By using this model landfill area will be determined as well as its storage capacity for the household. Nevertheless, it will also identify transfer route proximity and disposal of this household waste. This model will provide significant waste management system as well as simple, easy and effective. This will allow people for regular dumping, employees for regular collection and authority for management.

METHODOLOGY

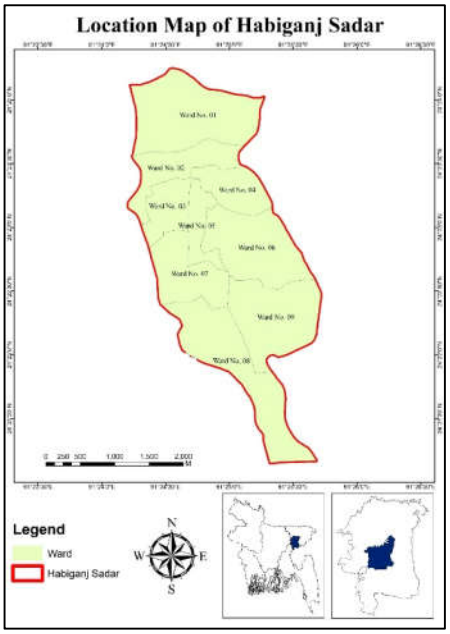

Figure 01 Location of Study Area

Habiganj Sadar Upazila (Habiganj locale) territory 253.74 sq. km, situated in the middle of 24°15' and 24°27' north scopes and in the middle of 91°19' and 91'30' east longitudes. It is limited by baniachang and nabiganj upazilas on the north, chunarughat and madhabpur upazilas on the south, bahubal upazila on the east, lakhai upazila on the west. Figure 01 is showing the location map of Habiganj Upazilla. Whole technique is three level process for planning reasonable site. In primer condition weightage excessively is finished with the variable factor that can affect on the structuring reasonable site for landfill. There are three factor that effect on planning appropriate site which are incline, street and land utilize. Incline has been renamed into some according to arrive utilize class. With street Euclidian separation has done and renamed into same class as land utilize. Keeping marsh, unused land in high weighted esteem, incline with a high class and low street closeness in high weight weighted overlay activity has been finished. This will be the yield arrive with high inclination for dumping ground of landfill territory of Habiganj. Reasonable site has been chosen dependent on a few

criteria. Criteria has been worked on the waterbody, confined region, open space and street has been incorporated. Waterbody has been cushioned for 200-meter, confined territory has been cradled for 500-meter, open space for 300-meter, street for 100-meter support has been finished. The crossing point zone of this cradled territory gives appropriate site for landfill. Association high weighted territory and appropriate condition region gives enhanced reasonable zone for landfill site. Ultimately advanced region has been cross checks with unused zone, and the coordinated region has been chosen for definite dumping station.

ANALYSIS

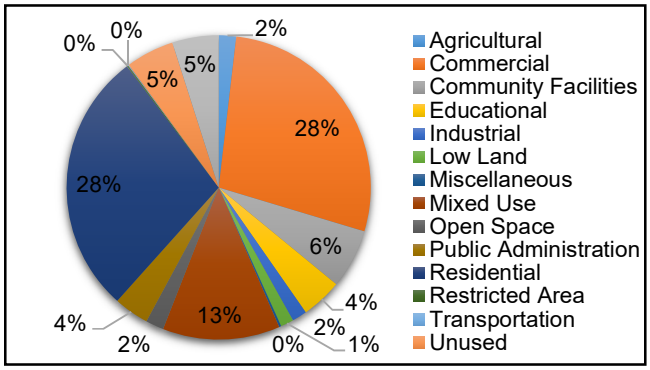

Figure 02 Percentage of Land use

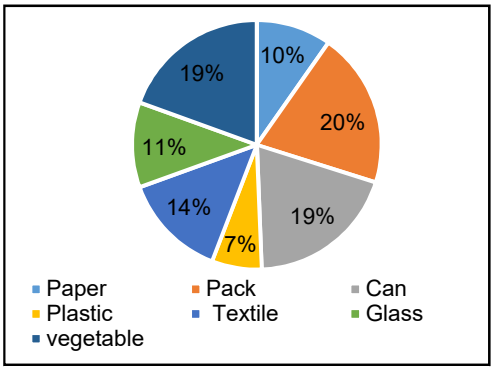

Figure 03 Percentage of Generated Waste Type

Figure 02 is showing the percentage of land use of Habiganj municipality. Habiganj municipality is a small area of 20.6 km² with a variation of land use. Around 15 types of land use are found here. Among them most of the lands are used for residential and commercial purpose. Most of the land of the municipality is occupied with various purpose. Only 1.24% of total area is open space. The figure 03 is showing the percentage of different type of waste generated in Habiganj municipality.

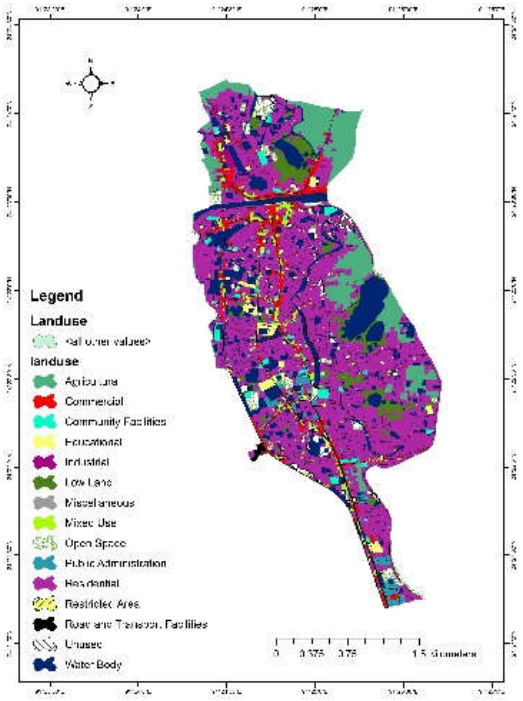

Figure 04 Land Use Map of Habiganj Municipality

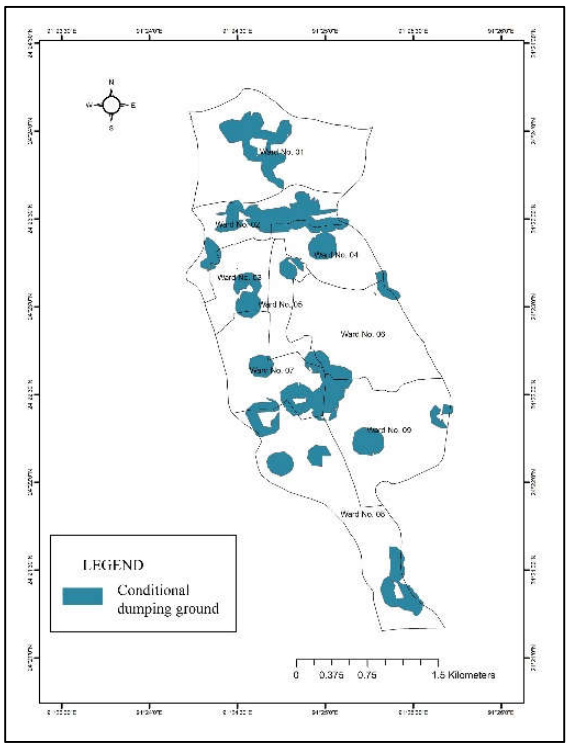

Figure 05 Conditional Suitable Map of Habiganj Municipality

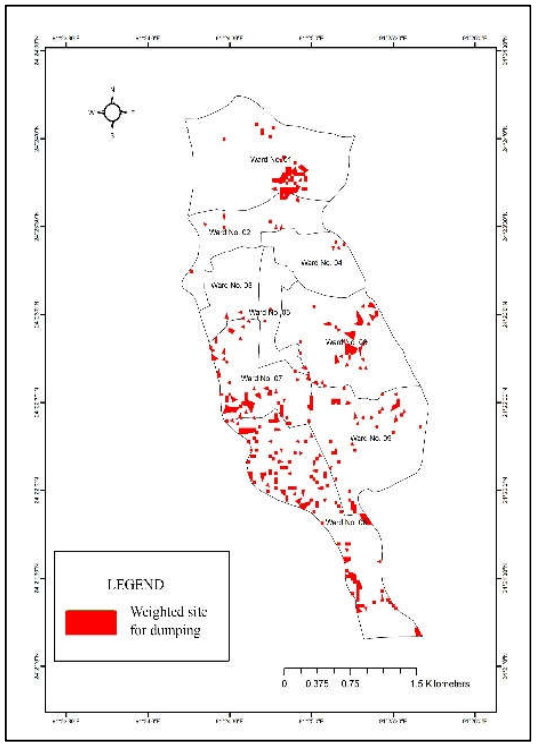

Figure 06 Weighaed Overlay Map of Habiganj Municipality

Suitable Site

From graph we can say that maximum percentage of waste is of polythene packet. This are the most harmful type of waste as it is not biodegradable and it is very harmful for the environment. Another most highly generated type of waste is bottle can and another is vegetable waste which is degradable. Another harmful waste is plastic which is 7% of total waste.

Figure 05 is demonstrating the conditional map of Habiganj pourasava. This guide incorporated the states of various area's cradle. The segments are waterbody, limited region, street, open space. For waterbody, street, limited territory and open space, 200m, 100m, 500m and 200m cushion is been finished. It tends to be seen from this guide; the conditions appropriate regions are not grouped in a solitary place but rather scattered in all the pourasava.

Figure 06 is demonstrating the weighted overlay map of Habiganj pourasava. The slope of this pourasava, Euclidean distance of street and all the land use of this pourasava has been characterized into 5 classes. Lower slope is given much weightage than higher slope. For land use like unused region, low lying zone are given much weightage than other land use as these grounds are most appropriate for the reasonable site of dumping squanders. At that point every one of the 3 shape is overlay and this map is found.

Figure 07 is indicating final suitable site of waste dumping site. This map is found by intersecting conditional and weightage suitable map. This map is demonstrating that generally in ward no 1, 7, 8 the appropriate site is for the mostly found. This map is also showing three proposed suitable sites as these areas located in unused land use. Unused region is for the most vital part for the site of dumping waste. These territories likewise cover the most part the entire region of this pourasava. The circled suitable areas are the proposed area for the selection of dumping site.

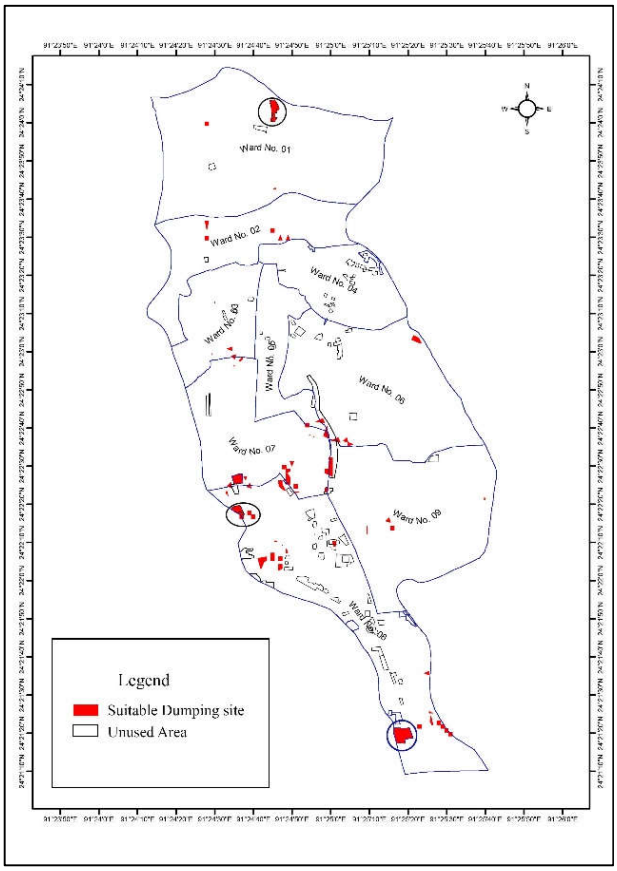

Figure 07 Suitable Site Map of Waste Dumping Site

Design

It is proposed for trench dumping method for landfill. From the above figure it is seen that there is gas management system which will allow all the gas that will produce from dumping ground. A gas monitoring probe also propose for the regulation of discharge from the landfill site. Due dumping of waste in close ground there is produce some sort of leachate, to resolve this a leachate removal pipe has been design which is connected to leachate management system. This will collect and treatment of leachate and latter discharge. At the center a vent pipe also been set to pass out the gas. A surface water control system also has to establish so that groundwater doesn't contaminate. This consist of two part one upgrading ground monitoring well and downgrading ground monitoring well. These will keep the landfill site sustainable

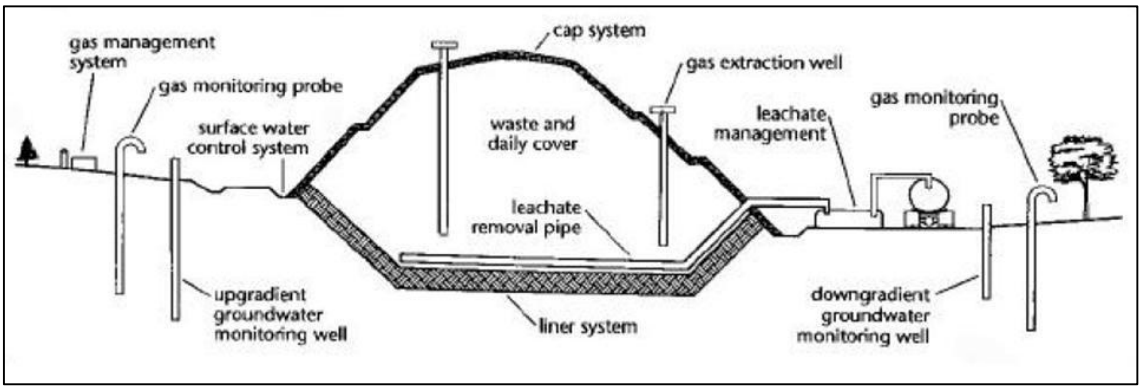

Figure 08 Trench Dumping Method for Landfill

Conclusion

This paper begins by giving brief presentation about strong waste (SW) and strong waste administration (SWM). At that point specifies the advantages of geographic data framework (GIS) that that can be used in the field of SWM. The goal of this paper is to plan of a strong waste framework. By choice of strong waste site and structure the landfill this paper could empower economical strong waste administration. Since amid structure of the examination all effect factor that can influence strong waste framework has been taken. What's more, present site for the strong waste framework is wasteful and incapable of strong waste dumping this will debase the earth and biology. With an intend to preserve ecological parity this plan has been finished with appropriate site.

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