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An Integrated Solid Waste Management Strategy for Semi-Urban and Rural Areas of Pakistan

Authors : Z. Zaman Asam, M. Ajmal, R. Saeed, H. Miraj, M. Muhammad Ahtisham, B. Hameed, A. -Sattar Nizami

Abstract : In Pakistan, environmental degradation and consequent human health deterioration has rapidly accelerated in the past decade due to solid waste mismanagement. As the situation worsens with time, establishment of proper waste management practices is urgently needed especially in semi urban and rural areas of Pakistan. This study uses a concept of Waste Bank, which involves a transfer station for collection of sorted waste fractions and its delivery to the targeted market such as recycling industries, biogas plants, composting facilities etc. The management efficiency and effectiveness of Waste Bank depend strongly on the proficient sorting and collection of solid waste fractions at household level. However, the social attitude towards such a solution in semi urban/rural areas of Pakistan demands certain prerequisites to make it workable. Considering these factors the objectives of this study are to: [A] Obtain reliable data about quantity and characteristics of generated waste to define feasibility of business and design factors, such as required storage area, retention time, transportation frequency of the system etc. [B] Analyze the effects of various social factors on waste generation to foresee future projections. [C] Quantify the improvement in waste sorting efficiency after awareness campaign. We selected Gujrat city of Central Punjab province of Pakistan as it is semi urban adjoined by rural areas. A total of 60 houses (20 from each of the three selected colonies), belonging to different social status were selected. Awareness sessions about waste segregation were given through brochures and individual lectures in each selected household. Sampling of waste, that households had attempted to sort, was then carried out in the three colored bags that were provided as part of the awareness campaign. Finally, refined waste sorting, weighing of various fractions and measurement of dry mass was performed in environmental laboratory using standard methods. It was calculated that sorting efficiency of waste improved from 0 to 52% as a result of the awareness campaign. The generation of waste (dry mass basis) on average from one household was 460 kg/year whereas per capita generation was 68 kg/year. Extrapolating these values for Gujrat Tehsil, the total waste generation per year is calculated to be 101921 tons dry mass (DM). Characteristics found in waste were (i) organic decomposable (29.2%, 29710 tons/year DM), (ii) recyclables (37.0%, 37726 tons/year DM) that included plastic, paper, metal and glass, and (iii) trash (33.8%, 34485 tons/year DM) that mainly comprised of polythene bags, medicine packaging, pampers and wrappers. Waste generation was more in colonies with comparatively higher income and better living standards. In future, data collection for all four seasons and improvements due to expansion of awareness campaign to educational institutes will be quantified. This waste management system can potentially fulfill vital sustainable development goals (e.g. clean water and sanitation), reduce the need to harvest fresh resources from the ecosystem, create business and job opportunities and consequently solve one of the most pressing environmental issues of the country.

Keywords : integrated solid waste management, waste segregation, waste bank, community development
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