

Associated Problems with the Open Dump Site and Its Possible Solutions

Authors : Pangkaj Kumar Mahanta, Md. Rafizul Islam

Abstract : The rapid growth of the population causes a substantial amount of increase in household waste all over the world. Waste management is becoming one of the most challenging phenomena in the present day. The most environmentally friendly final disposal process of waste is sanitary landfilling, which is practiced in most developing countries. However, in Southeast Asia, most of the final disposal point is an open dump site. Due to the ignominy of proper management of waste and monitoring, the surrounding environment gets polluted more by the open dump site in comparison with a sanitary landfill. Khulna is 3rd largest metropolitan city in Bangladesh, having a population of around 1.5 million and producing approximately 450 tons per day of Municipal Solid Waste. The Municipal solid waste of Khulna city is disposed of in Rajbandh open dump site. The surrounding air is being polluted by the gas produced in the open dump site. Also, the open dump site produces leachate, which contains various heavy metals like Cadmium (Cd), Chromium (Cr), Lead (Pb), Manganese (Mn), Mercury (Hg), Strontium (Sr), etc. Leachate pollutes the soil as well as the groundwater of the open dump site and also the surrounding area through seepage. Moreover, during the rainy season, the surface water is polluted by leachate runoff. Also, the plastic waste flowing out from the open dump site through various drivers pollutes the nearby environment. The health risk assessment associated with heavy metals was carried out by computing the chronic daily intake (CDI), hazard quotient (HQ), and hazard index (HI) via different exposure pathways following the USEPA guidelines. For ecological risk, potential contamination index (Cp), Contamination factor (CF), contamination load index (PLI), numerical integrated contamination factor (NICF), enrichment factor (EF), ecological risk index (ER), and potential ecological risk index (PERI) were computed. The health risk and ecological risk assessment results reveal that some heavy metals possess strong health and ecological risk. In addition, the child faces higher harmful health risks from several heavy metals than the adult for all the exposure pathways and media. The conversion of an open dump site into a sanitary landfill and a proper management system can reduce the problems associated with an open dump site. In the sanitary landfill, the produced gas will be managed properly to save the surrounding atmosphere from being polluted. The seepage of leachate can be minimized by installing a compacted clay layer (CCL) as a baseline and leachate collection in a sanitary landfill to save the underlying soil layer and surrounding water bodies from leachate. Another important component of a sanitary landfill is the conversion of plastic waste to energy will minimize the plastic pollution in the landfill area and also the surrounding soil and water bodies. Also, in the sanitary landfill, the bio-waste can be used to make compost to reduce the volume of bio-waste and proper utilization of the landfill area.

Keywords : ecological risk, health risk, open dump site, sanitary landfill

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