土質材料及びバイオ資材を活用した透過性反応壁材料の検討
Development of permeable reactive barrier system utilizing locally available geo- materials and bio resource in Sri Lanka: Characterizing of heavy metal adsorption and water permeability

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Open dumping is the common method for final waste disposal used in many developing countries. Various kinds of heavy metals often detected in landfill leachate and groundwater surrounded at open dumpsites in Sri Lanka. Thus leachate and groundwater treatment facilities are strongly recommended in order to prevent contamination of natural ecosystem. Permeable Reactive Barrier (PRB) systems might be an effective method to treat contaminated water at open dumpsites, which required low initial cost, maintenance cost and technical support. Therefore, the objectives of this study were to characterize the heavy metal adsorption and permeability performances of low-cost filling materials (soil, biochar, crushed brick, and their mixed samples) locally found in Sri Lanka. Adsorption isotherms of Pb and Cd for tested materials showed that the maximum adsorption capacities and removal percentages of Pb were higher than those for Cd. The brick mixed samples showed less adsorption capacities compared to the non-brick mixed samples because of the low adsorption capacity of brick. On the other hand, the brick mixed samples showed the highest water permeability and exceeded the targeted hydraulic conductivity of 10-3 cm/s, under relatively high compaction degree of 75%. This suggests that the mixing of brick with soil and biochar is effective to satisfy a required water permeability of filling materials for the PRB systems.