

Migration of sediment and ^{137}Cs on decontaminated arable lands

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To mitigate radiological risks to residents in Fukushima, decontamination, such as removal of contaminated surface soil and covering contaminated soils with clean soil (i.e., soil dressing), has been conducted in areas of heavy radiological contamination. Although removing and concealing radioactive materials are expected to reduce ambient dose rates, such anthropogenic alteration of soil may result in changes to the hydrological responses and sediment dynamics of the area under the decontamination. Few studies have investigated the dynamics of sediment and ^{137}Cs associated with decontamination efforts. Our research studies the release of sediments and ^{137}Cs from decontaminated lands to elucidate the influence of decontamination. Soil erosion plots were installed on four contaminated land use types (uncultivated farmland, cultivated farmland, grassland, forest) and two decontaminated land use types (uncultivated farmland, cultivated farmland) to observe sediment discharge and ^{137}Cs wash-off. The ^{137}Cs activity concentration of eroded sediments from decontaminated lands were approximately 10 times lower than those from contaminated lands. The amount of sediment eroded from the decontaminated farmland was comparable to those from contaminated farmlands, but higher than those from contaminated grassland and forest. ^{137}Cs wash-off rates on decontaminated lands were lower than those on contaminated farmlands and higher than those on grassland and forest. These results suggest that decontamination results in a decrease of ^{137}Cs wash-off on erodible agricultural lands and increase relative to less erodible lands (grasslands and forests). Surface runoff coefficients and contribution of fine sediment to discharges of both sediment and ^{137}Cs were lower on decontaminated farmlands than those on contaminated farmlands. One possible explanation is that high permeability of decontaminated land resulted in inactive discharge of fine sediment. Elucidation of soil erosion processes on decontaminated lands based on investigation of its soil physical properties, such as permeability and particle size distribution, are required to better understand the influence of the decontamination.

Keywords: Decontamination , Soil erosion, Slope, ^{137}Cs