

Long-term Changes in the Distribution of Atmospherically Deposited Radioactive Cs in a Small Forest in Fukushima Prefecture

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Radioactive Cs concentration in fresh leaves/needles, litter, surface soil, stream sand in a deciduous broadleaf forest and cedar forest in Minamitsushima, Namie-town was continuously investigated from June 2012 except for snow-cover period. A car-borne survey from Fukushima city to Minamitsushima showed that air dose rate declined faster than the values estimated by physical attenuation, due to the radioactive decontamination, other than the forest area. Radio-Cs concentrations ($^{137}\text{Cs} + ^{134}\text{Cs}$) in litter and surface soil in deciduous broadleaf forest were constant at 52.0, 102 Bq kg-dry⁻¹ respectively from 2014. However, those in fresh needle and litter in cedar forest continued to decline, probably because of washing and leaching by throughfall, from 2012 to 2016 and accumulated in surface soil (106 Bq kg-dry⁻¹ in 2016). Radio-Cs infiltrated into soil deeper in deciduous broadleaf forest (buffer depth: 1.26 cm) than in cedar forest (buffer depth: 1.14 cm) in spring in 2013, but the relationship between the two reversed in winter in 2015 (buffer depth: 1.5 cm in broadleaf forest and 2.6 cm in cedar forest). Radio-Cs were concentrated in smaller bottom sand in stream water (over 2 cm: 3.04, 0.2-2 cm: 10.2, under 0.2 cm: 54.5 Bq kg-dry⁻¹ in downstream near the broadleaf forest and over 2 cm: 2.67, 0.2-2 cm: 7.95, under 0.2 cm: 41.3 Bq kg-dry⁻¹ in upstream near the cedar forest) and the outflow of a part of that as suspended sand were concerned. Though the relative radio-Cs concentrations in smaller bottom sand to those in surface soil have declined (2013:0.54, 2016: 0.29 in downstream and 2013: 1.4, 2016: 0.31 in upstream), floating male flowers of cedar containing high radio-Cs (23.8 Bq kg-dry⁻¹) could be another transport media in spring.

Keywords: Forest, Surface soil, Fresh leaves/needles, Litter, Stream sand, Edge effect