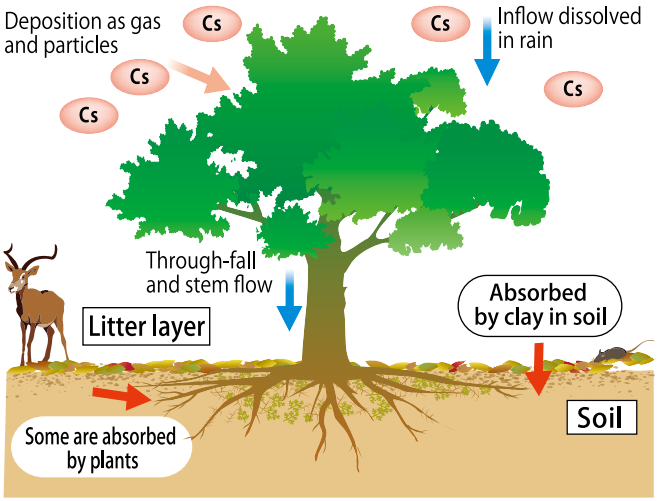
II Dynamics of Radioactive Substances in Forests

Forestry Agency set monitoring sites in three municipalities (Kawauchi Village, Otama Village, and Tadami Town) in Fukushima Prefecture in 2011 to clarify the distribution of radioactive cesium within forests. It investigates the concentrations and accumulated quantities of radioactive cesium in soil, in litter layers, and in the leaves, trunks, and other parts of trees.

Dynamics of Radioactive Substances in Forest Ecosystems

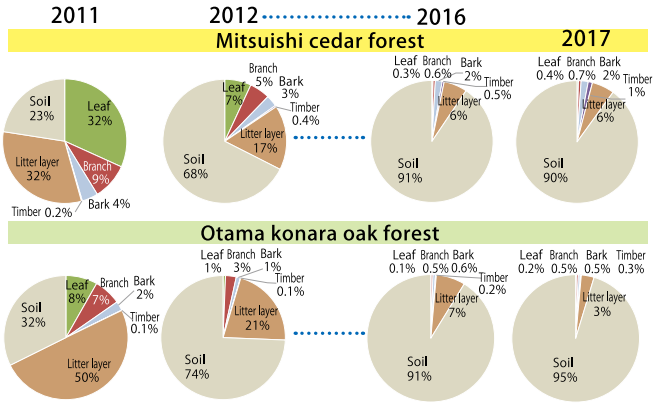
Fallout radioactive cesium into forests was carried as gas and particles in the air, dissolved into rain water, and attached to trees, mainly in the forest canopy (the upper parts of trees, with thick leaf growth). After that, the leaves fall and deposits are washed off by rain, moving into the litter layer on the ground surface. Next, the litter layer is decomposed and moves into the soil (Figure 1). This process was also revealed by investigations after the Chernobyl reactor accident.

Just as in the surveys areas where the Forestry Agency has been continuously taking measurements since 2011 (Mitsuishi cedar forest in Shimo-Kawauchi, Kawauchi Village, Futaba District, Fukushima Prefecture and Otama konara oak forest in Tamai, Otama Village, Adachi District, Fukushima Prefecture), the proportion of radioactive cesium in leaves, branches, and litter layer fell sharply and the proportion in soil rose between 2011 and 2012, the first year after the accident. After that, the proportion of radioactive cesium in soil rose further. In 2017, around 90% of radioactive cesium in forests was in soil, and a majority of that was present in the top layer of soil, at depths of 0-5cm deep (Figure 2).



[Figure 1] Dynamics of Radioactive Cesium in Forest Ecosystems

Reference : 2017 symposium document by the Forestry and Forest Products Research Institute

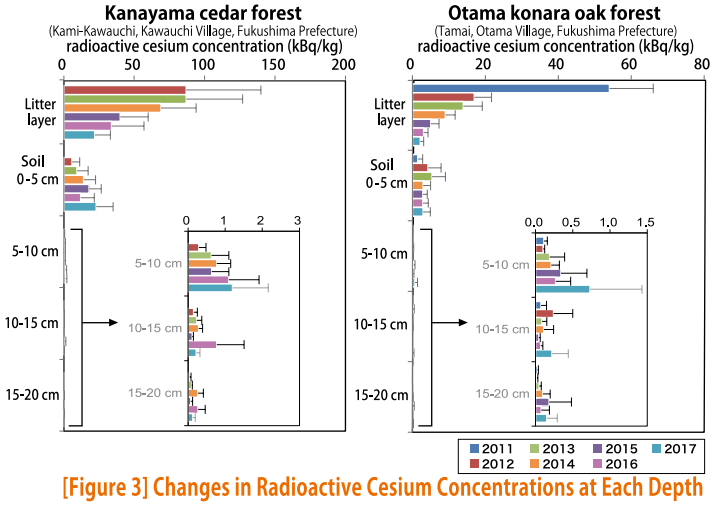


(Note) Survey results between 2013 and 2015 have been omitted.

[Figure 2] Proportion of Accumulated Radioactive Cesium in Each Part in Each Survey Area

Reference : Forestry Agency "Results of a Survey of Radioactive Cesium Distribution in Forests" (2017)

The radioactive cesium concentration at each depth level within soil appears to be shifting gradually over time, from above ground to the litter layer, and then into soil between 0 to 5cm in depth. In some monitoring sites, movement to deeper layers can be seen, so it will be necessary to watch the state of movement closely in future (Figure 3).



[Figure 3] Changes in Radioactive Cesium Concentrations at Each Depth in Soil (examples of Kanayama cedar forest and Otama konara oak forest)

Reference : Forestry Agency "Results of a Survey of Radioactive Cesium Distribution in Forests" (2017)