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## Estimation of fine sediment transport processes by forest management using Pb-210ex, Cs-137 and Cs-134

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While thinning practices are essential for forest maintenance and management, it has been suggested that the amount of sediment discharge from forests to rivers increases with the practices. In Karasawayama, Tochigi Prefecture, Japan, different types of thinning were carried out in 2011-12, and continuous observation of water and sediment runoff before and after thinning has been carried out. So far, through connectivity analysis, Lopez-Vincente (2017) estimated that work roads can be a major runoff pathway for sediment produced by thinning practices. On the other hand, radionuclides are known to be effective in estimating the source of sediment production. In this catchment, 8kBq/m<sup>2</sup> of Cs-137 and Cs-134 were newly deposited due to the Fukushima Daiichi Nuclear Power Plant accident during the observation period. Therefore, the purpose of this study was to estimate the source of fine sediment production from the slope scale to the watershed scale before and after thinning, utilizing Cs-134 of Fukushima origin and changing the end-members of the source sediment production in each year for more detailed source estimation. In addition, by using Pb-210ex, Cs-137, and Cs-134 at the same time, we can distinguish the production sources more clearly. In the field, SS samplers and turbidimeters were installed in the river to observe the amount and concentration of sediment, and soil erosion plots were set up in the forest and along the work road to collect sediment and measure the radioisotope concentration with Ge semiconductor detectors.

As a result of the analysis, the amount of sediment in the watershed where row thinning was conducted increased rapidly in the year of thinning and one year later. On the other hand, in the watershed where point thinning was conducted, there was no significant increase in sediment discharge. In the production source estimation, we were able to clearly distinguish between work roads and river banks by using Cs-134/Cs-137 as the horizontal axis and Cs-134/Pb-210ex as the vertical axis. The tracer analysis showed that the contribution of sediment production from the working road increased during the thinning period in the row-thinning catchment, but no such trend was observed in the point-thinning catchment.