Extraction of Production Forests Based on Economy Balances at Kanuma Area in Tochigi Prefecture

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The forest zoning was introduced in the municipality maintenance plan and it classified all forests into three such as forests for water and soil conservation, symbiotic forests with human, and forests for cyclical use of resources when the Forest and Forestry Basic Act was revised in 2001. In addition, some prefectures have established their own forest zoning divisions besides the forest zoning in the country. However, the definition of the forest zoning is not well-designed. Especially, the production forests are not certainly defined with considering economy balances. This study, therefore, examined the definition of the production forests based on the economy balances by calculating all costs of the harvest and expected yields.

The research area is Kanuma City and the Nishikata Town in Tochigi Prefecture. Forest registration, the GIS data of road layer, sub-compartment, and Digital Elevation Model (DEM) were used in the analysis. For the analysis, the program was made using Microsoft Visual C++. The amount of harvest volumes for each sub-compartment was calculated with a yield table using site indexes and ages in the forest registration. The logging machines assumed to be used on each sub-compartment was selected from five (a Tractor, a Forwarder, a small and medium Tower-Yarder, and a Large Skidder) based on the slope angle and the logging distance of each sub-compartment. And, all costs including the direct and indirect operation expenses, and the forest road establishment expenses were calculated.

The result with setting the best logging age to 60 years, and log prices of Japanese cedar and Hinoki cypress to 13,187 yen/m³ and 21,533 yen/m³, respectively showed that only 0.8% of the number of sub-compartment is beyond the break even point in this area. The areas of sub-compartments beyond the break even point tend to be bigger than other sub-compartments and these sub-compartments consisted of Hinoki cypress. It will be necessary to decrease costs considerably by developing the forest road network and extending the forestry operation sites with the merge of small sub-compartments. The next study will examine the definition of the environmental forests for multipurpose forest management.