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Croatian Journal of Forest Engineering, Vol.26 No.2 Prosinac 2005.

Izvorni znanstveni članak

Amount and availability of forest biomass as an energy resource in a mountainous region in Japan: a GIS-based analysis

Takuyuki Yoshioka
Hideo Sakai

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Sažetak

Feasibility of energy utilization of forest biomass in a mountainous region in Japan has been discussed with the aid of a geographic information system (GIS). In this study, logging residues, thinned trees, and broad-leaved forests are defined as forest biomass. First, the distribution map of biomass resources has been completed by use of the GIS, and information on topography of each sub-compartment has been prepared. Second, harvesting and transporting systems have been classified into six types according to the parts of tree used as energy source (two types) and topographical conditions (three types). The equations for calculating the costs whose variables are slope, skidding/yarding distance, and transporting distance have been developed. Finally, the relationship has been analyzed between the mass and procurement cost of forest biomass in the region. As a result, logging residues [the annual available amount is 4,035 t/y1 (DM2)] proved to be the most cost effective, followed by broad-leaved forests [0,317 t/y (DM)]; thinned trees [27,854 t/y (DM)] proved to be the most costly. This analysis could be of help in drawing an operational plan, i.e., in selecting sub-compartments to be felled. For instance, it has been calculated that the amount of biomass resources of 30,106 t/y (DM) was required for the construction of a power-generation plant that covered 24.8% of the power consumed by households in the region. To obtain this amount of forest biomass for energy purposes, forest biomass should be harvested in sub-compartments, whose procurement costs are lower than 13,037 yen/t (DM).

Ključne riječi

forest biomass; case study; mountainous region; GIS; harvesting and transporting cost; Japan



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