Impacts of Reduced Impact Logging on Stand Structures in Mixed Forests in 3 Northeastern Provinces in Cambodia

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Sustainable forest management (SFM) is an important component of the 2009 Copenhagen Accord, in which the REDD+ policy was highly recognized by the parties to the United Nations Framework Convention on Climate Change. Previous studies suggested that SFM cannot be achieved under the conventional logging commonly practiced in the tropics. Alternative but sound logging practice is therefore needed in order to achieve the REDD+ policy. Reduced impact logging (RIL) was recently found to be promising because of its ability to reduce damages to residual stands and wood wastes. Although RIL experiments have been conducted in some countries in the tropics, our study was very first RIL experiments conducted in mixed forests in Cambodia’s Kratie, Stung Treng, and Rattanakiri provinces in 2007-2008. Here, we analyzed data from 179 sample plots by DBH classes and according to three damage classes, namely slightly damage (A), moderately damage (B), and severely damage or dead (C) on stem density, basal area, and stand volume. On average, damages were estimated at 67.3 trees ha⁻¹ or about 20.3% of the total stem density in all three sites (DBH ≥ 10 cm). Of the 67.3 trees, 17%, 21%, and 63% were damages in class A, B, and C, respectively, and about 57.1% were trees in DBH class of 10-19 cm suggesting that small trees were largely affected by logging. In terms of stand volumes, 26.8 m³ ha⁻¹ (about 13.3 MgC) or 18.6% of the total stand volume. Our findings suggest that RIL could significantly reduce damages to residual stands, and thus carbon stocks. RIL should be adopted for achieving SFM under the REDD+ policy.

Additional keywords: basal area, logging damages, stem density, stand volume, carbon stocks

Developing a National-level System for Simulating the Forest Carbon Dynamics of Hinoki Planted Forests in Japan

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Systems for simulating the forest carbon dynamics at the national level are useful for drawing up forest policies on climate change. We developed a national-level system for simulating the forest carbon dynamics of Hinoki planted forests in Japan, consisting of a forest database and a stand-level carbon cycle model. The system is based on a 1-km resolution forest database containing data on age, species, size, density and biomass of four pools (foliage, branch, stem, and root) of stands. We developed a process-based stand-level carbon cycle model to simulate carbon dynamics under various climatic conditions and forestry regimes. In our simulation system, this model was applied to each stand recorded in the forest database using climatic values (radiation, temperature and vapor pressure deficit) and forest operation schedules (clear cutting and thinning) as inputs. We simulated the carbon dynamics of planted forests for the whole of Japan from 2005 to 2050 for several scenarios of forest policy. These simulations yielded time-series trajectories of total living stock biomass, annual change in biomass, and spatial distributions of both, enabling us to compare the effects of forest policy on national-level carbon dynamics in the near future.

Additional keywords: growth model, permanent plot

Forest Management Guidelines based on Biodiversity and Impact of Operation for Uneven-aged Forests in Hokkaido, Japan

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Selection cutting system has been considered as one of an advanced way to minimize the impacts of cutting operation. Over a period of several decades, most of natural forests in Hokkaido have been managed by selection cutting and as a result, they had been produced high quality timbers. However, some of the managed forests were considered as degraded forests both qualitatively and quantitatively. We analyzed biodiversity of managed forests and evaluated the impacts of silvicultural practices. Sometimes, recruit trees were dramatically decreased and regeneration of trees were very difficult by direct impact of logging operations and dense dwarf bamboo species due to variation of light condition. Adequate supplemental planting and regeneration operations are needed. Skidding operation might lead both qualitative and quantitative stand damages. Group selection cutting and careful logging technique should be applied. Fallen logs including nurse logs were decreased by logging operations that threaten the biodiversity. A certain amount of fallen logs and dead trees must be preserved in the management forests. To harmonize the logging operations and preservation of fallen and dead trees, we proposed new classification system. GPS and GIS should be important tools to deal with the appropriate management activities.

Additional keywords: growth model, permanent plot