Spatial characteristics of *Chamaecyparis optusa* stand managed applying regeneration cutting in Kiso area of Japan

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1. Introduction

Kiso area is known in Japan as a natural growing site of hinoki (*Chamaecyparis optusa*) trees; the source of a high quality lumber needed to maintain precious wooden cultural buildings such as the Horyuji temple in Nara, recognized as the World Heritage and one of the oldest surviving wooden buildings in the world. Hinoki achieves high prices; particularly lumber made of hinoki trees grown in naturally regenerated stands are the most demanded in a market.

To manage these stands it is of essential importance to evaluate success of natural regeneration of hinoki and its competitors. Usual procedure was indirectly through an estimation of the relative saplings density per hectare; for example, randomly distributing fixed-area plots. Density estimations applying fixed-area plots are unbiased in the case if the fixed-area is sufficiently large to represent a measured population. Since naturally regenerated saplings might have highly variable clumped distributions, sufficiently large fixed-area should be set and a practical applicability is often interfered. Furthermore, influence of the micro-relief conditions to the natural regeneration was not investigated.

Sub-compartment at Ogawairi national forest (3.64 hectares) is chosen as a case study. In this stand the regeneration cutting was conducted by a local authority manager in 1985 and hiba (*Thujopsis dolabrata*) trees were extensively chopped down in 1997 and 2001 as it was believed to be the main competitive to hinoki saplings.

2. Research Methodology

X, Y and Z coordinates of all hinoki and hiba trees higher than 1.5 meters are mapped and sampling simulations are performed in a Geographic Information System (GIS); taking in consideration the edge-effect in estimations of stand density. Sapling heights are measured in order to determine likelihood to emerge from a clump to an upper story. Mapped tree coordinates are used to create contour lines and define micro-relief conditions.

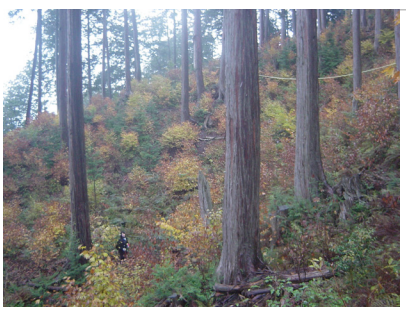
In order to evaluate success of natural regeneration, study is conducted on spatial characteristics and sampling procedures estimating density of clumped populations.

3. Conclusions

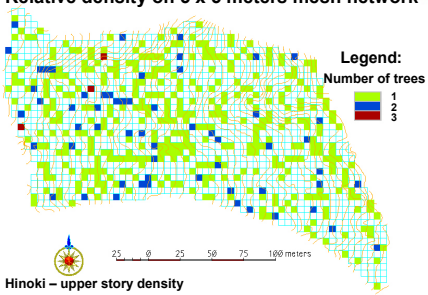
542 hinoki trees remained in an upper story; the western part has a higher density. Naturally regenerated 1254 hinoki and 294 hiba saplings exceeds 1.5 meters height.

High density of hinoki saplings is desirable since it might induce a positive natural selection. Natural regeneration of hinoki trees might highly depend on micro-relief conditions and the upper story density influencing a warmth and a light conditions. Dense regeneration of hinoki is likely to occur on reefs and southern/warmer micro-relief conditions. Reducing the upper story density might lead in increase of hinoki saplings density and accelerate its height increment.

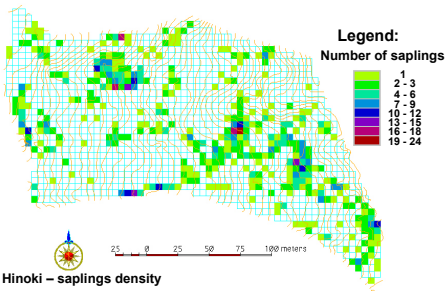
Study on ecological properties of hinoki in dependence to micro-relief conditions and relations to the upper story density might lead to improve a regeneration cutting system.



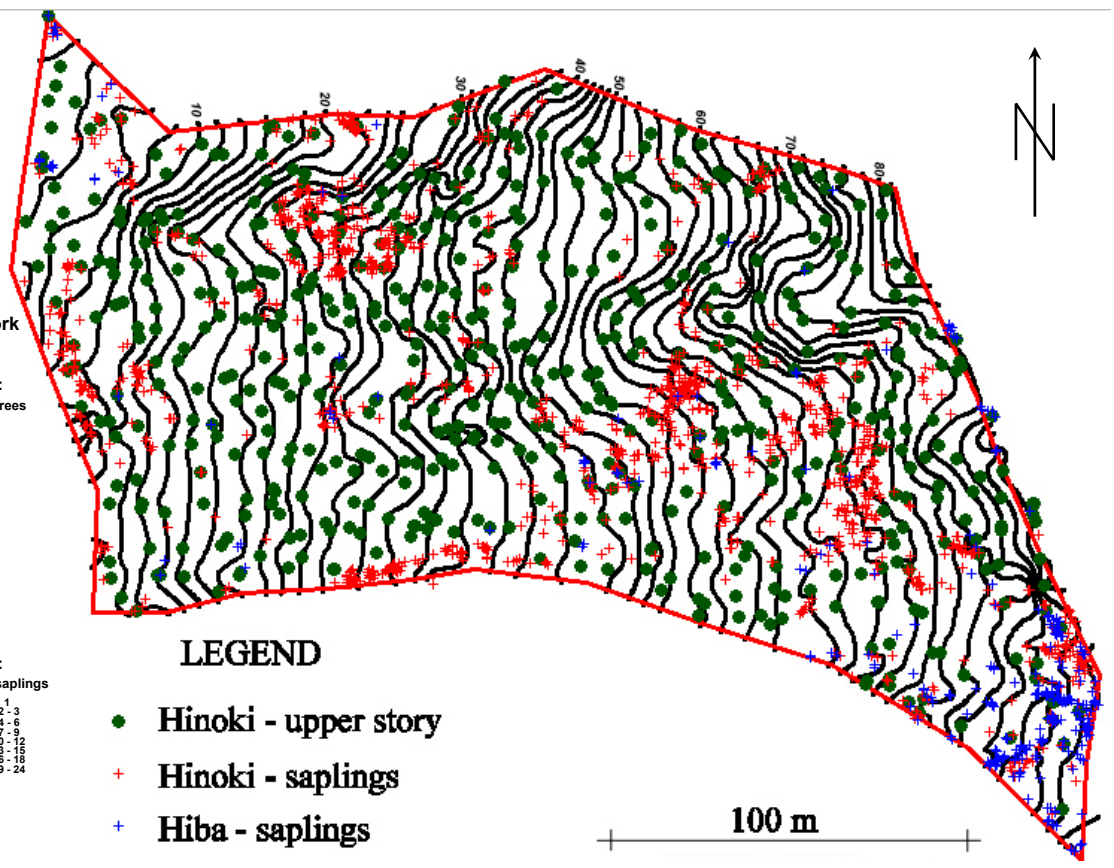
Relative density on 5 x 5 meters mesh network



Hinoki – upper story density



Hinoki – saplings density



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