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## Stand dynamics and regeneration in natural forests

Tree population in the forest stand has been changed and maintained in the process of recruitment, survival, and growth of tree individuals, which are determined by different disturbances and environmental factors including biotic and abiotic factors. The tree population show slow temporal changes and spatial heterogeneity. Therefore, it is necessary to conduct long-term and large-scale ecological researches for demonstrating tree population, stand dynamics, and regeneration of the forests. I have conducted long-term and large-scale ecological researches with adding tree ring analysis in different natural forests. In beech forests of Japan, the researches have been demonstrating dynamics of seedlings, understory trees, and canopy trees in different environmental conditions and the regeneration processes and mechanisms. In boreal forests of Mongolia, the researches have been demonstrating effects of disturbance by forest fires and logging on the regeneration and degradation mechanisms after large-scale forest fires.



Boreal forest in Mongolia

## Stand dynamics of secondary forests, *Satoyama* forests, and the conservation



Deciduous oak forest in Japan

*Satoyama* forests are secondary forests that were maintained by natural processes and human's activities. They sustainably supplied bio-resources because regeneration occurred after the harvesting. However, these *Satoyama* forests have been abandoned since energy regimes changed from bio-resources of forests into fossil fuel around 1960s. The abandonment has caused degradation of biodiversity, expansion of disease damages, and expansion of abandoned bamboo forests. On the other hand, these abandoned forests have been reevaluated as sustainable bio-resources recently. Therefore, it is necessary to demonstrate the degradation processes of abandoned forests and restore them. I have conducted ecological researches on the stand dynamics of *Satoyama* forests. The researches have been demonstrating degradation of the stand structure and possibility of the artificial regeneration in pine forests damaged by pine wilt disease, expansion processes and mechanisms of abandoned bamboo forests, and regeneration processes after logging in deciduous oak forests.