

# Studies on Forest Management Maintaining Biodiversity

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## 1. Bird communities in planted landscapes

Japan is a forested and planted country since 40% of its forests are covered by forestry plantations composed of Japanese cedar, cypress, larch and fir. My early career examined the effects of natural forest fragmentation caused by conifer plantations. Field survey showed that bird species richness per area declined with decreasing patch area of natural forests. On the other hand, it was shown that conifer plantations with broad-leaved trees harbor diverse bird communities. These results suggest that impacts of natural forest fragmentation can be mitigated by introducing broad-leaved trees in conifer plantations surrounding natural forests [1].

## 2. The need of biodiversity conservation in conifer plantations

Primary forests and large nature reserves only occur not in the fertile areas but in the unproductive areas (e.g., high elevation sites). We cannot always establish the large reserves in the real landscapes, and few primary forests suitable for nature reserves remain in many landscapes. These facts suggest the importance of biodiversity conservation not only in nature reserves but also in forestry plantations.

## 3. The significance of plantation forestry conserving biodiversity: an environmental economic approach

Economic values of timbers have declined after the WWII while the significance of biodiversity conservation is now appreciated. We examined responses of bird abundance to the amounts of broad-leaved trees in conifer plantations, and examined economic values of bird abundance. The analysis suggested that the economic cost of enhancing bird abundance in plantations via introducing broad-leaved trees can be overwhelmed by increasing benefits of bird conservation. It is suggested that semi-natural plantations with broad-leaved trees can be optimal forest types to maximize the social values of forestry plantations in many cases [2].

## 4. Concluding remarks

We are now undertaking a large-scale manipulative experiment to test the effects of retaining broad-leaved trees during the harvest of conifer plantations in Hokkaido prefectural forests. Our team considers that this option of plantation management would contribute to the public understanding and supports of Japanese forestry.

## References

- [1] Yamaura Y., Katoh K. and Takahashi T.: Effects of stand, landscape, and spatial variables on bird communities in larch plantations and deciduous forests in central Japan. *Canadian Journal of Forest Research* 38:1223-1243. (2008).
- [2] Yamaura Y., Shoji Y., Mitsuda Y., Utsugi H., Tsuge T., Kuriyama K. and Nakamura F. How many broadleaved trees are enough in conifer plantations? The economy of land sharing, land sparing and quantitative targets. *Journal of Applied Ecology* 53:1117-1126 (2016).