

Research Trends and Results

Establishment of efficient and effective environmental conservation measures for road projects

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1. Introduction

Various environmental conservation methods have been used for the conservation of rare animals and plants, as well as ecological systems, during road projects. However, their results and details have not been published so that information about the location of rare species can be kept undisclosed to prevent illegal poaching and/or removal. Therefore, at NILIM, we collect and analyze cases of environmental conservation measures (ECMs). We clarify highly effective preservation measures, with the goal of establishing more effective preservation technology by performing verification tests.

2. Evaluation of environment conservation measures for plants

If it is difficult to avoid environmental changes in a rare plant's habitat during a road project, plants will often be transplanted for the conservation of individuals as an ECM. We organized the survival rates by location after the transplanting of each species. Our results suggested that perennial plants, which live for multiple years, had good survival rates, whereas relatives of golden orchids

(Cephalanthera), which are often transplanted, had low survival rates and were decreasing yearly (Figure 1).

On the other hand, we identified some cases involving the successful implementation of golden orchid (Cephalanthera) transplantation. In these successful cases, the transplantation location was chosen by considering trees that are associated with mycorrhizal fungi. Thus, we examined some transplanting methods in the field by reference to these successful cases, and attempted to establish a method for transplantation and conservation.

3. Screening for transplantation/translocation sites using species distribution models (SDMs)

The transplantation/translocation sites of plants and small animals (e.g., amphibians) during road projects as ECMs are selected based on whether the environment of the candidate site is qualitatively similar to the original habitat. Recently, SDMs have attracted attention because they can predict and evaluate a habitat quality and potential statistically using the relationship between the species distribution and environmental factors (e.g., vegetation and landforms) (Figure 2). Thus, we examined an effective method for screening the candidate sites for

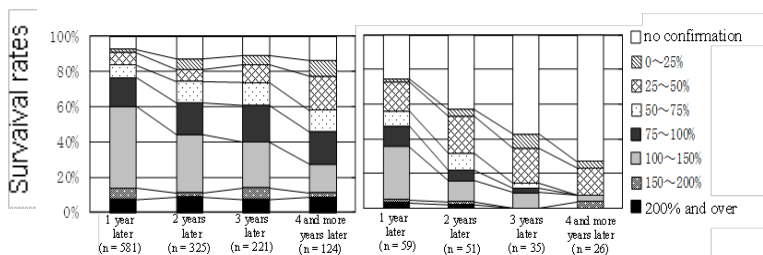


Figure 1 Transition of survival rates after transplantation:
Left: perennial plants except for orchids (Orchidaceae),
Right: relative of golden orchids (Cephalanthera).

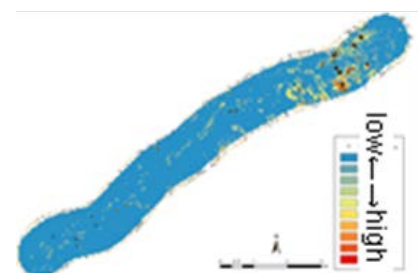


Figure 2 Estimated habitat quality of Japanese brown frog using SDM.

transplantation/translocation using SDMs.

4. Utilization of results

Based on these results, we published a technical note of the NILIM in the spring of 2016. This technical note included much useful information for road administrators, such as case studies of environmental conservation measures for fauna and flora, a conservation method for raptors based on scientific knowledge, and planning/evaluation technology of road crossing structures for mammals (e.g., overpass, underpass, and safety guard).

☞ Detailed information:

1) Keiichi Hasegawa, Nodoka Oshiro, Mayumi Kanda, Ryuji Inoue, and Yusuke Ueno, "A study on the current status and effectiveness of transplantation in road projects, with a focus on Orchidaceae", Proceedings of Annual Meeting of Environmental Systems Research, Vol.42, pp.177-184, 2014. (in Japanese)

2) Nodoka Oshiro, Keiichi Hasegawa, Yusuke Ueno, and Ryuji Inoue, "Comparison of species distribution models for screening transplantation sites", Proceedings of Annual Meeting of Environmental Systems Research, Vol.43, pp.153-158, 2015. (in Japanese)