Applying Bird Habitat Models for Conservation and Creation of Urban Greenery

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SUMMARY

Urban areas are highly artificial spaces, but natural processes such as the population dynamics of creatures remain. Biodiversity and complex food web control outbreaks of bugs, therefore creating an ecologically sustainable city also promotes a healthful human environment.

Although the volume of urban green in large cities is growing gradually, urban green has not yet been fully evaluated from a functional perspective. While isolation, fragmentation and diminishing of urban and suburban forests are rapidly progressing. The fact that isolation, fragmentation and diminishing of forests have negative effects on wildlife in the forest is well known.

In this study, I especially observed Great tits *Parus major* and Brown Hawk Owls *Ninox scutulata* as indicator species for urban greenery, and discuss methods of urban greenery planning to create an ecologically sustainable city. And I propose a method for evaluating urban greenery planning from perspective of animal (bird) habitat. The Great Tit was selected as an indicator of good urban green environment, and Brown Hawk Owl was selected as an indicator of good urban isolated forests.

This thesis is divided to three parts consisting of eight chapters following the first chapter. In the first chapter, the aim and contents of this thesis, the importance of considering bird habitats in urban areas and the practicability of wildlife habitat modeling for urban greenery planning are presented.

The first part consists of two chapters related to studying factors affecting birds in urban parks. In the second chapter, factors affecting the diversity and composition of bird species in urban parks including small parks in Osaka City, especially the effects of the urban matrix surrounding parks, were clarified. The usefulness of the Great Tit as an indicator species for urban greenery was also demonstrated. In the third chapter, a logistic regression model for predicting distribution of Great Tits in Osaka City was created, and the requirements of the species for urban greenery were clarified.

The second part consists of four chapters related to studying the conservation of woodland birds in fragmented forests in urban areas. In the fourth chapter, the relationship between woodland area and the diversity of bird species and nesting patterns of species compositions in urban fragmented forests in Kyoto City were analyzed. The relationships between relative species richness and woodland area in both the breeding season and wintering season were almost same, and the species compositions excluding edge species group presented a highly nesting pattern related to woodland area. In the fifth chapter, using eight years of data in an urban wildlife habitat park, *Inochi no mori*, established in the urban center of Kyoto City, the early successional stage of avifauna in a newly developed park was clarified. Almost all members of avifauna supposed to inhabit this wooded area in the breeding season were recorded by the ninth year after park construction. The number of woodland birds species especially in the wintering season were higher than those reported in the same area of natural isolated woods in Kyoto City. In the sixth chapter, potential stepping-stone corridors for birds in the urban area of Kyoto City were extracted using remote sensing and GIS. In the seventh chapter, a logistic regression model for predicting the distribution of Brown Hawk Owls in the urban area of Kyoto City was created, and the woodland area required to conserve the owl's habitats was clarified.

The final part consists of two chapters that discuss how to apply habitat models to urban greenery planning. In the eighth chapter, a simulation algorithm for applying the habitat model for Great Tits, which was obtained in the third chapter, to real urban planning is proposed. In the final chapter, how to apply bird habitat models obtained in this study for the conservation and creation of urban greenery is discussed.