

# **Biodiversity and Ecosystem Function in the Human-made Landscape: Birds Transport Human-Derived Nutrients into Urban Forests.**

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## **Abstract**

Biosphere is easily affected by Humanosphere. For example, biodiversity changes in the human-made landscapes are well known in many kinds of ecosystem as cities, rural landscape, and plantation. Centuries before, when humans settled in a narrow area, its impact on biosphere was not as huge as present. After the industrial revolution, human being has changed our landscape and ecosystem, causing biodiversity loss. Since the impact of land use change on ecosystem lasts for a long time, it is essential to understand the dynamics of biodiversity and ecosystem function in relation to landscape change. A case study of bird diversity and nutrient cycle in urban landscape will be presented here, to discuss the indirect effect of land use change in cities. In urban landscapes, bird species decrease and biomass increase compared to forest-dominated landscape. Urban birds contribute to allochthonous nutrient flow from residential areas to fragmented forests by consuming food in residential areas and depositing feces in forests. The estimation shows that, in urban forests with crow roosts, birds contribute 2.7 times the amount of allochthonous P contributed via other pathways; and 0.66 times the amount of allochthonous N input. High stable isotope ratios,  $\delta^{15}\text{N}$  and  $\delta^{13}\text{C}$ , in crow roosts indicate that they eat foods such as livestock meat,  $\text{C}_4$  maize or fish. Urban landscape support high avian biomass, which provides large nutrient input in fragmented forests with crow roosts. Therefore, humanosphere interact with forest ecosystem via birds.