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Compassionate conservation: Biodiversity enhancement on green roofs

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Green roofs may provide opportunities to enhance biodiversity in urban areas. Island biogeography theory (IBT) predicts that diversity decreases with both increasing horizontal distance from green areas and vertical distances (building height) and increases with increasing plot size. Habitat heterogeneity on green roofs may also influence species richness and species richness may also act as a barrier against invasive species. We address these questions with a number of experimental studies: (1) effects of identical arrays of plants on roofs of varying horizontal and vertical distances on arthropod diversity; (2) assessing plant species richness as a function of plot size; (3) effects of inorganic substrate and organic heterogeneities on species richness; (4) effects of plant species richness on invasive plant colonization; (5) bird species, plant species and arthropod species colonizing green roof habitats.

Our studies yielded the following results: (1) arthropod diversity decreased with increasing distance from green areas and increasing vertical distance supporting Island Biogeography Theory (IBT). Roof plots and adjacent yards had low community overlap suggesting that green roof habitats are unique habitats in urban areas; (2) diversity increased with increasing plot size, also supporting IBT; (3) increased fine-scale heterogeneity did not increase plant or arthropod richness. Fine-scale heterogeneity may result in small populations which increases the probability of local species extinctions; (4) increased plant species richness served as a barrier against invasive plants; (5) Birds utilize these green roof habitats; (6) Storm water drainage refers to reducing storm water. This result is consistent with many other studies demonstrated a lack of successful invisibility when species richness is high. Overall, our studies suggest that green roofs can contribute to higher diversity in highly urban systems.

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