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# Urban Biogeography: Distribution of Prokaryotic and Eukaryotic Life in Human-Dominated Landscapes

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## Abstract

**Urban biogeography explores how living organisms—both microscopic and macroscopic—are distributed across cities and other human-dominated landscapes. As urbanization accelerates globally, it reshapes ecological patterns, creating novel habitats and altering species interactions. Natural areas are broken into isolated patches. Concrete, metal, and synthetic materials serve as new habitats. Landscaping, waste, and infrastructure shape species composition.**

***Keywords:** Urban biogeography; Urban ecology; Human-dominated landscapes; Anthropogenic environments*

## Introduction

The traditional biogeography focused on natural ecosystems, urban biogeography recognizes cities as dynamic ecological mosaics where prokaryotic (bacteria and archaea) and eukaryotic (plants, animals, fungi) life forms coexist, compete, and adapt. Understanding these patterns is essential for biodiversity conservation, public health, and sustainable urban planning [1].

Microbial communities in urban environments are surprisingly diverse. A study on urban soil microbiomes found that microbial community assembly is shaped by both environmental filtering and stochastic processes, with high species turnover across microhabitats. These factors create a patchwork of "habitat islands" within cities, analogous to the islands in classical biogeography models [2].

Eukaryotic organisms plants, animals, fungi face unique challenges and opportunities in urban landscapes. Bird diversity, for example, peaks at intermediate levels of urbanization due to colonization by early successional species and extinction of forest

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specialists. Urban flora often includes a mix of native, ornamental, and invasive species. Green spaces, such as parks and gardens, serve as biodiversity refuges and corridors for dispersal Parks, roadsides, and industrial zones harbor distinct microbial assemblages [3].

These interactions influence ecosystem function, species health, and even the evolution of urban-adapted traits. Urban "habitat islands" vary in size, quality, and isolation, influencing species persistence and turnover. Urban environments drive rapid evolution, with species adapting to pollution, noise, and artificial light. Microbes, in particular, evolve quickly, developing resistance and novel metabolic pathways [4].

Efforts to enhance urban biodiversity must consider both prokaryotic and eukaryotic life, recognizing their interdependence and ecological roles. A theory of city biogeography is emerging, adapting classical models to the unique features of urban ecosystems. Urban biogeography reveals the complex and dynamic distribution of prokaryotic and eukaryotic life in human-dominated landscapes [5].

## Conclusion

Cities are not ecological voids but vibrant mosaics of life, shaped by infrastructure, culture, and climate. By studying these patterns, we can foster healthier, more resilient urban ecosystems that support biodiversity and human well-being. Parks, roadsides, and industrial zones harbor distinct microbial assemblages. Waste, pets, and foot traffic introduce and redistribute microbes. Temperature and moisture gradients affect microbial survival.

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