



HABITAT URBANIZATION AND EFFECTS ON BIRDS

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ABSTRACT

The growth of human populations is leading to a shift towards urban living, which in turn alters land cover and negatively impacts bird habitats both locally and globally. This review examines:

- 1) The urbanization of the planet,
- 2) Bird's reactions to human settlements
- 3) The reasons behind these avian responses.

While a slight majority of studies indicates an increase in bird density, there is a noted decline in species richness and evenness due to urbanization (Blair, 1996; Shochat et al., 2006). The most notable impacts of expanding settlements include arise in non-native bird species, an increase in species that nest on buildings (Chace & Walsh, 2006) (particularly swifts and swallows), higher rates of nest predation, and a decrease in species that nest on the ground or in interiors. The effects on raptors, owls, and cavity-nesting birds are less predictable and often depend on the surrounding environment. Factors that favor certain species in urban areas seem to be more straightforward than those that hinder them. The primary advantage for these species is the increased availability of food (Gleditsch & Carlo, 2011), while factors such as reduced predation, less human interference, and habitat improvements play a lesser role. Conversely, bird declines associated with human settlement are often linked to decreased habitat availability, smaller patch sizes, increased edge effects a rise in Alien plant species, reduced vegetative complexity, and heightened nest predation (Aronson et al., 2014). Urban planners and policymakers have significant influence on the growth and development of cities. Avian ecologists can contribute valuable insights to these critical decisions by:

- 1) Assessing how settlement patterns impact bird populations and
- 2) Analyzing how bird communities evolve across various levels of urbanization (Seress & Liker, 2015)

Keywords: Urban planners, urbanization, bird density, bird species, bird communities, bird declines

Introduction

Human activities are transforming landscapes, leading to the development of novel habitats with unprecedented environmental characteristics (McDonnell & Hahs, 2015). As urbanization continues to encroach upon natural habitats, it becomes increasingly important to understand the ecological changes we are instigating in urban animal communities. Birds serve as the focal point of urban ecological studies (Shochat et al., 2006). A commonly observed trend is that urban bird communities

typically exhibit reduced species diversity (Blair, 1996; Chace & Walsh, 2006), while a few successful species tend to have higher population densities in cities compared to nearby natural areas. However, the mechanisms that drive and sustain these community-level changes are not well understood. In this review, we explore the main elements of the urban setting that affect birds' physiology, behavior, or morphology, and we gather multiple recent studies to demonstrate their impacts. To understand urban food webs better, we analyze results from both bottom-up and top-down methods, indicating that changes in food supply and predation could notably influence the development of modern urban environments.

The current pace of urbanization and industrialization is one of the major reasons for the decrease in bird biodiversity. The best way to overcome this obstacle is to adopt an ecological approach to urbanization while protecting biodiversity; one of the best examples of this is the creation of urban parks. These urban parks are complex and ever-changing human-made areas designed to mimic natural ecosystems. However, changes in the relationships between the inhabitants and their surroundings can cause species to migrate or even go extinct, making these urban ecosystems difficult to sustain. In this study, we look into the various factors of an urbanized region that can influence the biodiversity of birds. The rapid spread of cities and industries has become one of the leading threats to bird biodiversity. As concrete replaces greenery, natural habitats shrink, forcing many bird species to either adapt, migrate, or disappear altogether. To counter this, urban planning must take a more ecological route—one that prioritizes coexistence with nature. A promising example of this approach is the integration of urban parks into city landscapes. These parks, although man-made, are designed to replicate the functions of natural ecosystems. Yet, they remain dynamic and sensitive environments. The interactions between species and their changing surroundings in these spaces are constantly in flux. Even small disruptions—like noise, pollution, or seasonal changes—can push certain species to leave or lead to local extinctions. This makes managing urban biodiversity not only a scientific challenge but also a responsibility that requires community involvement, adaptive planning, and long-term ecological thinking.

It has been demonstrated that urbanization greatly influences bird biodiversity, mainly due to changes and loss of habitat. Sheath et al. (2010) discovered that urban settings frequently resulting in the competitive displacement of Local bird populations (Shecht et al., 2010) by invasive, human-associated species. This interaction leads to a reduction in community evenness and general diversity, indicating that urban environments may foster conditions harmful to native birds that do not possess competitive strengths.

The analysis conducted by Seers and Liker (2015) bolsters these conclusions, showing that urbanization typically leads to diminished species richness and changed community dynamics in avian populations. The authors examine different elements affecting bird physiology and behavior in urban environments, such as food supply and predation risks, which are crucial for creating successful conservation plans.

Adaptation and Evolutionary Responses

Although urbanization presents considerable difficulties, certain bird species show impressive resilience to city settings. McDonnell and Hahs (2015) examine how urban growth can trigger microevolutionary alterations in bird species (McDonnell & Hahs, 2015), impacting behavior, communication, and physiology. These adaptations are essential for preserving avian diversity in urban environments, enabling specific species to flourish despite the difficulties posed by changes in habitat. Nevertheless, the authors urge for clearer terminology and better communication concerning these adaptations to boost conservation initiatives.

A study by Callaghan et al. (2019) highlights particular characteristics that affect bird species' adaptability to urban environments. They discovered that generalist species possessing larger brains (Callaghan et al., 2019) are more inclined to thrive in urban settings, indicating a change in community makeup towards species capable of effectively utilizing urban resources. This change prompts inquiries regarding the enduring survival of more specialized species that might be unable to adjust swiftly to urban challenges

Threats from Human Activities

Human actions pose a significant risk to bird populations around the globe. A major concern is habitat loss and fragmentation due to deforestation (Benítez-López et al., 2017), urban expansion, and agricultural growth, which removes birds' natural living and breeding areas. Pollution poses another major danger, with pesticides, plastics, and oil spills tainting ecosystems and directly harming birds through poisoning or entrapment. Light and noise pollution may disrupt birds' instinctive behaviors, including migration and communication. Climate change intensifies pressure by altering migratory paths, changing food supplies, and endangering coastal ecosystems due to rising sea levels. Moreover, numerous bird species suffer from illicit hunting and the pet trade, and collisions with

human-made objects such as glass structures, cars, and wind turbines lead to millions of bird fatalities each year. The arrival of invasive species, like household cats or foreign predators, also plays a role in decreasing bird populations, particularly on islands. Ultimately, contemporary farming methods, such as monocultures and extensive chemical use, diminish biodiversity and diminish the insect populations that numerous birds depend on for sustenance. In total, these human-induced threats present a significant challenge for bird conservation worldwide.

Gaps in Knowledge and Future Direction

Even with the extensive research conducted on urbanization and its impact on birds, numerous knowledge gaps persist. Future studies might gain from a more thorough investigation of interspecific interactions in urban ecosystems, along with longitudinal research evaluating the enduring effects of urbanization on bird populations. Moreover, the connection between urbanization and insect-eating bird populations requires more research, especially considering the link between habitat destruction and decreases in insect numbers (Bowler et al., 2019). As cities keep growing, grasping the processes of adaptation and the elements affecting species resilience will be essential for creating successful conservation approaches. Joint initiatives that combine urban ecology, evolutionary biology, and conservation science are crucial for tackling the issues caused by habitat urbanization and maintaining the viability of bird populations in city environments.

Conclusion

Urbanization leads to an increased number of a smaller variety of bird species. Nonetheless, concurrently, the diversity of species is significantly diminished in city settings. Protected forests improve genuine avian variety. While the bird population in city regions is significant, the information can occasionally be misinterpreted as indicating more favorable conditions for bird communities. Urbanization benefits only a select few species, which flourish greatly, leading to survival challenges for other species. The rise in House Crow numbers results in a reduction of forest species such as the Golden Oriole, Oriental White-eye, Indian Lora, and several other typical birds, since House Crows are aggressive and hunt the young of these birds. Simultaneously, urbanization aids certain bird species that have adapted to urban environments, especially those that are omnivorous or require nesting areas that resemble cliffs or ledges. Urban development endangers essential species such as the Indian Peafowl, driving them closer to

extinction as cities encroach upon forests. In this review, we showed that different aspects of habitat urbanization greatly influence bird populations.

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