

Using Reconciliation Ecology to Address Problems of Urban Homogenization

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Abstract

Urbanization is one of the leading causes of ecological change. In the US alone, 80% of the population lives in urban areas. A newly studied phenomenon, urban homogenization, highlights how these urban areas are more similar to each other than they are to their surrounding biomes. Urban homogenization causes changes to local species populations and biodiversity. Reconciliation ecology, the practice of deliberately creating habitat space in human dominated landscapes, can be utilized to address some of the problems created by urban homogenization, especially its threat to biodiversity.

Keywords: Urban homogenization, reconciliation ecology, ecosystem functions

Introduction

Urbanization is one of the leading drivers of ecological change in the world (Pickett et al., 2010). A relatively new scientific hypothesis, urban homogenization suggests that due to the strong similarities in land-management practices, urban areas are ecologically more similar to one another than they are to their adjacent ecosystems (Groffman et al. 2014; Pickett et al., 2010). Ecological changes attributed to urbanization have been observed in many facets of the environment such as biodiversity, water features, microclimate, and carbon and nutrient cycling (Blaustein, 2013; Groffman et al., 2014). This paper focuses on the impacts urban homogenization has on local biodiversity and ways to address these impacts.

Urban homogenization across cities and suburban areas has led to particular challenges in preserving local flora and fauna biodiversity in these areas (Blaustein, 2013; Groffman et al., 2014; Pickett et al., 2010). Urban conservation efforts attempt to bridge the growing gaps between urban areas and their surrounding natural areas. A newer method of conservation, reconciliation ecology, combines standard conservation strategies with socio-economic awareness to create holistic solutions to some of the problems caused by urban homogenization (Rosenweig, 2003). Reconciliation ecology has the potential to be the best means of addressing the problems associated with urban homogenization in mutually beneficial ways for humans and nature.

Urban Homogenization

Biological and Ecological Markers

Urban homogenization is the ecological response to urbanization, in which human dominated urban environments that are geographically distinct are more ecologically similar to one another than to their contiguous ecosystems (Blaustein, 2013; Groffman et al. 2014; Pickett et al., 2010). Urban homogenization is a globally noted phenomenon, despite being relatively newly recognized (Blaustein, 2013; Groffman et al. 2014). In the US, which contains six recognized climatic regions, cities that are located in ecologically distinct regions (Phoenix, AZ, Miami, FL, Baltimore, MD, Boston, MA, Minneapolis-St. Paul, MN, and Los Angeles, CA) all have similar species biodiversity and similar trends in how their biodiversity is changing

(Groffman et al. 2014). Local vegetation assemblages are often replaced with common grasses and built environments create similar habitat niches for species (Blaustein, 2013; Groffman et al. 2014).

Social Causes

In the US, approximately 80% of the population lives in urban areas (US Census Bureau, 2014) defined as urban centers, and the suburban and exurban areas, or “commuter towns” connected to them (Pickett et al., 2010). As humans, we have a tendency to build cities to fulfill our own narrow requirements for survival and comfort (McKinney, 2005), causing broad trends in land management practices across cities worldwide (Groffmann et al. 2014). Generally, human landscaping, whether at home or for businesses and parks, follows these trends independent of the climate of those cities (Larson et al., 2015), causing a trend of equalization in microclimates and habitat availability of those cities (Groffman et al, 2014). US based studies found that these landscaping choices are often driven by social and economic status, especially in the suburbs (Couvet & Ducarme, 2014; Larson et al., 2015; Pickett et al. 2010).

Effects of Urban Homogenization

Ecological Effects

One of the key tenets of ecology is species-area relationships, which states that larger geographic areas tend to have a higher biodiversity than smaller areas (Lomolino, 2000). Habitat fragmentation from human development, especially in urban areas, is a major disruptor of ecosystems and can drastically reduce species’ ability to survive and thrive. However, some studies indicate that there is often a *higher* level of biodiversity within urban areas than their local natural ecosystem (Pickett et al., 2010). Some scientists hypothesize that this is due to a combination of the continuous ecological disruption from development, the stable habitat of already developed areas, and the introduction and maintenance of non-native species (Groffman et al, 2014, Pickett et al. 2010). Some of these non-native species become invasive, if they are well adapted to their introduced region and do not require human assistance to prosper, such as bamboo, a common landscaping plant (Lundholm & Richardson, 2010; Pickett et al., 2010). Not

all non-native species are able to out-compete their native counterparts, which leads to an overall increase in biodiversity, the native and non-native, now inhabiting the same ecological region. In many cases, the native species continues to exist, though at a lower population than before the introduction of the non-native species.

Human Social Effects

Societal norms and trends play a major role in determining individual choices when managing land. There are both small scale societal norms, such as those for a neighborhood that desires a specific ambiance, or broader scale societal norms, such as the concept of the suburban lawn (Groffman et al., 2014; Pickett et al. 2010). The level to which an individual or household follows those norms can vary, but changing those norms and behaviors can be difficult at any scale (Pickett et al. 2010).

Suburbia has a particularly large impact on urban homogenization since 50% of US population resides in the suburbs (USCB, 2014). Suburban areas have the highest rates of population growth and regional development (USCB, 2014), and epitomizes one of the American ideal lifestyles (Groffman et al., 2014). Societal pressures for certain behaviors are high, including specific land management choices, such as lawn fertilization and care (Groffman et al., 2014; Larson et al., 2015), and people who live in suburban areas often have different economic situations than their neighbors than people who live in strictly urban areas (Larson et al., 2015). As such, the potential for continuing and increasing ecological damages in suburban areas of the United States is higher than strictly urban regions (Groffman et al., 2014, Pickett et al., 2010). The effects of homogenization in suburban areas may be so high that they can cause changes at the continental level (Groffman et al., 2014). Several studies have been proposed to look at the ecosystem services, such as carbon sequestration and controlling stormwater runoff, provided by common suburban flora, such as Kentucky bluegrass, *Poa pratensis*, in comparison to local species that fill similar ecological niches (Groffman et al., 2014; Pickett et al., 2010; Larson et al., 2015; Couvet & Ducarme, 2016).

Urban homogenization leads to a host of social issues, including “nature deficit disorder,” defined by Richard Louv as a lack of connection with nature in his book *Last Child in the Woods*

(2005, p. 10). Nature is key for healthy mental growth, and Louv points out that communities of any size are at risk of nature-deficit disorder (p. 36, & 100). Other studies, such as the one done by Baur, Gomez, and Tynon (2013), indicate that both physical and social health is positively correlated with time spent in natural, green spaces. People residing in urban areas are particularly prone to a lack of connection with nature, especially considering the already high and still increasing percentage of people in the US who live in urban areas (USCB, 2014). The process of urban homogenization can certainly contribute to the sterilization and homogenization of human outdoor experiences and a collective indifference towards the natural world. This “extinction of experience” directly impacts both individuals and societies as we lose our sense of place within neighborhoods and ecosystems (Miller, 2005).

Addressing the Issues in Biodiversity caused by Urban Homogenization

Traditional Conservation

In today’s conservation ecology, the two most common tactics are preservation and restoration (Rosenweig, 2003). Preservation ecology involves setting aside and protecting habitats and ecosystems in order to maintain biodiversity, while restoration ecology practices take human developed areas and return them to a condition as close to the native ecosystem as possible (Francis & Lorimer, 2011; Rosenweig, 2003). This is where traditional methods of conservation fall short. There is very little, if any, virgin land left in US urban areas for preservation and even fewer land is acceptable for restoration (Rosenweig, 2003).

Reconciliation Ecology

A more recently established, though long practiced field of conservation, reconciliation ecology, seeks to find ways to create habitat spaces within human dominated areas (Rosenweig, 2003). In his book *Win-Win Ecology* (2003), ecologist Michael Rosenweig describes reconciliation ecology as “sharing our habitats deliberately with other species” (Preface), taking special time to note the use of “deliberate”. Unlike preservation and restoration ecology, reconciliation ecology attempts to balance ecological and economical concerns. Rosenweig points out that reconciliation ecology cannot replace the other two methods, but complements

them by working in areas where both preservation and restoration are impossible or inefficient (2003). Reconciliation ecology seeks to create more niche habitats for species slower to adapt to urban environments (Rosenweig, 2003). It has the potential to be the best means of addressing the problems associated with urban homogenization in mutually beneficial ways for humans and nature.

A classic example of utilizing reconciliation ecology to solve a problem caused by urban sprawl and development is the case of the Eastern bluebird, *Sialia sialis*. What was once one of the most common birds in eastern US urban areas became an uncommon sight (Rosenweig, 2003). As insectivores that favor open fields and ground to deeper forests, they are a bird that normally did well in cities. However, their populations plummeted after a series of bad winter storms. Studies show that their nesting habitats, holes in trees, disappeared quickly over the last half century, leaving bluebirds no place to breed and allow their populations to recover. The solution, it turns out, was to create nest boxes with holes large enough for bluebirds, but too small for many other urban birds such as starlings, and not deep enough to attract smaller birds such as house sparrow (Rosenweig, 2003; Chace & Walsh, 2004). It took years of research and trials before the exact requirements for the boxes were discovered, but bluebird populations are beginning to make a good comeback in urban areas where nest boxes have been introduced. Prior to figuring out the nest box dimensions, the attempts at saving the bluebird populations instead did further damage to their populations. If not managed correctly, as with early attempts at creating bluebird boxes, reconciliation ecology has the potential to exacerbate already existing issues.

A newer example of reconciliation ecology that focuses specifically on addressing urban problems are living walls and green roofs (Francis & Lorimer, 2011). These rely heavily on individual and household level choices and actions and are distinct from the more common “green facade” where a plant is trained to grow up a wall. Living walls provide a place for root systems to grow directly into the wall itself, thus making them more similar to green roofs, where plants are planted in substrate. While not all roofs or outdoor walls are ideal for greenification, those that are provide the potential to add significant habitat for smaller species of both plants and animals (Francis & Lorimer, 2011; Rosenweig, 2003). Using local species of

plants in the living walls and green roofs encourages other local animals, especially insects, to return or continue using the habitat (Francis & Lorimer, 2011). There are a few major barriers to the utilization of living walls and green roofs, namely installation, upkeep costs, and the socioeconomic status of the people in the areas where the proposed project is. They also require a high level of involvement from citizens whose homes they are on (Francis & Lorimer, 2011; Rosenweig, 2003). Without public support, both in money and time, living walls and green roofs cannot be sustained long term.

Reconciliation ecology relies heavily on local efforts, especially those of citizen scientists and local institutions, and it requires consistent communication and mobilization to be effective. Family and community based conservation initiatives that connect people to local institutions and experts have the best potential to achieve larger goals, tackling conservation issues such as habitat fragmentation through the creation of community gardens and other green spaces (Shandas & Messer, 2008). A theme to “conserve biodiversity at home” is prevalent in many urban programs, especially ones that promote gardening. A push in this type of conservation initiatives has led to a similar rise in green-oriented city planning, in which more parks are being incorporated into city projects (Blaustein, 2013). The use of native plants as opposed to non-native species is also on the rise, addressing problems associated with changes in vegetation assemblages (Blaustein, 2013; Groffman et al., 2014).

Conclusion

Urban homogenization is concerning from both the ecological and social sides of the issue. It is a global phenomenon caused by similarities across human built environments in which urban areas have more in common ecologically with one another than with their neighboring ecosystems (Blaustein, 2013; Groffman et al. 2014; Pickett et al., 2010). In the US, urban homogenization has been studied in cities covering all six major climatic regions (Groffman et al., 2014). Ecologically, biodiversity in urban areas actually increases due to local species competition with newly introduced species (Lundholm & Richardson, 2010; Pickett et al., 2010), while social impacts are noted on community and personal health (Baur, Gomez, and Tynon, 2013; Louv, 2005; Miller, 2005). The societal impacts that cause urban homogenization

are diverse and their implications are not well understood (Groffman et al. 2014; Pickett et al., 2010). Reconciliation ecology, a newer branch of ecology that focuses on encouraging local biodiversity in human dominated environments, seems well suited to addressing issues of urban homogenization (Blaustein, 2013; Rosenweig, 2003). Both urban homogenization and reconciliation ecology are relatively newly studied concepts. As such, there has not been enough time for long term studies to corroborate existing evidence of urban homogenization and the impacts reconciliation ecology can have on it.

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