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# Urban rewilding and public health considerations

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# Key Messages

- Urban rewilding is an ecological restoration practice that seeks to return human-modified urban areas back to nature.
- Given the close proximity of dense population centres to urban rewilding initiatives, it is important to consider the ways in which urban rewilding might impact human health.
- Like other urban greenspaces, rewilded urban spaces can benefit human health by reducing harms (e.g., air pollution), restoring capacities (e.g., psychological restoration), and building capacities (e.g., promoting community connection).
- Rewilded urban spaces may also provide additional health benefits that other urban greenspaces do not, owing to heightened biodiversity and the perceived "wildness" of rewilded spaces.
- Despite many health benefits, some health risks may also arise from urban rewilding initiatives, such as increased habitat suitability for ticks and mosquitoes, human-wildlife conflict, seasonal allergies, and green gentrification.
- In many cases, the health benefits of urban rewilding may outweigh the risks. Nonetheless, careful planning and risk mitigation can help ensure benefits are maximized, and risks minimized.

# Introduction

Rewilding involves restoring natural ecosystems following major human disturbance to promote resilient, self-regulating and self-sustaining ecosystems. The concept originated in North America in the 1980s, and was originally focused on securing large, well-connected areas in which to release animals that were once native to the ecosystem.[1] Over time, the term has moved from the academic to the public realm, and has taken on multiple meanings or "styles" as it has grown in popularity.

Urban rewilding (also sometimes referred to as micro-rewilding) is a specific style of rewilding which focuses on adapting and applying rewilding principles (Box 1) to projects in urban or suburban areas. Owing to the space constraints of urban environments and the proximity to dense population centres, most urban rewilding projects do not involve the intentional reintroduction of larger animal species. Insects, small animals, and birds, however, may be introduced or often will return on their own following

efforts to rewild a space. While much of urban rewilding follows a passive approach, often some level of human intervention is needed to recover land that has been fundamentally changed by and for human use.[2]

## Box 1: Principles for successful urban rewilding

1. **Let nature lead.** Each project should encourage the reinstatement of natural processes into new and existing ecological habitats.

2. **Work at an appropriate scale for the urban context.** Each project's scale should consider the urban area, including population characteristics and density, as well as function and size.

3. **Create resilient landscapes by considering the past, present, and future.** Each project should consider the topography and history of the area and both current and future impacts of climate change.

4. **Ensure rewilding can be experienced by all.** Each project should consider the initial and ongoing interventions and maintenance required to ensure the safety and co-existence of nature and people.

5. **Recognize opportunities to support local economies.** Each project should provide socio-economic benefits and opportunities, such as access to ecosystem services and green space, and job and skills creations.

*Adapted from Urban rewilding: the value of co-benefits of nature in urban spaces. C40 Cities Climate Leadership Group, Arup, 2023.*

Examples of urban rewilding projects might include reintroducing native flora and fauna to an empty lot or a private garden or allowing nature in a park to grow without maintenance or human-intervention. While the scale and initial starting point of urban rewilding projects may differ, they can be essentially thought of as changing an area from a less "wild" state to one that is "wilder," effectively increasing nature's autonomy.[3] Approaches may be entirely hands-off (e.g., land abandonment) or alternatively call for some early-stage human management to facilitate the emergence of ecological and ecosystem processes that cannot be recovered without intervention (e.g., reintroduction of native species, removal of fencing, removal of levees or other "hard engineering" river management practices). The end goal, however, is to reach a state of passive management, allowing nature's dynamic processes to shape the future state of the ecosystem.[4]

Prominent Canadian examples of urban rewilding include Parc Jean-Drapeau in Montreal and Corktown Common in Toronto. The rewilding of Parc Jean-Drapeau in Montreal is a relatively recent initiative, beginning in 2021 in response to both the climate emergency and the coronavirus pandemic, two crises that have highlighted the importance of public parks for mental and physical well-being.[5] The project, still in the works, has involved revitalizing the park which had become run-down after years of poor maintenance and underfunding. The project to date has involved setting up a biodiversity corridor and converting several parking lots and grassy areas into native flower meadows, among other rewilding efforts. Corktown Common, on the other hand, is the result of a 2013 rewilding project that involved remediating flood-prone industrial lands through the re-introduction of flood-protective native ecosystems, such as marshland, mixed forest, and meadows.[6] The park now uses organic landscape management to upkeep the park, a strategy that essentially allows nature itself to lead and become self-sustaining.[7]

As the world faces looming biodiversity and climate crises, urban rewilding is being touted as a possible intervention cities can take to begin to address these issues.[8,9] With the well-established benefits of greenspace on human health, there is also growing momentum to safeguard nature in cities and restore sites that have been greatly altered from their natural or "wild" state.[10] However, given the close proximity of dense population centres to these urban rewilding initiatives compared to those that occur in more rural areas, it is important to consider the ways in which it might impact human health, so that benefits and risks can be appropriately managed.

This evidence brief provides an overview of the health impacts of urban rewilding, and aims to provide environmental public health professionals with the knowledge necessary to evaluate, advocate for, and provide input on the human health component of urban rewilding projects.

# Methodology

## Literature search

The literature search was developed to answer the following research questions:

- What are the health benefits of urban rewilded spaces?
- What are the health risks of urban rewilded spaces?
- What knowledge gaps exist regarding the health impacts of urban rewilded spaces?

- What factors should environmental public health professionals consider when evaluating urban rewilding proposals or plans?

A rapid literature search was performed to identify evidence of individual and population-level health benefits and risks associated with rewilding in urban or suburban areas. EBSCOhost databases (including Medline, CINAHL, Academic Search Complete, and ERIC), Google Scholar and Google were scanned for English language results with no date limit and no jurisdictional limit. Variants and Boolean operator combination of key search terms were used (a full list of search terms is available upon request). Additional references were added via forward and backward chaining of those search results and supplemental searches, as necessary. Retrieved papers were assessed by a single reviewer and the results were synthesized narratively. The synthesis was subject to internal and external review.

# Results

## What are the health benefits of rewilded urban spaces?

Urban greenspaces (e.g., forests, parks, and residential and community gardens, etc.) are associated with many health benefits that can be classified under three domains as proposed by Markevych et al. (2017): reducing harms, restoring capacities, and building capacities (Figure 1).[11] Urban rewilding initiatives have the potential to contribute substantially to human health at both the individual and population levels through many of these mechanisms.[12]

**Figure 1. Potential pathways linking greenspace to positive health outcomes**

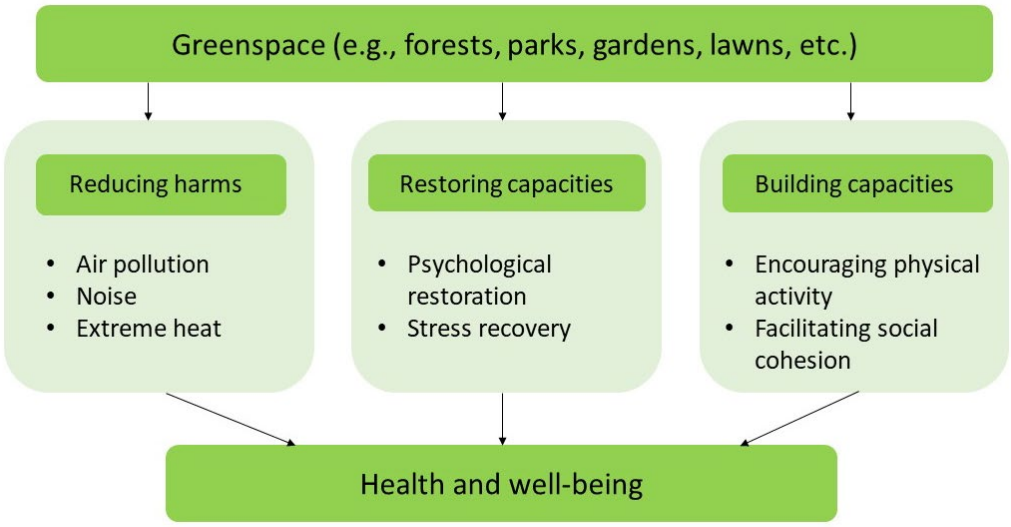


*Figure adapted from Markevych et al. 2017.*[11]

Some greenspaces are better than others in terms of their capacity to improve human health. For example, street trees may help reduce air and noise pollution but are less likely to facilitate social cohesion. Parks on the other hand often do both. Similarly, rewilded spaces often can provide more health benefits than more curated urban greenspaces (e.g., lawns, ornamental greenery, tended gardens), owing to characteristics such as increased biodiversity, perceived "wildness," and ecological integrity, which can help with psychological restoration and stress recovery (see Box 2 for a glossary of key terms).

## Box 2: Glossary of key terms

**Biodiversity** describes "the variability within and among, as well as the variability at other levels of organization, such as between ecosystems and landscapes."[13]

**Ecological integrity** describes an ecosystem where the composition and function of the ecosystem are unimpaired by human activity. Natural ecological processes are intact and self-sustaining, and the ecosystem's capacity for self-renewal is maintained.[14,15]

**Ecosystem services** are positive benefits that ecosystems provide to people and include four main types:

1. Provisioning services; these are benefits that can be extracted from nature, such as food, water, timber, etc.

2. Regulating services; these are benefits that moderate natural phenomena like pollination, carbon storage, water purification, etc.
3. Cultural services; these are non-material benefits that people gain from nature such as aesthetic inspiration, spiritual connection, and recreation.
4. Supporting services; these are benefits that are necessary for the production of all other ecosystem services such as nutrient cycling, production of biomass, production of oxygen, etc.

**Perceived "wildness"** is a subjective measure of how "wild" or "natural" a place is. Different studies use different methods to assess this measure.

For example, greenspaces with greater biodiversity tend to have more diverse environmental microbiomes (e.g., the community of bacteria, fungi, and viruses in a given environment), exposure to which helps shape the human microbiome, and has been linked to enhanced immune regulation and consequently protection from allergic and autoimmune diseases.[16-18] Increased biodiversity also supports ecosystem services, including protection from soil erosion and climate extremes, water purification, and aesthetic enjoyment, among others.[19,20] And while mental health is not (yet) considered an ecosystem service,[21] both biodiversity and the degree to which environments are perceived as "wild" or "natural" have been found to be positively correlated with a number of well-being indicators, though results are somewhat mixed.[22-31]

Hoyle et al. (2019) found a statistically significant correlation between perceived naturalness and restorative effect (i.e., feelings of relaxation and/or escape) after inviting participants to walk through sites characterized by their degree of naturalness (i.e., strongly natural, intermediate, or strongly unnatural).[30] Similarly, Mavoa et al. (2019) detected a statistically significant relationship between subjective well-being and both flora and fauna species richness, independent of other natural environment measures.[26] Several other studies, using a range of methodologies, have found similar results.[29,32,33] Nonetheless, some studies have found no such correlation between biodiversity and degree of naturalness to psychological restoration or other indicators of well-being.[31,33] Using an experimental design, Van den Berg et al. (2014) compared the restorative impacts of four environments—an urban streetscape, a tended parkland, a tended woodland, and a wild woodland— on participants after showing them a scary movie.[31] Compared to the urban streetscape, the three natural environments (i.e., the tended parkland, tended woodland, and wild woodland) were correlated with a stronger recovery in mood, vitality, and restorative state; yet when these environments were compared to each other, the authors found no significant difference. This suggests that the degree of naturalness may matter less than the presence of greenspace itself. Additionally, a few studies have found that wildness that takes

the form of very dense vegetation may *compromise* psychological well-being by being seen as probable settings for physical or sexual assault and other crimes.[34,35] These divergent findings highlight the need for more research.

Finally, predicting the health benefits expected from an urban rewilding project can be difficult to do as such projects often differ widely from each other in both scale and approach.[36] Similarly, projects may also differ in terms of the habitat being rewilded (wetland, grassland, forest, etc.), and the degree of degradation to the ecosystem prior to beginning the project. For example, rewilding a meadow ecosystem would result in different health benefits than rewilding a forest ecosystem, owing to the different ecosystem services these habitats provide. Similarly, rewilding a highly degraded landscape would in theory result in greater health benefits than rewilding a public park, which would have already provided some greenspace health benefits. The other difficulty in evaluating the health benefits of urban rewilding projects is the relative lack of empirical research on the subject.[37-39] While much is known about the health benefits that urban greenspace provides, it is less clear if and how the biodiversity or "wildness" of that greenspace enhances these health benefits, particularly as it relates to mental health. This leaves a gap in understanding as to how biodiverse or wild a space needs to be to generate health benefits. More research is needed to discern which qualities of wild or rewilded areas promote health and well-being.

## What are the health risks of rewilded urban spaces?

Like health benefits, the health risks of rewilding are also dependent on project scale and approach, the habitat being rewilded, and the degree of degradation to the ecosystem prior to beginning the project. There is similarly a lack of empirical evidence tying rewilding initiatives to these risks. Potential risks that have been suggested are based mostly on hypothetical scenarios, taking into account the approaches that might be involved in the rewilding process.

These potential risks of urban rewilding projects can be categorized as either direct or indirect. Direct risks include increased transmission of tick- and mosquito-borne diseases; the increased risk of human-wildlife conflict; and worsened symptoms in those with seasonal allergies.[10,40,41] For example, ticks are commonly found in wooded areas with leaf litter, along forest edges, in tall grassy areas, and within vegetated habitats under tree canopies — any of which are likely outcomes of a rewilding project, where vegetation like grasses are left to grow long or leaf litter left to naturally decompose.[42] Rewilding of urban wetlands, on the other hand, may unintentionally benefit mosquitoes by creating an ideal habitat for breeding, and consequently increase the risk of mosquito-borne disease transmission settings.[43] Regarding potential for human-wildlife conflict, risks could include increased wildlife-vehicle collisions, property damage, and/or physical attacks to people or their pets.[3]

Many of these risks can be mitigated through considered design and planning. For example, there are a number of landscape management strategies that can minimize the movement of ticks in a rewilded area, such as the use of hardscaping materials (e.g., gravel, stones, bare soil, or cedar woodchips) to create clear pathways for human movement throughout rewilded areas.[44] For mosquitoes, reintroduction of natural predators is another option to reduce associated risk.[45,46] A meta-analysis of 31 studies concluded mosquito larvae were significantly reduced through predation by dragonflies and other similar insects.[45]

Indirect risks include the risk of displacement of low-income populations from their communities as a result of green gentrification, as well as the inverse risk of perpetuating inequities by concentrating projects, and subsequently health benefits, in the wealthier parts of cities.[47,48] The New York City High Line is an example of a successful urban rewilding project that turned an abandoned railway into a rewilded elevated walkway. Noted health benefits include reduced air and noise pollution for pedestrians, among others.[49] However, the transformation also resulted in the gentrification of the neighbourhood, raising adjacent housing values by 35% and displacing low-income residents from this community.[50] These indirect risks are often more complicated to address. Nonetheless, there exist a number of strategies aimed at developing greenspaces that resist subsequent gentrification and displacement.[51]

For example, rent control and anti-eviction protections (e.g., the right to counsel) in communities at risk of green gentrification can be used to enable renters to continue living in their existing rental unit.[51] Similarly, for current or prospective low-income homeowners near the greenspace, property tax freezes and financial supports such as down-payment assistance can be implemented to ensure homeownership remains financially feasible for low-income residents.[51] Non-profit organizations can also create community land trusts, which are a model of affordable housing that serves to acquire and hold land in the interest of the local community.[52] Other anti-gentrification and anti-displacement strategies may be targeted towards private sector housing developers, small businesses, and public funding agencies. Regardless of the strategy chosen, it is essential that strategies be implemented at the early stage of greenspace planning and development, and that communities be engaged in the process throughout.[51]

Finally, it is also important to note that while the concept of rewilding is aligned with many Indigenous philosophies and practices,[53] the rewilding movement has historically excluded Indigenous people. In doing so, rewilding projects often miss out on a significant opportunity to learn from Indigenous leaders about local land history and ecology and improve project outcomes. More importantly, rewilding projects that exclude Indigenous collaboration diminish the likelihood of creating an urban area that would allow Indigenous peoples to reconnect with the land or engage in environmental healing. To address this harm, the rewilding movement must take into account the interests, knowledge, and needs of Indigenous

communities, encouraging Indigenous-led rewilding projects and collaboration with local Indigenous communities.

## What factors should environmental public health professionals consider in planning and evaluating urban rewilding initiatives?

In many cases, the health benefits of urban rewilding will far outweigh the risks. Nonetheless, careful planning and risk mitigation can help to ensure that benefits are maximized, while risks minimized. This will involve breaking down the silos between urban planning, environmental conservation, and public health. In particular, environmental public health professionals could advocate for involvement during the planning and implementation process of urban rewilding initiatives, evaluating a project's health-related impacts and recommending potential mitigation strategies to potential health risks.

Some key public health considerations during the planning and implementation processes include:

- The site's current health risks and benefits (pre-rewilding).
- The location of the site, including proximity to people and/or homes and businesses, as well as the expected number of visitors to the area.
- The rewilding approaches being proposed, and the health risks they may pose. For example, if there is a proposed animal reintroduction, what might be the human health risks of this (if any)?
- Whose voices have been included in the consultation process and whose voices are missing.
- Considerations of how people are likely to interact with the rewilded site in the future.
- As rewilding is a dynamic process, consideration of the predicted health benefits and risks of the project over time.

Evaluation of urban rewilding initiatives is necessary to improve understanding of both the benefits and harms of these kinds of projects. It is important that evaluations 1) be planned from the outset, including baseline data collection for pre-post rewilding comparisons, 2) account for both the slow progression of changes over time and the dynamic nature of rewilded spaces, including seasonal changes and climate change, and 3) consider the equity effects and impacts for specific sub-populations.[54]

# Summary

Urban rewilding is a style of rewilding focused on adapting and applying certain rewilding principles to projects in urban or suburban areas. As greenspaces, urban rewilding projects are likely to result in numerous health benefits for those interacting with or living near to the site, such as reducing air pollution and noise, restoring psychological capacities, and encouraging social cohesion and physical activity. Rewilded sites may also contribute to added health benefits that other urban greenspaces (e.g., parks, tree-lined streets) do not, owing to their increased biodiversity and perceived "wildness." More research, however, is needed to better understand how these characteristics improve human health and how much (e.g., what degree of biodiversity or perceived wildness) is necessary to achieve these benefits. Furthermore, studies that examine the health impacts pre- and post-urban rewilding would help better inform our understanding of these initiatives. As for health risks, the evidence remains thin. Nonetheless, precautionary measures such as those mentioned in this review can and should be implemented at the outset of urban rewilding projects to mitigate known risks where possible.

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