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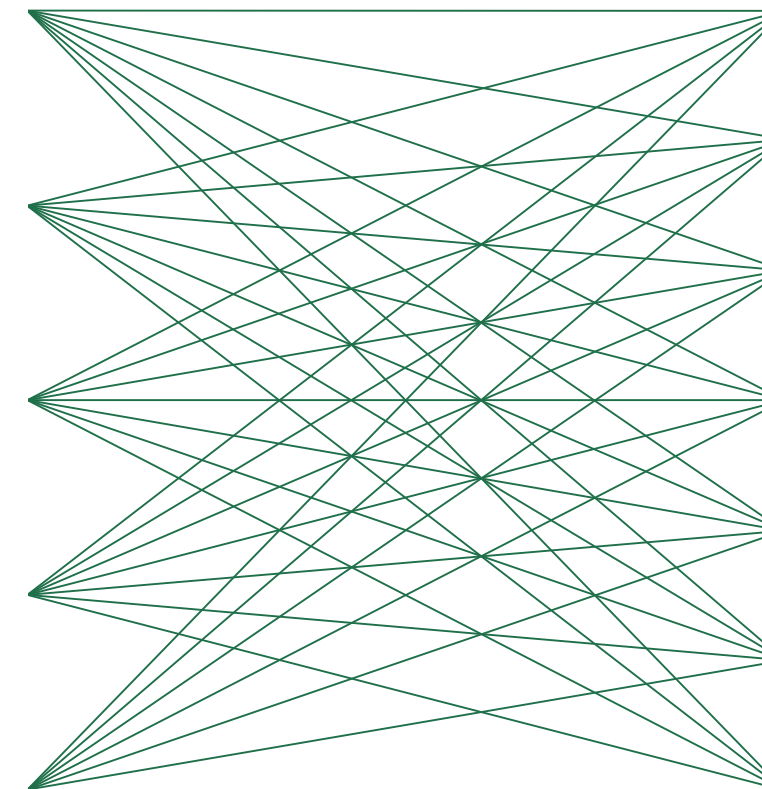


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# FOREWORD

Urban designers face the demanding challenges of concurrently addressing complex, multi-layered goals and requirements to foster enjoyable, effective and ethical city spaces. In this document, Green Futures Lab (GFL) interns Neha Chinwalla and Clelie Fielding have tackled integrating two critical aims: the importance of a public realm that cultivates strong connections to a place and to others, promoting social well-being; and at the same time prioritizing urban design practices that are needed to reduce the severity of climate change and its impacts, to promote global well-being.

In this study, Clelie and Neha have dug deeply to identify recognized measures of social well-being and relevant urban design approaches that support social health, and married this knowledge with understanding of climate-mitigative design considerations, based in part on our previous two Green Futures

Lab publications, *Designing the Climate Responsible City* and *Materials Matter*. They have asked “How can urban design help to address both global climate protection and social well-being in a community?”

Through their Scan Design internship with the UW's GFL and Schulze + Grassov Urban Design in Copenhagen, the pair has created this accessible and beautifully illustrated guide to help designers understand climate mitigative tactics that are needed to protect the global atmosphere, the adaptive praxes that are required to endure climate change impacts, and concepts and environmental factors correlated with human social well-being. Through a detailed integrated Design Framework they suggest a suite of infrastructure and public space policy and design practices that can especially help to lessen emissions and sequester greenhouse gases while also promoting human social health. Inspiring and informative public space

case studies are then presented through the dual lenses of climate mitigation and social well-being accomplishments. Research references invite your further exploration.

We are profoundly grateful to the Scan Design Foundation for funding this internship and guide, and hope that it will inform, catalyze and support the important climate-positive work of urban designers, architects, landscape architects and community advocates. Please download the booklet from the Green Futures website: [www.greenfutures.be.uw.edu](http://www.greenfutures.be.uw.edu) and use it to help create cities that address the long-term challenges of global climate mitigation while supporting our human need for healthy social lives.

Nancy Rottle, PLA, FASLA  
Director, UW Green Futures Lab, College of Built Environments  
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Right: Biking in Malmo, Sweden (Darryl Vallejos)





# INTRODUCTION

As shapers of the built environment, landscape architects and urban designers are primarily concerned with people and places. We are passionate about creating beautiful, functional places that serve the health and well-being of people and the environment.

Today, we are facing a global climate crisis that threatens the health and well-being of people and places. Simultaneously, social connections are unraveling with the rise of technology that tends to pull people apart rather than bring them together, a severe loneliness epidemic, and significant polarization on topics such as politics, culture, economy and race; all of which were exacerbated by the COVID-19 pandemic.

Now, more than ever before there is an urgent need to address the human impact on the climate, and this tremendous effort will be easier if we work together with improved social connections.

Through climate action, urban designers have an opportunity to envision and create more livable, equitable, and healthy cities for all people. As designers and planners continue to create and implement solutions to reduce greenhouse gas emissions, they must also consider how climate design interventions can also support people's social well-being.

This book explores the reciprocal relationship between climate mitigation and social well-

being, building a case for why every urban design project must address both. The goal of this book is to provide designers and planners with resources and a framework on reaching carbon reduction goals and supporting social well-being.

We begin with defining climate mitigation and social well-being. In Chapter 3, we argue for the integration of the two topics. Chapter 4 provides a framework for climate mitigation and social well-being in urban design projects, with strategies, key considerations, and precedents for designers to use. The final chapter features case studies with both climate mitigative practices and social well-being elements.

Right: Volunteers working in the 24th Street School garden in West Adams, Los Angeles, California  
(Peter Bennett/Citizen of the Planet Photography)





# PRINCIPLES



## ACCESS + EQUITY

- Improving access to urban nature and quality of urban greenspace without displacement
- Prioritizing communities lacking social infrastructure and opportunities for social connection



## EDUCATION + EMPOWERMENT

- Inspiring sustainable behavioral change and environmental stewardship
- Providing the tools, processes, and access to expertise for people to have agency over their own communities, both for climate action and their collective well-being



## COMMUNICATION + COLLABORATION

- Encouraging collaboration between designers, planners, community-based organizations, and residents towards climate solutions that provide social benefits for all
- Co-designing climate responsible, social public spaces with communities

This book is based on these three principles, which express the ideal frameworks for planning and designing cities for climate mitigation and social well-being. The principles serve as values for creating more equitable, collaborative planning and design processes.

Right: Children and adults enjoy the undulating paths at Xuhui Runway Park (Sasaki)





**01**  
**DEFINING CLIMATE  
MITIGATION**

*How can we use design  
to help protect the global  
climate?*



*There are many ways to  
mitigate climate change.  
Let's learn about the  
methods most relevant to  
urban designers!*

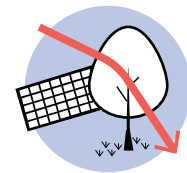




# CLIMATE MITIGATION KEY TERMS

These definitions distinguish the intricacies between different climate mitigation strategies and how they manage carbon.

This document uses “carbon” to represent all greenhouse gases that contribute to climate change.



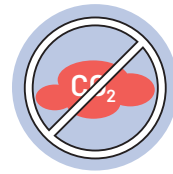
## CLIMATE MITIGATION

efforts to reduce greenhouse gas emissions and to sequester carbon dioxide to prevent more severe impacts from climate change



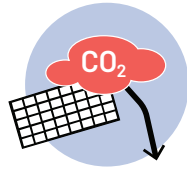
## CLIMATE ADAPTATION

efforts to prepare for the impacts of climate change to reduce harm to people and natural systems<sup>(1)</sup>



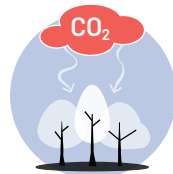
## DECARBONIZATION

ending the dependence on fossil fuels, such as oil and gas, to reduce greenhouse gas emissions, typically associated with electricity, industry, and transportation



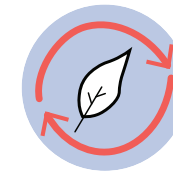
## CARBON REDUCTION

efforts, such as transitioning from fossil fuel dependence, to reduce human-caused carbon dioxide emissions to the atmosphere



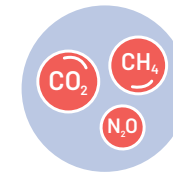
## CARBON SEQUESTRATION

the process of capturing and storing atmospheric carbon dioxide



## CARBON NEUTRALITY

state where human activities have no net effect on the climate system; requires greenhouse gas capture and reduction to balance emissions from human activities



## GREENHOUSE GASES (GHG)

gases in Earth’s atmosphere that trap heat (water vapor, carbon dioxide, methane, ozone, nitrous oxide, chlorofluorocarbons) and cause atmospheric warming



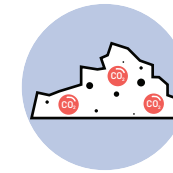
## URBAN HEAT ISLAND (UHI)

phenomenon where urban areas are significantly warmer than surrounding areas due to density of surfaces that absorb and retain heat and heat-generating processes in urban areas



## MALADAPTATION

when an adaptation strategy results in people being more vulnerable to climate change, as well as the trade-offs between mitigation and adaptation strategies



## CARBON SINK

anything that absorbs more carbon from the atmosphere than it releases; e.g. soil retains carbon in undigested organic material



## WHY CLIMATE MITIGATION?

Cities are home to more than half of the global population, with around 4.4 billion people living in cities across the world and continuing to grow. Cities are also responsible for the majority of global carbon emissions, as urban areas emit 60% of global greenhouse gases (2).

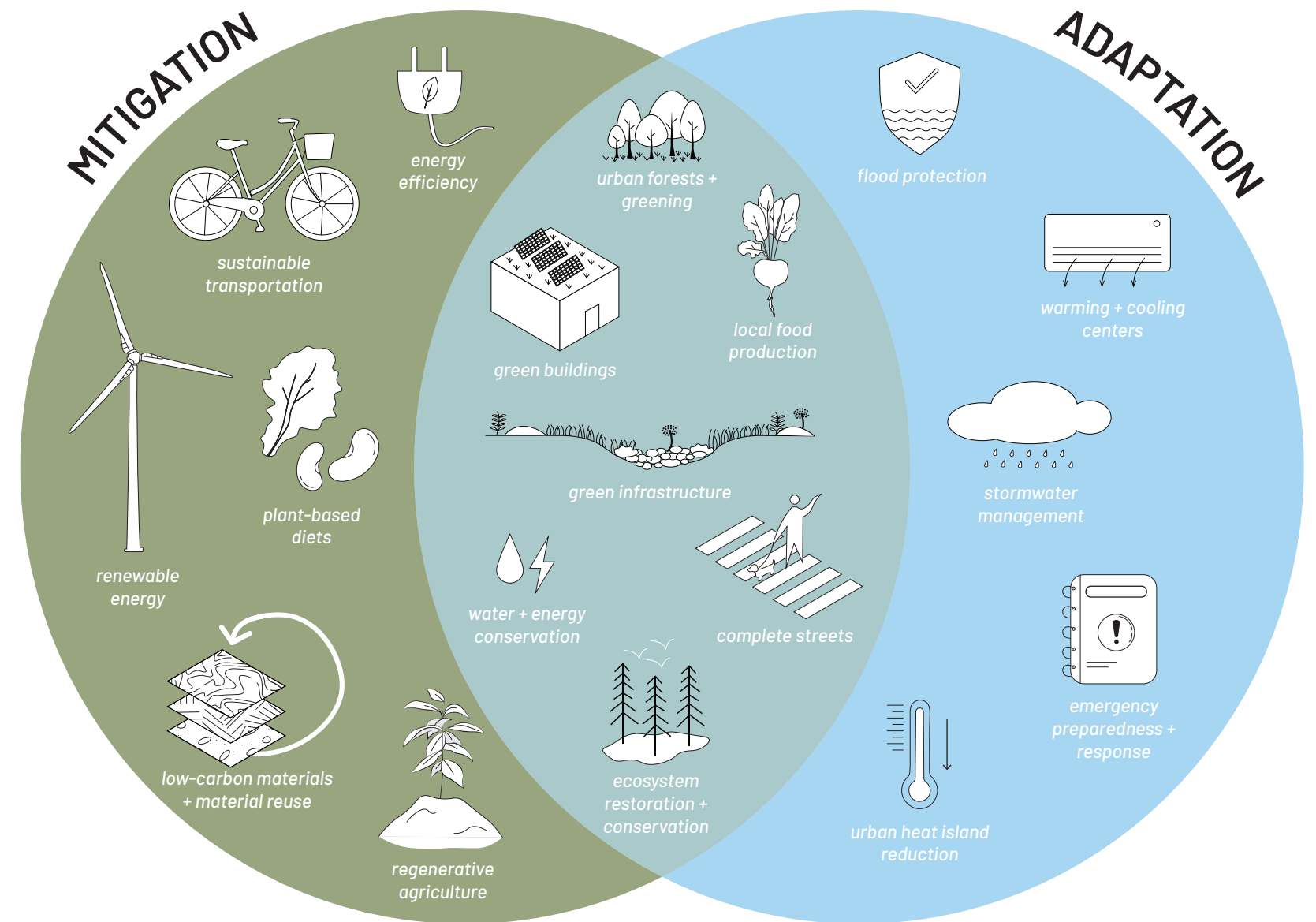
In response, climate mitigation describes strategies to reduce and sequester greenhouse gas emissions. Cities can use their talent, resources, and innovation to promote climate mitigative design. As cities continue to grow and develop, urban designers must focus on climate mitigation in every project and scale to support global emissions reduction efforts. Mitigation in the built environment is essential to prevent further, more severe impacts from climate change, which helps reduce the disproportionate burden vulnerable communities face from climate impacts.

Though the focus of this book is on climate mitigation, these efforts do not occur in a silo. Climate adaptation is another part of the equation, describing efforts to prepare for and reduce vulnerability to the impacts of climate change. Together, mitigation and adaptation strategies create a more comprehensive response to climate change.

As cities decide what policies to implement or projects to invest in, planners must be aware of the possibility of maladaptation. Maladaptation describes the tension of choosing between mitigation and adaptation strategies, along with the negative consequences one strategy can have on another goal (3).

For example, adaptation strategies such as cooling centers can increase carbon emissions if run on fossil fuels. Designers can avoid maladaptation by considering synergies between mitigation and adaptation. Mitigation strategies can also have benefits for adaptation (or vice versa), which is why the cases highlighted in Chapter VI will also discuss some adaptation strategies. We must work to rapidly reduce emissions, while also preparing for the impacts from greenhouse gases already trapped in the atmosphere.

*“Mitigation and adaptation are not mutually exclusive and should be seen as a two-pronged approach to managing the short and long-term disturbances to the climate.” - ICLEI Local Governments for Sustainability*





# CLIMATE MITIGATION SYSTEMS



## URBAN FOOD SYSTEMS

People in cities across the world consume 70% of the global food production (4). According to the U.S. Environmental Protection Agency, about ten percent of national GHG emissions come from farming and ranching. The production, distribution, loss, and waste of food is currently a carbon intensive process, with adverse consequences including deforestation, biodiversity loss, soil erosion, and impacts to food availability.

While most agriculture occurs outside of urban areas, urban designers can promote best practices for climate mitigative food systems by creating public spaces with food production elements.



## TRANSPORTATION

Transportation is the largest greenhouse gas emitting economic sector in the US. In 2022, 30% of the U.S.'s total GHG emissions came from the transportation sector (5).

Urban designers can decrease emissions and pollution from combustion engine vehicles by designing safe, accessible, and pleasant alternatives to driving a car. ASLA describes sustainable transportation modes as low-emission, active, safe, equitable, resilient, ecological, and beautiful (6). Strategies include expanding public transit, investing in micro-mobility infrastructure for cyclists, increasing neighborhood walkability and improving the quality of the pedestrian environment.



## ENERGY SOURCE AND USE

Dependence on fossil fuels, such as coal, oil, and natural gas, is the leading cause of climate change. In response, strategies to transition from fossil fuels are foundational to climate mitigation, and therefore connect to all of the other systems.

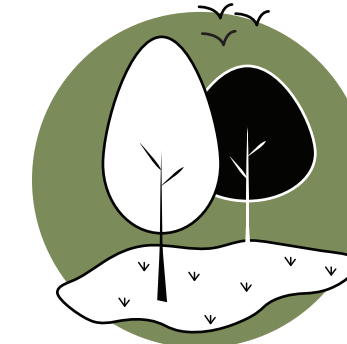
Energy efficient strategies help reduce energy consumption and greenhouse gas emissions, especially when fossil fuels are the main energy source. Using energy-efficient site features and materials, producing energy with minimal fossil fuel use such as solar panels, wind and hydro, producing energy through waste-to-energy plants, and tracking energy use intensity (EUI) can reduce reliance on fossil fuels and ignite the energy transition. City policies can enforce energy-efficient standards and promote use of fossil-free energy sources.



## WASTE AND MATERIALS

The buildings and construction sector accounts for 37% of global emissions, the largest portion of greenhouse gas emissions internationally (7). Urban designers must consider the climate impacts of construction and demolition, and reduce waste when possible.

As highlighted *Materials Matter*, urban designers must advance climate-positive design by reusing materials and choosing low-carbon and carbon sequestering materials. Circularity in the design and construction of the project as well as how the project can promote sharing between community members can contribute to reduction of and efficient use of embodied carbon. Additionally, landfill diversion of waste can be achieved through reuse, composting, and recycling.



## URBAN NATURE AND GREEN SPACES

Urban nature and greenspaces constitute an overarching strategy for both reducing and sequestering carbon emissions, often referred to as nature-based solutions to climate change. This can range anywhere from street trees to large open parks.

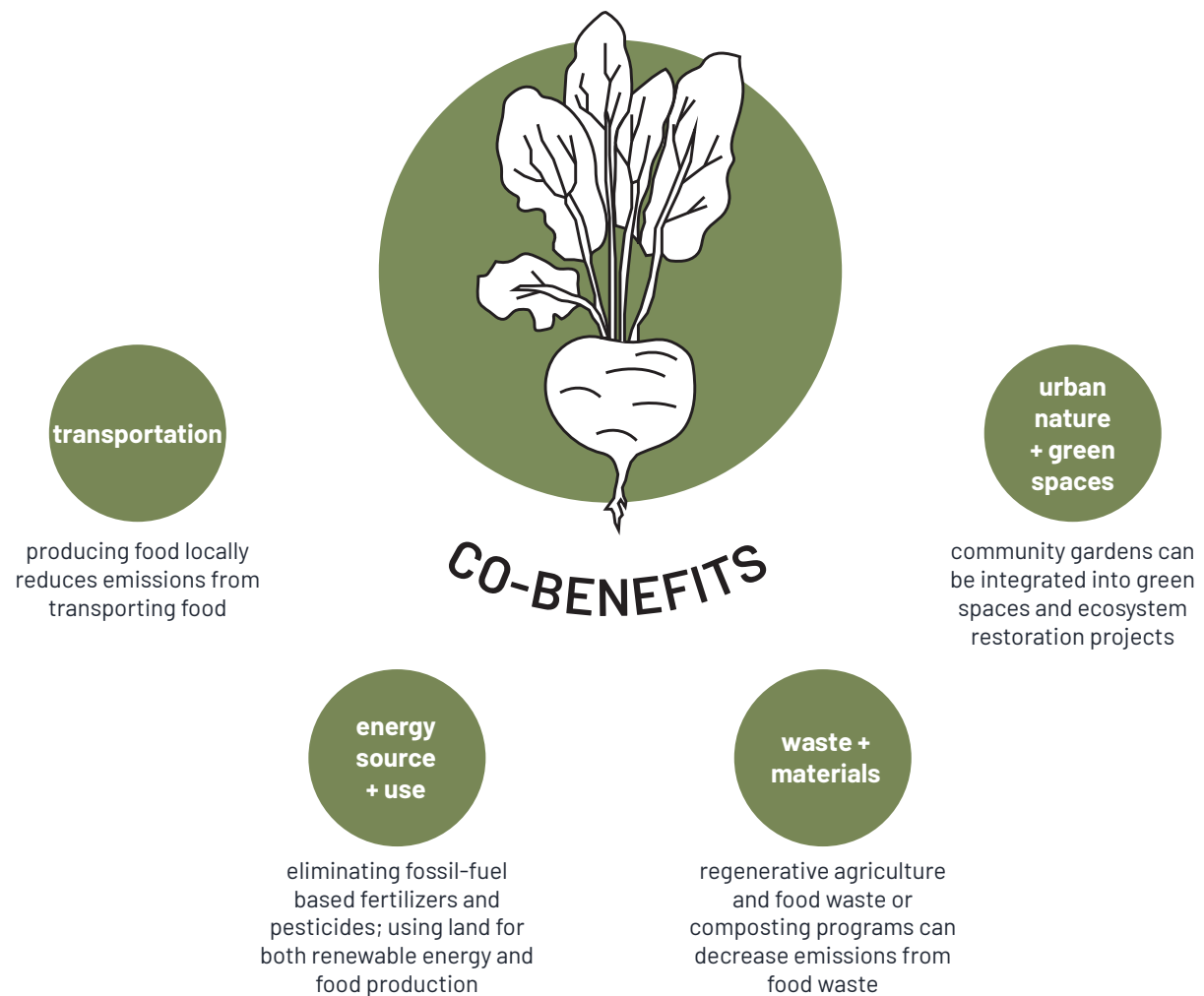
Designers can support climate mitigation by increasing tree canopy cover, designing layered vegetation, managing soil health and incorporating biochar to sequester carbon, and protecting or restoring critical carbon sink ecosystems. Trees adjacent to buildings can significantly reduce building energy consumption. Many nature-based solutions can also advance climate adaptation. For example, ecosystem restoration, bioretention of stormwater, and afforestation can manage stormwater and reduce urban heat island effects.



# URBAN FOOD SYSTEMS

Comprehensive urban food systems can support climate positive futures through regenerative agriculture, and ensure food security in dense populations. Urban agriculture also offers notable social benefits, such as educating people on food production, providing access to healthy food options, and building community through farming.

Community gardens, initiatives like Seattle's p-patches program, farmers markets, and urban farms can produce local food, educate communities about agriculture, and offer sustainably grown produce. City planners can also promote plant-based eating through efforts such as communications campaigns, events around plant-based businesses, and food assistance programs to improve access to produce.



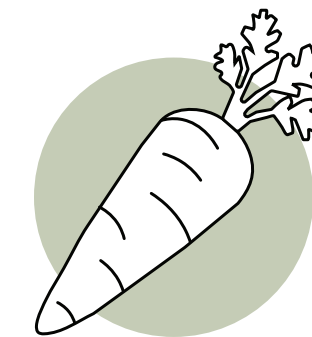
## STRATEGIES



### LOCAL FOOD PRODUCTION

Growing local food promotes sustainable food systems by cutting transportation emissions, providing fresh produce, and eliminating the need for carbon intensive supply chains. Urban agriculture improves food security: whether it is at the scale of an urban farm, community garden, p-patch, or balcony veggie box, local sourcing ensures food access and fresh fruits and vegetables (8).

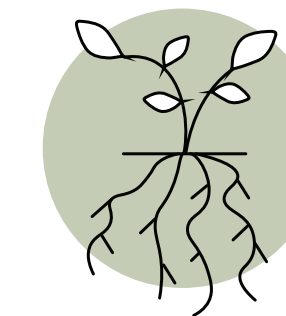
In addition, researchers have documented the social benefits of local food production through community gardens, community-supported agriculture (CSA) programs, and farmers' markets. While the power of sharing a meal with others is universally understood, there is also a profound sense of social connection that arises from participating in local agricultural production (9).



### PLANT-BASED DIETS

Switching to a plant-based diet – whether by significantly reducing meat consumption or adopting vegetarian or vegan lifestyle – can contribute to climate mitigation. The UN's Intergovernmental Panel on Climate Change (IPCC) reported that reducing meat and dairy consumption could enable more people to be fed using less land (10). Raising livestock has a significant environmental impact, primarily due to the methane emissions produced by the animals, and the large amounts of land required for grazing, which often leads to deforestation.

Animal agriculture is a major contributor to deforestation, pollution, biodiversity loss, and excessive water use, and produces heavy emissions, which is why eating more vegetables and less red meat and dairy products can help sustain the planet (11).



### REGENERATIVE AGRICULTURE

The principles of regenerative agriculture center around farming in balance with the land and ecosystems to protect its health and vitality for future generations. Farms cultivate healthy relationships between animals and land to properly cycle nutrients, retain water from animal manure, and prevent weeds and pests without chemicals. Regenerative agriculture also utilizes strategies to restore and protect soil health by limiting soil disturbance and limiting synthetic inputs.

Through photosynthesis and microbes, soil is one of the largest carbon sinks, making soil health crucial for mitigating climate change. Healthy soils are capable of absorbing more water during a flood. Regenerative agriculture decreases the reliance on fossil fuels by not using fossil fuel-based fertilizers and pesticides (12).



# TRANSPORTATION

In the United States, the average passenger vehicle produces almost one pound of carbon dioxide per mile driven, and car transportation accounts for 47% of an average American family's carbon footprint if they have two cars (13). Additionally, street construction typically requires use of large quantities of concrete and other materials with high embodied carbon. Reaching carbon neutrality requires a rapid reduction of the reliance on car travel by providing safe, accessible, convenient, and enjoyable alternatives to driving.

As streets comprise the largest net area of public space in a city, urban designers must consider how streetscapes can serve people traveling in many different modes, while also providing ecological and social functions.



## CO-BENEFITS

### urban food systems

producing food locally reduces emissions from transporting food

### urban nature + green spaces

increasing urban connections and green spaces supports micromobility and reduces carbon emissions

### energy source + use

transitioning transportation systems to more efficient renewable energy sources

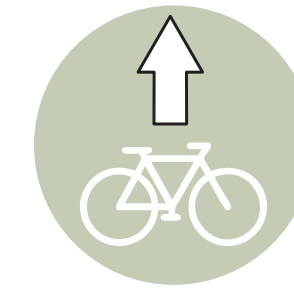
# STRATEGIES



## PUBLIC TRANSIT

A reliable, robust, and accessible public transit system is one of the best ways to reduce a city's carbon emissions. Transit improvements also make streets safer for everyone and are directly correlated with a decrease in traffic fatality rates (14). Good transit street design reduces vehicle congestion, while also making walking and cycling safe and enjoyable.

In public transit projects, urban designers must also plan for the impacts of climate change on transportation systems. C40 recommendations for reducing flooding impacts on transit include avoiding mass transit corridors or elevating transit infrastructure in flood prone areas. For extreme heat, C40 recommends cooling pavements and greening or shading strategies to make public transit travel safer during heatwaves (15).



## MICROMOBILITY INFRASTRUCTURE

Traveling by human-powered or electric smaller, lightweight devices, such as bicycles, scooters, and skateboards, is known as micromobility. Since most people living in cities do not own cars, micromobility allows people to get around with no or low carbon impact (16).

The Complete Streets approach provides dedicated space for people to move safely and comfortably in every mode. Complete streets have dedicated, protected bike lanes for micromobility users, and often integrate more public space and green infrastructure than auto-centric designs. Cities like Toronto have adopted Complete Street policies with clear street design processes (17). Designers can use the principles of Complete Streets to create streetscapes that prioritize sustainable transportation modes.



## WALKABILITY

Walking and rolling using mobility devices is a carbon-free mode of transportation mode which is essential for public city life. Walkability can be promoted by increasing neighborhood density and mixed-use zoning, as well as connections with public transit. Streets should be designed with adequate lighting, street trees, and safe crossings. Sidewalks reduce pedestrian collisions by up to 89% (18).

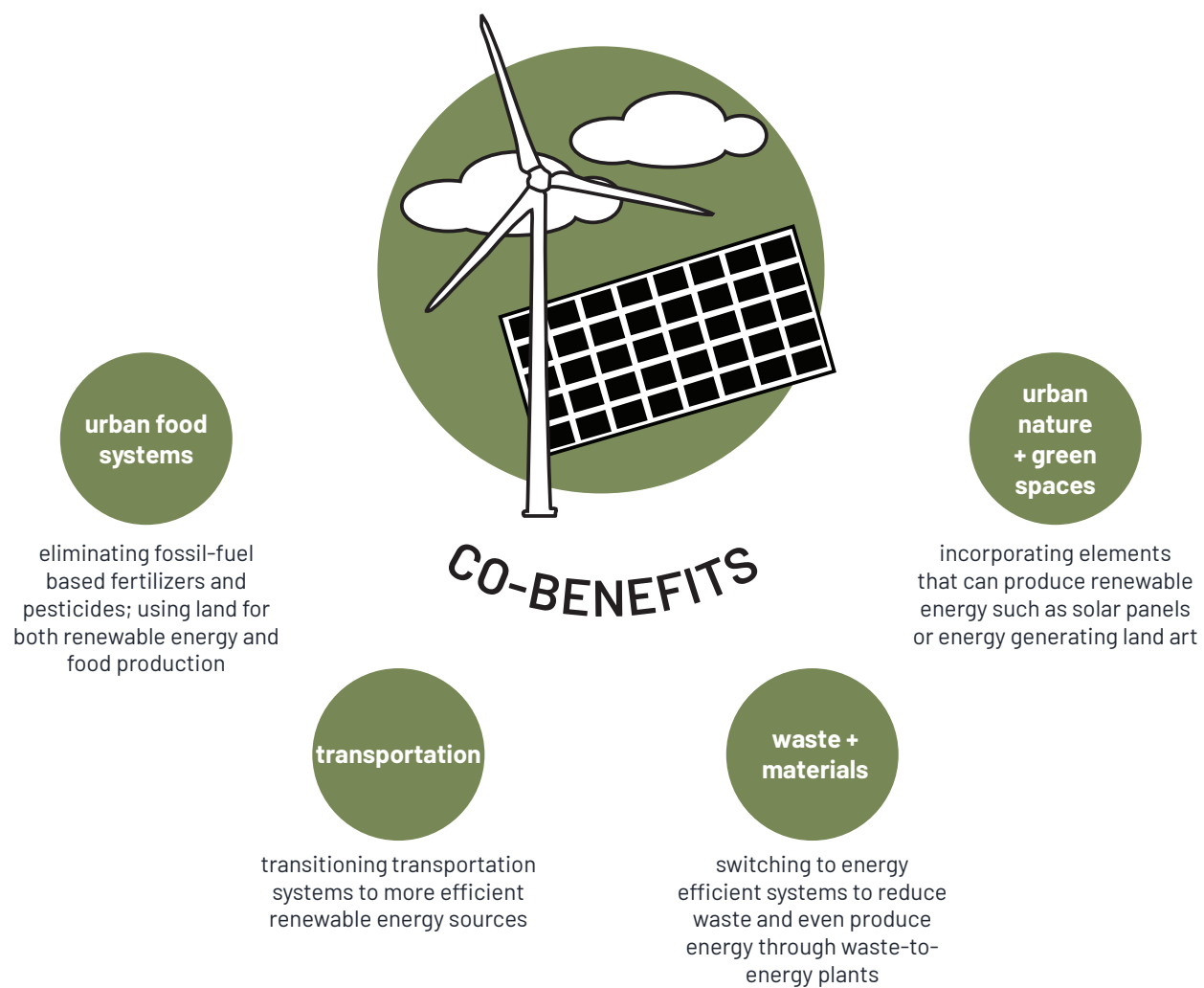
A scenario study by Project Drawdown revealed that increasing walkability without major interventions would reduce 2.83 gigatons of GHG emissions and car ownership costs by \$3.18 trillion in the US by 2050. Another scenario with more investments in walkable infrastructure predicted a reduction of 3.51 gigatons of GHG emissions in the US and savings of \$3.94 trillion in car operating costs (19).



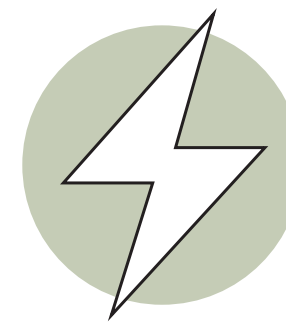
# ENERGY SOURCE AND USE

Urban designers can support the energy transition to renewable energy sources, including wind and solar power, by integrating renewable energy in projects. Ideas include solar-powered lighting or sculptures that generate wind power. Designers can reduce fossil fuel use through electrification, renewable energy, and energy efficiency strategies, and planners can impose policies to regulate energy sources and uses.

A 2012 study from the US Department of Energy's National Renewable Energy Laboratory found that each state has enough resources to generate more than enough clean energy to serve the population<sup>(20)</sup>. In 2023, renewable energy made up 9% of the US's energy consumption<sup>(21)</sup>. With the resources available, all that is needed is funding and political willpower to ensure the clean energy transition.



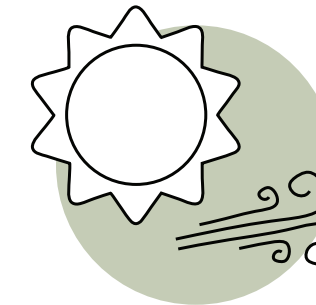
## STRATEGIES



### ELECTRIFICATION

Electrification refers to the transition from fossil fuel systems to technologies that run efficiently on electricity. The process of electrification occurs at the same time as the energy transition, with the electricity coming from increasingly more renewable sources<sup>(22)</sup>.

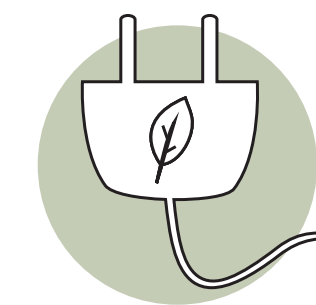
Building electrification entails replacing fossil fuel boilers and furnaces with efficient electric heat pumps, which also improve air quality indoors and outside<sup>(23)</sup>. Urban mobility electrification is achieved through switching to electric vehicles (EV), buses, and trains. EVs are 3.6 times more energy efficient than a comparable combustion engine vehicle<sup>(24)</sup>. Urban designers can support electrification by including heat pumps for buildings and charging infrastructure in public areas.



### RENEWABLE ENERGY

Renewable energy comes from naturally replenishing sources like solar, wind, geothermal, hydropower, and biomass. While these sources are virtually inexhaustible, their availability is flow-limited. For instance, Copenhagen's Copenhill waste-to-energy plant relies on a steady waste supply, converting 599,000 tons of waste into heat and electricity in 2020<sup>(25)</sup>. About 10% of the plant's waste intake comes from other countries.

Renewable energy sources should be selected based on the resources that are readily available in a given climate. Urban designers can incorporate green roofs with solar panels to more efficiently provide renewable energy and reduce heat islands, while planners can collaborate with utilities and other municipalities to create regional clean energy plans<sup>(26)</sup>.



### ENERGY EFFICIENCY

Designers can use energy efficiency strategies in their projects to decrease energy use, which reduces GHG emissions when the energy source is fossil fuels. Designers can select energy efficient fixtures, such as solar powered, specify materials that were created and sourced with energy efficient standards, and planners can impose policies to require energy efficient material resourcing.

For building operations, one method to reduce energy consumption is to track the energy use intensity (EUI). EUI is a number that measures the energy efficiency of a building; a lower EUI means fewer GHG emissions. Calculating EUI standardizes comparisons between building efficiencies and can be a resource for policymakers for energy use and efficiency<sup>(27)</sup>.



# WASTE REDUCTION AND MATERIALS

A materials transition in the construction sector is necessary to reduce carbon emissions and mitigate climate change. This transition involves switching to low carbon or carbon sequestering materials, focusing on how the materials are manufactured, produced, and transported to minimize carbon emissions. It requires substituting carbon-intensive materials such as steel, cement and glass with alternatives like polymer concrete, fiberglass, engineered wood and mass timber (28).

In addition to shifting to more sustainable materials, designers can be advocates for circular reuse and landfill diversion of construction materials. Carbon intensive materials that are not able to be reused can be recycled into other products and used to generate alternative forms of energy.



## urban food systems

regenerative agriculture and food waste or composting programs can decrease emissions from food waste

## urban nature + green spaces

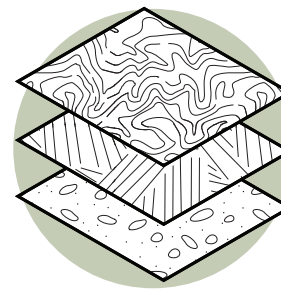
utilizing circularity by repurposing materials on-site, and enhancing plant health with biochar or compost

## CO-BENEFITS

## energy source + use

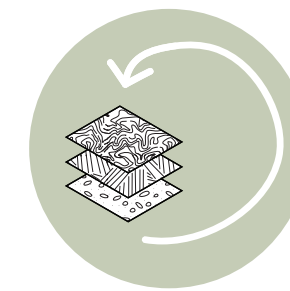
switching to energy efficient systems to reduce waste and even produce energy through waste-to-energy plants

## STRATEGIES



### LOW-CARBON OR CARBON SEQUESTERING MATERIALS

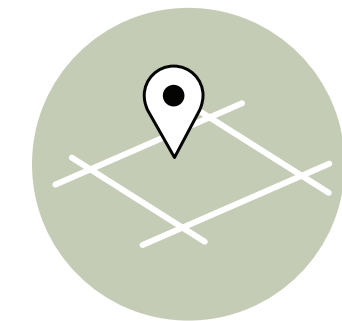
Understanding embodied carbon helps landscape architects choose low-carbon materials. As explained in *Materials Matter*, the extraction, manufacturing, and transportation processes result in varying levels of embodied carbon in materials. There are a few recently developed materials that can store and sequester carbon. Naturally occurring materials that sequester carbon such as wood, cork, kelp, and algae, can be transformed into building materials that store carbon permanently. These include an insulation made from mycelium, which is fire-resistant and absorbs carbon as it grows, and cement bricks made out of industrial waste and injected carbon (29). Materials engineers have developed methods to capture carbon during the concrete production process with ongoing innovative research.



### REUSE AND CIRCULARITY

Material lifecycles can be shifted by cities to circular systems that prioritize reuse rather than landfill disposal. Landfills emit large quantities of methane as organic waste decomposes without oxygen, but municipal composting can reduce methane emissions by up to 95% (30). As illustrated in *Materials Matter*, after harvesting and processing, the circular system would operate as follows: storage, construction, reuse and repair, disassembly, upcycle and reuse, secondary material processing, secondary material product, design for circularity, and back to material storage.

Selecting reused materials can have significant impacts for climate mitigation. Concrete can be recycled and reused to drastically reduce the carbon footprint of a project, and employed in creative ways that adds character to the re-imagined site (31).



### SOURCING AND QUALITY

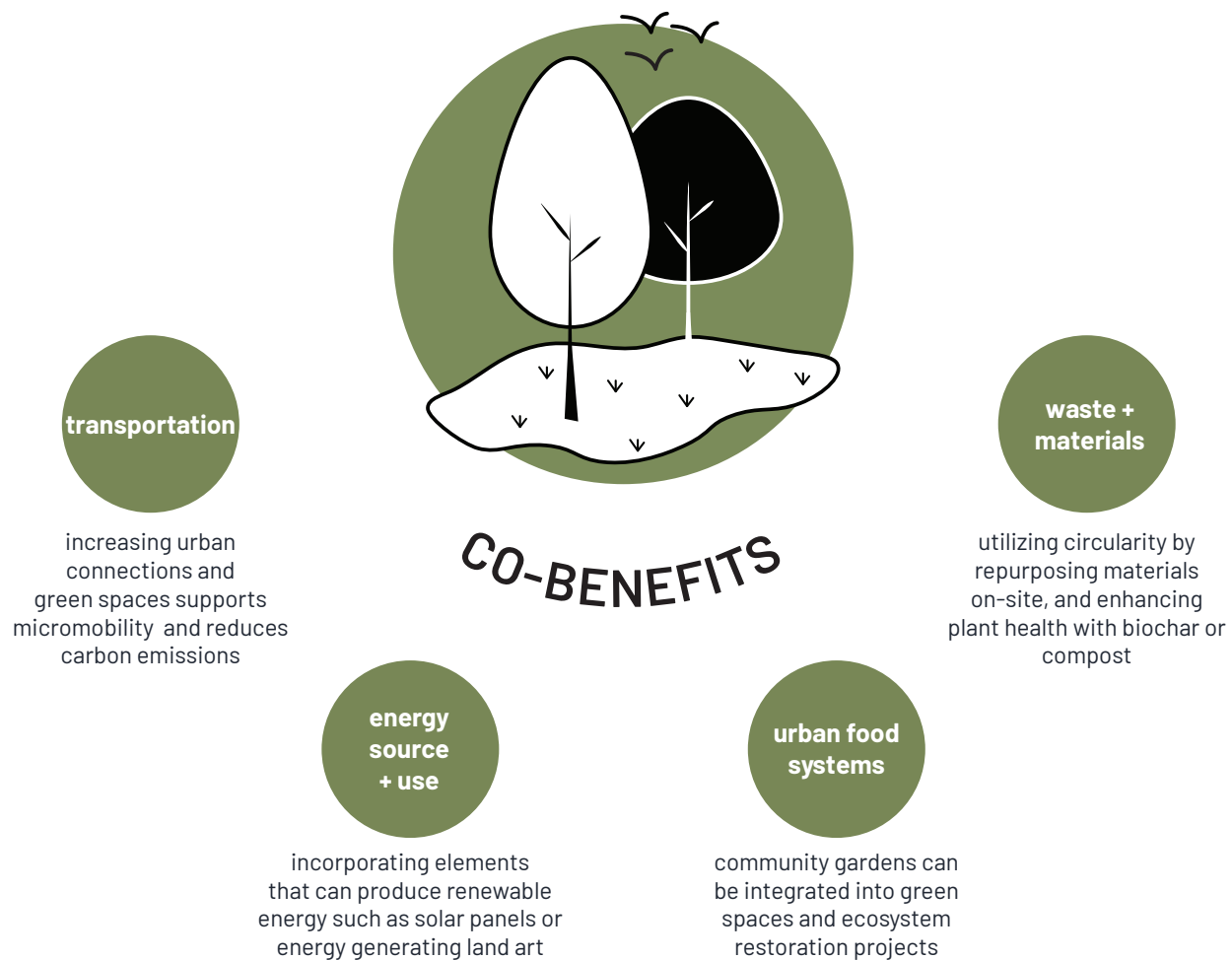
Opting for regionally sourced materials is an effective way to minimize carbon emissions related to transportation. The SITES sustainable development and design guidelines specifies different distances of sourcing depending on the material; for example, soils and other aggregate materials should be sourced within 50 miles, while native plants should be sourced within 250 miles (32).

As mentioned in *Materials Matter*, not only does local sourcing contribute to a reduced carbon footprint, but also enhances cultural identity and place attachment. Material aesthetics, quality, and absence of toxins are paramount to ensuring a healthy living environment as well as human well-being.

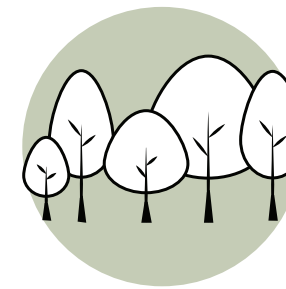
# URBAN NATURE AND GREEN SPACES

Urban nature and greenspaces are essential for climate mitigation and adaptation, and can be achieved through nature-based solutions. Increasing tree cover in cities provides shade, reduces urban heat islands, decreases energy use in buildings, improves air quality, and enhances stormwater management. Trees, while effective at carbon sequestration, require significant care to thrive in urban spaces.

Proper soil management is essential for boosting plant health, controlling water quality, and sequestering carbon. Additionally, protecting and restoring carbon-rich ecosystems like wetlands is vital for effective carbon capture and supporting biodiversity. Urban planners and landscape architects play a key role in establishing, preserving and maintaining public parks, urban ecosystems and open space.



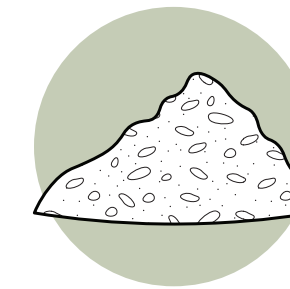
## STRATEGIES



### TREE COVER AND HEALTHY VEGETATION

Urban greening, or increasing tree cover and vegetation in cities, is an impactful tactic for climate mitigation. Trees offer numerous climate adaptation advantages like providing shade and cooling through evaporation, improving air quality, heat island reduction and supporting stormwater management (33). Additionally, trees can be highly impactful for carbon sequestration, however, their effectiveness is often diminished by low biomass, space constraints, and limited maintenance in urban areas.

Increasing tree canopy on a city wide scale must be a comprehensive and integrated approach. Urban greening is most effective for when the vegetation is densely planted, and plants are selected carefully for natives and climate resilient species (ibid).



### SOIL MANAGEMENT AND HEALTH

Proper soil management is critical for ecosystem services, such as sustainable plant production, water quality, human health, and climate mitigation (34). Strategies like carbon sequestration in soil can simultaneously boost agricultural production and offer environmental benefits. However, using nitrogen fertilizers to enhance crop yields leads to increased nitrous oxide emissions, a harmful greenhouse gas.

Climate positive strategies include adding organic matter, such as compost, biochar, or animal manure, to soil. Other strategies include: increasing vegetation and soil biodiversity, reducing toxin and pathogen inputs, using cover crops, and minimizing tillage in farming practices. All of these practices benefit the climate by increasing soil carbon intake, increasing plant growth, and decreasing greenhouse gas emissions (ibid).



### PROTECTION AND RESTORATION OF CARBON SINK ECOSYSTEMS

One of the most effective carbon sink ecosystems is wetlands, which include peatlands, mangrove forests, salt marshes and seagrass beds. Wetlands have an exceptionally high carbon sequestration rate, capturing 20% of the organic ecosystem carbon, despite covering only about 1% of the planet's surface (35).

Natural wetlands have been declining for decades, due to pollution, invasive species, drainage, and climate change. Landscape architects and planners can collaborate with environmental scientists and engage local experts to design restoration strategies. Restoring and protecting wetlands not only ensures increased carbon capture, but also increases habitat and biodiversity throughout the ecosystem.

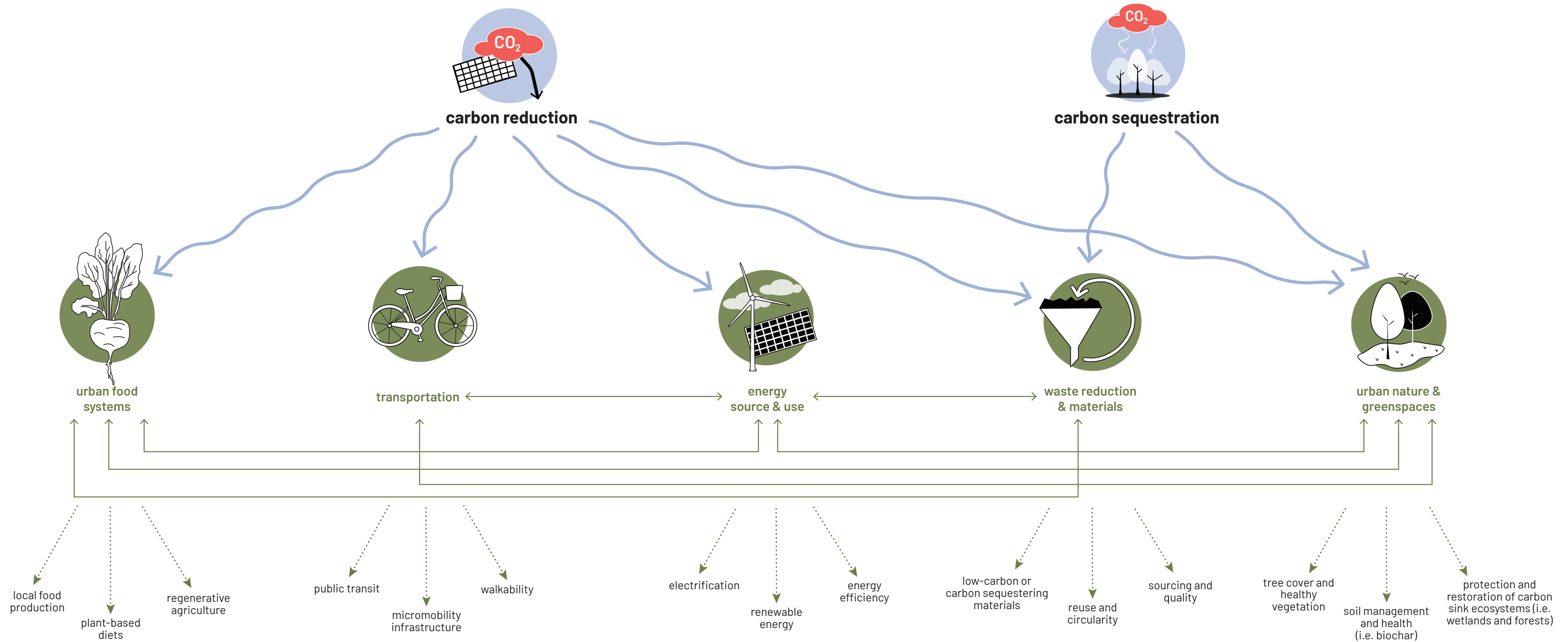


# SYSTEMS CONNECTIONS

Climate mitigation consists of strategies to reduce and sequester greenhouse gases. In this diagram and guide, carbon is used as a shorter phrase to represent all greenhouse gases, including carbon dioxide.

Synergies exist between climate mitigation strategies, as illustrated by the arrows between the systems. For example, increasing tree cover can reduce building energy use by providing shade that reduces cooling demand, connecting urban nature and energy use.

Examples of strategies to reduce or sequester carbon are described under each climate system.



02

## DEFINING SOCIAL WELL-BEING

*How can we design  
for people to positively  
address the climate  
emergency?*



*Scholars have developed  
concepts to understand  
social well-being. Let's see  
how they can be applied to  
designing public space!*





# SOCIAL WELL-BEING KEY TERMS

Within the field of social sciences, there are many theories about what social components create a positive and fulfilling life. These key terms and concepts are foundational to understanding the use of social well-being in this guide



## SOCIAL WELL-BEING

the feeling of connectedness to place and other people. Positive social well-being can be defined as having a sense of belonging, social cohesion, and place attachment within a group



## BELONGING

feeling part of a community or group, such as having something in common with and feeling connected to others



## PLACE ATTACHMENT

an emotional connection between people and a place that "evolve through emotional connection, meaning, and understandings of a specific place and/or features of a place" (36)



## SOCIAL COHESION

strong relationship networks within a community where people trust and feel connected to others within the group



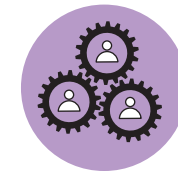
## SOCIAL ACTUALIZATION

seeking and having the ability to reach one's potential as part of a community



## SOCIAL CAPITAL

the tangible and intangible "resources embedded in a social structure which are accessed and/or mobilized in purposive actions" (37)



## SOCIAL INFRASTRUCTURE

"the physical places and organizations that shape the way people interact" and "the physical conditions that determine whether social capital develops" (38)



## SOCIAL COHERENCE

"the perception of the quality, organization, and operation of the social world, and it includes a concern for knowing about the world" (39)



## SOCIAL CONTRIBUTION

an individual's social responsibility and value in a community, centered around the belief that everyone brings a unique contribution to the world



## SOCIAL DETERMINANTS OF HEALTH

non-medical factors that affect a person's health

## WHY SOCIAL WELL-BEING?

Social well-being is under pressure from multiple crises, largely spurred by the rise of social media and a global pandemic. The Center for Disease Control (CDC) has declared a mental health crisis, reporting that the prevalence of anxiety and depression increased by 25% post-COVID, and the World Health Organization (WHO) has reported an increase of isolation and loneliness in cities (40). By highlighting social well-being, the aim is to improve health outcomes by fostering deeper connections and social networks through urban design.

In the climate conversation, the lens of social well-being centers people in the work of climate mitigation and considers how climate action, as well as the consequences of not taking action, impacts communities. As climate action involves undoing past harms and charting a better path forward, social well-being is a crucial consideration in designing and planning a carbon-free future that serves the needs of all.

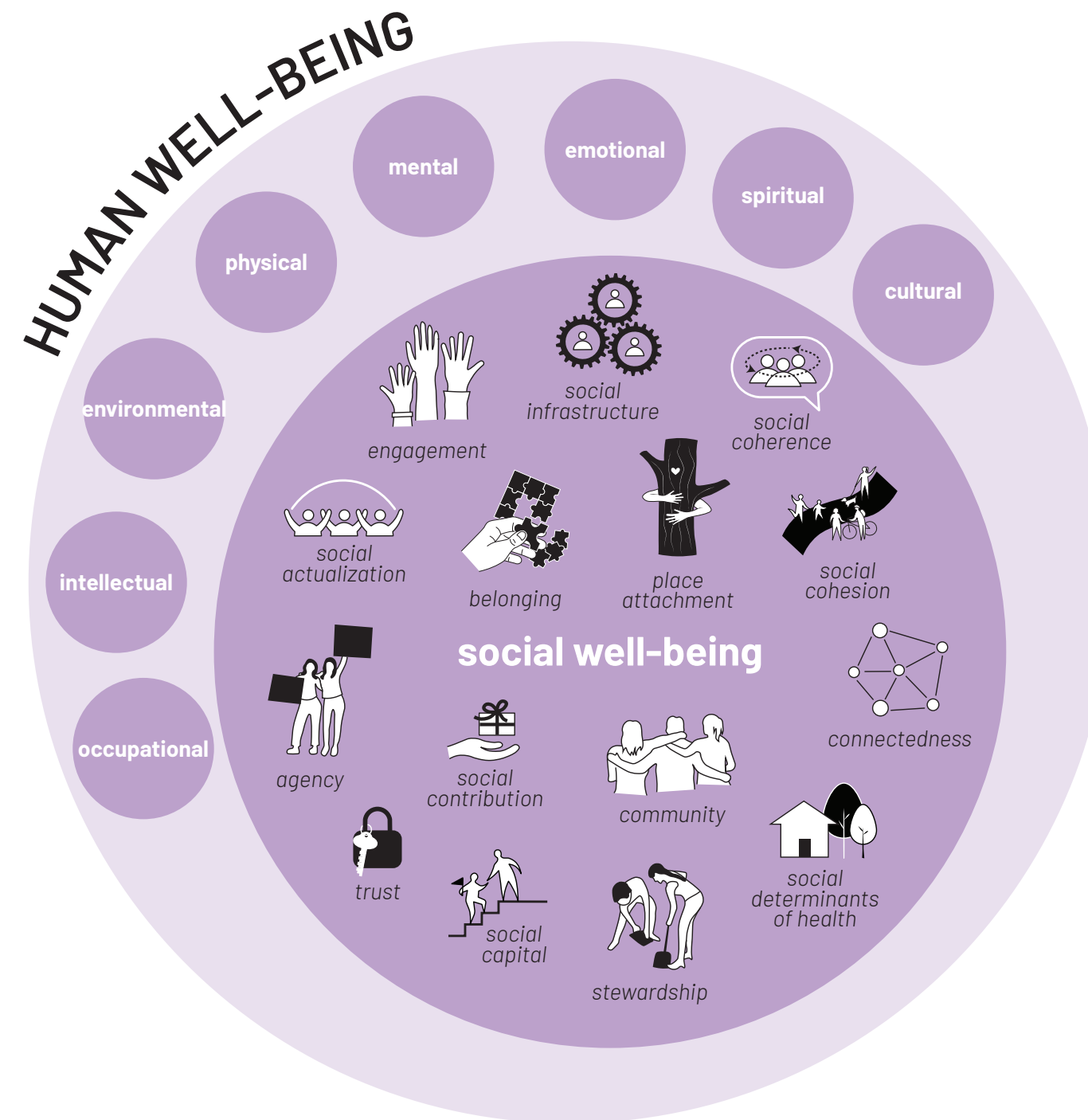
### WHAT IS SOCIAL WELL-BEING?

Human well-being is a holistic approach to health which considers what one needs physically, mentally, emotionally, socially, culturally, spiritually, and economically to thrive (41). Social well-being is an element of overall well-being centering around how people connect with each other and their environment. Social well-being is intrinsically tied to the built environment through how people experience their neighborhood or city.

In 1998, sociologist Corey Lee M. Keyes defined social well-being through five dimensions: social integration, social contribution, social coherence, social actualization, and social acceptance (39). Together, these dimensions examine people's relationships to society and the extent or strength of the social networks in their

community. Social well-being discusses feelings of social value, acceptance, and knowing one's role in society. Keyes argues that people with healthier social well-being are hopeful about the future of society, care more about the world around them, and feel responsibility to contribute to their community (ibid).

As the graphic on the right illustrates, social well-being is one component of the overarching concept of human well-being. In contrast to human well-being, which is experienced on an individual level, social well-being is intrinsically tied to a group or collective. Positive social connections enhance well-being and interpersonal relationships through mutual trust, shared experiences, and collective action.





# BRANCHES OF SOCIAL WELL-BEING

Based on reviewed research on social well-being, this document uses three branches to define social well-being. Belonging, place attachment and social cohesion are three core elements which together contribute to one's social well-being.



## BELONGING

Sense of belonging encompasses a person's "feeling of attachment and placement for and within a given community" (42).

Belonging can include the perceptions of being a part of a close-knit neighborhood where people get along and know each other. Keyes' definition of social integration includes "the extent to which people feel they have something in common with others who constitute their social reality (their neighborhood), as well as the degree to which they feel that they belong to their communities and society" (39).

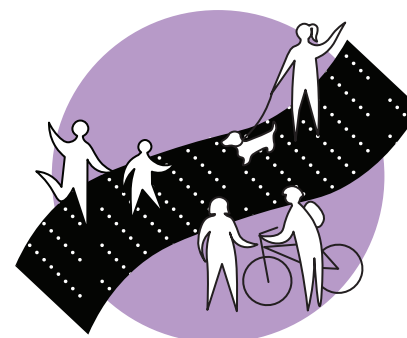
Contributing to and engaging in community can support a sense of belonging, along with connecting to other community members and feeling supported by them.



## PLACE ATTACHMENT

Place attachment is defined as holding an emotional connection to a place, where meaning is derived by the person experiencing the place. Place identity is a part of place attachment, discussing the "pattern of beliefs, preferences, feelings, values, and goals" people use to describe their physical environment (43).

Manzo and Perkins (2006) state that place attachment is central to having a sense of community by bringing people together around a shared interest in their neighborhood (43). The authors argue that residents who feel emotionally connected to their neighborhood are more likely to take action in its improvement or participate in planning processes, part of which can involve climate action.

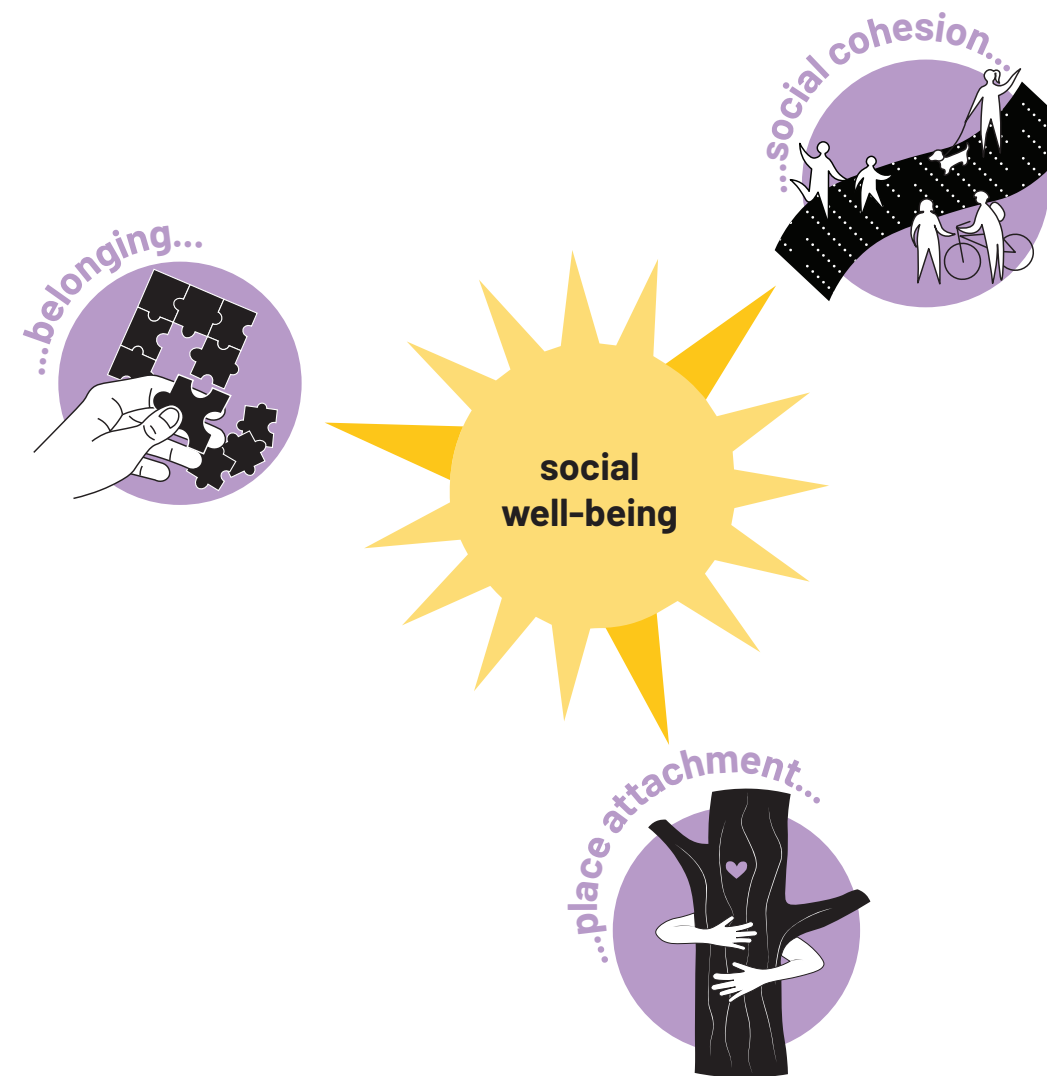


## SOCIAL COHESION

Social cohesion is part of Keyes' definition of social integration and is a significant aspect of social well-being.

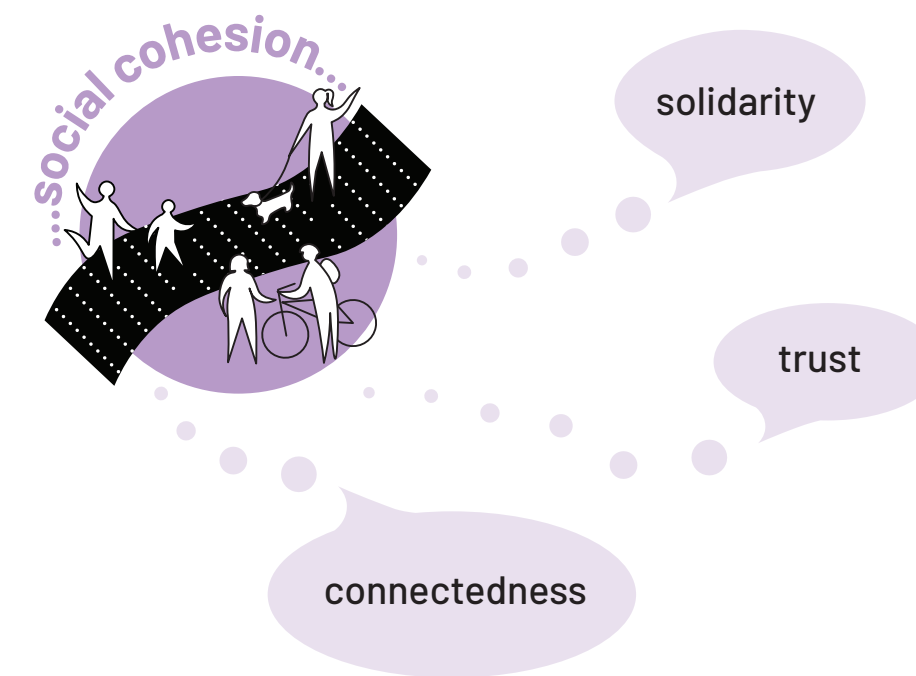
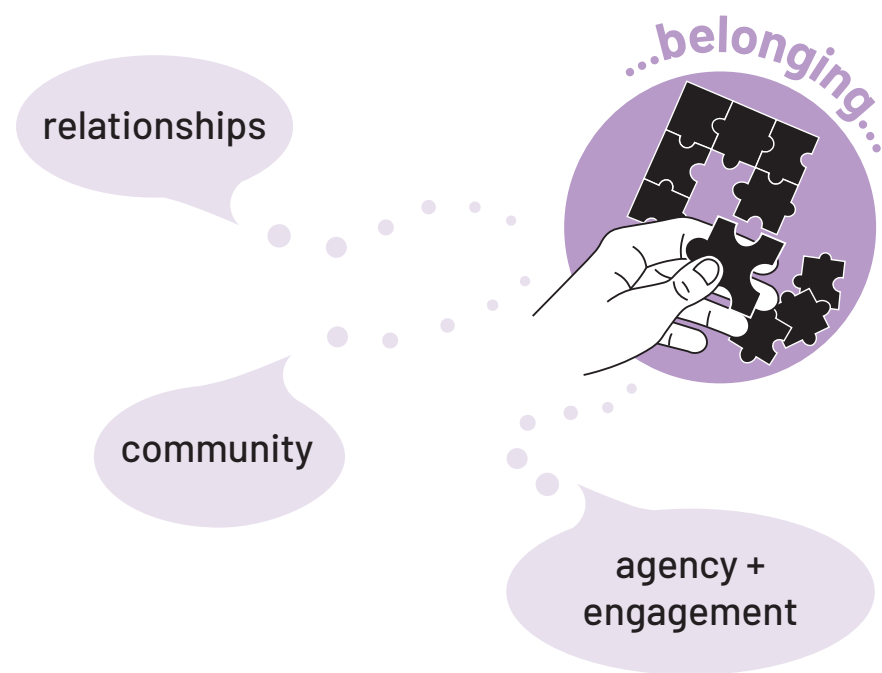
In a literature review by Miller et al. (2020), the authors identified trust, solidarity, connectedness, and sense of belonging as the four most common characteristics of social cohesion. Trust and connectedness were also the most common antecedents described with social cohesion.

In another literature review, solidarity, neighborhood attachment and sense of community, and social interactions were the major themes for defining social cohesion. Clarke et. al state that, "Social cohesion is often-times highlighted as a societal good that improves human well-being, health outcomes, and overall sense of well-being" (44).



# OUR DEFINITION FOR SOCIAL WELL-BEING

Each one of the three branches of social well-being can be further explained in three words or phrases. The light purple bubble call-outs help to succinctly define what is meant by belonging, place attachment, and social cohesion. The graphic on this page ties together our definition for social well-being.



Social well-being describes the feeling of connectedness to place and other people. Positive social well-being means having a sense of belonging, social cohesion, and place attachment within a group. Social well-being allows people to reach their full potential and thrive in their environments, while empowering them to contribute to their community.





# PLANNING AND DESIGN ELEMENTS OF SOCIAL WELL-BEING

Built environment professionals can advance social well-being through design interventions and programming. Using physical design element, urban designers can make public spaces which achieve the outcomes of the three branches of social well-being.

With inspiration from Gehl Architecture's Twelve Quality Criteria for public spaces, these seven elements are the key considerations for urban designers seeking to promote social well-being<sup>(45)</sup>.



## GATHER AND STAY

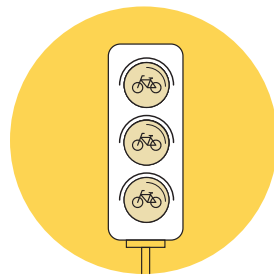
Design elements to promote gathering include **movable seating** and **flexible spaces** to allow users to amend the space and furnishings to their needs. Adaptable spaces creates a sense of agency and encourages people to spend time in a public space. People may gather and stay for **planned and unplanned events** and amounts of time. Creating a variety of gathering spaces from **active to passive participation** invites all people to stay.



## MOVEMENT AND PLAY

Integrating the opportunity for movement and play for **all ages and mobility needs** is crucial for a successful outdoor public

space. People often seek the ability to move and play in a park or other urban public space, but the type of action can vary. The space can promote movement with a **looped walking, running, or rolling path**. Or the space can include **interactive elements** utilizing natural materials like water, sand, or wood to invite an **auditory or tactile** play experience.



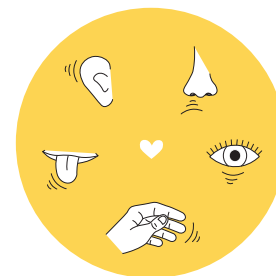
## SAFETY AND SECURITY

The perception of safety and security in the outdoor public realm looks different for every person. However, some common themes include: **clear sightlines** around and through trees and bushes, clearly defined pathways, **sufficient lighting** at night, and **well-maintained** spaces. Other considerations for safety and security include initiatives like Complete Streets, which ensures **clear signaling** and **dedicated lanes** for each mode of transportation from pedestrians, to cyclists, public transit, and automobiles.



## CONNECT WITH NATURE

From **street trees** providing shade to a wetland providing **diverse habitat, carbon sequestration, and scenic views**, nature is a part of the urban ecosystem. Landscape architects expand **public access** to and **engagement** with green and blue spaces. Designers can increase connection with nature through **climate-sensitive design** in the form of protection from the sun, wind and rain and providing opportunities to interact with **biodiverse plantings, native species, and wildlife**.



## POSITIVE SENSORY EXPERIENCES

People experience the world through **five acute senses**. In the public realm,

our senses are on alert for sights, sounds, and smells that may threaten our safety or, alternatively, reduce stress. Unpleasant elements such as loud noises and repellent odors are typically more noticeable than pleasant elements. Ways to prioritize positive sensory experiences include: designing the built environment to the **human scale**, making the ground plane or **street-level dynamic, active, and engaging**, and ensuring **responsible, dedicated stewardship** of the natural and built environment.



## COMMUNITY OWNERSHIP AND COLLECTIVE ACTION

Allowing a public space to **reflect the neighborhood** and incorporating ways for the community to be involved in the design and planning process is critical to ensuring a sense of ownership. To promote place attachment, belonging, and social cohesion, the designers should encourage **community involvement** in design decision making so the space



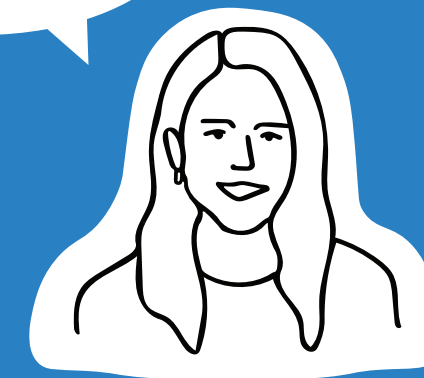
## SOCIAL INFRASTRUCTURE AND PROGRAMMING

Social infrastructure and programming encompasses **everyday and special needs** that individuals need to feel connected to others. For designers and planners, this means designing spaces that can host **community events** of various types, including access to **shared services and amenities** like tool lending libraries, bike tire pumps, environmental education, or information on proper waste sorting and recycling. Social infrastructure can also include **physical spaces that support communities** with stored energy and water in the event of a disaster or climate event.

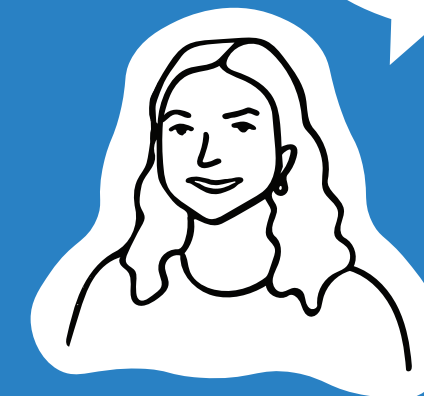
03

# INTEGRATING CLIMATE MITIGATION AND SOCIAL WELL-BEING

*Why is it important to  
prioritize these two  
values?*



*How can these design  
considerations be  
mutually beneficial?*





# DESIGNING FOR ALL PEOPLE + THE PLANET

Urban designers are primarily concerned with people and places. In the midst of a global climate crisis, loneliness epidemic, and the wake of the COVID-19 pandemic, urban designers must focus on projects that provide both climate and social benefits. While Chapters 1 and 2 define climate mitigation and social well-being, this chapter builds the case for why the two should be an integrated urban design strategy to support both the health of the planet and the well-being of people. The following sections describe the mutual benefits and added value that transpires out of designing for both climate mitigation and social well-being. In the current realities of the global climate crisis and social dissonance, the design standard for quality urban public space should be places that mitigate the effects of climate change as well as provide opportunities for social well-being.

## WHY DESIGN FOR BOTH SOCIAL WELL-BEING AND CLIMATE MITIGATION?

### *Climate Action + Social Well-being Benefits*

Climate mitigation is about more than the technical aspects of decarbonization and greenhouse gas accounting. It is also a movement to protect people and ecosystems from increasingly more severe risks and impacts from climate change. Instead of focusing solely on how much carbon can be reduced or sequestered, urban design projects should also support and serve affected communities.

For instance, it is equally important to engineer for flood prevention as it is to design for the needs of the people living in the floodplain.

Sites can simultaneously mitigate climate change and provide vibrant social spaces. Human-centered climate interventions such as “nature-based infrastructure, sustainable urban drainage, and active travel solutions for transport” have also “been shown to yield multiple benefits for individual health and other aspects of well-being” (46).



People cooling off in Lake Washington in Seattle during a heatwave. (The Urbanist)

As more funding becomes available for climate action, designers and planners have a responsibility to engage the communities they are working in and to consider how climate solutions can offer social benefits.

### *Social Cohesion with Neighbors + More Resilient to Climate Disasters*

Social cohesion, belonging, and place attachment are crucial for community resilience to climate change. Public green places with social infrastructure not only provide the opportunity for people to meet neighbors, but also the chance to engage

with the non-human and non-technological environment. Building relationships with others who live in close proximity creates communities that are more resilient to climate disasters, by creating social networks that are organized, cooperative, trusting and spring into action when disaster strikes.

For example, in 1995 when a massive heatwave hit Chicago, the heat was felt most severely by people in low-income housing, the elderly, and African American communities. However, the city reported that several areas with the “lowest rates of heat-related deaths were low-income, African American communities,”

with the explanation that their level of social cohesion and community interaction provided support systems that fought isolation and severe physical health impacts (47).

Reporting on the event reflected how “fostering community cohesion in low-income, climate-vulnerable areas is an overlooked strategy for climate resilience before, during, and after extreme weather events” (47). Similar to how the climate crisis cannot be solved on an individual scale, people need social infrastructure, community support, and shared resources to not only survive a climate event, but thrive in their environments.



Creating social greenspaces can strengthen a community's resilience by strengthening networks and health. The Urban Land Institute's "Social Spaces Resilient Communities Report" states that, "social spaces and biodiversity can work synergistically to support each other," such as green spaces protecting or restoring ecosystems while also increasing "health and wellness for both humans and nature" (48). Public spaces can provide mutual benefits for both climate action and mental, physical, and social well-being.

### Place Attachment + Collective Action

Individuals and communities that develop place attachments with everyday local places and urban nature are more likely to foster a sense of stewardship over the land that they inhabit. Place attachment is a critical spatial and social component to collective climate action, "reinforcing mutual bonds of trust among community members, and an action dimension motivating sustained, collective stewardship of place" (49).

According to Adger (2022), "social relationships are critical to the well-being of individuals, families and communities, and for many this connectedness involves both human and non-human elements, meaning that the well-being of one is linked to that of the others, creating a sense of stewardship that extends to the environment" (46). Developing a

sense of care for a place, especially one that is related to a special community or occasion, can inspire people to have a transformed attitude toward the nature of the place, and perhaps reflect a behavioral change towards things like climate resilience.

Opportunities for collective action toward climate mitigation empower people to work together to grow, plant, and steward landscapes. Organizations like Forterra's Green City Partnerships and Mountains to Sound Greenway bring together volunteers across Washington State to restore urban parks and trails respectively.

A community that is more engaged in the design process, and or one that participates in the development and maintenance of a public space, is more likely to develop a sense of ownership and stewardship over the place.



Volunteers restoring a forested urban park through the Green City Days program by Forterra (Forterra)



## HOW DOES DESIGNING FOR CLIMATE MITIGATION SUPPORT SOCIAL WELL-BEING?

### Positive, Actionable Messaging + Behavioral Change

Media, data, and messaging around climate change can stimulate a significant amount of anxiety and stress, often referred to as climate anxiety. Climate anxiety can make people feel hopeless and helpless, like they lack the agency to act because the crisis is incomprehensibly large and beyond fixing. However, studies have shown that if the climate change messaging is instead about solutions, it “may promote well-being by increasing individual senses of self-efficacy and propensity to act collectively” (47).

Providing people with actionable solutions, such as behavioral changes or community organizing, has demonstrated to be a positive approach that inspires action amongst individuals and communities. The reality is that individual actions alone will not solve the climate crisis; it will take “group-based and collective responses” on multiple levels from neighborhoods to cities and countries (47).

### Inclusive Design and Planning Process + Belonging and Empowerment

Designers and planners must engage communities on climate mitigation with empathy and inclusivity. Certain climate change messaging which characterizes communities as “vulnerable” to climate impacts can lead to disempowerment and a loss of voice in adaptation or mitigation efforts. Instead of designing for vulnerable communities, designers should be working with them, building trust, and consulting them as local experts. Designers can bring their technical expertise to communities with local expertise and lived experiences to co-create social and climate solutions.

On collaboration and belonging for social and environmental sustainability, Ruggeri states, “by working together and imagining new futures for their community spaces, residents lay the foundations for a collective sense of urgency and commitment to both the place and the people who inhabit them that is critical to their survival” (47). Community-based approaches to climate adaptation and mitigation can have positive effects on both the community’s sense of belonging and connection to environmental stewardship, as well as the design outcome.

### Neighborhood Parks and Open Spaces + Social Well-Being

In their article on “How neighborhood greening impacts adolescent health disparities,” Kondo et al. (2024) describes potential mechanisms of change for improving social determinants of health (50). The mechanisms can also broadly apply to how climate action projects can improve social well-being.

The mechanisms are: reducing pollution and heat exposures, reducing stress, improving social connectedness, engaging the community, decreasing screen time, using outdoor spaces positively, improving perceived safety of public spaces, and increasing food access and availability.

Similarly, neighborhood parks can be transformative for social cohesion and social capital. The Trust for Public Lands argues that America’s social capital is declining due to severe polarization and Americans treating “parks and green spaces as luxury amenities rather than as critical social infrastructure” (37). Parks and public spaces connect people to nature and contribute to positive physical, mental, and social well-being. Greenspaces foster environmental stewardship and community connections, and also sequester carbon through vegetation and soil.



Concert celebrating the opening of Vista Hermosa Park in Los Angeles, California (Mia Lehrer + Associates, 2008)

“Social spaces and biodiversity can work synergistically to support each other. For example, green spaces and recreational areas designed to protect or restore local ecosystems can boost health and wellness for both humans and nature.” – Urban Land Institute

04

# DESIGN FRAMEWORK

*What are connections  
between climate mitigation  
systems and practices for  
social well-being?*



*And how can designers  
implement these practices  
in urban and landscape  
design?*





# PATHWAYS

## CONNECTING CLIMATE MITIGATION + SOCIAL WELL-BEING

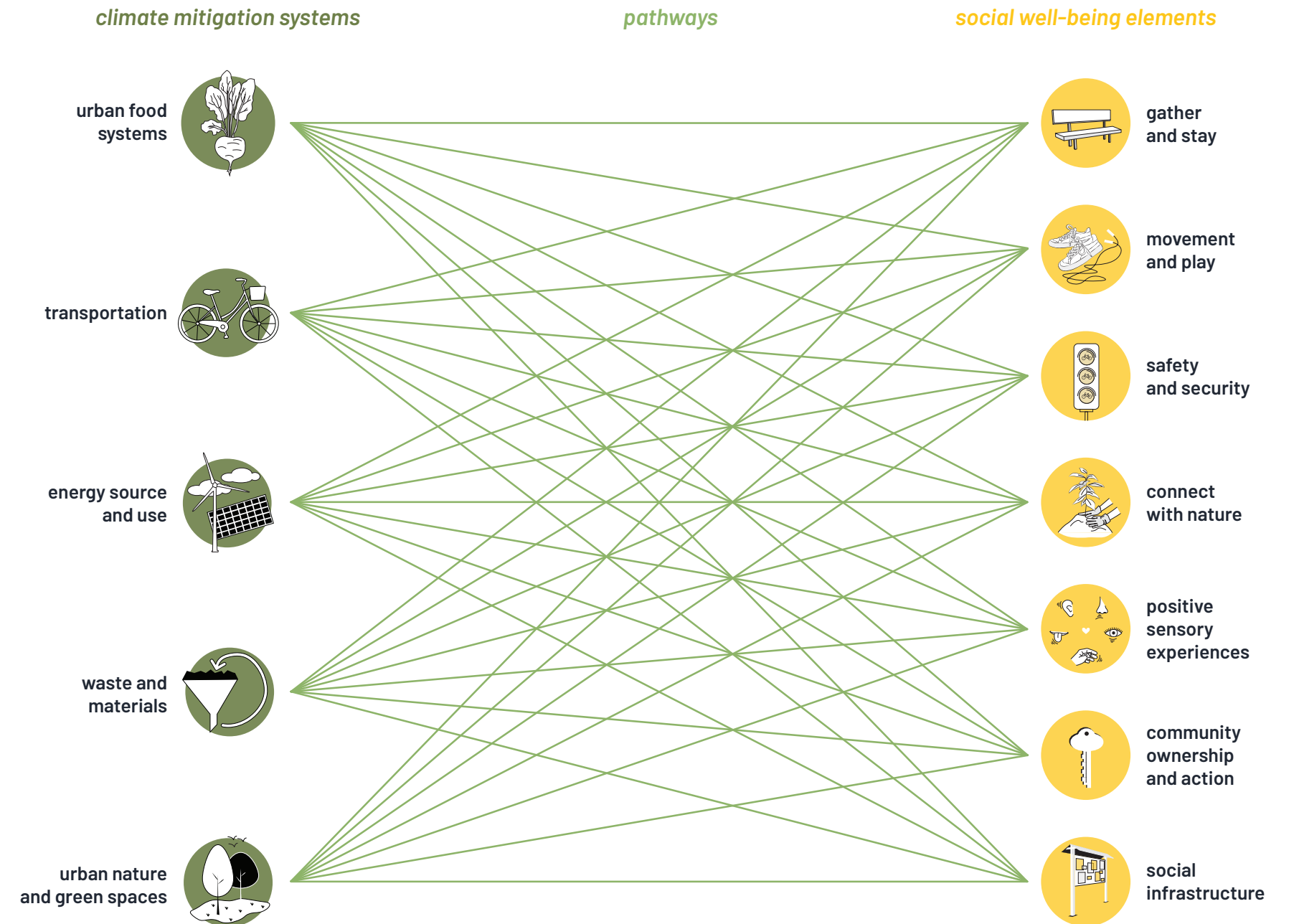
This chapter provides a Framework for how to connect and implement climate mitigation systems and social well-being elements in design for the outdoor urban realm.

Connections can be drawn between each climate mitigation system and social well-being element with an actionable design concept, known as a Pathway.

The Pathways are described briefly on the following pages, and explained in more detail on the subsequent seven pages which explore one column of the Framework chart at a time.

The purpose of this chapter is to demonstrate several tangible examples of how the Pathway concepts can be successfully implemented in urban and landscape design.

A successful project does not need to have every Pathway concept. This Framework provides a chart of options that can be selected for the best project fit.



# FRAMEWORK CHART

	 gather and stay	 movement and play	 safety and security	 connect with nature	 positive sensory experiences	 community ownership and action	 social infrastructure
<b>urban food systems</b> 	public events at urban farms, informational signage, farmers markets	engage with urban farms through work parties	provide food security and food assistance programs at urban farms	engage with agricultural practices at urban farms through work parties	interact with soil and plants, engage with agricultural practices	community supported agriculture, community gardens	shared farm equipment, plant-based cooking classes
<b>transportation</b> 	solar panels on transit shelters and signs, seating elements and shelter at transit stops	Safe Routes to School, active transportation, connections through green spaces	Complete Streets, safety on public transit, dedicated bike lanes	street trees, scenic views, greenways, and other connections through green spaces	user-friendly transit, Complete Streets, accessible and pleasant journeys	bike share programs, community engagement and outreach for transit projects	bike safety classes, free or reduced cost bike gear and public transit, e-bike charging stations
<b>energy source and use</b> 	energy efficient lighting, energy generating site furnishings and public art	energy generating play features, outdoor play and decreased screen time	LED or solar-powered lighting, heat pumps	solar panels on green roofs, unplug to spend time in nature	improve air quality from electrification, energy generating public art	community solar, energy efficient cooperative housing	solar power and battery storage for community buildings, resources to reduce energy use
<b>waste and materials</b> 	reused and carbon sequestering materials for shelter, seating, paving elements	human-powered waste collection services, reused and carbon sequestering materials	reused and carbon sequestering materials that create safe and accessible public spaces	reduce paving, low maintenance landscapes, retain existing soil on site	reused, carbon sequestering, and aesthetically pleasing material selection	circular communities with shared resources and tools, zero waste practices	composting facilities, education for proper recycling and waste sorting, lending libraries
<b>urban nature and green spaces</b> 	public access to explore restored ecosystems, ecological functions in public spaces	nature-based play, combine recreation opportunities with restored ecosystems	clear sight lines, ample lighting, well-maintained public spaces and ecosystems	ecosystem restoration, Increase biodiversity and soil carbon, preserve and create wetlands	increase biodiversity and habitat, engage with restored ecosystems	engage with urban green spaces through work parties, community land trusts and stewardship	clean energy jobs training, environmental literacy programs, outdoor classrooms





# GATHER AND STAY + CLIMATE MITIGATION SYSTEMS

+



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public events at urban farms, informational signage, farmers markets

Urban farms often host events to engage people with agricultural practices, or lead tours for school groups. People can also learn about regenerative agricultural practices and choose local produce by visiting farmers markets.



=

solar panels on transit shelters and signs, seating elements and shelter at transit stops

Inviting shelters and informative signs provide somewhere to wait for public transit. Adequate bike parking encourages people to cycle to events. Solar panels on public features such as bus shelters supports climate mitigation and exposes people to local renewable energy projects.



=

energy efficient lighting, energy generating site furnishings and public art

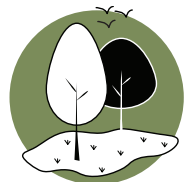
The Land Art Generator Initiative is a nonprofit that develops art installations with energy generating technology, such as solar and wind (51). Smart Street furniture uses solar panels and kinetic energy converters to harness renewable energy (52).



=

reused and carbon sequestering materials for shelter, seating, paving elements

Selecting for reused or carbon sequestering materials can bring a layered story to a site that may encourage people to gather, stay, and explore. For example, if paving materials are reused on site, they may be recognized and appreciated by locals.



=

public access to explore restored ecosystems, ecological functions in public spaces

Public spaces should provide opportunities to gather and also serve ecological functions. This can include incorporating a water feature for stormwater management or increasing tree cover that provides shade and sequesters carbon.

## Implementation Checklist

- ✓ Have you selected less carbon intensive materials for seating, paving and gathering elements?
- ✓ Are you providing opportunities for people to enjoy the space in different weather conditions?
- ✓ Are there flexible spaces where people can gather and stay for various programmed or unprogrammed activities?
- ✓ Do the site elements generate power to support the local space?



Visitors enjoying seating, water features, and greenspace (Hoerr Schaudt)

## Resilient Social Spaces

### UPTOWN NORMAL CIRCLE

Normal, Illinois

Creating a new core for Downtown Normal to orbit, the Circle captures 1.4 million gallons of stormwater and reuses it in the dynamic water feature. An additional 1.4 million gallons of stormwater are diverted from the storm sewer through direct collection from sidewalks into surrounding tree wells and planter areas.

The addition of 104 new trees sequesters at least 10,790 pounds of carbon per year. The circle design introduced a new vehicle roundabout, which is expected to reduce traffic collisions by 35%. The site furniture, which invites people to spend time in the circle, was constructed with sustainably harvested ipe wood (53).



Children play in the water feature, which reuses captured stormwater (Hoerr Schaudt).





# MOVEMENT AND PLAY + CLIMATE MITIGATION SYSTEMS

+



=

engage with urban farms through work parties

Volunteering at an urban farm can be both a physical activity and an educational experience. Volunteers may learn about regenerative agricultural practices and how buying local produce can support climate mitigation, while moving their bodies.



=

Safe Routes to School, active transportation, connections through green spaces

Safe Routes to School is a program that advocates for safer walking and biking routes to school to encourage these transportation modes (54). This program supports active transportation, reduces carbon emissions, and inspires behavioral change.



=

energy generating play features, outdoor play and decreased screen time

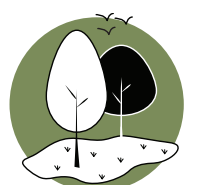
Smart Street created a "smart energy floor," where kinetic floor tiles (operating as solar panels) were introduced in sidewalks Australia (55). In addition to their climate function, the tiles also serve as a play element for all ages as they light up when walked on.



=

human-powered waste collection services, reused and carbon sequestering materials

The Pedal People group based in Northampton, MA, offer trash, recycling, and compost collection and redistribution services, all powered by bicycles (56). Materials for pathways and play features should be either reused, carbon sequestering, or locally sourced.



=

nature-based play, combine recreation opportunities with restored ecosystems

Nature-based play involves the use of natural elements such as trees, plants, water, rocks, and sand, which can sometimes be sourced on site. This creates a dynamic play environment encouraging creative play with natural elements.

## Implementation Checklist

- ✓ Are you providing accessible paths for recreation and/or active transportation?
- ✓ Have you selected reused, local, or low carbon materials? Do the materials provide an ecological function to the site?
- ✓ Are there adequate opportunities for all ages and abilities to recreate? And are there options for sensory and tactile play?
- ✓ Is energy generation incorporated into play for all ages?
- ✓ Are carbon sequestering materials such as trees, logs, surfaces and structures incorporated in play areas?



Aerial photo of the PlayGarden (Seattle PlayGarden)

## Inclusive Play

SEATTLE CHILDREN'S PLAYGARDEN  
Seattle, Washington

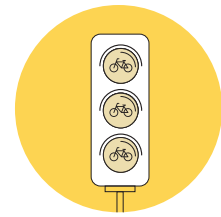
The PlayGarden provides a place for people of all abilities to enjoy outdoor play. The park's garden area serves as an outdoor classroom, play element, and climate structure. The garden is estimated to yield 940 lbs of fruits and vegetables annually, and the produce is prepared by students in the on-site kitchen. Through

a hybrid bioswale and raingarden, the site captures and infiltrates 150,040 gallons of stormwater runoff per year. A 1,300 sf green roof on the park house detains stormwater runoff and regulates the building's temperature. The play features offer the freedom to play, and invites play between children of different abilities (57).



People enjoying the garden plots in the PlayGarden (Seattle PlayGarden)





# SAFETY AND SECURITY + CLIMATE MITIGATION SYSTEMS

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provide food security and food assistance programs at urban farms

Urban farms can provide access to fresh, healthy produce for families in communities seeking food security or supplemental meals. Local food assistance programs can also educate about plant-based and carbon conscious food diets.



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Safe Routes to School, Complete Streets, safety on public transit, dedicated bike lanes

Safe Routes to School advocates for active transportation to and from school. Complete Streets is a method of planning and constructing streets with separate lanes for all users: pedestrians, bicyclists, transit riders, and motorists.



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LED or solar-powered lighting, heat pumps

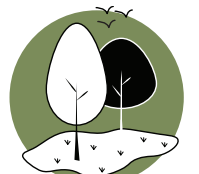
Adequate lighting and shelter from the elements can significantly increase the feeling of safety and security in public spaces, especially in waiting zones like bus stops. These elements can be solar powered and may shade areas as an added bonus.



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reused and carbon sequestering materials that create safe and accessible public spaces

Materials determine the aesthetic quality and sense of comfort or safety in a public space. Materials should be selected based on reuse, carbon sequestering capacity, or because they are locally sourced, produced, or crafted.



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clear sight lines, ample lighting, well-maintained public spaces and ecosystems

The perception of safety in urban nature and green spaces can vary person to person. Best practices include clear sight lines, ample lighting powered by solar panels, and thriving planted areas that have the appearance of frequent maintenance.

## Implementation Checklist

- ✓ *Is energy efficient lighting used to create a welcoming and carbon conscious environment?*
- ✓ *Are the pedestrian and micromobility paths separate and protected from vehicular traffic? Do the paths use materials with minimal embodied carbon?*
- ✓ *Do plantings allow for both growth of carbon-sequestering trees as well as clear sightlines where needed?*
- ✓ *Does your plan or design invite active uses to populate safe neighborhood places within walking and biking distances?*



Visitors in San Jacinto Plaza in the evening (Jonnu Sinaleton / SWA Group)

## Creating Connections

### PEDESTRIAN PATHWAYS

#### El Paso, Texas

A series of new pedestrian pathways connect people to prominent public spaces in El Paso's Arts District. According to 32% of respondents in a Landscape Architecture Foundation survey, the pathways have made Downtown El Paso feels more safe and welcoming, with an increased sense of community. Around 7.5

tons of carbon are sequestered annually by 102 newly planted or preserved trees at San Jacinto Plaza, where the number of plant species increased by 243%. Community engagement, particularly to El Paso's Latino community, created vibrant public space connections that repair the city's prior car-centric planning (58).



Durango Street Improvements provided safer pedestrian access to the ballpark and other landmarks (Jonnu Singleton/SWA Group)





# CONNECT WITH NATURE + CLIMATE MITIGATION SYSTEMS

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engage with agricultural practices at urban farms through work parties

Urban farms can benefit the environment by increasing plant diversity, boosting air quality, and reducing urban heat. Volunteering at farms reconnects people to where our food is grown.



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street trees, scenic views, greenways, and other connections through green spaces

Active transportation routes in urban areas can connect with natural elements and pass scenic views. Designing accessible micromobility routes that brings people closer to nature makes active transportation a more pleasant, enjoyable option.



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solar panels on green roofs, unplug to spend time in nature

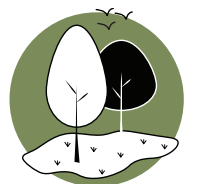
Biosolar roofs, or green roofs with solar panels, are a powerful climate mitigation tactic. The biosolar roofs provide significant cooling and energy savings for the building, increase the solar panel efficiency 21-107%, and reduce stormwater runoff (59).



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reduce paving, low maintenance landscapes, retain existing soil on site

A connection to nature and waste reduction can be achieved by simply reducing paving on site. Areas of hardscape paving can be replaced with more natural materials or other low maintenance or native plants.



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ecosystem restoration, Increase biodiversity and soil carbon, preserve and create wetlands

Ecosystem restoration and preservation with public access, especially forests, wetlands and prairies. Make carbon-sequestering experiences possible to bring human benefits through scenic views, stress reduction, and interactions with wildlife.

## Implementation Checklist

- ✓ Does the design provide opportunities to connect with nature in multiple ways?
- ✓ Does the planning and design process promote ongoing stewardship?
- ✓ Are you prioritizing natural and native landscape materials where possible and minimizing unnecessary hardscape?
- ✓ Does the proposal promote ecological function, increase biodiversity support carbon-sequestering wetlands and/ or provide habitat?
- ✓ Are you integrating robust living materials in ultra-urban spaces, and providing pathways for long-term survival?



Restored wetland with a new elevated trail (Brandon Huttenlocher / Design Workshop)

## Restoring Urban Nature

HOUSTON ARBORETUM & NATURE CENTER  
Houston, Texas

Several natural disasters caused significant tree mortality in Houston Arboretum and Nature Center (HANC). The restoration effort aimed to restore the site's native ravine landscape with 20 acres of prairie and savanna ecosystems, rather than reforesting the Arboretum. The first phase of restoration included

two wetlands which detain and reuse stormwater, and provide essential habitat. A new trail system, elevated to prevent flood damage, invites visitors to experience the wetland ecosystems. HANC serves as an environmental education center for all ages, with visitors and volunteers engaging with the replanted native landscape (60).



Volunteers planted Indiangrass and Little Bluestem in the restored savanna (Brandon Huttenlocher/Design Workshop)





# POSITIVE SENSORY EXPERIENCES + CLIMATE MITIGATION SYSTEMS

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interact with soil and plants, engage with agricultural practices

Gardening, farming, or interacting with healthy soil has proven to boost serotonin levels, improve moods, and reduce stress (61). Working with a group collaboratively improves social well-being, and working the land responsibly helps the climate.



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user-friendly transit, Complete Streets, accessible and pleasant journeys

Improving the experience of public transit and micromobility journeys through Complete Streets design, proper maintenance, informational materials, and art elements encourages people to take zero or low carbon transportation modes.



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improve air quality from electrification, energy generating public art

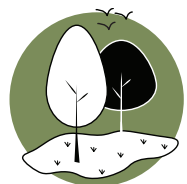
Recent studies found that increased electrification, or the use of electric technology rather than fossil fuels, has reduced GHG emissions and improved air quality in several US cities (62). Clean air quality also supports a positive sensory experiences.



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reused, carbon sequestering, and aesthetically pleasing material selection

Creating and maintaining public spaces with high quality, low carbon, or carbon sequestering materials can also provide aesthetic benefits which enhance how people experience the place.



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increase biodiversity and habitat, engage with restored ecosystems

Increasing habitat and biodiversity supports healthy ecosystems and engages more positive sensory experiences, such as nature soundscapes and views, edible plants, tactile experiences, and pleasant scents.

## Implementation Checklist

- ✓ Does the design enhance the positive qualities of the site and its environs, such as views?
- ✓ Does the design alleviate unpleasant sensory elements such as noise, smells, or pollutants?
- ✓ Does the design inspire a sense of curiosity or creativity and provide details to explore or features that calm?
- ✓ Are the play elements made with materials that have minimal embodied carbon?
- ✓ Does the design include planted areas that not only increase habitat and biodiversity, but also invites opportunities for educational nature play?



Children climb a 250 year old fallen white oak tree in the Outpost Playground (Earthscape Play)

## Sensory Recreation

### PRESIDIO TUNNEL TOPS San Francisco, California

With scenic views of the bay, mountains, and the Golden Gate Bridge, San Francisco's Presidio Tunnel Tops exemplifies many types of positive sensory experiences. Using natural elements to represent the Bay Area's features, the Outpost playground is designed for non-prescriptive, tactile play. The site features several natural

elements that were found on site, including the sculpted tunnel tops, which are formed from the 90,000 cubic yards of soil that were extracted for creating the tunnels (63). The Field Station invites visitors to learn about the history and nature of the Presidio through tactile elements like nature specimens, historical artifacts, and tools.



The Field Station, which encourages visitors of all ages to use "your senses to discover the great outdoors" (presidio.gov)





# COMMUNITY OWNERSHIP AND ACTION + CLIMATE MITIGATION SYSTEMS

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community supported agriculture, community gardens

Community Supported Agriculture (CSA) programs are a system where members pay the farmers for a portion of the weekly harvest. CSAs support local food production, strengthen community networks, and may inspire more plant-based diets.



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bike share programs, community engagement and outreach for transit projects

Community engagement in creating transportation systems is critical to understanding community perspective and developing public buy-in for climate mitigative transit projects. Bike share programs extend micromobility resources to a wider audience.



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community solar, energy efficient cooperative housing

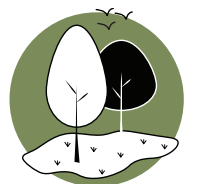
Community Solar projects provide solar energy to groups that subscribe monthly. Subscribers receive credit for a portion of the energy generated by the solar project (64). This allows more people to access renewable energy, save money, and reduce GHG.



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circular communities with shared resources and tools, zero waste practices

Circular communities, as outlined by the Circular Community Foundation, are co-designed systems that keep resource loops within a community or local context (65). Circular living can include buy-nothing groups, shared resources, and zero waste practices.



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engage with urban green spaces through work parties, community land trusts and stewardship

Community Land Trusts (CLT), are an alternative form of land ownership. A nonprofit holds the land for a place-based community, and acts as a land steward for uses like affordable housing, community gardens, and other civic or commercial spaces (66).

## Implementation Checklist

- ✓ *Have relationships and trust been built with the community before asking for input?*
- ✓ *Does the design process involve co-creating space with intentional and authentic community engagement?*
- ✓ *Have you contributed to and listened to community expertise and involved the community throughout the design process?*
- ✓ *Have you promoted ways for the community to continue stewardship, and to collectively take action to reduce GHGs?*



Danny Woo Community Garden gathering space (HistoryLink)

## Community Gardening

**DANNY WOO COMMUNITY GARDEN**  
Seattle, Washington

The Danny Woo Community Garden is the largest greenspace in Seattle's Chinatown International District (CID), located at the intersection of I-5 and Yesler Way. The plot of 1.5 acres was donated to the community by restaurateur and community leader Danny Woo in 1975. The garden brings the community together to "engage with

nature, access safe and healthy food, and build cohesion with neighbors" (67). The garden includes 63 fruit trees and almost 100 garden plots with no fees for gardeners. The garden hosts volunteer events which are open to all, and CID community events such as a traditional Filipino pig roast in the summer, and apple cider party in the fall.



Children playing in the garden (Interim CDA)





# SOCIAL INFRASTRUCTURE + CLIMATE MITIGATION SYSTEMS

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shared farm equipment, plant-based cooking classes

Programming at urban farms or resilience hubs may include plant-based cooking classes or educational materials on regenerative farming. Shared farming or gardening equipment promotes circular economies and reduces individual consumption.



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bike safety classes, free or reduced cost bike gear and public transit, e-bike charging stations

Initiatives that promote safe and accessible bike and micromobility infrastructure. Bike Works, for example, is a nonprofit based in Seattle, WA, that sells affordable bikes and teaches bike riding, bike safety, and repairing your own bike (68).



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solar power and battery storage for community buildings, resources to reduce energy use

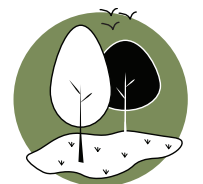
Stored energy is vital for community resilience. During power disruptions, people turn to critical community buildings, which should be equipped with solar power and battery storage for both climate mitigation and adaptation.



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composting facilities, education for proper recycling and waste sorting, lending libraries

Providing the infrastructure and tools for proper waste sorting and disposal can make the process more approachable and intuitive. Neighborhood organizations or cities should provide essentials like compost bags and easy access to shared tools.



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clean energy jobs training, environmental literacy programs, outdoor classrooms

Improving access, education, and job training in environmental fields is part of social infrastructure. Building connections between urban nature and people through stewardship and a sense of wonder can inspire place attachment and an ethic of care.

## Implementation Checklist

- ✓ *Did you provide spaces for everyday functions which can also serve the neighborhood during a climate disturbance?*
- ✓ *Does the design encourage or promote shared resources and circularity?*
- ✓ *Does the design provide educational opportunities around climate action and inspire behavioral change or stewardship?*
- ✓ *Does the site have renewable energy collection and storage capacity that can provide power to the community in an emergency?*



View of the Stillmeadow Resilience Hub through the urban forest at Peach Park (Stillmeadow Community Fellowship)

## Resilience Hubs

**STILLMEADOW COMMUNITY FELLOWSHIP**  
*Baltimore, Maryland*

Resilience hubs are buildings which are trusted by the community, and support the neighborhood in everyday life and before, during, and after an emergency. One of the first resilience hubs in the country was Stillmeadow Community Fellowship, which continues operate as a church. It provides critical social infrastructure and

programming to Baltimore's Irvington and Westgate neighborhoods. It is equipped with solar panels, battery storage, water cisterns, and a community garden, which is part of Stillmeadow's 10-acre urban forest. Stillmeadow offers programs for food donation, emergency preparedness, youth, nature education, and computer literacy (69).

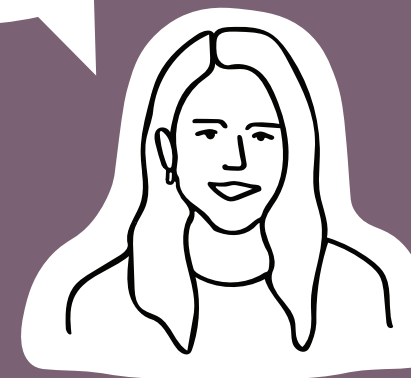


Yorell Tuck (left) and Kim Cruise (right) in the building's storage room stocked with emergency response supplies (Anson Yu 2024)



# 05 CASE STUDIES

*It would be great to see examples of built projects that successfully integrate some of these pathways...*



*We have found some inspiring examples! Many are from LAF's Landscape Performance Series, which highlight social, environmental, and economic benefits.*





# RAILROAD PARK

Designers: **Tom Leader Studio, MacKnally Land Design**

Location: **Birmingham, Alabama**

Size: **19 acres**

Date Completed: **2010**

Project Type: **Urban Parks + Open Spaces**

## SUMMARY

Replacing a former warehouse and rail yard for industrial waste with open green space and water bodies, the Railroad Park bridges the two sides of downtown. The park honors its industrial path with a new "Rail Trail" and other paths guiding pedestrians through the park as trains slowly pass by. Using reclaimed materials

from the industrial past while planting new trees and vegetation, Railroad Park has improved greenspace access and micromobility connections downtown <sup>(70)</sup>. The park is also now referred to as "Birmingham's living room" and serves as a vibrant cultural space for city events <sup>(71)</sup>.



Aerial view of Railroad Park  
(Tom Leader Studio)



# RAILROAD PARK

## CLIMATE MITIGATIVE ELEMENTS

“People love to see species of birds that had disappeared from downtown but are now living in the wetlands,” she explained. “When the lake was built, it was the first time we saw the Birmingham skyline reflected in water, and that was a real point of pride. The park has been a great equalizer, bringing suburban and urban Birmingham together.” (72)

— Camille Spatling, Railroad Park Foundation Director



### Urban Nature and Greenspaces

- 531 newly-planted trees of 20 species sequester around 20,800 lbs of atmospheric carbon per year and capture about 92,000 gallons of stormwater runoff annually.
- The park captures and filters the site’s rainwater, serving as flood protection for the local watershed. The Birch Bowl is a paved plaza used for stormwater capture and a play area for children.
- Thirty percent of the park is water. A 3,500 sf wetland connecting to lakes serves as a detention basin. Through streams, the water is pumped back to the original pond. A rain curtain oxygenates the water along the lakeside boardwalk.
- The 1 acre, 7 ft-deep lake helps irrigate the park and cools the breezes during the summer as the only open body of water downtown.
- The number of observed bird species on the site increased from an estimated 10 to 35 (250% increase).



### Waste and Materials

- Recycled granite curbs line the stream system, and cobblestones found on the site were re-purposed as a buffer around the lake to prevent soil erosion.
- Bricks and limestone chunks also sourced on site were used for gabion baskets, with covers on the top for seating.



### Transportation

- The rail trail and other connected trails provide shared pedestrian and biking paths through the park and connecting the two ends of downtown.



Pedestrians walking in the park, gabion benches create an amphitheater (Tom Leader Studio)



Before: remnants of the steel industry; a warehouse, debris and a prominent railroad (Tom Leader Studio)



After: green infrastructure and wetlands that relate back to the site’s original natural state (Tom Leader Studio)



Stormwater is circulated through water bodies on site, using plants for biofiltration (Tom Leader Studio)

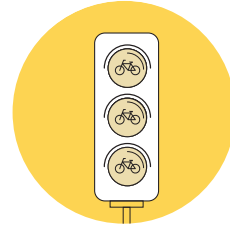


# RAILROAD PARK

## SOCIAL WELL-BEING ELEMENTS

Hailed as Birmingham's "Front Lawn," Railroad Park provides a historically rich venue for local recreation, family activities, concerts, and cultural events. Created with the residents of Birmingham in mind, the Park provides a welcoming space where all can exercise, have a walking meeting, meet a friend for a picnic, find solace amid nature, and feel a sense of community." (73)

— Railroad Park



### Safety and Security

- Provides safe connections downtown for pedestrians and micromobility.
- LED lighting elements under the Rail Trail Bridge's rain curtain create a safe, inviting environment at night.

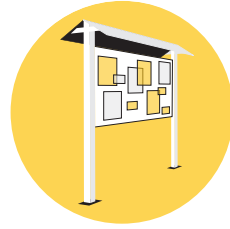


The pavilion welcomes people to the park, providing shade, cover, and light at night (Tom Leader Studio)



### Gather and Stay

- Events, amenities, and gathering spaces like a 4,000-seat amphitheater make Railroad Park a popular cultural site with over 600,000 visitors per year.



### Social Infrastructure

- Wi-Fi is available for free in the park.



"Birch Bowl" is a stormwater retention pond and play feature (Tom Leader Studio)



### Connect with Nature

- People can enjoy spotting birds that have returned downtown because of the wetland.
- Visitors experience peaceful moments on the many paths near the water and by vegetation (72).



### Movement and Play

- Visitors can exercise while meeting new people using the outdoor gym equipment and three skate bowls. In a survey of 95 respondents, 77% said the park is a place of exercise for them.
- Children have two play areas to spend time in, while watching the trains in the distance. The stream system and Birch Bowl have also become popular play elements for children.



Children playing in the stream that runs through the site (Tom Leader Studio)



# MONON BOULEVARD AND MIDTOWN PLAZA

Designers: Rundell Ernstberger Associates  
Location: Carmel, Indiana  
Size: 7.4 acres, 6 blocks  
Date Completed: 2019  
Project Type: Streetscapes + Linear Parks

## SUMMARY

The re-imagined Monon Boulevard and Midtown Plaza breathe new life into a site that was formerly used as an industrial backwater site and later offered a rudimentary greenway trail. The significant upgrades to the boulevard and plaza provide a strong place identity for the local community, a resilient landscape with

native plantings, artistic site furnishings, and permeable hardscape that invites a sense of play and climate responsiveness. The trail is made pedestrian and bike friendly by shrinking the vehicular lane to 10 ft wide, reducing travel speed and providing dedicated lanes for walking and biking (74).



Aerial view of Monon Boulevard and Midtown Plaza (Rundell Ernstberger Associates)



# MONON BOULEVARD AND MIDTOWN PLAZA

## CLIMATE MITIGATIVE ELEMENTS

*"[Monon Boulevard] sequesters an estimated 289,076 lbs of atmospheric carbon dioxide annually in 344 newly planted trees."* (74)

— LAF, Landscape Performance Series Case Study

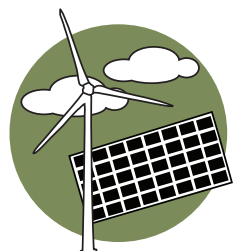


### Transportation

- The creation of a multi-modal boulevard with separate, dedicated paths for bicyclists and pedestrians promotes safe, accessible micromobility travel.
- Updating the multi-use trail has increased trail use by 118% after redevelopment. New materials and improved connections make it a more desirable space.



Before: the state's first rail-trail, that would become the new Monon Boulevard (Rundell Ernstberger Associates)

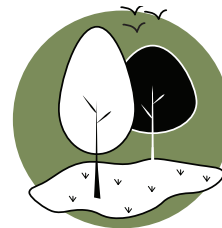


### Energy Source and Use

- The shade provided by the new trees is projected to save the surrounding buildings 142,752 kWh of energy (74). Additionally, the tree's shade will lower surface temperatures by a weighted average of 3 to 8.9F compared to pre-construction, making the space more enjoyable in warm weather.



After: new connections, materials, and green infrastructure (Hadley Fruits & Rundell Ernstberger Associates)



### Urban Nature and Greenspaces

- Soil remediation from the light industrial past use resulted in a significant improvement in soil health, with an increase in organic matter and reduction in alkaline, making the soil more amenable to plant growth.
- Silva cell modular technology was implemented for 140 trees to improve tree growth. Post-construction analysis reveals that the new Monon Boulevard trees grow 32-35% more annually than nearby trees in similar growing conditions without silva cells (74).
- About 325 trees were planted on site (54% native species) and are expected to sequester an estimated 289,076 lbs of atmospheric carbon dioxide annually (74).



Cyclists passing "Love at First Ride" sculpture at the South Gateway (Hadley Fruits & Rundell Ernstberger Associates)

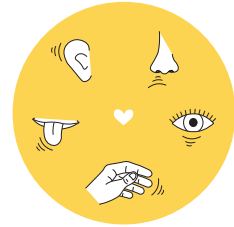


# MONON BOULEVARD AND MIDTOWN PLAZA

## SOCIAL WELL-BEING ELEMENTS

*“Investing in public space and diverse land uses while retaining and enhancing existing small businesses sets Monon Boulevard and Midtown Plaza apart from other redevelopments. This project models how an industrial corridor can evolve into a destination with social, environmental, and economic benefits essential to the community’s urban areas.” (75)*

— Rundell Ernstberger Associates



### Positive Sensory Experiences

- As part of the City’s Arts District, public art and unique bike racks provide visual interest and landmarks.
- The street redesign improves the pedestrian and cyclist experience in every sense through safety and aesthetic interventions.



### Gather and Stay

- 81% of the LAF surveyed residents agreed that the site strengthens place identity, and 69% agreed that it enhances family and friend bonding (74).
- Flexible spaces with movable seating, outdoor games, spinning chairs, and bench swings provide fun gathering opportunities.



### Movement and Play

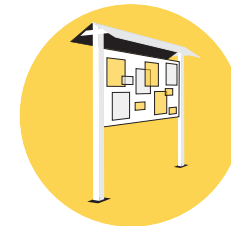
- Activity zones provide play options, such as bocce ball, shuffleboard, game tables, spray plaza, and climbing play features.
- The cycle track and wide sidewalk promotes walking and biking.



Monon Trail counter records thousands of daily users (Daniel Showalter & Rundell Ernstberger Associates)

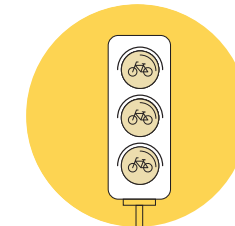


Monon Trail counter records thousands of daily users (Daniel Showalter & Rundell Ernstberger Associates)



### Social Infrastructure

- Increased amenities and programming throughout the boulevard has increased visitor numbers and community event attendance.



### Safety and Security

- Separated bike and pedestrian paths create safer multi-modal travel.
- The vehicular lanes were reduced and the redesign lowers vehicular speeds.



### Connect with Nature

- Visitors experience tree-lined paths along their route, which is a significant change in environment from what the bike path looked like before this project.



# RAINIER BEACH

## URBAN FARM AND WETLANDS

Designers: **Berger Partnership**  
Location: **Seattle, Washington**  
Size: **10 acres**  
Date Completed: **2012**  
Project Type: **Urban Agriculture**

### SUMMARY

In 2009, community members in Southeast Seattle, one of the most diverse zip codes in the US, advocated for an urban farm on a former Seattle Parks Department nursery. The farm seeks to “increase access to affordable quality food sources”<sup>(76)</sup> in the community, and the City of Seattle designated the area as part of a “Food Innovation Zone”<sup>(77)</sup>. The farm is owned by Seattle Parks and Recreation, co-managed by Tilth Alliance and the Friends of Rainier

Beach Urban Farm and Wetlands, and stewarded by community volunteers, students, and staff. Along with the farm’s amenities and maintenance building, the project also preserved wetlands on the site. The farm’s first year included 17,000 hours of educational programming, over 4,000 pounds of produce grown for the community, and 3,500 people engaged through volunteer, educational, and paid programs.



Aerial view of Rainier Beach Urban Farm  
(Berger Partnership)



# RAINIER BEACH URBAN FARM AND WETLANDS

## CLIMATE MITIGATIVE ELEMENTS

*“Rainier Beach Urban Farm and Wetlands is a city park where we come together to grow food, foster community, and work to restore the wetlands through powerful partnerships.” (76)*

— Tilth Alliance



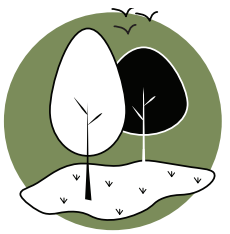
### Urban Food Systems

- The design of the farm “focused on applying innovative green infrastructure practices for both the farm and the restoration of wetlands to support experiential learning on multiple levels.” (78)
- The farm aims to demonstrate best practices in organic and sustainable agriculture, using a social enterprise business model.
- Through environmental education programs and urban food production, the farm engages community members around sustainable agriculture and environmental stewardship.



### Energy Source and Use

- The farm features a solar trellis, which provides energy to the farm.



### Urban Nature and Greenspaces

- After a wetlands delineation study of the site was conducted in 2010, the vegetation management plan was designed to preserve and restore wetlands, which are critical for carbon sequestration.
- Through the gardening layout, the site also preserved deciduous and coniferous forest area.



### Waste and Materials

- The farm uses best practices for organic and sustainable farming, including composting infrastructure.



View of the community building and planting beds at the farm (Berger Partnership)



Greenhouses in fall at Rainier Farm (Tilth Alliance)



Volunteers at working at Rainier Farm (Tilth Alliance)



The Farm Stand at Rainier Farm (Tilth Alliance)



# RAINIER BEACH URBAN FARM AND WETLANDS

## SOCIAL WELL-BEING ELEMENTS

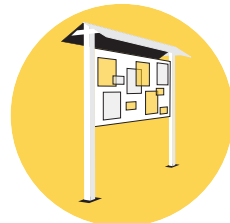
*“Building a local and sustainable food system is key to building the health, vitality, and resiliency of all communities. The Rainier Beach Urban Farm & Wetlands is a space that celebrates diversity and provides opportunities to educate, engage and connect community through sustainable urban farming and environmental stewardship.” (79)*

— Friends of Rainier Beach Urban Farm and Wetland



### Community Ownership

- The farm is co-managed by the Tilth Alliance, a non-profit agency whose mission is to advance a “sustainable, healthy and equitable food future,” and Friends of Rainier Beach Urban Farm and Wetlands, a group of neighborhood advocates who lead community outreach, fundraising, and volunteer efforts (76).
- The farm has several volunteering opportunities, helping volunteers learn or strengthen skills, connect with new people, and be environmental stewards of their community.
- The farm also offers a Rainier Beach Youth Steward position for high school aged youth to gain experience in wetland restoration and urban farming.



### Social Infrastructure

- The farm has free community U-pick sections of the farm, a neighborhood community supported agriculture (CSA) program, and a seasonal farm stand to improve accessibility to affordable fresh produce.
- The farm’s urban agriculture education center offers gardening and cooking classes, green jobs training, and youth and family programs such as camps, after-school programs, and school field trips.
- Community lunches and dinners bring together volunteers, elder farming program participants, interns, Rainier Beach High School students, and other community members to enjoy the food they grow together.



### Connect with Nature

- Field trip programs with local schools invite children to explore the farm and learn about farming and nutrition.
- Tilth Alliance partnered with Horn of Africa Services and nearby Lake Washington Apartments to connect elders to gardening. Elders garden for 4 hours a week and receive a farm cooked community meal, a Good Food Bag with fresh produce, and a monthly stipend.
- The farm provides the Rainier Beach community access to the lakefront natural areas and connects them to nature through farming and gardening.



The community building at Rainier Beach Urban Farm (Berger Partnership)



### Gather and Stay

- Picnic seating, pedestrian paths, and open areas, along with farm events and programming, provide opportunities for community members to gather at the farm.



### Positive Sensory Experiences

- The farm is located on Lake Washington, with new pedestrian paths allowing people to enjoy the sensory experiences of the lake, farm, and wetland areas.



# DUNE PENINSULA AT POINT DEFIANCE PARK

Designers: **Site Workshop**  
Location: **Tacoma, Washington**  
Size: **11 acres**  
Date Completed: **2019**  
Project Type: **Urban Park + Open Space**

## SUMMARY

Point Defiance is a 46-acre former toxic waste site. Nearly a century of routine arsenic- and lead-filled smelter waste was dumped into the Tacoma waterfront, creating massive man-made hills upon which the park is now situated. The site was designated an EPA Superfund site in 1983, and began a decades-long remediation process shortly after.

Dune Peninsula is an 11-acre portion of the whole site, and was realized as a public park in 2019 with the intent to create a healthier environment for all through introducing biodiverse habitats and multiple recreational opportunities, and to “reference the historic uses of the site in design features and art”<sup>(80)</sup>.



View of Mount Rainier from Dune Peninsula (Stuart Islett)



# DUNE PENINSULA AT POINT DEFIANCE PARK

## CLIMATE MITIGATIVE ELEMENTS

*“Prairies are critical habitats in the South [Puget] Sound. There’s only 3% of them left in the South Sound so carrying that biodiversity forward onto this place instead of lawn was important. The prairie is a climate resilient ecology because of its drought resistance. The species that we planted are likely to persist when we get lots of rain, then when we get no rain at all, and also when we have extreme heat.” (81)*

— Clayton Beaudoin, Principal Landscape Architect, Site Workshop



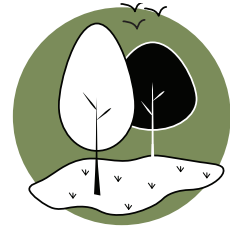
### Transportation

- A universally accessible multi-modal trail connects Dune Peninsula to downtown Tacoma, creating an essential link as part of the Downtown-to-Defiance trail that all can use.



### Waste and Materials

- Reduced carbon emissions and saved at least \$750,000 during construction by eliminating the export of dirt and import of replacement topsoil (81).
- A local artist was involved in the design process from the beginning. They developed several sculptures out of the steel pipes and other materials from the site, providing a new life for the materials and celebrating the history of the site.



### Urban Nature and Greenspaces

- The 5 acres of prairie saves an estimated 300,000 gallons of water and \$3,800 annually, when compared with other parks with more traditional landscaping (82). One of the design goals was to create landscapes that are both high habitat value and low maintenance.
- Strong emphasis on biodiversity with increased plant and animal species.
- A total of 207 bird species were observed from 2017-2022 at Dune Peninsula, 85% of which are species that overlap with those reported at Mima Mounds Area Preserve, a nearby, well-established prairie habitat (83).



Expansive view of the Tacoma waterfront from a highpoint on the dunes (Stuart Islett)



Native plantings bring life and biodiversity to the sweeping meadows on site (Stuart Islett)



Multiple accessible pathways offer various viewpoints from the dramatic topography (LAF, Rebecca Habtour)



An artistic arrangement of steel pipe sculptures echo the smokestack that once stood on site (Stuart Islett)

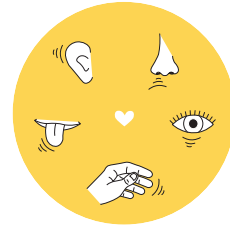


# DUNE PENINSULA AT POINT DEFIANCE PARK

SOCIAL WELL-BEING ELEMENTS

*“Hundreds of visitors responded to a survey about the park and 94% reported a positive experience. The most common emotion visitors felt was happiness, followed by tranquility. Among other survey findings, 96% of visitors enjoyed the variety of plants at the park, 92% of visitors felt ecosystem restoration was important, and 88% of visitors reported that the planted native prairie contributed positively to their experience.”* <sup>(83)</sup>

– LAF, Landscape Performance Series Case Study



## Positive Sensory Experiences

- From the hundreds of responses in a public survey, 94% reported a positive experience, using emotive descriptors like happiness and tranquility <sup>(83)</sup>.
- A meaningful connection to the site’s historic uses is established through artful design and storytelling elements that brings awareness to visitors.



## Gather and Stay

- There are several seating opportunities, mainly created from natural elements like stone or concrete that mimics a stone shape. These features invite restful moments, play and iconic views.
- The artistic elements on site which honor the site’s past, invite people to stay and take photographs.



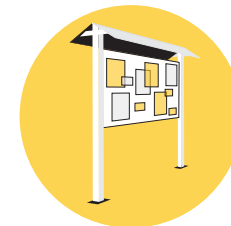
## Connect with Nature

- Visitors can now access the waterfront with 360 views of Mount Rainier and the Puget Sound that were previously inaccessible.
- In a public survey, 96% of respondents reported enjoying the plants, 92% of respondents felt the ecosystem restoration was important, and 88% of respondents noted that the “planted native prairie contributed positively to their experience” <sup>(83)</sup>.
- The site and surrounding area provides habitat for a variety of wildlife species including eagles, hawks, heron, deer, sea lions and orcas, which can be observed by park visitors.



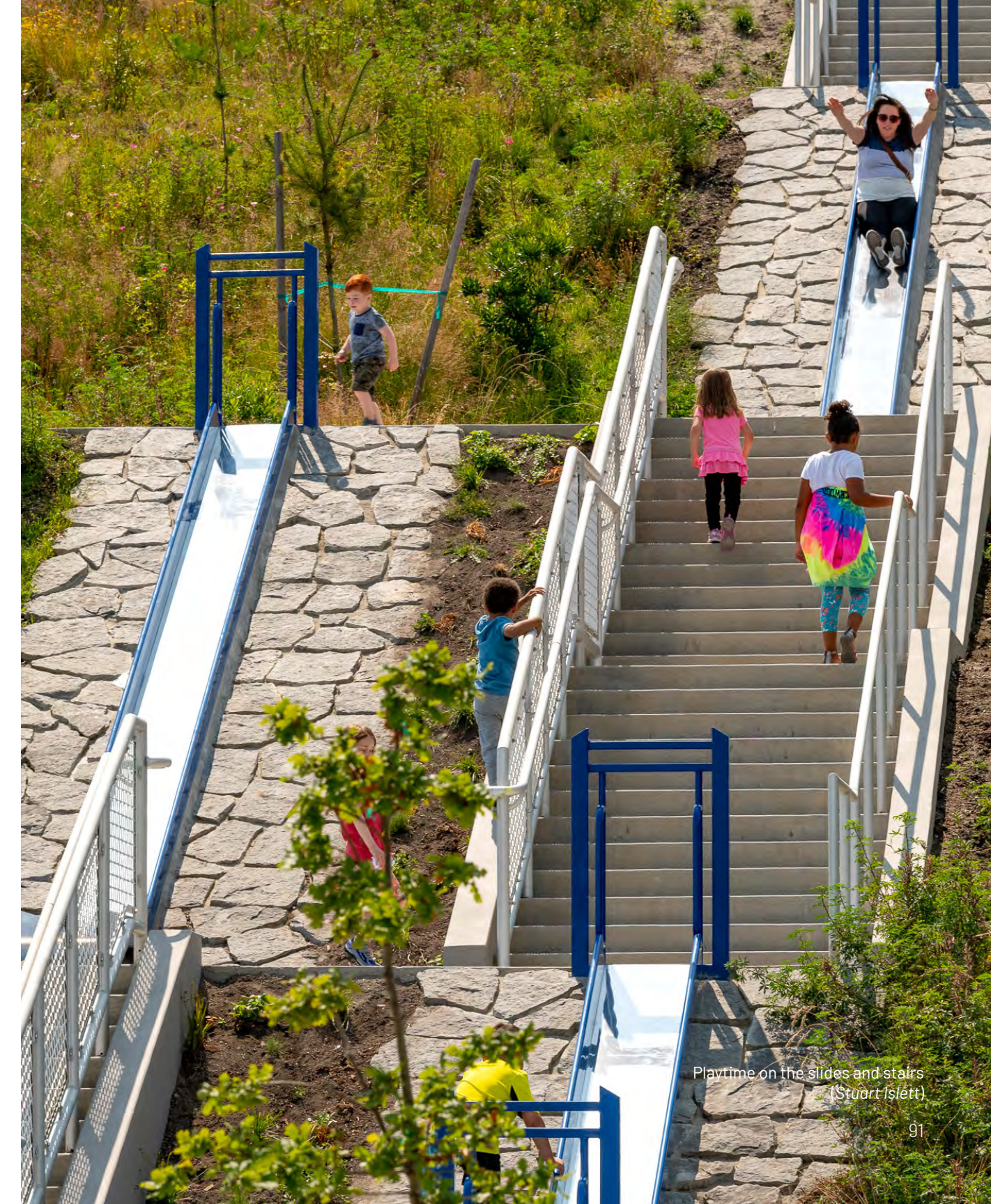
## Movement and Play

- Decades of dumped toxic waste created dynamic topography. With the addition of accessible multi-modal pathways, the dunes are perfect for playing, cycling, rolling, walking and running.
- A multi-level slide and staircase feature utilizes the significant elevation with a playful feature for all ages.



## Social Infrastructure

- The Tacoma Parks Department provides educational opportunities, relating environmental awareness with elements like the prairie landscape planting typology and biodiverse habitat creation.



Playtime on the slides and stairs  
(Stuart Islett)



# EARTHSONG

## ECO-NEIGHBORHOOD

Designer: **Robin Allison**

Location: **Auckland, New Zealand**

Size: **3 acres**

Date Completed: **1995**

Project Type: **Co-Housing + Eco-Village**

### SUMMARY

Earthsong is a co-housing neighborhood on an old organic orchard centered around the principles of permaculture and sustainable community living practices. Earthsong founder and former architect Robin Allison envisioned a community to “demonstrate the highest practical standards of sustainable human settlement”<sup>(84)</sup>.

The 68 current members live in either two-story terrace houses with two to four bedrooms or apartments with one to two bedrooms to accommodate different families and needs. The residents share the Common House with amenities such as a dining or meeting hall, large kitchen, rooms for children and teens, and laundry facilities.



Earthsong community vegetable garden  
(Architecture Environment Research, AER)



# EARTHSONG ECO-NEIGHBORHOOD

CLIMATE MITIGATIVE ELEMENTS

*“A cooperative neighborhood can facilitate behavior change through information exchange and education, sharing ideas and tips about how to manage the systems more efficiently, internal pricing plans that reward low users and discourage high use, built-in information feedback mechanisms, and accountability through making information on individual house use available to all.” (85)*

— Earthsong



## Urban Food Systems

- Large common gardens and an orchard, as well as personal gardens, comprise more land area than lawn areas.
- Gardens grow edible plants alongside native and ornamental plants. Grape vines shade the houses in the summer. Watercress, puha, banana palms, and berries grow in the stormwater channels.

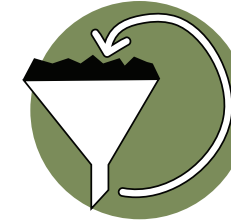


Earthsong community vegetable garden (AER)



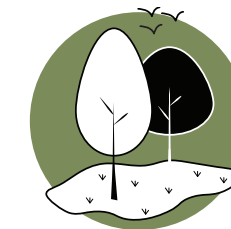
## Energy Source and Use

- Passive solar design maximizes energy efficiency and natural climate control. Buildings were built small to reduce consumption.
- The homes use solar water heaters, along with energy-efficient lighting and appliances.
- Residents are informed about their energy use for different appliances and “encouraged to limit their power use to around 3.5 kilowatts/household at any one time” (85).
- Energy efficient design and demand management together result in the average Earthsong house using only about half the amount of electricity as an average house somewhere else.



## Waste and Materials

- Materials were selected using the following environmental criteria:
  - Renewable or sustainable source with low environmental impact from extraction
  - Low embodied energy
  - Low toxicity
  - Reusable or recyclable after the building life
- The designers chose reconstituted timber products to avoid toxic glues and naturally-durable timber over treated timber options.
- Earthsong’s discarded waste per household is only 30% of the waste of an average household in Waitakere City, according to a 2010 Waitakere City Council waste audit (86).
- Wooden compost bins are provided in the teardrop garden. Many households have their own smaller compost bins, or have worm farms for food waste.
- Rainwater is collected from the roofs into tanks and piped back for use within the homes.



## Urban Nature and Greenspaces

- The former orchard now has greater diversity of plants through new gardens and vegetation cared for by the residents.



## Transportation

- Cars must be parked at the edge of the neighborhood site. Accessible pedestrian paths circulate through the living areas and gardens.



Example of the co-housing buildings in the Earthsong community (AER)



# EARTHSONG ECO-NEIGHBORHOOD

SOCIAL WELL-BEING ELEMENTS

*“Sustainability requires us to look beyond ourselves as discreet and independent lives and acknowledge our interdependence with each other and with the natural world. A sense of belonging and connection between people and with the natural environment are key elements in learning to live more sustainably.”<sup>(87)</sup>*

— Earthsong



## Community Ownership

- Residents were involved in the design process of the site, empowering them to contribute to their neighborhood from the start with a continuous participatory process.
- Cohousing creates a strong social network by nature of knowing your neighbors and working together to create and maintain the neighborhood with shared values.
- A social organization establishes “agreements around personal and collective rights and responsibilities, and strong social tools for communication, decision-making and conflict resolution”<sup>(87)</sup>.



## Gather and Stay

- Earthsong residents of all ages have many opportunities for socializing through potlucks, parties, spaces specifically for children or teens, and spontaneous interactions in the community.



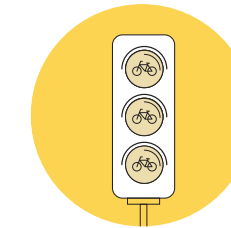
## Connect with Nature

- Residents work together to maintain the communal gardens and orchard.
- The site was designed to optimize productive greenspaces around the buildings.



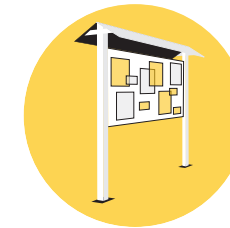
## Movement and Play

- The community has a sandpit, playhouse, trampoline, and swings, as well as open areas for sports.
- The common house has a teen outdoor patio, children’s room, teen’s room, table tennis, and pool table.



## Safety and Security

- The absence of cars in the community allows for safety in walking, playing, and biking.
- Trust and cooperation between neighbors fosters a sense of neighborhood safety.



## Social Infrastructure

- The common house provides shared spaces for social gatherings. The large kitchen can accommodate four or five cooks to prepare meals for up to 100 people. Optional communal meals are offered twice a week<sup>(88)</sup>.



Earthsong’s Common House (AER)



# ØSTERGRO AND ØENS HAVE

Designers: Kristian Skaarup, Livia Urban Haaland,  
Sofie Brincker, Steffen Kristensen

Location: Copenhagen, Denmark

Size: 600 m<sup>2</sup> and 2,500m<sup>2</sup>

Date Completed: 2014 and 2019

Project Type: Urban Agriculture

## SUMMARY

Located within Copenhagen's first "climate resilient neighborhood" of Østerbro, ØsterGRO is also the first rooftop farm, situated atop an old car-auction house. The farm is powered by a core team of employees, and sustained by a CSA (Community Supported Agriculture) association that provides support through a paid membership as well as volunteer work hours<sup>(89)</sup>. Øens Have, created by the same team, is the largest urban

farm in Scandinavia. Both ØsterGRO and Øens Have include restaurants on site that serve vegetarian meals made with farm produce. While ØsterGRO supports more engagement with CSA members, volunteers, and school groups, Øens Have caters to a wider audience because of its accessible and visible location on Refshaleøen. The mission of the initiative is to connect people in the city to the production of high quality organic food.



People gather for an event at the ØsterGRO rooftop farm and restaurant (ØsterGRO)



# ØSTERGRO AND ØENS HAVE

CLIMATE MITIGATIVE ELEMENTS

*“We have no illusions that Copenhageners can become self-sufficient with agricultural products from urban gardens and agriculture, but we would like to be a link between the city and organic agriculture outside the city, inspire local organic markets and disseminate knowledge about food production – both on the city’s roofs and out in the countryside.” (90)*

– Livia Urban Haaland



## Urban Food Systems

- The agriculturally productive green roof, and the urban farm located in a historically industrial district contribute to valuable carbon sequestration and carbon reduction, mitigating negative climate effects such as urban heat island.
- The CSA program at ØsterGRO, in partnership with Stensbølgård farm, feeds 40 families during the season, providing organic and local produce to city dwellers.



ØsterGRO roof top farm and restaurant (ØsterGRO)

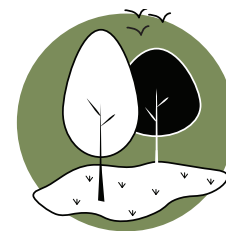


## Waste and Materials

- There are two circular yurt buildings at Øens Have, made of wood and canvas that provide restaurant and event gathering space on the site. The minimal use of materials for the yurt buildings, outdoor kitchen, and small greenhouse structures creates very little material or carbon impact on the site. The farm and restaurant are closed in the winter, therefore there is no need for insulated buildings.
- Both farms compost organic waste on site, ensuring circular waste systems.



Farm worker harvesting carrots at ØsterGRO (ØsterGRO)



## Urban Nature and Greenspaces

- The diversity and amount of plants on the ØsterGRO rooftop increase biodiversity and critical habitat for bees and insects within the area.
- By practicing regenerative agriculture, the farmers at Øens Have are reviving the soil health, providing a rich habitat for bees, insects, birds and microorganisms.
- The vegetable beds at Øens Have are open to the public year round, providing a green oasis within an industrial part of the city.



Volunteers harvesting at ØsterGRO (ØsterGRO)



Yurt structure at Øens Have with tables set inside, and people eating outside (Øens Have)



# ØSTERGRO AND ØENS HAVE

SOCIAL WELL-BEING ELEMENTS

*“In collaboration, we work to promote ecology in the city through food experiences, fresh organic produce, community and communication.”* <sup>(89)</sup>

— Øens Have



## Gather and Stay

- The restaurants feature long communal tables that encourage customers to meet new people and share a meal with others.
- The farms lead tours to schools and groups of all ages, and host lectures, workshops, and other events that welcome locals and visitors from all over the world to gather, stay, and make new connections.



The greenhouse and the yurts at Øens Have (Øens Have)



## Connect with Nature

- Volunteering at the farm provides the opportunity for people to make meaningful connections with the soil, the produce, and the people they are working with.
- Assisting with the production of food brings people closer to the food they eat, how the vegetables are grown and the farmers that steward the land on a daily basis.



Workers harvesting beets at ØsterGRO (ØsterGRO)



## Community Ownership

- CSA members and volunteers are introduced to organic vegetable farming practices, plant-based diets, and the importance of local food systems. Volunteering in this way develops a sense of ownership or stewardship over the land and the food production.



## Social Infrastructure

- The two farms provide numerous educational opportunities related to agricultural practices, such as local and organic food production, plant-based diets, compost production and limiting food waste, as well as the opportunity for behavioral change toward growing your own food, urban agriculture, and climate resilient agricultural practices.



Volunteers harvesting and socializing at Øens Have (Øens Have)



# XUHUI RUNWAY PARK

Designers: **Sasaki**  
Location: **Shanghai, China**  
Size: **36 acres**  
Date Completed: **April 2020**  
Project Type: **Streetscapes + Linear Parks**

## SUMMARY

Formerly the Longhua Airport, the Xuhui Runway Park is a linear park in a high-density, mixed-use area. The project's social goals include encouraging commuting outside of cars, promoting active lifestyles, and providing a "universally accessible" park for all to recreate and enjoy. The transformation

of the post-industrial site with all hard paving into a lush green space manages stormwater from the park and surrounding roads, provides wildlife habitat, and mitigates the urban heat island, air pollution, and noise pollution from Yunjin Road. The project was recognized as the first SITES Gold award in Mainland China <sup>(91)</sup>.



Families play at the new Runway Playground (Sasaki)



# XUHUI RUNWAY PARK

## CLIMATE MITIGATIVE ELEMENTS

*“One of the successes we are very proud of is the work we did on the site’s sustainability, and not only the stormwater management, but also the educational impact on society by letting citizens know what a rain garden is. The native plantings and wetland species are growing very well. The kids and locals like the environment very much and are able to learn what a wetland is and its function.”* (92)

— Tianwen Zhou, Senior Associate and Landscape Designer, Sasaki



### Transportation

- Introduced designated bike lanes and 96 bike parking spaces.
- Provides new bicycle infrastructure, pedestrian paths, and pleasant “last mile” walking experiences for commuters from the adjacent subway stop.



### Energy Source and Use

- An estimated 167,000 kWh and \$15,800 is saved annually by the use of LED lights over standard metal halide lighting (93).

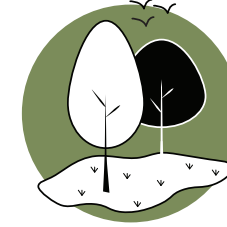


### Waste and Materials

- 50,160 square feet of the airport’s runway was retained and restored to become the main pedestrian path through the park, with 29,278 sf of demolished concrete from the airport repurposed for other paths and a randomized paving pattern (93).
- 29,600 sf of fused bamboo lumber was used for benches, boardwalks, and riverfront overlooks.



Elevated pathways over the rain gardens (Sasaki)



### Urban Nature and Greenspaces

- With 82 plant species, including 2,227 trees native to the Yangtze River Delta, the park is estimated to have an annual net carbon sink of 488,039 kilograms. The species diversity is increasing over time, with 108 plant species observed in 2022 (93).
- Areas such as a bird watching garden, butterfly grove, bioengineered riparian edge, and floating wetland provide habitat for birds, pollinators, and aquatic species.
- A 62,000 sf rain garden and forebay, along with a 2-acre constructed wetland, treat the park and Yunjin Road’s stormwater. The rain garden can hold 314,556 gallons of stormwater (93).
- Underground, a 10,408-gallon cistern holds part of the treated stormwater runoff from the rain garden and forebay. The water can irrigate almost 5 acres of the planted areas or fully supply the Runway Fountain, saving an estimated 1.04 million gallons of potable water and \$3,200 annually (93).



A mother and child walking on a boardwalk made out of fused bamboo lumber (Sasaki)



Before: Longhua Airport, closed in 2011 (Sasaki)



After: a new runway path with reused materials (Sasaki)



# XUHUI RUNWAY PARK

SOCIAL WELL-BEING ELEMENTS

*“Master planned as a public street and linear park side-by-side, this project serves as a runway of modern life, offering a space of recreation for nearby communities, as well as a respite from the high-density redevelopment around. Following its environmentally, socially, and economically sustainable approaches, the site will lead the city’s new lifestyle.” (92)*

— Sasaki

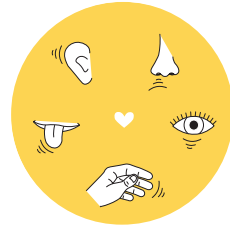


## Gather and Stay

- Provides gathering spaces through a sunken garden for cultural events and performances for up to 900 people, along with a flexible lawn space for events up to 3,500 people or five concurrent soccer games in five-a-side-size fields.
- The majority of 263 surveyed park users reported the park supporting their social interactions, with 81% saying they usually frequent the park with their family, friends, or colleagues (93).



A family gathers in the gardens (Sasaki)



## Positive Sensory Experiences

- Eighty five percent of surveyed users reported visiting the park has a positive effect on reducing stress and 81% said the park improved their quality of life.
- The park reduced average noise levels from 73.9 decibels to 61.0 decibels, providing a sound buffer from Yunjin Road traffic (93).



Sloped pathways offer a dynamic and playful experience amongst diverse plantings (Sasaki)



Pedestrians walking along water (Sasaki)



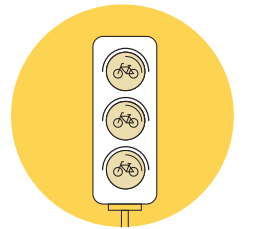
## Connect with Nature

- Transformed a post-industrial hardscape into a thriving greenspace in a dense area of Shanghai.
- Offers opportunities to spend time outdoors, bird watch, and enjoy water features.



## Movement and Play

- Offers more than 32 types of activities, with walking being the most common activity in the park.



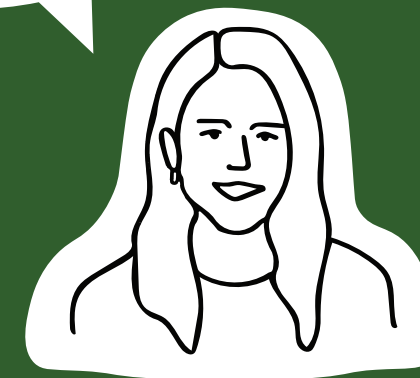
## Safety and Security

- Most park users feel safe going to the park, according to 84% of survey respondents (93).

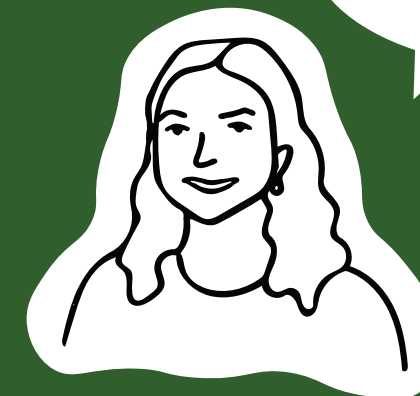


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*We have learned so much about climate mitigation and social well-being!*



*Yes, let's review where all of that great information came from!*





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