

In collaboration  
with Oliver Wyman



# Nature Positive: Leaders' Insights for the Transition in Cities

INSIGHT REPORT  
SEPTEMBER 2024



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# Foreword



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As the planet becomes more urbanized, so too should the solutions to two of its biggest challenges – climate change and the loss of nature. Further, by 2050, the urban population is projected to swell by 2.5 billion people.<sup>1</sup> For this reason, local governments need to become increasingly central and pivotal in shaping both local and global nature and climate agendas.

The World Economic Forum's Nature-Positive Cities initiative, established in collaboration with Oliver Wyman, is designed to promote advocacy and cooperation between local governments, the private sector and civil society, and to catalyse investments in urban interventions that will have positive impacts on nature.

A cornerstone of the Nature-Positive Cities initiative is its multistakeholder approach. Mayors and leaders from the private sector and civil society have collaborated as members of the Global Commission on Nature-Positive Cities to develop urban solutions in harmony with nature. This collaborative approach is crucial for aligning urban development with the natural environment and raising awareness of the

role that healthy ecosystems play in building more liveable and resilient urban spaces. By empowering these ecosystems at a city scale, cities can accelerate adoption of nature-positive strategies that improve their infrastructure, safeguard public health and strengthen local economies.

The involvement of the private sector is particularly vital. Companies within cities have the capacity to drive forward nature-positive solutions through innovations in technology, effective resource management and corporate social responsibility efforts. Their commitment to sustainable practices is essential for the broad adoption of nature-positive actions across urban landscapes.

We are honoured and delighted to introduce this collection of insights by members of the Global Commission. This compendium reflects the collective efforts of engaged stakeholders, including city residents, that teach urban policy-makers how to advocate for and accomplish nature positive action in cities. We hope it prompts you to connect with our Nature-Positive Cities initiative and spearhead nature-positive efforts in your own communities.

# Executive summary

This report highlights success stories of weaving nature into urban life, and offers replicable and scalable solutions for more nature-positive cities.

Despite the potential benefits of nature-based solutions (NbS) to address cities' development challenges, implementation in urban settings remains limited.

The evidence brought forward by the scientific community is not sufficient to succeed in the fight against climate and nature change. Leadership, advocacy and high-level partnerships in support of nature action are vital in activating cities' transition to a nature-positive economy.

## The Global Commission on Nature-Positive Cities

This collection of articles is the result of one year of research, encounters and dialogues between members and special guests of the [Global Commission on Nature-Positive Cities](#). It marks the culmination of a yearlong commitment and presents a comprehensive set of strategies and interventions designed to support the transition towards nature-positive urban development.

Drawing from a diverse range of global contexts, the report highlights both the challenges and successes of integrating nature into the urban fabric, offering practical solutions that can be adapted to various cityscapes. The insights shared here are grounded in real-world examples, with an emphasis on replicability and scalability.

Carlos Correa, Colombia's former Minister of Environment, underscores the role of municipal policies in driving the transition. London Breed, Mayor of San Francisco, and Mark Watts, Executive Director of C40 Cities Climate Leadership Group, further demonstrate the potential of civic engagement and municipal action and showcase San Francisco's commitment to expanding green spaces equitably and incorporating biodiversity into urban planning.

Johnny Ayoub, Head of Oliver Wyman's IMEA Climate and Sustainability platform, and Mikolaj Sekutowicz, Chief Executive Officer of Impact One, bring some successful examples of urban greening, highlighting the critical role of urban afforestation and the value of methods like the Miyawaki pocket forests to address water stress and regenerate public spaces.

Cha-ly Koh, Chief Executive Officer of Urbanmetry, and ProBogota's Director of Urban Projects, Martín Anzellini, address the impacts of rapid urbanization on nature. Both argue that cities can prevent

unchecked sprawl and protect natural ecosystems through an integral approach to densification. This approach is especially pertinent in rapidly growing urban areas in Latin America and Southeast Asia.

Kotchakorn Voraakhom, Chief Executive Officer of Landprocess, and Edmilson Rodrigues, Mayor of Belém, connect examples from Thailand, Singapore, Netherlands and Brazil and show how cities can harness natural water systems to enhance resilience against flooding and other climate-related hazards.

Federico Cartín Arteaga, Founder and Director General of Rutas Naturbanas and Heather Thompson, Chief Executive Officer of the Institute for Transportation and Development Policy, explore the connection between urban mobility and nature regeneration. They highlight how green corridors and sustainable transport options contribute not only to the protection of biodiversity but also to improved quality of life.

The private sector's role in supporting nature-positive urbanization is explored by Arjun Dhawan, Executive Vice-Chairman of Hindustan Construction Company (HCC), and Nollaig Forrest, Chief Sustainability Officer of Holcim, stressing the relevance of circular economy practices and closer public-private interactions. Singapore and Barranquilla are presented by Esther An, Chair of Corporate Advisory Board, World Green Building Council and Jaime Pumarejo, former Mayor of Barranquilla, as examples of steady private sector collaboration with the local government. Both leaders share how strengthened public-private collaboration under a nature-first approach can lead to significant environmental and social benefits.

Former Mayor of Quito, Mauricio Rodas, and Sandra Villars, Oliver Wyman's Finance and Risk Partner, cite innovative financial mechanisms that can be applied to many cities looking to finance large-scale green infrastructure projects.

Finally, the convergence of global initiatives for biodiversity conservation and the leadership of local governments is exemplified in Incheon, a city that has fostered the East Asian-Australasian Flyway Partnership (EAAFP) and regenerated urban spaces to enable migratory birds to safely transit across the globe.

This report offers a rich collection of insights and strategies that cities can adapt and implement to advance their nature-positive agendas.



## Collection of insights

This collection highlights successful urban interventions, emphasizing collaborations, effective policy implementation, increased investment and collective action for nature.



1

# Why nature-positive cities can help transform the planet



## Carlos Correa

Former Minister of the Environment and Sustainable Development, Colombia

In recent years, “nature-positive” has become a popular buzzword among world leaders advocating for climate and biodiversity action. The term is defined by the Nature Positive Initiative – which represents conservation organizations, institutes and business and finance coalitions – as a global societal goal to “halt and reverse nature loss by 2030 and achieve full recovery by 2050”.<sup>2</sup>

The economic case for nature action is clear: 44% of global gross domestic product (GDP) – \$31 trillion – generated in cities is at risk from nature loss.<sup>3</sup> Yet, only 37% of the world’s 500 most populous cities have developed a dedicated strategy focused on nature or biodiversity preservation.<sup>4</sup>

The [G7 2030 Nature Compact](#) identifies investing in nature and driving a nature-positive economy as one of four core pillars for action. The [Kunming-Montreal Global Biodiversity Framework](#) (GBF),

meanwhile, proposes 23 targets that aim to protect 30% of terrestrial and marine ecosystems, reverse biodiversity loss and scale up finance for nature by 2030. These are largely keeping with the vision of a nature-positive world.

The transformation to a nature-positive world will be driven by innovative policy and robust regulatory frameworks that reimagine how communities interact with nature. With global trends showing that nearly 70% of the world’s population is projected to live in cities by 2050, cities will be fundamental drivers of the transformation.<sup>5</sup>

It’s important for governments around the world to align their policies with the broader framework outlined by the GBF targets and Paris Agreement goals and draw upon the lessons learned from cities that have already adopted policies designed to lead this transformation.



“ Prioritizing regulations and policies that guide and promote the implementation of nature-positive solutions will be critical for urban governments in the coming years.

## The roadmap towards nature positivity

The transformation towards nature positivity is a daunting one that will require a set of enabling conditions to be put in place by municipal governments around the world.<sup>6</sup> The new report, [Nature Positive: Guidelines for the Transition in Cities](#) (the first publication of a collection of publications advocating for the regeneration of nature urban areas), emphasizes how a clear mandate from city leadership to prioritize sustainability across all city operations is fundamental to enable the implementation of a nature-conscious agenda in cities.

We must create policy roadmaps that help us meet both our climate and biodiversity targets. Prioritizing regulations and policies that guide and promote the implementation of nature-positive solutions will be critical for urban governments in the coming years. They should be backed by adequate and timely financing, as well as standard risk- and impact-management processes. Citizen participation is also an essential component of nature-positive cities.

Strengthening public-private collaboration in real estate, energy, mobility, commerce and elsewhere will help cities meet scale. As a group of mayors recently highlighted, these collaborations can help fund and implement nature-positive projects and also provide the technical expertise and other resources necessary to accelerate the transition.<sup>7</sup>

Urban leaders must connect their local policies and regulatory frameworks to national strategies and international climate and biodiversity goals. This will allow them to show progress and mark cities' contributions to the Montreal and Paris Agreements.

Finally, local governments are highly encouraged to adapt and address policy failures that have enabled the destruction of natural habitats. Governments should work to rectify previous failures in public procurement that have stymied nature-conscious innovation. Reforming subsidies that are incentivizing unsustainable practices and pricing in the impact of negative externalities can help move us in the right direction.

## Lessons learned from trailblazers

While policy innovation will be the driving force towards the transition to nature-positive cities, it will be pertinent to draw on the experiences of cities that have led the way. Nature-positive cities is a relatively novel concept that requires us to be adaptable and willing to learn.

Increasing and improving green spaces in cities is key to facilitating a shift to nature positivity. Some have taken ambitious steps forward with measurable benefits. The 2012-2015 Montería administration

worked with policy-makers, the private sector and stakeholders to build a sustainable city and helped transform the city's Sinú River into an axis of social, cultural and economic development.

Policy-making and urban planning must be rooted in the understanding of the surrounding ecosystem. An example of this is [Montería 2032](#), a 20-year development plan to return the city to the river and people. Intrinsic to this plan was acknowledging that revitalizing the Sinú River would be critical to reclaiming Montería's public spaces, water management, basic sanitation and tourism.

The city has made tremendous strides in ensuring nature is the focus of its policy-making, setting the stage for a remarkable turnaround. In recent years, Montería has recovered 50 urban and rural parks and expanded Ronda del Sinú, a park that was declared a protected area in 2017.

Elsewhere in Colombia, Barranquilla is one of the many cities in Latin America that followed the World Economic Forum's vision on [BiodiverCities by 2030](#). This initiative seeks to create a future where the “built environment, social structure and natural capital co-exist in harmony”.<sup>8</sup> The city has undertaken several blue and green infrastructure projects to build the foundation for a better future.

The [Ciénaga de Mallorquín Park](#) was a once-neglected area that has been converted into a green space with nearly 4 km of bike lanes. To date, over 60,000 mangroves have been planted in the park. The city's Gran Malecón Riverwalk is a bold initiative to reclaim the once-industrial Magdalena riverfront as an area of public use, helping change the perception of the riverfront from uninhabitable and polluted to a thriving public space.<sup>9</sup>

The city of Salvador in Brazil has established 39 conservation areas spanning 19 kilometres squared (km<sup>2</sup>) to help restore the Atlantic Forest biome and strengthen climate resilience.<sup>10</sup> The rehabilitation programme has facilitated the planting of 30,000 trees, with the city's residents involved in planting half of them. In Ecuador, Quito's climate change action plan sets forth a bold adaptation goal of increasing green spaces to at least 20 metres squared (m<sup>2</sup>) per resident.<sup>11</sup>

These real-world examples show that creating nature-positive cities presents a formidable opportunity to ensure sustainability and prosperity in a rapidly urbanizing world. The race is on to meet the goals of the GBF and become nature-positive by the end of the decade. As the next biodiversity COP approaches in Colombia, the discussion on how cities must pave the way for a nature-positive future is expected to take centre stage.



60,000

mangroves have been planted in the Ciénaga de Mallorquín Park.

2

# Cultivating nature, cooling cities: an urban future grown to last



**Johnny Ayoub**

Partner, IMEA Head of Climate and Sustainability, Oliver Wyman



**Mikolaj Sekutowicz**

Chief Executive Officer, Impact One

Urbanization has surged in recent decades, especially in regions with arid climates like the Middle East where the population in cities has nearly doubled since the 1960s.<sup>12</sup> This has surpassed the global urbanization average of 55%.

This rapid expansion has come at a cost: as cities have traditionally expanded, they have become more susceptible to the impacts of climate change. Concrete landscapes disconnect society from nature and exacerbate pollution, presenting significant environmental risks. Yet, amid these challenges lies a solution: by integrating green-blue infrastructure into a city's fabric, it is possible to combat climate change and create healthier, more sustainable urban environments.

↓ Source: Royal Commission for Riyadh City.

Bringing nature back to cities goes beyond mere aesthetics – it's about promoting good public health and transforming infrastructure industries for a better future.

### Greening a desert to benefit citizens and the planet

Initiatives such as the [Green Riyadh](#) project in Saudi Arabia exemplify the potential of incorporating nature into city landscapes, offering benefits for both inhabitants and the planet.

This large-scale afforestation project is expected to result in the planting of 7.5 million trees across the capital of Saudi Arabia, with an ambient temperature reduction of 2°C across the city and up to 15°C reduction where afforestation is most dense.





# 10%

increase in vegetation cover can decrease ambient air temperatures by 2°C.

“ Greening the city will provide critical learnings for the entire region while improving the lived experience of Riyadh’s residents.

These estimates are supported by research, which found that a 10% increase in vegetation cover can decrease ambient air temperatures by 2°C.<sup>13</sup> This temperature decrease is expected to modestly reduce the energy consumed by artificial cooling systems.

In addition, the initiative is projected to enhance public health and improve air quality by reducing carbon dioxide (CO<sub>2</sub>) concentration by 3-6% and reducing dust concentration. It will also increase the per capita green space to nearly 30 m<sup>2</sup>, which is well above the World Health Organization’s recommended 9 m<sup>2</sup>,<sup>14</sup> potentially boosting physical activity and enhancing mental health among the city’s residents.

Yet, in such an arid environment, how will all this new greening survive and thrive? Firstly, the Green Riyadh plan includes the introduction of native plant species compatible with the local environment. In addition, a water recycling and stormwater management project aims to increase the daily volume of reused water from 90,000 cubic metres to approximately one million cubic metres. This will also help mitigate the impacts of flood events.

When considered with its potential to have long-lasting effects also on biodiversity, greening the city will provide critical learnings for the entire region while improving the lived experience of Riyadh’s residents.

### Cooling cities through urban afforestation

Afforestation has long been recognized as a valuable technique, primarily for restoring wildlife habitats and providing forestry products. In recent years, it also gained prominence as a crucial tool in the fight against climate change.<sup>15</sup> Its ability to sequester carbon and its cost-effectiveness make tree planting a frontline mitigation measure.

Urban afforestation is particularly noteworthy for addressing both environmental and societal needs. Recent research highlights the vast potential of the peri-urban forests, those located at the rural-urban fringe, to host up to 240 billion trees globally and supercharge microclimate adaptation.<sup>16</sup>

The cooling potential of urban parks in dry climates can provide long-term relief from the heat to nearby residents. Increasing tree coverage to 30% in neighbourhoods through parks and green corridors has been shown to lower surface temperatures by 7-10°C.<sup>17</sup>

This simple measure has been associated with preventing a significant portion of premature deaths caused by heat stress, underscoring the life-saving potential of urban afforestation efforts.<sup>18</sup>

In essence, afforestation emerges as the most cost-efficient method to enhance outdoor environmental

conditions, offering tangible benefits for public health and well-being. As societies strive to cool down their cities and mitigate the impacts of climate change, investing in urban afforestation is a clear and compelling solution.

### Maximizing the benefits of urban greenery

Urban afforestation in arid regions offers more than just shade and beauty – it provides vital ecosystem services that contribute to overall environmental health.

As tree cover reaches a critical mass, it begins to regulate the water cycle, absorb air pollutants and remove carbon from the atmosphere, positively impacting macroclimatic conditions.

The success of urban tree planting relies on various factors, especially their integration into the wider ecosystem. Careful consideration of biodiversity outcomes and ecosystem design factors is essential when planning and implementing urban afforestation programmes, ensuring the intervention’s functionality and the full realization of its benefits.

In the battle against desertification, trees also play a crucial role by enriching the soil with nitrogen through their roots, promoting the growth of essential microbes and fungi that keep the soil healthy and fertile.

Innovative ecosystem design practices, such as the [Miyawaki method](#), capitalize on symbiotic relationships between native species, reducing maintenance requirements and amplifying biodiversity and carbon sequestration potential, especially in water-scarce areas. Moreover, increasing permeable surfaces can mitigate flooding risks, as demonstrated by the Sponge City concept, pioneered in Chinese cities and applied worldwide.<sup>19</sup>

By redirecting water runoff to underground storage systems through nature-based solutions, cities like Baicheng, Qian’an, Jiann and Xixian have already made significant strides towards water absorption targets.

Over time, these rainwater management systems will alleviate the burden on irrigation systems, benefiting public parks and afforested areas alike.

### Nature-positive cities for a sustainable future

A precise understanding of the environmental, social and economic impact of large-scale afforestation projects, like the Green Riyadh initiative, is crucial for a transparent accounting of its benefits. Only then can cities certify their progress in achieving net-zero and nature-positive goals and targets.



3

# Urban sprawl and the nature opportunity of compact cities



Martín Anzellini

Director, Urban Projects, ProBogota



Cha-ly Koh

Chief Executive Officer, Urbanmetry

Resource consumption by cities is projected to grow to 90 billion tonnes by 2050.

Urban growth and expansion are defining trends of the 21st century, particularly pronounced in the developing world and emerging economies. Doubling populations and increasing numbers of people experiencing poverty and with no access to formal housing are just a few examples of the damage sprawl can wreak. When development grows unchecked, those without resources must live further and further away from a city centre.

### The nature impact of urban growth and expansion

Urban expansion can have an especially dire impact on nature and biodiversity as extended infrastructure encroaches on agricultural land, forests, water bodies and other floodable areas. Land conversions to accommodate new urban spaces are expected to be an increasingly

prominent driver of habitat and biodiversity loss. Spatially explicit projections of urban expansion combined with data on habitat and terrestrial biodiversity show that future urban expansion will lead to 11-33 million hectares of natural habitat loss by 2100.<sup>20</sup>

On the other hand, the impact of urban growth on nature is not only addressed from a expansive or spatial point of view, but also has to do with the increased consumption of resources as a consequence of population growth. Currently, about 70-75% of total global natural resources are consumed within urban areas. Resource consumption by cities is projected to grow from 40 billion tonnes in 2010 to 90 billion tonnes by 2050 to keep up with urbanization trends, exceeding what the planet can sustainably provide, as detailed in the [Global Resources Outlook 2024](#).

Favela Cosme Velho, Rio de Janeiro, Brazil.



“Any planning strategy must be accompanied by sound policies that avoid “compact but disposable” cities lacking long-term viability.

While urban population growth is inevitable and one of the most remarkable phenomena of the modern era, it does not necessarily need to result in the unchecked expansion of cities’ spatial footprints. Compact city strategies focusing on sustainable, higher-density and efficient land use can help mitigate the negative impacts of population growth and urban sprawl in nature.

### Matching urban population growth with compact cities

Compact cities are characterized by dense development patterns, well-connected public transport systems, and easy access to local services and employment opportunities. As such, they can provide a suitable alternative to respond to the needs of growing urban areas. Compact cities also lessen the impact on the environment, with shorter intra-urban distances and less automobile dependency.

More holistic compact strategies should be put in place to prevent sprawl and respond sustainably to population growth. Such holistic compact strategies include:

- **Implementing urban growth boundary (UGB) strategies** as seen in cities such as Portland,<sup>21</sup> Melbourne<sup>22</sup> and Bangalore.<sup>23</sup> The purpose of the UGB is to direct urban growth to areas best able to be supplied with appropriate infrastructure and services and protect other valuable peri-urban land and related ecosystem services from urban development pressures.
- **Prioritizing sustainable and affordable housing solutions** over makeshift shelters to ensure long-term liveability. In the city of Kuala Lumpur,<sup>24</sup> the increase in density was permitted with the condition of affordable housing provision.
- **Taxing the increase in land value** resulting from public investments in infrastructure and capturing the value generated by a dynamic increment of building rights to incentivize developments and improvements on existing land rather than building on new land. This mechanism can have great environmental benefits as the money levied can also be invested in increasing the quality of public spaces through afforestation and setting aside land for nature. Forms of land-value tax have been implemented in areas such as Pennsylvania, Kenya, New Zealand, Australia, Denmark, Estonia, Hong Kong, Singapore and Taiwan, China.<sup>25</sup>

- **Implementing inclusionary zoning, rent control and other physical or monetary incentives** to counter-balance the increase in land and housing prices. These policies aim to encourage a more efficient use of land, potentially lowering per-unit land costs and making housing more affordable. In Kuala Lumpur, policies of densification and implementation of transport-oriented developments (TOD). Kuala Lumpur’s [2040 Draft Local Plan](#) has allowed for a 30% incentive for redevelopments in brownfields within 400 metres of transit planning zones. As a result, redevelopment in brownfields urban areas has fulfilled most of the housing demands in the city.
- **Leveraging public-private partnerships** where private investors and landowners exchange their assets by building rights. This allows the city to exchange buildable areas with social housing units and land for developing facilities, public spaces and natural reserves. The Lagos de Torca project in Bogota is a public-private partnership aimed at increasing the number of developments available to accommodate the growing population while doubling the area of wetlands,<sup>26</sup> connecting creeks from the eastern mountains and enhancing greening by planting over 95,000 trees. The project was financed by converting the “right to build” into an asset sold to the private sector while guaranteeing the resources to execute the infrastructure (e.g. water supply).

As cities grow and expand spatially in an unplanned way, the urgency to close the gap in basic services and infrastructure provision will persist. Any planning strategy must be accompanied by sound policies that avoid “compact but disposable” cities lacking long-term viability. Densification strategies must, therefore, be matched with policies that encourage modernization and monitoring of resource consumption, transport systems and permanent control of informal settlements.

Planning for compact cities must also include substantial investment in infrastructure projects within city boundaries, such as improved roads, efficient public transit systems, metropolitan parks, and accessible public facilities and utilities. In concert with these efforts, governments must enhance social services, including education and healthcare, to meet the growing demands.

The pressing need to optimize space calls for a re-imagination of urban design, creating environments where both human and natural life can not only survive but thrive, ensuring sustainable and nature-positive urban futures.



# 2050

is projected to see resource consumption by cities grow from 40 to 90 billion tonnes.



4

# Nature-positive urban waterways: solutions for inequality and climate resilience



**Edmilson Rodrigues**  
Mayor of Belém, City of Belém, Brazil



**Kotchakorn Voraakhom**  
Chief Executive Officer, Landprocess

Globally, more than 40% of the world's population lives within 100 km of a coastline and more than 600 million people (10% of the global population) live at elevations of 10 metres or less above sea level.<sup>27,28</sup> Human civilizations have long relied on waterways for commerce, food and transport.

However, the uncertainty of climate change underscores the need for nature-based interventions to help cities thrive amid changing flood pulses

and adapt to future climate hazards.<sup>29</sup> Some cities are already harnessing their natural endowments to adapt for the future. Through natural systems and sustainable infrastructure, cities can enhance their resilience, protect ecosystems and improve the quality of life for their inhabitants. The following sections outline how two cities, which depend on integrated urban water systems, are advancing essential urban interventions to ensure positive impacts on both people and nature.

↓ Old Town District, City of Belém, Brazil.



“ Addressing scenarios of water-based urbanization is essential for the city’s holistic growth and survival.

### Redeveloping for resilience: water-based urbanism in Bangkok

Bangkok in Thailand, a delta city often referred to as the “City of Three Waters”, faces increased flood vulnerability due to its unique hydro-ecological landscapes shaped by rivers, rainfall and the sea.<sup>30</sup> Despite being an area of naturally flood-prone areas, factors such as heavy urbanization on floodplains and a shift from water-based to land-based development inevitably increase the severity of floods.<sup>31</sup> Additionally, land subsidence and severe coastal erosion from resource extraction, infrastructure load and mangrove deforestation derive in larger impacts and a “sinking city”.<sup>32</sup>

Addressing scenarios of water-based urbanization is essential for the city’s holistic growth and survival. Groundwater management regulations in Thailand from the 1970s, including the 1977 Groundwater Act, initially helped control groundwater use and laid the groundwork for nature-positive action.<sup>33</sup> However, with growing climate challenges, these measures alone are insufficient.

### Beyond policies: implementing blue-green infrastructure

Bangkok has pioneered several blue-green infrastructure and adaptive reuse projects, integrating existing grey infrastructure to enhance nature and the city’s interaction with ecosystem services.

- The [Chulalongkorn Centenary Park](#), for example, was designed to collect a million gallons of rainwater and runoff, handling the same water capacity as public sewage systems. The park improves Bangkok’s poor ranking among Asian megacities for publicly available green space and provides rainwater for use during droughts.
- The [Thammasat University Urban Rooftop Farm](#), the largest urban farming rooftop in Asia, promotes multidimensional sustainability, including renewable energy, food security, flood mitigation and public spaces. Mimicking local cascading rice terraces, it slows runoff and grows food for the campus, creating a circular economy with organic waste elimination and zero-mile plant-based food.
- The [Chao Phraya Sky Park](#) and the [Chong Nonsi Canal Park](#) democratized access to the urban rivers and canals by regenerating the city’s 40-year-old waterfront infrastructure. The parks promote greater interaction between communities and districts, reimagining citizens’ relationships with waterways and reclaiming the city’s ecological identity through the development of canal-side parks and improved connectivity and flows.

### Belém do Pará: a city in a river

The city of Belém do Pará, in Brazil, is a community deeply connected to the riverine ecosystem – culturally and economically. The city is living proof of urban efforts to rehabilitate urban watersheds and, in consequence, reduce inland flooding, enhance soil filtration capacity and ensure socioeconomic benefits such as a reduction in crime rates and improved socioeconomic conditions for citizens.

The city hosts more than 1.5 million inhabitants settled alongside the five rivers that span the city. Over time, urban developments in the riverbanks and watershed lands have been driven by grey interventions and landfilling. As a result, flooding risks have increased and the need to reform infrastructure and improve community engagement with the water systems has become central in Belém’s urban planning.

The local government, in partnership with the Federal Government of Brazil and international cooperation agencies, has begun the implementation of two projects to re-inventing waterfronts and watersheds to recover water quality and enhance the living standards of more than 70% of Belém’s inhabitants:

- The Macrodrainage of the Matafome Basin Program<sup>34</sup> is built upon infrastructure provision, housing replacement and environmental recovery. These are the three indissociable pillars to promote macro-drainage combined with the renaturalization of the stream without channelling its watercourse or paving its bed. Municipality of Belém will oversee the project’s execution, which counts with sovereign guarantee of the national government. The total investment in the programme is \$75 million, of which a regional development bank will finance \$60 million, and \$15 million will be funded by local contribution.
- The Community Urban Agroforestry Park from the Igarapé São Joaquim Masterplan focuses on the renaturalization of the river by highlighting the Amazonian peoples’ relationship with its rivers. It aims to create a space that serves as both a meeting point and a place for nature preservation, encouraging meaningful interaction between people and the urban river.

### Advancing nature-positive waterfront redevelopments

The combination of policies, ecology and landscape architecture is a key element of water-based urbanism. A key to success from Belém and Bangkok has been building strong public-private-community partnerships to complement government initiatives and realize this critical yet achievable transition to cities in harmony with nature and their rivers.



1.5 million

inhabitants have settled alongside the five rivers that span Belém do Pará.



5

# Green segways for nature-positive living: shaping nature-based urban mobility



Federico Cartín Arteaga

Founder and Director General, Rutas Naturbanas



Heather Thompson

Chief Executive Officer, Institute for Transportation and Development Policy

## Bringing nature into city spatial planning

By viewing parks, green roofs, waterways and street trees as a cohesive network, cities can maximize the ecological, social and economic benefits that nature provides. Connectivity through green corridors is a win-win – good for nature and good for active mobility – and should be the backbone for nature-positive urban planning.

Water bodies are key urban corridors to plan around. Shared-use paths designed along river systems and other water bodies can maximize social and environmental benefits by either regenerating surrounding ecosystems to provide open and accessible space for people and wildlife and as natural protection.

## Nature-positive urban solutions: systems and nodes

The fields of forestry, ecology, biodiversity and urban planning are rooted in the understanding that complex, interrelated systems are built from nodes of activity linked together.

**Nodes** act as hubs where people connect to one another and to nature, such as a community park. When joined with other spaces by green corridors, this network of nodes supports a much larger **system** that unites the fundamentals of urban and ecological design. These structures act as sites for ecosystem services, community engagement and well-being.

↓ Source: Rutas Naturbanas Foundation.



“ Integrating nature in the built environment means adapting policies, identifying co-benefits, encouraging stakeholder participation and staging the interventions.

**Regenerating mobility with nature**

[Rutas Naturbanas](#) is a citizen-led urban planning solution developed and introduced in the metropolitan region of San José to address riverbank ecosystem regeneration. Riverbanks in Costa Rica are private property, and Rutas Naturbanas requires the coordination of numerous independent property owners and multiple private sector organizations to create 40 km of nature paths. The project has incorporated nature into all steps of planning and design, including:

- Using low-impact construction methods
- Incorporating native flora to create a resilient habitat that provides food and shelter to local fauna and that improves soil quality
- Developing structures that limit floods, water runoff and landslides

The rivers that traverse the capital region pose flooding, landslide threats and connection and mobility challenges for citizens and local fauna as river crossings are limited.

Infrastructure was developed around independent micro-ecosystems across the city, such as parks, schools, lot balances and existing pedestrian boulevards. The planning and design were conducted closely with residents and other stakeholders, incorporating citizen awareness strategies into the process and promoting public-private partnerships with developers as well as working closely with the local government to adapt policies.

**Greener mobility: the case of Guangzhou, China**

China introduced its *Action Plan for Green Mobility in 2020* to guide cities nationwide in adopting strategies that promote public transport, walking and cycling while reducing emissions and private vehicle use.<sup>35</sup>

The Institute for Transportation and Development Policy (ITDP) has been supporting the southern city of Guangzhou, home to 15 million people, in implementing infrastructure that prioritizes greener mobility with pedestrian and cycling-friendly greenways, parks and open space to better connect its public transport and bus systems with accessible and sustainable streets while also providing space for better water and flood management.

The city has now built more than 600 km of greenways and lanes for walking or cycling, many

of which include natural measures like native landscaping, grass-planting ditches, and stone and rain irrigation gardens.<sup>36</sup> The city's greenways have also provided new social and environmental facilities that connect with the city's famed Pearl River, helping enhance the mobility of both local people and wildlife. According to ITDP's research, Guangzhou's networks of safer, greener infrastructure – particularly protected lanes for cyclists – can help prevent about 16,000 tonnes of carbon dioxide equivalent (tCO<sub>2</sub>e) emissions per year from driving. This would be equivalent to the amount of carbon that could be sequestered by planting 300-400,000 new trees every year.

**Key considerations for cities seeking to strategically integrate nature into the built environment**

Integrating nature in the built environment means adapting policies, identifying co-benefits, encouraging stakeholder participation and staging the interventions. A successful approach to urban green corridors includes:

- **Building robust frameworks for integrating and regenerating nature with planning:** When planning for the spatial integration of nature in an urban context, policies and guidelines should require a biological approach to development, regeneration and inclusion across the city.
- **Promoting nature in tandem with mobility corridors:** To support both human mobility and wildlife connectivity, cities need to design built environments and active mobility corridors that integrate blue-green infrastructure.
- **Promoting the use of interdisciplinary and participatory planning approaches:** To shape the city's political agenda, communities and formal grassroots organizations can use collective action to inform interventions.
- **Demonstrating economic benefits to bolster private sector investment:** Rutas Naturbanas estimated a significant economic impact (approximately \$317 million) for real estate developers.

Nature-centric spatial planning is essential for promoting mobility networks that serve nature and people's needs. By requiring careful evaluation of design impacts, enhancement of surrounding areas and effective management of natural capital, cities ensure a sustainable, healthy and prosperous future.



6

# Beyond concrete: the building blocks of nature-positive cities



**Arjun Dhawan**  
Executive Vice-Chairman, HCC



**Nollaig Forrest**  
Chief Sustainability Officer, Holcim

### Gearing up for rapid urban transformation

Building cities in harmony with nature is a universal desire. The world will add the equivalent of New York City’s building stock every month for the next 40 years, the construction sector needs to conserve resources and build better with less.<sup>37</sup> This means ensuring cities reduce and avoid harm to nature and invest in a regenerative future.

To ensure that urbanization does not further contribute to nature loss and supports biodiversity restoration, the private sector must commit to reducing resource demand through circularity practices and contributing to nature restoration. This shift will be possible through public and private

sector alignment with a nature-positive vision throughout the construction value chain.

### Business perspective: providing scalable and ready-to-implement solutions

Businesses have an active role to play in advancing a low-carbon economy and providing solutions for nature. There is a significant opportunity for the construction sector to make more positive contributions to nature through increasing circularity practices. Construction and demolition waste can be reused as aggregate, backfill materials and in other valuable applications. Leading companies have shown that this is possible through a “3 R approach”: reduce, recycle, regenerate.

↓ Kanyon Shopping Center, Istanbul, Türkiye.



“ To reap the benefits of a circular economy, policies must be adapted to enable greater collaboration across the value change.

To **reduce** the sector’s biodiversity footprint, construction companies are limiting their total use of natural resources through well-thought-out designs, reducing packing waste, and minimizing construction errors.

- Holcim develops and deploys low-carbon building materials that reduce the embodied emissions associated with the construction phase, as well as several energy efficiency practices that reduce buildings’ operational emissions.<sup>38</sup>
- HCC’s invested in an assembly setup under the standardization and modular design techniques for its Mumbai Coastal Road Project. This approach will be replicated for future projects, thereby saving fuel and material costs beyond the project’s tenure. Technology and innovative design further resulted in the “Network Arch” bridge structure using 15% less steel and less execution time.

To **recycle** materials and keep them in the construction loop, companies are pioneering solutions and innovations to advance circular construction to build better with less and new from old.

- [ECOCycle®](#) is Holcim’s circular technology platform that recycles construction demolition materials into new building solutions. This technology enables the recycling of 10-100% of construction demolition materials across a wide range of applications, bringing them back into the market and allowing for a considerable reduction in resource consumption.
- HCC’s construction practices limit the use of water, reusing available water where possible and limiting further groundwater extraction. These efforts are part of the UN’s [CEO Water Mandate](#), which mandates the use of quality monitoring and wastewater treatment by signatories.

To **regenerate** ecosystems and bring more nature into cities, companies are embedding the development of nature-positive solutions into their research and development activities and across their portfolios.

- [Bioactive concrete](#), developed by Holcim integrates dense and porous concrete to create a structure on which artificial reefs can develop.<sup>39</sup> It can also help to restore fragile marine ecosystems.
- Monopile technology, implemented by HCC for its Mumbai Coastal Road project, uses a single column in the seabed to support the equivalent load of multiple traditional pile structures – thereby reducing the impact on native flora and fauna, saving construction time and lowering the carbon footprint.

## Actions companies can take to become more nature-positive

As companies fully commit to this vision, four feasible early contributions from the private sector can be clearly articulated:

- 1 Conduct targeted research and development efforts to develop building materials that are more eco-friendly, including [ECOPact](#) and [Hydromedia](#).
- 2 Adopt global construction and material use standards such as the UN’s [CEO Water Mandate](#).
- 3 Develop circular economy practices to enable the reuse of limited materials and limit waste production.
- 4 Understand and account for the status and protection of local and flora in development initiatives.

## Government perspective: addressing demand signals and policy bottlenecks

Local governments must join the transition by putting in place the necessary enabling policy regimes and supporting infrastructure to expand the adoption and use of recycled materials.

Some governments are already stepping up support. Zurich, for example, requires that all publicly owned buildings be made using concrete with 25% recycled materials,<sup>40</sup> and ReLondon (a partnership between the London mayorality and boroughs) is working to reduce annual consumption of primary raw materials by 20% in new constructions.<sup>41</sup>

To reap the benefits of a circular economy, policies must be adapted to enable greater collaboration across the value change, from improving demand and supply signalling to investing in public procurement systems and education to scale the impact.

Three contributions public stakeholders can make towards a more nature-positive built environment include:

- Evolving building norms and specifying circular solutions in projects
- Supporting industry innovators
- Incorporating sustainable solutions into standard building practices

With sound and committed action plans from both public and private sectors to advance regulations and standards that support nature protection and encourage greater resource efficiency, cities will rapidly advance in their transition towards a net-zero nature-positive future – one where urban development does not come at the expense of nature.



7

# Nature first: a city identity grown to last



**Esther An**

Chair, Corporate Advisory Board,  
World Green Building Council



**Jaime Pumarejo**

Former Mayor of Barranquilla,  
Colombia (2020-2023)

## Nature-first master planning

In rapidly developing cities, master planning is essential for incorporating nature into the urban layout. Two cities, Singapore and Barranquilla, exemplify the benefits of incorporating nature into city infrastructure, particularly with regard to climate hazard resilience, citizen health and socioeconomic development.

## How the city-state of Singapore became the world leader in solutions

Launched in 2021, Singapore's "City in Nature" vision is a plan to create a green and liveable urban space by 2030. It includes restoring nature in the built environment, expanding the city's parks and strengthening the connection between green spaces. However, delivering on this promise requires strong collaboration across the public and private sectors.

↓ Aerial view of Marina South in Singapore.

Source: Eco-Business.





To date, Singapore has preserved 7,800 hectares of green space, with the government looking to extend the network to add an additional 1,000 hectares over the next 10-15 years.<sup>42</sup> The city has created green spaces using 370 km of park connectors, which has established Singapore as a global leader in urban greening.<sup>43</sup> Singapore's 48% green coverage, with large and well-connected patches, promotes biodiversity, combats urban heat island effects and absorbs rainwater, thereby enhancing resilience to climate change.<sup>44</sup> Permeable surfaces, green roofs, bioswales and water harvesting systems have been developed all across the city to complement park spaces. A notable example is Bishan-Ang Mo Kio Park, a linear park alongside a naturally meandering river, which doubles as a flood control system, showcasing effective integration of nature-based solutions with urban infrastructure.

The city has seen vast improvements in air quality and ecological resurgence with the successful planting of half a million trees since 2020. The [OneMillionTrees movement](#) seeks to enhance urban greenery and biodiversity by increasing the number

of trees planted throughout Singapore, including streetscapes, gardens, parks and park connectors, nature reserves and parks, and more.

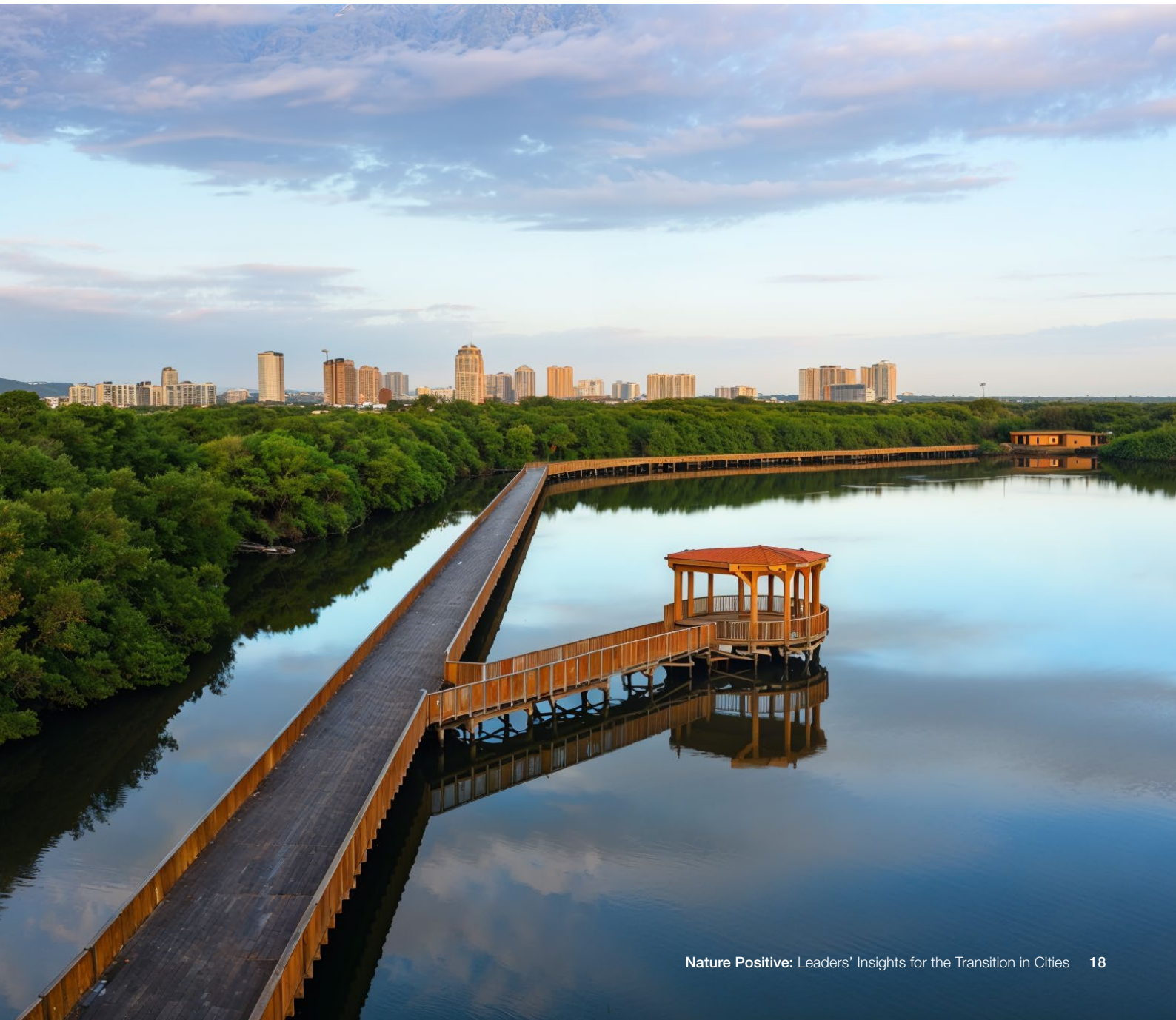
### **Barranquilla pioneering BiodiverCity**

Barranquilla, Colombia, recorded a 45% increase in GDP between 2011 and 2021. Economic growth has been paired with an increase in access to public healthcare, more public green space and high-quality infrastructure.

An anchoring master plan, the [Gran Malecón project](#), was set out in 2017 to develop community and green spaces alongside the Magdalena River.<sup>45</sup> The intervention has been vital for rejuvenating engagement in areas that were previously hotspots for criminal activity. The award-winning programme has now evolved to incorporate larger green projects. Such is the case of the 650-hectare eco-park Ciénaga de Mallorca, which serves as the new centrepiece of the city's transition to a greener future while empowering neighbouring local communities through ecotourism and economic opportunities.

↓ Mallorca Ecopark, Barranquilla, Colombia.

Source: Gabriel Eisenband.







1.9 million

m<sup>2</sup> of public space  
in the city have been  
recovered.

↓ Oriental Pied Hornbill.

Source: Singapore  
National Parks Board.

The riverfront project and master plan were combined with [Todos al Parque](#), an initiative that developed sports fields, introduced green areas and appointed park rangers to manage and maintain green spaces.<sup>46</sup> Since the start of the programme, more than 1.9 million m<sup>2</sup> of public space in the city have been recovered.

Barranquilla's priority approach has been responding to space constraints and directing population growth outside ecologically valuable spaces. This means balancing economic needs, infrastructure and green areas amid land scarcity. Integrating nature within dense urban environments requires innovative solutions and the buy-in of local populations to address pressing challenges through targeted solutions.

#### Private sector collaboration and leading innovation

Leading global real estate developers in Singapore have contributed to shaping the densely populated urban landscape by integrating sustainable practices and innovative green solutions. These efforts support Singapore's national vision and regulatory mechanisms to promote a nature-positive urban environment. City Developments Limited (CDL) was the first South-East Asian corporation to establish net-zero targets aligned with the World Green Building Council and continues to update its biodiversity policy to reflect the interconnectedness of land and marine ecosystems.

The Tree House Condominium, designed by CDL, is a 24-storey green wall that holds the Guinness World Record holder for the largest vertical green wall.<sup>47</sup> The building is designed to reduce interior temperatures by up to 3°C through an innovative use of nature.<sup>48</sup> Prior to construction beginning, Companies in Singapore are encouraged to conduct biodiversity impact assessments on greenfield sites near natural habitats and to incorporate measures to mitigate the impact and reintroduce native species. Through this process, flagship projects identified 99 native animal species and 32 plant species and guided landscaping to support local biodiversity.<sup>49</sup>

Similarly, in Barranquilla, the private sector has been key in the city's green transformation through its collaboration with local administrations and developers. By aligning investments with the city's strategic vision, developers have been actively involved in creating subsidized housing and, occasionally, building new green spaces. This virtuous cycle has ensured that parks and green areas are developed under the guidance of the city's parks programme, encouraging urban rejuvenation. Additionally, the increased property values resulting from these improvements have been effectively captured and reinvested into further urban development, creating a sustainable model for growth.

Nature-first cities are the cities of the future. Those that successfully harness the skills and capabilities of the private sector to better incorporate nature into the city's blueprint for operations.



8

# Cultivating resilience: San Francisco’s pledge to nature and community



London Breed  
Mayor of San Francisco, USA



Mark Watts  
Executive Director, C40 Cities  
Climate Leadership Group

San Francisco is home to a unique and iconic natural heritage that attracts people worldwide. The parks, natural areas and open spaces host hundreds of species in a diversity of ecosystems, contributing significantly to the city’s urban biodiversity. These include Indigenous plants and animals found nowhere else, such as the Franciscan Manzanita and Mission Blue Butterfly.

However, ongoing climate change and biodiversity loss threaten the health and well-being of the planet and cities, making preserving urban biodiversity crucial.

Thankfully, San Francisco is poised to cultivate resilience for people and nature today and for future generations. By empowering people and building partnerships to promote, enjoy and restore nature in every community, the city can strengthen its ecological health and resilience to climate change.

Through the coalition [Reimagining San Francisco](#), its [C40 Urban Nature Accelerator](#) commitments – a global initiative to support and scale innovative climate solutions integrating nature into urban environments – and a new pledge with the [1t.org US pledge](#) – a platform to help governments and organizations improve the quality and ambition of

forest conservation and ecological restoration – the city is more committed than ever to collaborating with community-based organizations, non-profits and educational institutions to enhance San Francisco as a city where people and nature thrive together.

### C40 Urban Nature Accelerator

Among leading peer cities in the C40 Urban Nature Accelerator, San Francisco stands out for its civic engagement in urban nature regeneration.

The city is delivering on Urban Nature Accelerator pathways by increasing the total cover of quality green spaces and ensuring that these spaces are equitably distributed.

In 2017, San Francisco became the first city where every resident was within a 10-minute walk of open park space, aligning with the 15-minute city concept.<sup>51</sup> At the UN Biodiversity Conference (COP15) in Montreal, Canada, San Francisco shared and workshopped with other C40 city peers to further disseminate knowledge about these successes and challenges. C40 anticipates continued city-to-city collaboration at COP16 in 2024 in Cali, Colombia.

↓ Golden Gate Bridge, San Francisco, USA.





“ The goal is for all San Franciscans to experience nature daily and help steward the city’s natural heritage, restoring its biodiverse, climate-resilient ecosystems throughout natural and built environments.

### Nature-based climate resilience

Nature serves as a vital buffer protecting San Franciscans and city infrastructure from extreme heat, flooding, drought, sea-level rise and storms. San Francisco was built for its temperate coastal climate, making it particularly vulnerable to extreme heat. The buildings and related infrastructure need to be better adapted to increasing temperatures.

Global warming will raise sea levels around the San Francisco Bay by three to six feet or more by the end of this century.<sup>52</sup> Coupled with more extreme weather patterns, approximately 4 square miles of San Francisco land are at risk of temporary or permanent flooding, affecting over 37,000 people, 170,000 jobs and essential infrastructure.<sup>53</sup>

Numerous studies have shown clear evidence of the mental and physical benefits of spending time in natural environments. During the pandemic, when indoor gatherings were restricted, access to green spaces was crucial for community health and resilience. A robust network of healthy ecosystems is essential for physical protection and resilience and for maintaining the city’s urban biodiversity.

### Leading biodiversity policies and initiatives

Beginning in the 1980s with regulations to protect wildlife in city parks and the Environmental Protection Element of the General Plan, the city has progressively implemented policies and initiatives to conserve natural resources, restore ecosystems and educate the public.

Since 2006, the city has been implementing the Recreation and Park Department’s [Natural Resource Areas Management Plan](#) by restoring habitat across 32 natural areas, including creek and lake ecosystems in the city’s major parks.

In 2017 and 2018, the Environment Commission and Board of Supervisors passed resolutions that adopted citywide biodiversity goals and a biodiverse city vision. The [2017 Citywide Biodiversity Goals](#) include:

- Restore and maintain biologically rich ecosystems.
- Create equitable access to nature for all residents, workers and visitors.
- Empower people and develop community partnership to promote ecological stewardship.
- Incorporate biodiverse, purposeful greening into ecological planning and design.
- Leverage natural ecosystems to create resilience in a living city.

The [2023 Biodiversity Guidelines](#) mandate that municipal construction projects support the

city’s biodiversity goals. In 2023, San Francisco secured \$12 million from the Inflation Reduction Act to plant 3,500 street trees, enhance canopy cover in parks in communities and support our City Street Tree Nursery and its workforce development initiative.<sup>54</sup>

The Port of San Francisco just completed the restoration of the living shoreline in an environmentally just community where local youth can now participate and be trained in ecological stewardship.<sup>55</sup>

Plans include installing native plant gardens at public housing and daylighting creeks. These various policy implementations reflect a collaborative, multifaceted approach to integrating biodiversity considerations into urban planning and projects and creating a sustainable environment for future generations.

### Commitments to fostering nature and community

The City of San Francisco’s 1t.org pledge and C40 commitments are part of global, national and citywide alliances committed to enhancing urban ecological health and ensuring equitable access to local nature. The goal is for all San Franciscans to experience nature daily and help steward the city’s natural heritage, restoring its biodiverse, climate-resilient ecosystems throughout natural and built environments.

San Francisco’s [1t.org US pledge](#) includes growing 30,000 street trees to establish a fully stocked street tree network, ensure equitable nature access, and make 30% of the city’s green space biodiverse by 2030. San Francisco intends to amend its Climate Action Plan to include metrics supporting tracking the progress of the 1t.org pledge and C40 commitments. To that end, the 2023 Desired Outcomes of the recently constituted Reimagining San Francisco alliance are measurable objectives that build on the citywide biodiversity goals:

- Ensure 30% of San Francisco is biodiverse green space by 2030.
- Complete a network of biodiverse corridors for local wildlife and people.
- Fully resource natural land management, restoration and stewardship.
- Ensure communities have the resources to steward biodiversity where they live.
- Create a routine to embed biodiverse landscapes in the built environment.

Through this comprehensive vision and pledges to action, San Francisco reaffirms its commitment to a future where nature and urban life harmoniously coexist. By enhancing biodiversity, ensuring equitable access to natural spaces and bolstering community engagement, San Francisco sets a transformative example for urban sustainability.



**\$12 million**

was secured by San Francisco in 2023 to plant 3,500 street trees.

9

# Innovative multistakeholder finance for nature-based urban resilience in Africa



Marie Lam-Frendo  
Chief Strategy Officer, Meridiam



H.E. Cyril Xaba  
Mayor of Durban, South Africa

### The importance of urban resilience in rapidly growing cities

Cities are growing rapidly, and as they continue to grow, they often sprawl out of the old city boundaries into nature. Traditional infrastructure is often challenged to keep with this pattern, and as such, new infrastructure is required to meet the needs of the communities while respecting and protecting the natural environment and preparing for climate change and the increased frequency of natural disasters.

Durban, also known as eThekweni Municipality, is the second largest city in South Africa. It is home to 4.1 million people and has over 4,000 km of rivers

and almost 100 km of coastline. The city is facing profound development challenges due to unsteady energy supply, migration and informal settlements, and the impacts of climate change. In this context, social development priorities often hinder the environmental agendas and budget allocation for nature-related interventions that can have resilience dividends in the medium and long term.

In 2021, a new fund for urban resilience has been created to respond to urban challenges like Durban's and address and support the development and financing of resilience – more specifically, water and sanitation, solid waste, transport and social infrastructure projects that promote urban resilience in both Europe and Africa.<sup>56</sup>

↓ Durban's Waterfront, South Africa.





“ Only a small number of adaptation projects have attracted private-sector investment due to their limited bankability.

## Financing urban resilience

[The Urban Resilience Fund \(TURF\)](#) was initially developed as a public-private partnership between Meridiam, the Rockefeller Foundation, the United Nations Capital Development Fund (UNCDF) and the European Investment Bank. It is, by design, a blended finance fund that aims to support cities in designing and investing in highly impactful, sustainable and resilient urban infrastructure.

The fund's main objective is to develop essential infrastructure, as outlined in city resilience plans, to respond to growing needs. The fund has three windows: a €300 million fund focusing on Africa, a €150 million fund focusing on Europe and a €20 million catalytic fund to help develop projects from an early stage.

The multistakeholder partnership supporting this fund is important for three reasons:

- 1 Coalescence of project finance from multiple players, enabled by private finance and appropriate fund management. Seven development finance institutions (DFIs) and private investors (e.g. pension funds) are involved in equity programmes across the fund.
- 2 Alignment of resilience requirements among all parties to enable the assessment of a project's resilience, from inception through to investment and asset management. Meridiam formed a resilience committee composed of the fund's limited partners to enable this.
- 3 Use of sustainability assessment tools to align project investment strategy of creating resilient and sustainable cities. The assessment tools, including SIMPL (Sustainable Impact Measurement Platform) were developed in partnership with third parties.

## Preparing the ground: modelling risk and prioritizing action

A key enabler of urban resilience is data management and monitoring. Durban, in South Africa, is a city recognized for its pioneering analytic tools, such as the [GreenBook MetroView](#), which enables the city to predict climate risk through the Climate Risk Profile Tool and act upon the risk with the appropriate policy through the Climate Actions Tool.

The Climate Risk Profile Tool demonstrates the risk levels of different regions of the municipality for major hazards (e.g. fire, inland and coastal flooding, drought and extreme heat). The Climate Actions Tool then defines critical actions and policies for cities to implement across a range of sectors, from governance and food security to transport and health.

The tool is valuable in estimating the impact of natural risks and hazards to enable Durban to appropriately prepare for short-term challenges and develop action plans and strategies to mitigate future problems. However, modelling and prioritization of actions is not enough when it comes to securing urban resilience in the long run.

## Building project bankability

Securing funding for mitigation and adaptation projects is crucial in bolstering resilience for cities facing the immediate impacts of climate change. Unfortunately, only a small number of these projects have attracted private-sector investment due to their limited bankability. TURF's catalytic fund aims to embed bankability into project design, making these initiatives more attractive to investors.

Cities like Durban can make use of existing analytical tools and draw lessons from cities like Nouakchott, the capital of Mauritania, which has successfully navigated the complex pathway of resilience implementation and funding. Nouakchott is naturally protected by a dune ridge, which serves as a barrier against submersion risks. However, decades of human activity have severely degraded this ridge, leaving the city increasingly vulnerable to rising sea levels, further coastline erosion and flood damage.

To safeguard Nouakchott against these threats while also enhancing the quality of life for its residents through the integration of attractive public spaces into urban planning and mobility schemes, a public-private company was established. This entity, Société d'Aménagement du Littoral de Nouakchott (SALN), jointly owned by TURF B and the Government of Mauritania, will manage the financing, design, construction and operation of an integrated coastal protection and urban development project. This phased project is set to be completed by 2027, with revenue generated from infrastructure use (e.g. rental of new premises, tolls), land leases to developers and an annual government subsidy.

This approach encourages a rethinking of public-private collaboration, promoting new models and structural reforms that prioritize nature-positive interventions at all levels. It also ensures revenue generation for projects that typically struggle with bankability.

Public-private investment funds play a crucial role in the financing landscape for cities. By integrating tools like TURF into city planning, local governments can unlock new opportunities to develop innovative solutions that predict and manage natural disaster risks through the values of existing healthy ecosystems. This is especially impactful in areas with informal development or limited infrastructure, offering hope for a more resilient and nature-positive future.

10

# From Africa to Ecuador: lessons for financing resilient and sustainable urban development



Mauricio Rodas

Former Mayor of Quito, Ecuador (2014-2019)



Sandra Villars

Financial & Risk Partner, Oliver Wyman

As climate change increasingly threatens populated urban areas, cities need to be at the forefront of pioneering sustainable and nature-positive transitions to mitigate environmental challenges. Projects crucial for protecting growing urban

centres from the dangers of climate-related threats are being stymied by a lack of innovative financing solutions that would allow otherwise resource-stretched municipal governments to tackle them.

↓ Quito, Ecuador.





“ Financial institutions not only provide loans but also play major technical oversight and assessment roles.

Local governments in most countries – and particularly in the developing world – have limited fiscal capacity. They are heavily reliant on transfers from national governments as well as revenue they generate from taxes and fees, for which compliance and collection are often problematic. With few exceptions in the developing world, they do not have access to extra capital project funds, such as from the issuance of municipal debt. This financial constraint is a significant challenge, especially considering that urban populations in these nations are growing rapidly, and many face imminent climate-related threats from rising sea levels, flooding and extreme weather events such as droughts. For instance, in Africa, urban populations are expected to nearly triple by 2050, while six of the eight countries most affected by climate change are in Africa.<sup>57</sup>

From complex regulatory bureaucracy to stark inequalities in access to global financial flows, municipalities across the world are navigating a labyrinth of obstacles to secure the necessary funding for these vital climate-related projects. Among the most pernicious of these obstacles is the difficulty in structuring long-term financing agreements that align with the risk appetite and funding capacity of investors. While multilateral development banks are, in principle, able to navigate these challenges, in practice, many must still overcome their limited experience in successfully aligning interests across the stakeholders of large sustainable infrastructure projects to deploy financing at the municipality level.

### The pressures of urbanization

Like many cities in the developing world looking to tackle major infrastructure improvements, the city of Quito, Ecuador's capital, faced daunting challenges when it decided a decade ago to build the first underground rapid transit system in the country. Between 2000 and 2013, the population of Quito – the largest city in Ecuador – expanded by 3.8% per annum, and that expanding population needed a way to move about the city more efficiently and sustainably. At that point, Quito had a network of five bus rapid transit systems, which became insufficient to mobilize a growing population.

In many countries around the world, cities face several obstacles when trying to access finance. Some are banned from international borrowing altogether, while others require a national government's sovereign guarantee, which is often not granted due to political rivalries. Quito's case was not that different initially, but public opinion support finally helped to make the project possible.

The popular Quito Metro Line One project went forward and is now 22.5 km long and serves 15 stations. The all-electric underground line can provide as many as 400,000 rides a year and forms

the backbone of Quito's public transport system by connecting the bus rapid transit corridors and conventional bus networks. The metro's construction generated 5,000 direct and 15,000 indirect jobs, and part of its mission is to enhance access to employment, with around 760,000 jobs within its area of influence. The metro has cut the commute from the northern part of the city to the southern part to a little over half an hour, a saving of almost an hour for transit riders and half an hour for those who use private cars.

### How Quito surmounted the hurdles

The total cost of the project was \$2 billion, and unlike many developing world cities, Quito was able to assemble an innovative package of finance through the World Bank, the Inter-American Development Bank, the Development Bank of Latin America and the Caribbean and the European Investment Bank.

One key to success was the active participation of the financial institutions involved, which the city government supported with great commitment. They not only provided loans but also played major technical oversight and assessment roles. This participation made a considerable difference because the regulations governing the project mandated by the financial institutions themselves were much stricter than what was required by national law, which made the project's development more complex, but eventually allowed it to run efficiently, meet higher quality standards and receive international recognition.

### A plus for the city and the environment

The Quito metro modernized the city's transport infrastructure and simultaneously slashed the city's carbon footprint. It already is significantly reducing travel time and traffic congestion, lowering the operational costs of the transport service, enhancing connectivity, security, and comfort, and decreasing emissions of pollutants and greenhouse gases.<sup>58</sup>

The metro also adhered to strict environmental standards. It was the first instance of environmental remediation on gasoline-contaminated aquifers in a major Latin American city. Over one million tonnes of soil from the metro excavation were used to landscape a park, Parque Bicentenario, at Quito's former airport. An old mine was also repurposed into a park using waste materials from the excavation.

The case of Quito offers valuable insights into what's possible when cities are willing to collaborate more closely with multilateral development banks to create financing agreements. The strategy employed by Quito could serve as a blueprint for other budget-stressed municipalities looking to achieve a proverbial paradigm shift in their quest for financing.

# Incheon's solutions to address nature challenges



Yoo Jeong-Bok

Mayor of Incheon Metropolitan City, Republic of Korea

## South Korea's relationship with nature

South Korea is a mountainous country that is very biologically diverse with nearly 38,000 endemic species found across the country's forests through to numerous coastal ecosystems. However, rapid urbanization and industrialization in recent decades, coupled with the introduction of invasive species, and climate change, have placed pressures on ecosystems and biodiversity and sparked the government towards introducing regulation and nature-positive action.<sup>59</sup>

## Environmental challenges in the city of Incheon

Founded in 475 AD, Incheon is a major port city and the third most populous city in South Korea. Incheon sits at the mouth of the Han River, which has been a major hub for imports and has enabled the city to grow its industrial business.<sup>60</sup> The ports and waterways are important sites for the city's industry, but also form an important link to the culture and cuisine of the region, which relies heavily on fish and seafood.

High levels of industrial activity with a heavy reliance on ocean and riverways have created unique challenges for the city. These include addressing fine dust accumulation, flood risks and difficulties in properly managing water. Rapid urbanization across the country has increased air and water pollution, requiring a highly bespoke nature-positive solution to address these challenges.

At present, nature solutions proposed at the national level are well executed through major South Korean cities, creating a great track record for cities like Incheon to increase the adoption of localized policies and nature-based solutions at the sub-national level.

## Incheon's strong system of environmental management

In line with the city's vision and strategy on biodiversity, Incheon has developed and adopted a Natural Environment Conservation Action Plan that aims to expand protected areas, strengthen wildlife protection, and management of natural ecosystems. Key qualities of the plan include:

↓ Songdo Central Park, Incheon, South Korea.





“ The biodiversity action plan has targeted actions to promote citizen awareness and actions that farmers and fishers can adopt to ensure a more sustainable use of biodiversity.

**Strong governance structures:** Incheon has an Environment Bureau composed of seven divisions responsible for environmental and climate policies, landfills, water quality and environmental safety. The city collaborates with various organizations to address the city’s urgent environmental issues and contribute to the development of long-term eco-friendly policies. For example, its collaboration entities include 18 committees, such as the Environmental Policy Committee for stronger citizen governance, the Incheon Sustainable Development Committee and the Health and Environment Research Institute, for research on environmental conservation and to solve the city’s urgent climate challenges and to create long-term eco-friendly policies.

**Policies to increase private sector involvement:** The city’s Natural Environment Conservation Action Plan has an outcome specifically to expand private sector participation by establishing nature conservation efforts and measures. The city is actively pursuing policies that encourage public and private-sector participation in various areas, such as the protection of wildlife, promotion and educational programmes. To solidify opportunity windows for the private sector to engage more closely with the protection and monitoring of the city’s natural values, in April 2021, Incheon designated and announced five flagship species that are symbolically representative of the region’s ecological, geographical and cultural characteristics and are recognized by citizens as important. These flagship species include

the Spotted Seal (mammal), Black-faced Spoonbill (bird), Milky Fiddler Crab (invertebrate), Gold Frog (amphibian) and Vesper Iris (plant).

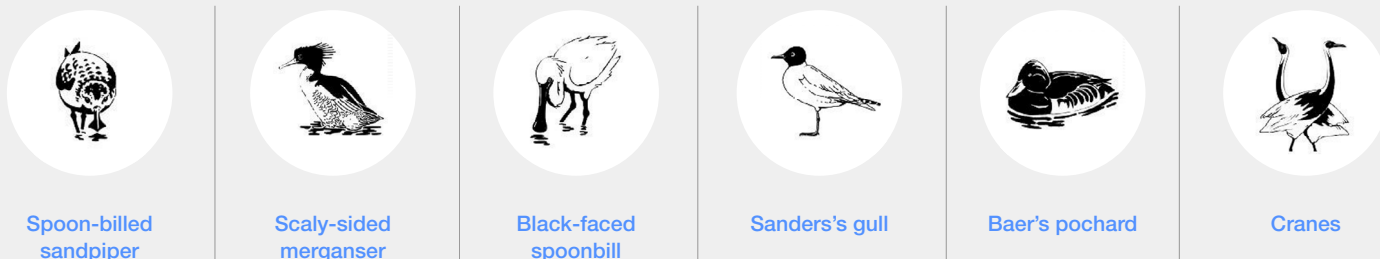
**Citizen engagement:** A key objective of the Nature Environment Conservation Action Plan is to develop and implement nature education programmes, guide training and promote the understanding and management of biodiversity across the city. The city conducts these activities through seminars on conservation in connection with private organizations, for students through nature courses and field trips, and through a civil service training centre programme on natural environments.

Additionally, the biodiversity action plan has targeted actions to promote citizen awareness and actions that farmers and fishers can adopt to ensure a more sustainable use of biodiversity.

**Cities for nature: a safe path for migratory birds**

Incheon is part of the East Asia-Australasian Flyway Partnership (EAAFP), a multistakeholder partnership that was designed to provide a safe migratory path for waterbirds and their habitats. The programme involves 18 countries and locations from Siberia, through the Songdo Tidal Flat in Incheon and down to Australia and New Zealand. The programme supports the transitioning of numerous endangered, vulnerable or near-threatened bird species from shorebirds, cranes and seabirds.

FIGURE 1 East Asia-Australasian Flyway key species



Source: East Asia-Australasian Flyway Partnership

The objective of the partnership is not only to build habitats for migratory birds to rest but to enhance public education, strengthen research and monitoring and strengthen capacity for decision-makers.

The city is also seeking to expand its work on migration paths and habitat conservation by using academic research through a cooperative network devoted to bird conservation.

**Next steps and key actions for the city**

Increasing nature habitats in cities for migratory species is critical, mostly in strategically positioned and densely populated urban areas such as Incheon. The city’s commitment to creating a healthy environment for all forms of life is closely aligned with biodiversity actions taking place at all scales in South Korea.

As the city advances its nature-positive journey, a strengthened focus on enhancing nature infrastructure and adopting measures to protect both waterways and flyways will remain paramount.

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# Endnotes

1. Eurocities, “COP 27: Local governments must be empowered to deliver climate agreement”. <https://eurocities.eu/latest/cop-27-local-governments-must-be-empowered-to-deliver-climate-agreement/>.
2. World Resources Institute. (2023). *RELEASE: Nature Positive Initiative Launches to Promote the Integrity and Implementation of the Global Goal for Nature*. <https://www.wri.org/news/release-nature-positive-initiative-launches-promote-integrity-and-implementation-global-goal>.
3. World Economic Forum. (2022). *BiodiverCities by 2030: Transforming Cities' Relationship with Nature*. [https://www3.weforum.org/docs/WEF\\_BiodiverCities\\_by\\_2030\\_2022.pdf](https://www3.weforum.org/docs/WEF_BiodiverCities_by_2030_2022.pdf).
4. World Economic Forum. (2024). *Nature Positive: Guidelines for the Transition in Cities*. <https://www.weforum.org/publications/nature-positive-cities-guidelines-for-rehabilitating-nature-in-the-urban-era/>.
5. United Nations Department of Economic and Social Affairs. (2018). *68% of the world population projected to live in urban areas by 2050, says UN*. <https://www.un.org/development/desa/en/news/population/2018-revision-of-world-urbanization-prospects.html>.
6. World Economic Forum. (2024). *Nature Positive Cities: Guidelines for rehabilitating nature in the urban era*. [https://www3.weforum.org/docs/WEF\\_NPC\\_Report\\_Consultation\\_2024.pdf](https://www3.weforum.org/docs/WEF_NPC_Report_Consultation_2024.pdf).
7. Jeong-Bok, Y., L. Breed, E. Rodrigues, J. Pumarejo, et al. (2023). *‘5 ways we can promote nature-positive cities’: These Mayors around the world are calling for action*. <https://www.weforum.org/agenda/2023/09/beyond-net-zero-the-rise-of-nature-positive-cities/>.
8. World Economic Forum. (2022). *BiodiverCities by 2030: Transforming Cities' Relationship with Nature*. [https://www3.weforum.org/docs/WEF\\_BiodiverCities\\_by\\_2030\\_2022.pdf](https://www3.weforum.org/docs/WEF_BiodiverCities_by_2030_2022.pdf).
9. Breathelife. (2022). *Barranquilla's Thriving Green and Blue Spaces: Successes in Urban Planning*. <https://breathelife2030.org/news/barranquillas-thriving-green-blue-spaces/>.
10. C40 Cities Climate Leadership Group, Nordic Sustainability. (2019). *Cities100 2019*. [https://www.c40knowledgehub.org/s/article/Cities100-2019?language=en\\_US](https://www.c40knowledgehub.org/s/article/Cities100-2019?language=en_US).
11. C40 Cities. (2021). *Plan de Acción de Cambio Climático de Quito 2020*. [https://88f84eeb-89a2-497e-8780-c82be89d7824.filesusr.com/ugd/b7992f\\_928d8634b9b04c00bc4f284ab70f1e27.pdf](https://88f84eeb-89a2-497e-8780-c82be89d7824.filesusr.com/ugd/b7992f_928d8634b9b04c00bc4f284ab70f1e27.pdf).
12. United Nations Development Programme. (2018). *The Arab cities resilience report*. <https://www.undp.org/sites/g/files/zskgke326/files/migration/arabstates/MainReportScreen-30-46.pdf>.
13. Gill, S., J.F. Handley, R. Ennos and S. Pauleit. (2007). Adapting Cities for Climate Change: The Role of the Green Infrastructure. *Built Environment*, vol. 33, no. 1, pp. 115-133. [https://www.researchgate.net/publication/253064021\\_Adapting\\_Cities\\_for\\_Climate\\_Change\\_The\\_Role\\_of\\_the\\_Green\\_Infrastructure](https://www.researchgate.net/publication/253064021_Adapting_Cities_for_Climate_Change_The_Role_of_the_Green_Infrastructure).
14. UN Habitat. (2018). *Developing Public Space and Land Values in Cities and Neighbourhoods*. <https://unhabitat.org/sites/default/files/download-manager-files/Discussion%20Paper%20-%20Developing%20Public%20Space%20and%20Land%20Values%20in%20Cities%20and%20Neighbourhoods.pdf>.
15. Kim, D. K. (2021). *Afforestation can help to tackle climate change. Here's how*. World Economic Forum. <https://www.weforum.org/agenda/2021/11/afforestation-can-help-tackle-climate-change-heres-how/>.
16. Francini, S., G. Chirici, L. Chiesi, P. Costa, et al. (2024). *Global spatial assessment of potential for new peri-urban forests to combat climate change*. <https://www.nature.com/articles/s44284-024-00049-1>.
17. Wheeler, S. M., Y. Abunnasr, J. Dialesandro, E. Assaf, et al. (2019). Mitigating Urban Heating in Dryland Cities: A Literature Review. *Journal of Planning Literature*, vol. 34, no. 4, pp. 434-446. <https://regionalchange.ucdavis.edu/sites/g/files/dgvnsk986/files/inline-files/Wheeler%20et%20al%202019%20Journal%20of%20Planning%20Literature.pdf>.
18. lungman, T., M. Cirach, F. Marando, E. P. Barboza, et al. (2023). *Cooling cities through urban green infrastructure: a health impact assessment of European cities*. <https://pubmed.ncbi.nlm.nih.gov/36736334/>.
19. R. Schiffman. (2024). *He's Got a Plan for Cities That Flood: Stop Fighting the Water*. The New York Times. <https://www.nytimes.com/2024/03/28/climate/sponge-cities-kongjian-yu.html>.
20. Li, G., C. Fang, Y. Li, Z. Wang, et al. (2022). Global impacts of future urban expansion on terrestrial vertebrate diversity. *Nature Communications*, vol. 13, no. 1, 628. <https://www.nature.com/articles/s41467-022-29324-2>.
21. Oregon Metro. (2023). *Urban growth boundary*. <https://www.oregonmetro.gov/urban-growth-boundary>.
22. Victorian Planning Authority. (n.d.). *Key facts on Melbourne's Urban Growth Boundary*. <https://vpa.vic.gov.au/metropolitan/more-information/urban-growth-boundary-key-facts/>.
23. Venkataraman, M. (2014). Analyzing Urban Growth Boundary Effects in the City of Bengaluru. *Indian Institute of Management Bangalore Research Paper no. 464*. [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=2464946](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2464946).
24. Metropolis. (2019). *Affordable housing: profiles of five metropolitan cities*. <https://www.metropolis.org/sites/default/files/resources/AffordableHousing-5Profiles-EN.pdf>.
25. Wilson, S. (2018). *Land value tax: the least-bad tax*. *MoneyWeek*. <https://moneyweek.com/497288/land-value-tax-the-least-bad-tax>.



26. Government of Colombia. (n.d.). *Lagos de Torca*. <https://www.habitatbogota.gov.co/proyectos-estrategicos/lagos-de-torca>.
27. United Nations. (n.d.). *Percentage of Total Population Living in Coastal Areas*. [https://www.un.org/esa/sustdev/natlinfo/indicators/methodology\\_sheets/oceans\\_seas\\_coasts/pop\\_coastal\\_areas.pdf](https://www.un.org/esa/sustdev/natlinfo/indicators/methodology_sheets/oceans_seas_coasts/pop_coastal_areas.pdf).
28. Ibid.
29. da Silva, W. (2017). *Urban floods intensifying, countryside drying up*. <https://www.unsw.edu.au/newsroom/news/2017/08/urban-floods-intensifying--countryside-drying-up>.
30. Thaitakoo, D. and B. P. Mcgrath. (2010). Bangkok liquid perception: Waterscape urbanism in the Chao Phraya river delta and Implications to climate change adaptation. *Community, Environment and Disaster Risk Management*, vol. 2, pp. 35-50. [https://www.researchgate.net/publication/235321170\\_Bangkok\\_liquid\\_perception\\_Waterscape\\_urbanism\\_in\\_the\\_Chao\\_Phraya\\_river\\_delta\\_and\\_Implications\\_to\\_climate\\_change\\_adaptation](https://www.researchgate.net/publication/235321170_Bangkok_liquid_perception_Waterscape_urbanism_in_the_Chao_Phraya_river_delta_and_Implications_to_climate_change_adaptation).
31. Chen, W., W. Wang, G. Huang, Z. Wang, et al. (2021). The capacity of grey infrastructure in urban flood management: A comprehensive analysis of grey infrastructure and the green-grey approach. *International Journal of Disaster Risk Reduction*, vol. 54. <https://www.google.com/url?q=https://www.sciencedirect.com/science/article/abs/pii/S221242092100011X&sa=D&source=docs&ust=1721913262311612&usg=AOvVaw2lmrGvl3EN9s7GilyTJjFR>.
32. Stone, M. (2021). *Sinking land and rising seas: the dual crises facing coastal communities*. *National Geographic*. <https://www.nationalgeographic.com/environment/article/sinking-land-rising-seas-dual-crises-facing-coastal-communities>.
33. Thailand Department of Groundwater Resources. (n.d.). *History of Groundwater Development in Thailand*. <https://www.dgr.go.th/en/about/391#:~:text=Groundwater%20Act%20was%20enforced%20to,Act%20became%20enforced%20throughout%20Thailand>
34. Fonplata Development Bank. (2022). *Environmental and social improvement for the main watershed of Belém do Pará – Brazil*. <https://devweb2.fonplata.org/en/news/13-12-2022/environmental-and-social-improvement-main-watershed-belem-do-para-brazil>.
35. International Energy Agency (IEA). (2023). *Action Plan for Green Mobility*. <https://www.iea.org/policies/16901-action-plan-for-green-mobility>.
36. Guangdong-Hong Kong-Macao Greater Bay Area. (2023). *Guangzhou greenway wins international design awards*. [https://www.cnbayarea.org.cn/english/News/content/mpost\\_536454.html](https://www.cnbayarea.org.cn/english/News/content/mpost_536454.html)
37. United Nations. (2021). *UN chief promotes 'enormous' benefits of greener cities*. <https://news.un.org/en/story/2021/10/1101992>.
38. Holcim. (n.d.). *Making Buildings Sustainable*. <https://www.holcim.com/what-we-do/decarbonizing-building/sustainable-buildings-in-use>.
39. Holcim. (2021). *Bioactive Concrete Fully Integrates Nature and the Environment*. <https://www.holcim.com/media/media-releases/bioactive-concrete-fully-integrates-nature-and-built-environment>.
40. Gretler, C. (2021). *How Zurich Blazed a Trail for Recycled Concrete*. Bloomberg. <https://www.bloomberg.com/news/articles/2021-09-27/using-recycled-concrete-for-sustainable-construction>.
41. ReLondon. (n.d.). *Case study – 'Circular Construction In Regenerative Cities' (CIRCult) project*. <https://relondon.gov.uk/resources/case-study-circular-construction-in-regenerative-cities-circuit-project>.
42. SG101. (n.d.). *Green and Blue Spaces*. <https://www.sg101.gov.sg/infrastructure/case-studies/greenandbluespaces/>.
43. Singapore Ministry of National Development. (2022). *Written Answer by Ministry of National Development on future plans for park connector networks and whether PCNs can increase in number and length*. <https://www.mnd.gov.sg/newsroom/parliament-matters/q-as/view/written-answer-by-ministry-of-national-development-on-future-plans-for-park-connector-networks-and-whether-pcns-can-increase-in-number-and-length>.
44. United Nations. (2018). *Towards a Sustainable and Resilient Singapore*. [https://sustainabledevelopment.un.org/content/documents/19439Singapores\\_Voluntary\\_National\\_Review\\_Report\\_v2.pdf](https://sustainabledevelopment.un.org/content/documents/19439Singapores_Voluntary_National_Review_Report_v2.pdf).
45. El Norte. (2024). *Primera piedra marca el inicio de la construcción del Gran Malecón del Suroriente*. <https://elnorte.com.co/index.php/2024/04/09/primera-piedra-marca-el-inicio-de-la-construccion-del-gran-malecon-del-suroriente/>.
46. Maassen, A. (2022). *In Barranquilla, Colombia, Urban Parks Revitalize a Declining City*. World Resources Institute. <https://www.wri.org/insights/barranquilla-colombia-urban-parks-revitalize-declining-city>.
47. City Developments Limited. (2014). *CDL sets world record for largest vertical garden*. <https://www.cdl.com.sg/newsroom/cdl-sets-world-record-for-largest-vertical-garden#:~:text=The%20stunning%2024%2Dstorey%20%2C289,with%20its%20eye%2Dcatching%20facade>.
48. Tan, A. (2016). *The world's largest vertical garden? It's right here in Singapore*. The Straits Times. <https://www.straitstimes.com/singapore/environment/the-worlds-largest-vertical-garden-its-right-here-in-singapore>.
49. Teo, A. and S. Gautama. (2015). *Tree House Condominium: Home with a Green Heart*. CITYGREEN, issue 10: Resilience in Cities. [https://www.nparks.gov.sg/-/media/cuge/ebook/citygreen/cg10/cg10\\_tree\\_house\\_condominium.pdf](https://www.nparks.gov.sg/-/media/cuge/ebook/citygreen/cg10/cg10_tree_house_condominium.pdf).
50. 1t.org. (n.d.). *Pledge by San Francisco Environment Department*. <https://us.1t.org/pledge/sanfrancisco/>.
51. Jones, C. and R. Sutton. (2018). *Why Everyone in San Francisco Lives Within a 10-Minute Walk to a Park*. National Recreation and Park Association (NRPA). <https://www.nrpa.org/blog/why-everyone-in-san-francisco-lives-within-a-10-minute-walk-to-a-park-episode-014/#:~:text=In%20May%202017%2C%20Mayor%20Lee,minute%20walk%20to%20-a%20park>.

52. City and County of San Francisco. (2020). *Sea Level Rise Vulnerability and Consequences Assessment*. [https://sfplanning.s3.amazonaws.com/default/files/plans-and-programs/planning-for-the-city/sea-level-rise/SLRVCA\\_Report\\_Full\\_Report.pdf](https://sfplanning.s3.amazonaws.com/default/files/plans-and-programs/planning-for-the-city/sea-level-rise/SLRVCA_Report_Full_Report.pdf).
53. San Francisco Planning. (n.d.). *Sea Level Rise Adaptation*. <https://sfplanning.org/sea-level-rise-action-plan#:~:text=Coupled%20with%20more%20extreme%20weather.by%20temporary%20or%20permanent%20flooding>.
54. SF.GOV. (2023). *San Francisco Awarded \$12 Million Federal Grant to Plant Thousands of New Street Trees to Fight Climate Change and Provide Green Jobs*. <https://www.sf.gov/news/san-francisco-awarded-12-million-federal-grant-plant-thousands-new-street-trees-fight-climate>.
55. CA.GOV. (n.d.). *San Francisco Bay Living Shorelines Project*. <https://scc.ca.gov/climate-change/climate-ready-program/san-francisco-bay-living-shorelines-project/#:~:text=Project%20Description&text=Habitats%20created%20through%20the%20project,rise%20along%20with%20sea%20levels>.
56. Meridiam. (n.d.). *Our Impact: Sustainable and Resilient Cities of Tomorrow*. <https://www.meridiam.com/assets/sustainable-and-resilient-cities-of-tomorrow/#:~:text=In%202021%2C%20we%20launched%20The.increased%20vulnerability%20to%20climate%20change>.
57. World Economic Forum. (2024). *Quantifying the Impact of Climate Change on Human Health*. [https://www.oliverwyman.com/content/dam/oliver-wyman/v2/publications/2024/jan/quantifying\\_the\\_impact\\_of\\_climate\\_change\\_on\\_human\\_health.pdf](https://www.oliverwyman.com/content/dam/oliver-wyman/v2/publications/2024/jan/quantifying_the_impact_of_climate_change_on_human_health.pdf).
58. Chen, G. and C. F. Jaramillo. (2024). *Transforming urban transport: Lessons from Quito's Metro Line One*. <https://blogs.worldbank.org/en/voices/transforming-urban-transport-lessons-QUITO-metro-line-one>.
59. Convention on Biological Diversity. (n.d.). *Republic of Korea - Country Profile*. <https://www.cbd.int/countries/profile?country=kr>.
60. Eukliadiadas, M. M. (2021). *Incheon Free Economic Zone: A Successful Case of Local Economic Development in South Korea*. Tomorrow.City. <https://www.tomorrow.city/incheon-free-economic-zone-a-successful-example-of-local-economic/>.





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