Chapter 1

THE REGENERATIVE APPROACH AS THE NEXT BOUND OF URBAN DEVELOPMENT

Cities have the potential to achieve both liveability and resilience in a climate-changed and resource-constrained world. This chapter presents key paradigm shifts to creating a regenerative city.

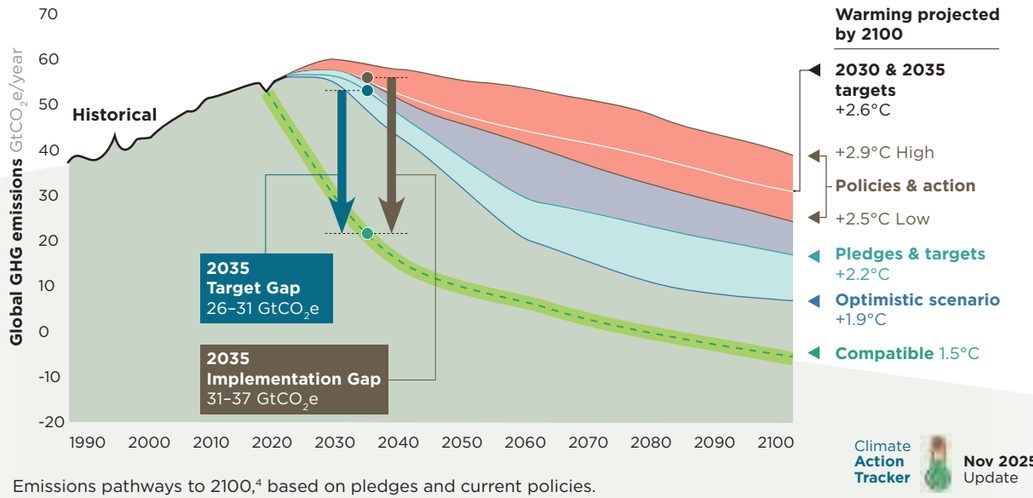
The Parque Lineal Gran Canal (Grand Canal Linear Park) in Mexico City, a once-abandoned sewerage drain that has been transformed into a well-utilised park, is testament to how the city is taking strides in engendering social resilience through environmental regeneration.

Photo courtesy of Onnis Luque

THE REALITY OF CLIMATE CHANGE FOR CITIES

Cities are at the forefront of climate innovation—the places where green technologies, smart systems and sustainable construction methods are actively being implemented. In 2023, the first Global Stocktake, a periodic assessment of the collective progress made towards achieving the goals of the Paris Agreement, recorded near-universal progress on steering climate action in this direction.[1]

Yet, climate data indicates that more can be done. From 2015 to 2025, recorded temperatures continued to reach new highs. In 2025, the Earth's average global surface temperature increased by 1.44°C above pre-industrial levels, while ocean temperatures also hit historic highs.[2] The declining health of our planet is additionally marked by the breach of seven out of nine critical planetary boundaries.[3]



Emissions pathways to 2100,[4] based on pledges and current policies.
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Resilient and Regenerative Cities for a Climate-Changed World

by **WINSTON CHOW**, *Co-Chair of the Intergovernmental Panel on Climate Change (IPCC) Working Group II,* **ELAINE TAN**, *Director of Research at the Centre for Liveable Cities (CLC), and* **ANDY TAN**, *Senior Assistant Director of Research at the CLC*

In this essay, Winston, Elaine and Andy discuss how cities present unique opportunities for innovative climate solutions. Emerging regenerative strategies offer pathways beyond traditional sustainability approaches to actively remove atmospheric carbon through nature-based solutions, low-carbon developments, and circular systems that transform linear consumption into closed-loop processes.

Regenerative urban development transcends conventional sustainability measures by actively enhancing social and ecological systems, by creating pathways for cities to maintain high liveability while strengthening biodiversity, and by ensuring responsible resource stewardship for future generations.

Scan QR code to read the essay.

Cities face the three-pronged challenge of balancing liveability, biodiversity conservation and resource stewardship.
Photo courtesy of Singapore Tourism Board

London, a dense and complex historical city, has managed to continually reinvent itself and remain a highly liveable and integrated metropolis.

Photo courtesy of Colin and Kim Hansen (CC BY-SA 4.0 / Wikimedia Commons)

We are also living in a period of great urban transition. By 2050, nearly 70% of the world's population will live in urban areas.[5]

Considering that key urban functions in cities are responsible for 75% of global energy consumption, they are among the largest contributors to the emissions driving climate change.[6] At the same time, cities are vulnerable to compounded and cascading climate impacts that transcend geographical, sectoral and temporal boundaries.[7]

However, challenges can also be opportunities. As compact urban agglomerations, density in cities allows for the optimisation of resources where urban systems can operate at economies of scale that support coordinated, shared services. When paired with well-integrated transportation systems, density facilitates connectivity. As concentrations of talent and innovation, cities can adopt and scale climate adaptation and mitigation strategies.[8]

The revitalised Chong Nonsi canal in Bangkok shows how green and blue spaces can be integrated into dense urban spaces.

Photo courtesy of Dharmadana (CC BY-SA 4.0 / Wikimedia Commons)

> ...to be less bad is to accept things as they are, to believe that poorly designed, dishonorable, destructive systems are the best humans can do. This is the ultimate failure of the 'be less bad' approach: a failure of the imagination."

WILLIAM MCDONOUGH
Author of Cradle to Cradle: Remaking the Way We Make Things

The Gare Maritime in Brussels is a carbon neutral mixed-use hub repurposed from Europe's largest freight railway station.
Photo courtesy of Nanda Sluijsmans, Flickr

Khoo Teck Puat Hospital in Singapore integrates greenery within the compound, enabling patients and nearby residents to be in close proximity to local flora and fauna.
Photo courtesy of Munhuiyee (CC BY-SA 4.0 / Wikimedia Commons)

Urban farms are growing in popularity globally as a sustainability measure that can strengthen food security and enhance ecosystem services, including climate regulation and stormwater management.
Photo courtesy of Rhododendrites (CC BY-SA 4.0 / Wikimedia Commons)

In recent years, cities have been guided by sustainable development frameworks to address climate change, taking a net-zero approach while setting the path for continuity.[9] Yet, sustainability approaches tend to focus on doing less harm rather than more good, and the current pace of urban development and accelerated growth have already pushed us beyond ecological limits and posed challenges to liveability in many cities. To address the climate crisis and achieve global climate targets, there is a clear need to advance beyond sustainability. Going forward, **how might cities achieve both liveability and resilience goals in a climate-changed and resource-constrained world?**

This publication puts forth a regenerative approach to urban development that combines mitigation and adaptation strategies, going beyond minimising harm to actively doing good.

The regenerative approach demands us to rethink the relationship between urban development and natural systems, where cities are not seen as separate from nature but as integral parts of living ecosystems that are capable of renewal and regeneration. It stresses both mitigation and adaptation, seeking to strengthen cities' resilience by leveraging the synergies between these strategies to take climate action and achieve liveability goals.

OP-ED

TOWARDS THE REGENERATIVE CITY: THE NEXT LEAP FOR URBAN DEVELOPMENT

CHRISNA DU PLESSIS
Professor of Regenerative Futures at the Department of Architecture, University of Pretoria, and co-author of Designing for Hope: Pathways to Regenerative Sustainability

Cities today face a convergence of crises—from climate instability to social fragmentation and resource scarcity—revealing the limits of a sustainability paradigm too often reduced to doing less harm. In an era that has already pushed past several planetary boundaries, this approach is no longer enough. As these limits draw nearer, cities have both the incentive and the responsibility to move beyond neutral ambitions and take a brave leap towards a regenerative future.

The stories we tell about sustainability also shape what we believe is possible. While the dominant narrative that leans on guilt and scarcity imagines a future of inevitable collapse, living systems show that endings also create space for new life. A regenerative narrative reframes the present moment as an opening for deep transformation and it offers an active form of hope, recognising that humans can contribute to the flourishing of life and that cities can become catalysts for co-evolution rather than places of extraction.

Reframing the Story of the Future

At its heart, regenerative development marks a profound shift in worldview. Instead of seeing the city as a machine to be optimised, it invites us to understand urban environments as living systems that are continually adapting and unfolding. Working from this perspective means shifting attention away from merely maintaining existing structures and trying to solve intractable problems. Instead, the focus is on identifying and nurturing potential and cultivating new possibilities. This shift reframes urban development through four key transitions: from reducing harm to generating net-positive value, from negotiating trade-offs to co-creating co-benefits, from human-centred design to mutually supportive human–nature relationships, and from linear resource flows to circular metabolic patterns.

Regeneration emerging through the cracks at Moja Gabedi, a community garden in Hatfield, Pretoria, South Africa. This once-derelict urban wasteland was turned into a healing oasis for human and non-human inhabitants through community co-creation.
Photo courtesy of Chrisna du Plessis

Rethinking Humanity's Ecological Role

A crucial part of this shift involves rethinking humanity's place within the wider ecology. The move from an ego-centred stance, which emphasises dominion over nature, to an eco-centred perspective is already well recognised. Regenerative thinking goes further by embracing the idea of *seva*, or service, which suggests that human activity can actively enhance the capacity of ecosystems to thrive.

Ultimately, regenerative development is anchored in purpose. It is concerned less with meeting efficiency targets and more with nurturing the capacity of living systems to evolve in complexity, diversity and creativity. Regenerative cities are not simply more sustainable or resilient versions of what we already know. They represent a deeper transformation: urban places that heal relationships, nurture life, and unlock human and ecological potential. Just as a caterpillar must relinquish its old form to become a butterfly, cities too must be willing to shed outdated identities and open themselves to new possibilities.

Reconnection and Reciprocity as Catalysts for Transformation

This transformation begins with reconnecting people to place. Living systems offer powerful lessons for how cities can evolve. Regenerative cities pay close attention to the flows, forms and functions that characterise healthy ecosystems. They draw from the deep ecological and cultural identity of place, working with local soils, waters, seasons and communities. Regenerative design encourages people to attune to the local ecologies that sustain them and rediscover their role within the wider web of life. While biophilic design has shown that bringing nature into the built environment enhances human well-being, regeneration demands reciprocity. People must also contribute to the vitality of the ecosystems they inhabit. Many emerging projects already embody this principle by creating buildings and landscapes that enhance biodiversity, purify air and water, and strengthen social-ecological networks.

In time, regenerative cities behave like mature ecosystems. They are grounded in reciprocity and mutual support, and their economic and social systems prioritise net-positive contributions rather than individual gain. From this grounded understanding, it becomes possible to identify leverage points: small, strategic interventions that can set larger systems on a path of positive transformation.

New Life Grows from Broken Places

Embracing regeneration also requires accepting the role of creative destruction. Dysfunctional infrastructures and outdated paradigms must sometimes be allowed to collapse so that their latent potential can be reorganised into more resilient forms. In nature, collapse is not a failure. It is an essential step in renewal. Often, transformation begins at the edges where the old system is loosening—in the neglected spaces of failing infrastructure, storm-damaged neighbourhoods or decaying industrial landscapes. These liminal spaces can become fertile ground for regenerative possibilities to take root and reshape the city from within. With imagination and care, they can become the first places where regenerative possibilities set cities on a bold new path towards a more life-giving urban future.

Cities as Key Drivers of Global Regeneration

Cities are uniquely positioned to lead this shift in thinking. Although they occupy only a small portion of the Earth's surface, their concentration of creativity, resources and influence makes them powerful drivers of global change. Regenerative actions taken at the neighbourhood or district scale can ripple outward to influence regional and even global cycles. By moving beyond the limitations of sustainability and embracing the city as a thriving, living system, it is possible to create urban environments that contribute to the enduring health and well-being of the entire planet. The regenerative approach stands as an invitation to engage with urban spaces as vibrant, co-evolutionary participants in the web of life.

THE GENESIS AND EVOLUTION OF THE REGENERATIVE APPROACH IN URBAN DESIGN

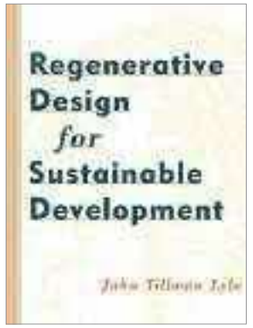
In the 1970s, a new approach to design—one centred on ecological regeneration—emerged. Architects like John T. Lyle envisioned that the ecosystem should ground the relationship between humanity and nature, establishing an ecosystem-centric order to development.[10] Traditionally, indigenous cultures have embraced regenerative agriculture to ensure resource resilience and protect local ecosystems.[11]

The 1980s witnessed a quiet revolution in design thinking that reshaped our relationship with the natural world. Amid rapid industrialisation, architects and planners began synergising development with ecological flows, seeking to create durable and ecologically responsible sites. This led to the idea of biophilia and the proliferation of self-renewing landscapes—concepts adjacent to the regenerative approach and aimed at the conscious design of ecosystems as a whole.[12]

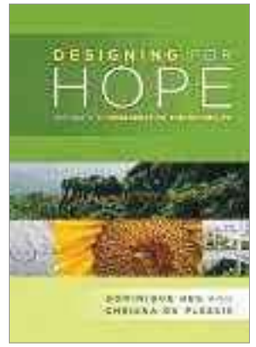
As the foundational principles of regeneration evolved, these theories translated into frameworks for practice. In 1995, theorists Bill Reed and Pamela Mang developed a theoretical foundation for regenerative development. Alongside scholars like Chrisna du Plessis, Herbert Girardet and John Robinson, they advocated for urban development that supports ecological health and continuous improvement of the surrounding environment. Since then, regenerative design has gained traction alongside complexity theories that emphasise interconnectedness across social, economic, environmental and political systems.

> **Regenerative development asks us to consider what does it mean to actually add value to life, … and encourage or participate in evolutionary processes."[13]**
>
> **BILL REED**
> *Principal of Regenesis*

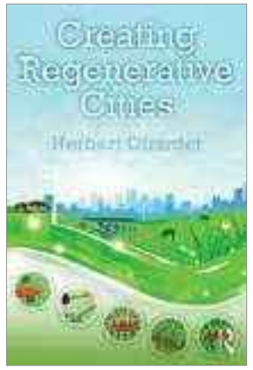
Early books on regenerative urban design



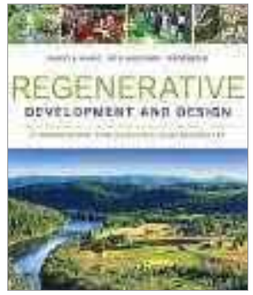
Regenerative Design for Sustainable Development by John T. Lyle, published in 1994



Designing for Hope: Pathways to Regenerative Sustainability by Dominique Hes and Chrisna du Plessis, published in 2014



Creating Regenerative Cities by Herbert Girardet, published in 2014



Regenerative Development and Design: A Framework for Evolving Sustainability by Pamela Mang and Ben Haggard, published in 2016

Shifts from sustainable approaches to regenerative ones.[14]
Image courtesy of Chrisna du Plessis, adapted with permission

At its core, regenerative development seeks to foster co-evolutionary and positive interdependent relationships between human activities and ecological processes.[15]

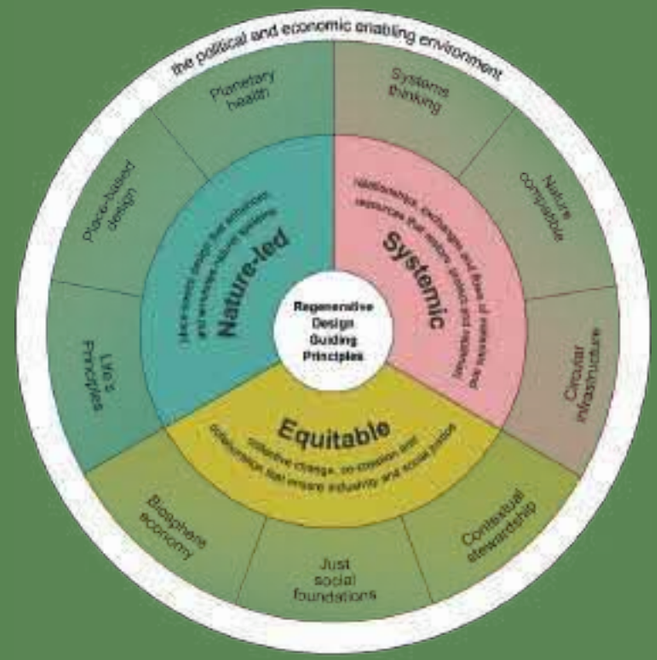
To bring about meaningful change, regenerative design calls for engagement from all agents involved: designers, communities and the built environment itself. With this principle, decision-makers are prompted to re-evaluate their approach to planning and designing cities. Practitioners in the infrastructure and environment sectors are increasingly incorporating nature into design practice, applying integrated systems thinking, and drawing connections across multiple spatial scales, all of which reflect regenerative-aligned principles.[16]

OP-ED

REGENERATIVE DESIGN: ACROSS URBAN SCALES

adapted from an essay published in *Urban Solutions* 27

BREE TREVENA
Australasia Foresight Team Lead, Arup



The Regenerative Design Guiding Principles.
Image courtesy of Arup

Sustainability has shifted from a niche concern to a central priority in the built environment. The World Economic Forum's *Global Risks Report* shows why we need to keep pushing. Over the next decade, most of the top five long-term global risks will be environmental, including extreme weather, biodiversity loss and major disruptions to Earth's systems.

Towards Regenerative Design

Where sustainable or green design aims to reduce harm, regenerative design challenges us to do better by actively improving social and planetary health. Three connected principles can act as a compass to guide this shift, with regenerative designs being 1) nature-led, 2) systemic and 3) equitable.

Nature-led designs are developed with local places and ecosystems in mind. Nature-based solutions often outperform engineered ones, with research showing an average of 50% in cost savings.

Systemic designs look at the relationships, flows and circular systems that can cut embodied emissions by up to 75% while generating economic value.

Equitable designs are created by working collaboratively with communities to ensure inclusive and just outcomes that are supported by clearer pathways for meaningful engagement.

Working Across Scales

Cities are important sites for regenerative ambitions. Operationalising these principles works by recognising how decisions at one urban scale ripple across others.

At the material scale, cement production accounts for around 8% of global CO_2 emissions, with the core ingredient, clinker, responsible for the majority of its impact. By replacing clinker with calcined clay, embodied carbon can be cut by up to 40% while maintaining performance.

At the building scale, workplaces can demonstrate regenerative principles by integrating features like biophilic design, natural ventilation and inclusive planning, which are already achieving notable yet practical regenerative outcomes.

At the neighbourhood scale, cities like Singapore, Mumbai and New York City proudly wear the mantle of “sponge cities”, where natural and naturalised areas help to reduce flooding by design.

As we scale to a city or region, aligning the incentives of stakeholders in the built environment matters. Market mechanisms like stormwater credit trading programmes show how policy and governance can accelerate investment in green infrastructure.

For anyone shaping the built environment—from policymakers and engineers to architects and community partners—by initiating each project with the question, “How can this advance regenerative design?”, we can help to cultivate a more resilient future.

Scan QR code to read the essay.

OP-ED

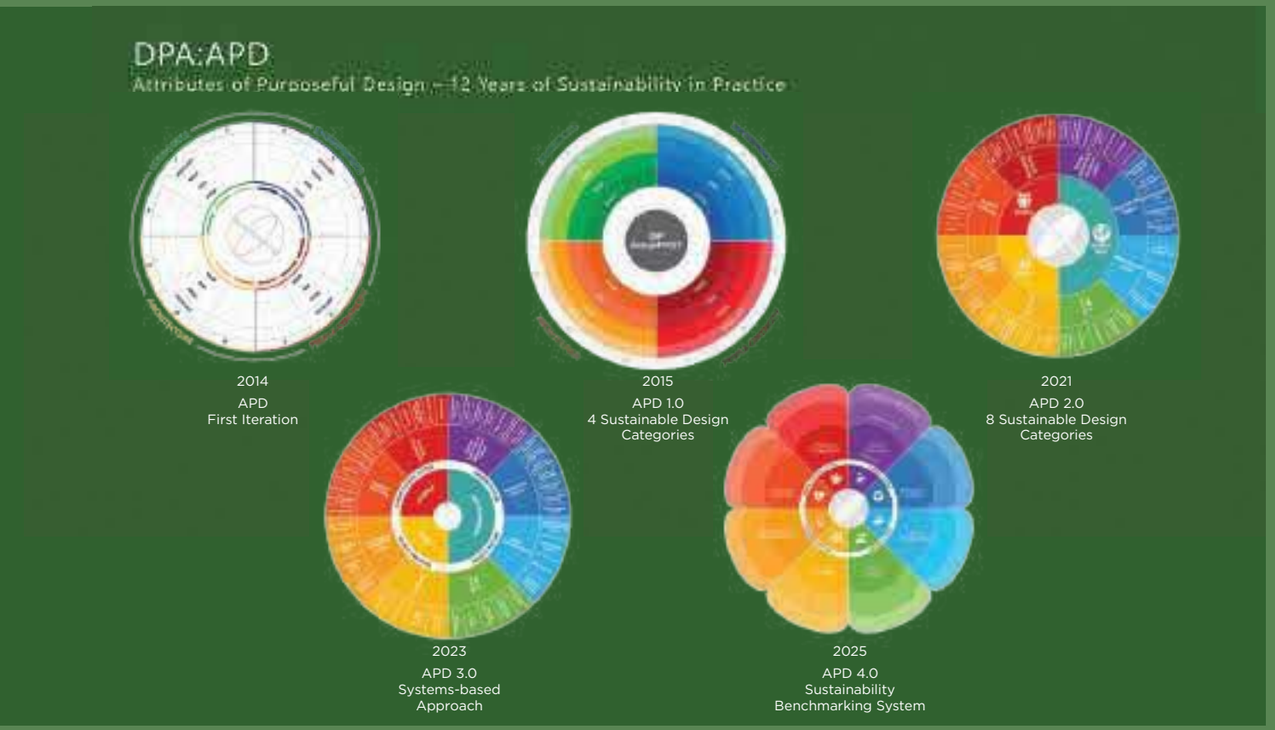
FROM SUSTAINABLE TO REGENERATIVE: BUILDINGS THAT GIVE BACK

ANGELENE CHAN
Executive Chairman, DP Architects

Rising temperatures, breached planetary boundaries and compounded urban risks demand a bold ambition: cities that actively give back. Regenerative urbanism asks not just how we reduce impact, but how we generate better benefits—for people, communities and ecosystems—through design.

Singapore’s dense urban fabric presents both constraints and opportunities. At DP Architects (DPA), we have embraced these opportunities through projects that integrate ecology, community and infrastructure. Bukit Canberra is a case in point. Rather than treating public facilities as isolated components, the development unites sports, healthcare, green and blue spaces, and community programmes within a living, permeable ecosystem. Here, design delivers multiple benefits: supporting health and social well-being, enabling active mobility, enhancing biodiversity and strengthening the human-nature connection within an urban setting.

At Bukit Canberra, a porous and connected design engenders a sense of community.
Photo by Jerome Teo, courtesy of DP Architects



The evolution of DP's Attributes of Purposeful Design over the last 12 years.
Image courtesy of DP Architects

To translate regenerative ambition into tangible outcomes, DP has developed a structured approach that embeds sustainability across all projects and practices. At the heart of this is Green-Well-Tech (GWT), a core organisational thrust that operationalises sustainability through strategy, tools and people. Central to GWT is the Attributes of Purposeful Design (APD)—a design and assessment framework first introduced in 2015. The APD is used to evaluate performance across four systems—Human and Social, Carbon, Natural, and Economic—with clearly defined sustainability priorities that enable consistent assessment across project types and scales.

Institutionalised as groupwide key performance indicators and integrated into DP's ISO compliance, the APD requires all new projects to undergo assessments at multiple stages of development. This structured framework empowers project teams and clients to prioritise sustainability early, track progress systematically and identify patterns across typologies, ensuring that regenerative principles move from aspiration to actionable results.

Regeneration is not limited to new developments. In the case of the Golden Mile Complex, Singapore's first conserved post-independence building, which is privately owned, we prioritised adaptive reuse over replacement. This approach preserves embodied carbon and architectural heritage while keeping the building socially and economically relevant.

Spaces and amenities are integrated into the landscape at Bukit Canberra to foster a sense of cohesion and belonging.
Photo by Jerome Teo, courtesy of DP Architects

Community workout at Bukit Canberra.
Photo courtesy of DP Architects

The House of Tan Yeok Nee is the last remaining traditional Teochew style mansion in Singapore.

Photo by Darren Soh, courtesy of DP Architects

An artist's impression of the rejuvenated Golden Mile Complex from Nicoll Highway.

Image courtesy of Perennial Holdings and Far East Organization

Likewise, the restoration of the House of Tan Yeok Nee demonstrates that heritage buildings can actively enrich contemporary urban life. Through careful design and sensitive execution, conservation becomes regenerative: the past is preserved and communities gain spaces that foster cultural continuity and social cohesion.

What defines a regenerative approach is its mindset. Success is measured by what a project restores, enhances and amplifies, not just by what it avoids harming. Achieving this requires collaboration across disciplines, early engagement with communities, and systems that evolve with time rather than static solutions designed to endure. This allows architecture to become proactive, contributing to social well-being, environmental health and economic vitality simultaneously.

Ultimately, regenerative urbanism is about giving back: designing cities that enrich human life while restoring the natural and cultural systems that support it. Through projects like Bukit Canberra, Golden Mile Complex and the House of Tan Yeok Nee, DP Architects is demonstrating that the built environment can do more than coexist with nature—it can actively enhance it. Our cities don't just have to endure; they can flourish.

OP-ED

THE CITY THAT KNOWS ITSELF: HOW INTELLIGENT CITIES CAN LEARN TO GIVE BACK

SEAN CHIAO
Group Chief Executive Officer, SJ Group

We are, by nature, a regenerative species. Like every living organism, we are built to participate in cycles of renewal, and contribute to the ecosystems that sustain us.

But somewhere along the way, we lost the thread.

We began to see the natural world as something separate from ourselves. We chased control, predictability, efficiency. In the pursuit of growth, we harnessed stored energy, altered entire landscapes and built cities that deplete the very systems we depend on.

The result? Ecological degradation. And a deepening disconnect between people and place.

Regeneration is how we find our way back. A return to how living systems actually work: through reciprocity, adaptation and interdependence. A regenerative city restores, renews and enhances the systems around it, creating the conditions for more life to thrive.

What needs to accompany aspiration is measurement. Without systematic assessment, regeneration cannot be operationalised, benchmarked or scaled, and the investment needed to make it last will not follow.

At SJ Group, our Regenerative Futures Framework is built for exactly this. Our premise is simple: cities must be assessed as complex socio-ecological systems. We evaluate performance across six interconnected impact areas—nature, life, society, knowledge, economy and built environment—each with clear action areas, delivery principles and performance outputs.

Temasek Shophouse in Singapore.
Photo courtesy of Temasek Shophouse

New Lowell Vision Plan in Canada.
Image courtesy of SJ Group

Biomimicry Building in India.
Image courtesy of SJ Group

With a systemic lens, we examine how systems connect and depend on each other. We are building a continuum of performance, from business-as-usual to pioneering, that rewards continuous improvement over static compliance. And we integrate both quantitative and qualitative measures. After all, not everything that matters can be reduced to a number.

In Kaua'i, Hawai'i, the Economic Resilience Center is a real-world proof point. Its repurposed structure has a resilience understood as inseparable from the health of the surrounding coral reefs and wetlands. Indigenous knowledge is woven into the design. Ecological, social and economic performance are measured as one system, because they are one system.

Temasek Shophouse, a century-old conserved heritage building in Singapore, integrates real-time occupancy monitoring, solar panels, rainwater harvesting and native planting. Achieving up to 47% energy savings, it's on track to become Singapore's first heritage shophouse to achieve the Building and Construction Authority's Green Mark Platinum Zero Energy certification. At larger scales, Singapore's Changi Airport shows how regenerative thinking enhances human experience through biophilic design and high-performance engineering.

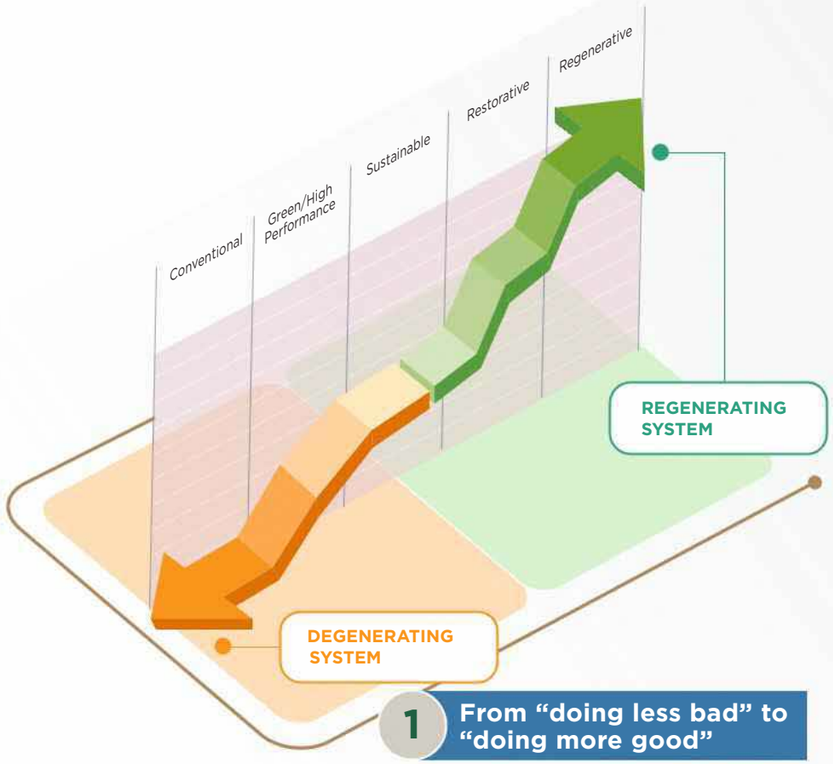
In Canada, the New Lowell masterplan, and in India, the Biomimicry Building, go further. These quantify CO_2 sequestration, oxygen production, stormwater retention, temperature regulation and air purification before and after design. These developments actively improve ecological performance by design.

To take this further, SJ Group has developed a Cognitive City framework, a dynamic digital layer that enables real-time monitoring and adaptive decision-making. AI can help cities learn from how their systems perform and accelerate their evolution. Regenerative design defines the direction that evolution should take: restoring ecosystems, strengthening communities, creating long-term value.

Together, they describe something genuinely new: a city that can measure, adapt and continuously improve, mirroring the behaviour of living systems.

The regenerative city is a living process. And a city that truly knows itself—one that measures, learns and adapts—will know how to give back. We have the frameworks, the tools and the knowledge. Now we build.

PARADIGM SHIFTS FOR THE REGENERATIVE CITY

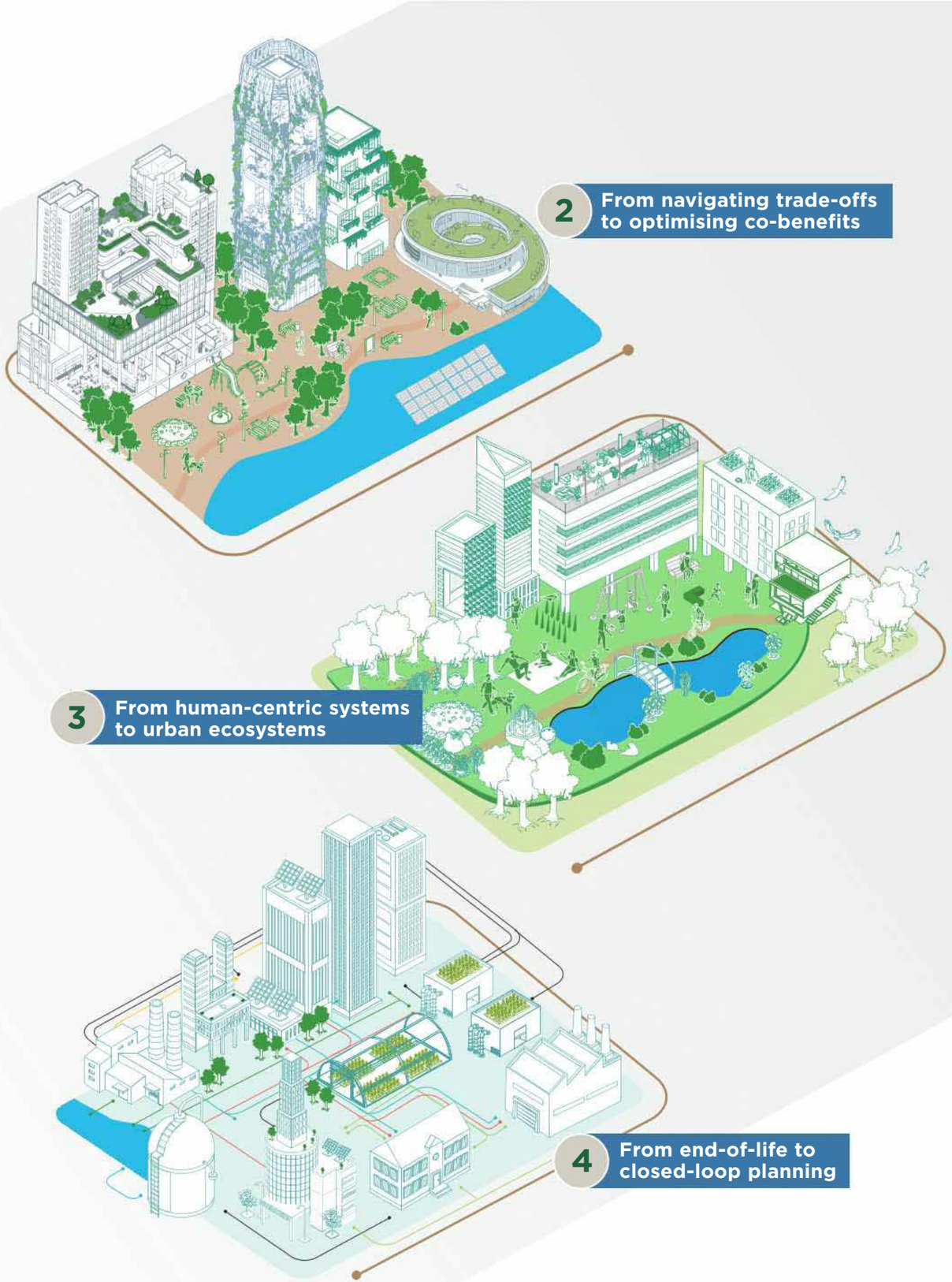


1 From "doing less bad" to "doing more good"

To engender a mindset shift, we must first answer the question, **how does a regenerative approach differ from sustainability?**

Both the regenerative approach and sustainability pursue ecologically responsible relationships between urban development and natural ecosystems.[17,18] Both also seek to preserve the planet's capacity to support life. But there is a fundamental difference in their ambition and approach.

This evolution in ambition demands a reorientation in how we conceive, plan and build cities. There are four paradigm shifts that define the transition towards a regenerative approach.



2 From navigating trade-offs to optimising co-benefits

3 From human-centric systems to urban ecosystems

4 From end-of-life to closed-loop planning

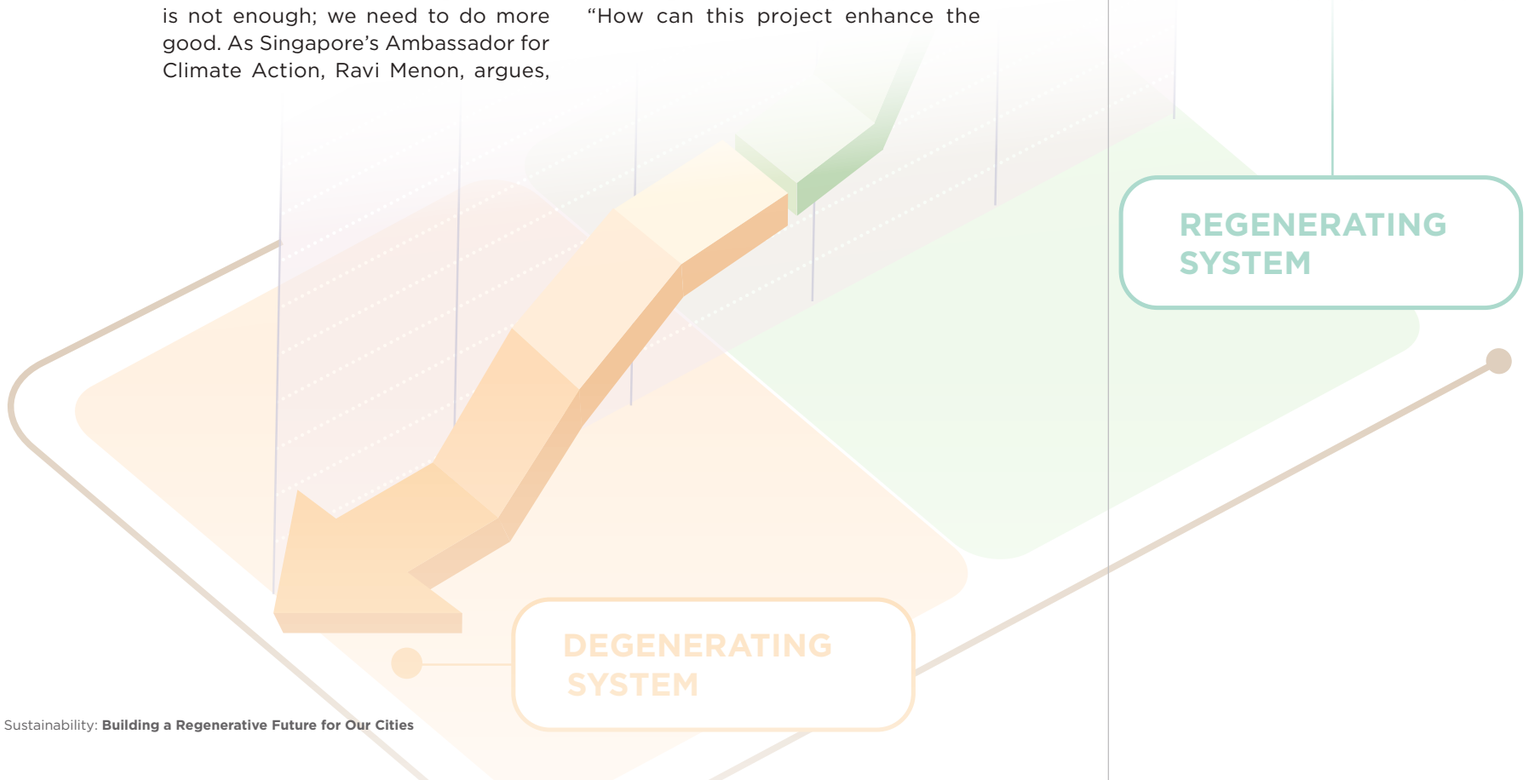
1 From “doing less bad” to “doing more good”

The United Nations defines sustainable development as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs”.[19] It encompasses facets of environmental, economic, social and political conditions, reinforced by the need for intergenerational equity. Sustainability also extends to net zero goals and the green transition, as well as resource efficiency, while emphasising that the social needs of all must be met.[20]

According to William McDonough, an expert in sustainable architecture and pioneer of cradle-to-cradle design, sustainability strives only to do “less bad”.[21,22] But doing less bad is not enough; we need to do more good. As Singapore’s Ambassador for Climate Action, Ravi Menon, argues, our fixation on risk reduction could make us overlook opportunities for achieving good. The regenerative approach sets us on a trajectory that moves through stages of restoring nature, harnessing socio-ecological co-benefits and building resilience and adaptive capacity in the face of change; in essence, designing cities where humans and the natural environment belong in one system.[23]

The regenerative approach seeks to make positive change. It moves beyond simply managing the capacity of existing systems to absorb, recover from and adapt to disturbance. Instead of asking, “How can this project minimise environmental impact?”, the regenerative approach asks, “How can this project enhance the local ecosystem?” Being regenerative means effectively engaging with our complex, dynamic environment in order to generate the co-benefits of healthy ecosystems, resilient communities and equitable economic progress.

Fundamentally, the regenerative approach is about balancing between competing environmental and socio-economic demands, and expanding our problem-solving capacity. For practitioners, this shift moves us from meeting minimum standards and minimising impact to seeking multiple positive outcomes simultaneously. It changes how we evaluate success: not by what we prevented, but by what was restored and enhanced.



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Climate Resilience Through Regeneration

by **RAVI MENON**, *Singapore’s Ambassador for Climate Action, and Senior Advisor to the National Climate Change Secretariat at the Prime Minister’s Office*

In this opinion piece, Ambassador Ravi posits that climate resilience can be turned from a defensive strategy into a pathway for new opportunities and co-benefits. Beyond minimising risks and harm, the idea of regeneration pushes us to consider how climate solutions can holistically restore and enhance natural ecosystems while also generating social well-being and economic vitality.

To achieve good, he prompts us to consider the interconnectedness of ecosystems, economies and communities, citing the Mekong River, Southeast Asia’s largest waterway, as an example of interdependencies between eco- and urban systems, and the ripple effects across borders. Regenerative practices remind us that climate action is not just about surviving the challenges ahead, but also about unlocking new opportunities and shared benefits for communities, businesses and ecosystems.

Scan QR code
to read the opinion piece.

2 From navigating trade-offs to optimising co-benefits

For cities, the "trade-offs" approach has conventionally guided us to assess the ability of actions to deliver outcomes.[24] It has enabled us to make value-based judgements about the cost of urban interventions against their expected outcomes. The regenerative approach, however, enlarges the space in which better outcomes can be pursued by looking beyond a narrow set of objectives and enabling synergistic solutions that deliver multiple benefits.

The "co-benefits" approach, first introduced in the Intergovernmental Panel on Climate Change's Third Assessment Report that was published in 2001, acknowledges that one policy or action can lead to multiple positive effects. Co-benefits lead us to consider how urban interventions can achieve mutualistic outcomes across social, economic and environmental domains, while also accounting for outcomes previously deemed ancillary to sustainability.[25] **Trade-offs must be accompanied by co-benefits to ensure that decisions are not only informed by a balance between risk and reward, but an optimisation of potential.**

Brooklyn Bridge Park generates co-benefits by mitigating floods and storm surges while simultaneously enhancing the local ecosystem and providing a place for New Yorkers to relax.

Photo courtesy of MusikAnimal (CC BY-SA 4.0 / Wikimedia Commons)

Cities in China have implemented sponge city initiatives, creating and restoring parks and wetlands to mitigate flooding instead of traditional flood-control measures. This has brought co-benefits to both local ecosystems and citizens.

Photo courtesy of Tomskyhaha (CC BY-SA 4.0 / Wikimedia Commons)

A view of Canada Water, with restored wetlands in the foreground.
Photo courtesy of Alysia Wee

Canada Water's Rafter Walk crosses over the revitalised wetland, allowing people to get closer to nature without disturbing it.
Photo courtesy of Acabashi (CC BY-SA 4.0 / Wikimedia Commons)

This shift fundamentally changes project design and evaluation. **It moves city-making solely from managing competing demands to also orchestrating synergies that reinforce liveability and resilience outcomes.** It enables cities to not only view natural systems for their ecosystem services or low-carbon developments for climate mitigation, but also to recognise their ability to achieve social and economic goals. In practice, co-benefits tend to favour environmental outcomes over socio-economic ones, and trade-offs around equity and displacement remain real and underexplored.[26] The co-benefits approach does not dissolve these tensions, but equips decision-makers with a broader evaluative lens to navigate them more deliberately.

For example, Canada Water in London, a 0.21-km^2 mixed-use district, reflects synergies across low-carbon strategies, circularity and social outcomes. By repurposing the Daily Mail paper warehouse into a community and educational space using recycled materials, we observe how low-carbon strategies are not only fit for climate mitigation, but can also be optimised to tap on existing resources to provide more community-centred spaces.

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Charting Regenerative Urban Futures: A Working Regenerative City Framework

by **HUGH LIM**, *Executive Director of the Centre for Liveable Cities (CLC); and* **ALYSIA WEE**, *Assistant Director of Research at the CLC*

In this essay, Hugh and Alysia discuss how the regenerative approach fills the gaps of sustainability, unpacking what constitutes a regenerative urban future through the co-benefits lens. They present three case studies across Singapore, London and Bangkok, applying a working regenerative framework from the CLC to map synergies, correlations and interdependencies across various components within the urban system.

They explore how nature-based solutions can achieve important co-benefits across social and ecological systems, including flood resilience, biodiversity conservation, and health and well-being.

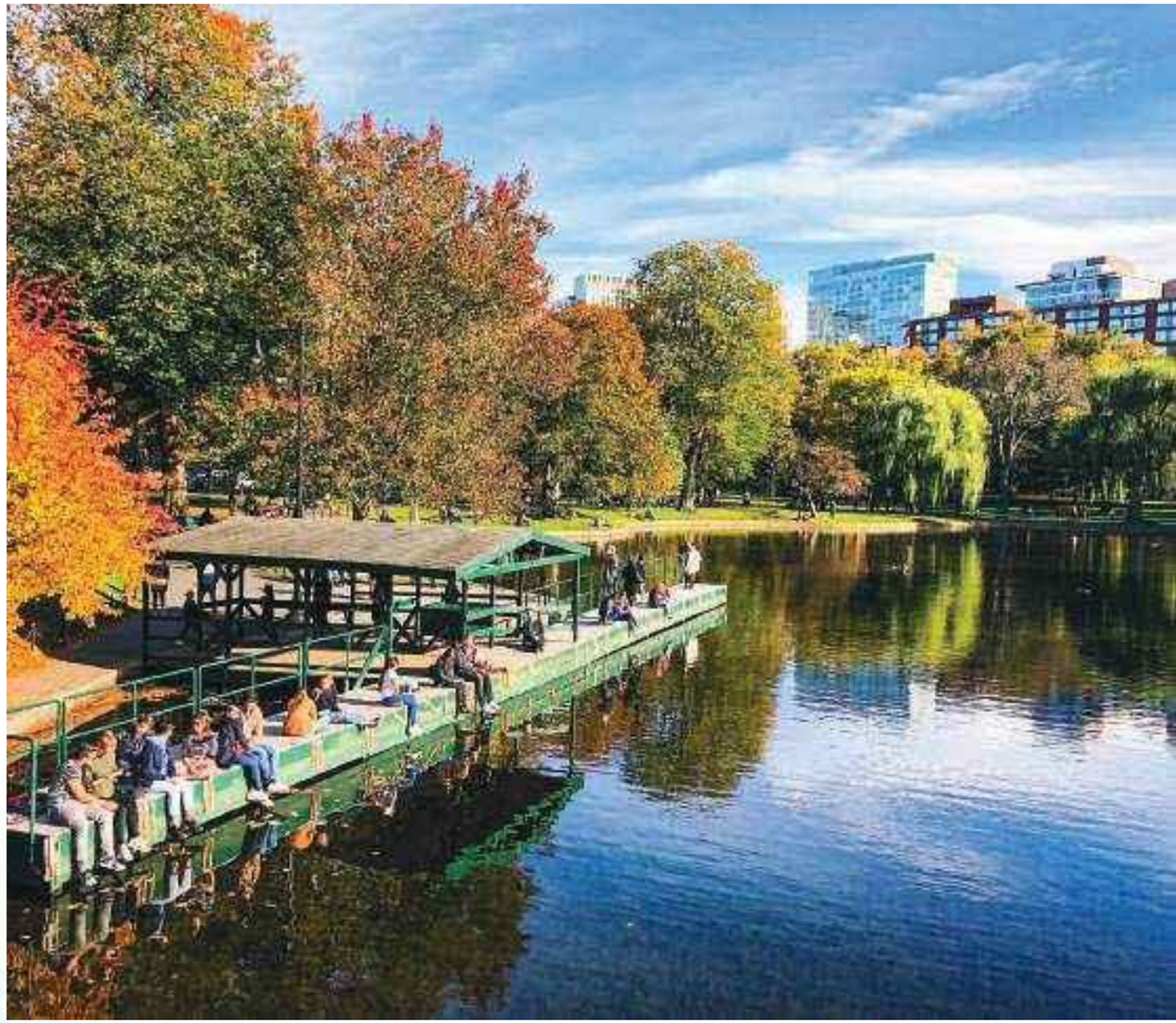
Scan QR code to read the essay.

3 From human-centric systems to urban ecosystems

The lens of economic utility has conventionally framed our decisions for urban development.[27] For example, the worth of a forest is often measured by the amount of timber it produces, its ability to sequester carbon, or how well it serves human recreation. Nature has become a commodity we own, exploit and optimise for human benefit.

This mindset deems nature as separate from cities, rather than as living systems that, when integrated, can deliver multiple co-benefits. It limits our ability to work with natural processes and overlooks the opportunity to work with and learn from ecological systems.

Echoing the early theorists of regenerative development, an urban ecosystems-led paradigm encourages the alignment of urban development with ecological processes.[28] It recognises that social and ecological systems are interdependent. The regenerative paradigm seeks to create conducive environments where humans and nature share mutually dependent and beneficial relationships rather than extractive ones.



Designed with social and ecological systems in mind, Boston's Emerald Necklace is a chain of nine parks linked by green corridors and waterways. It provides continuous green spaces for residents while tackling habitat fragmentation.

Photo courtesy of FASTILY (CC BY-SA 4.0 / Wikimedia Commons)

The Madrid-Río Park is a verdant riverside park that provides cool spaces that help the city adapt to higher temperatures in the summer.

Photo courtesy of Madrid City Council

Aside from its environmental benefits, the Cheonggyecheon stream has allowed new communal spaces to flourish and higher footfall for nearby businesses.

Photo courtesy of Philip Jang on Unsplash

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RETURNING LIFE TO THE CITY: RENATURALISING THE MANZANARES RIVER

by **JUAN AZCÁRATE**, *Deputy Director-General of Energy and Climate Change; and* **ANTONIO MORCILLO**, *Deputy Director-General of Parks and Nursery Gardens, Madrid City Council*

In this City Focus feature, Juan and Antonio share on behalf of the Madrid City Council on how Madrid undertook a remarkable transformation to return life to the city. Today, The Madrid-Río complex is a verdant riverside park that spans 7.5 km. It sits atop the Spanish capital's former main ring road, the M-30, a six-lane thoroughfare which previously cut off locals' access to the Manzanares River.

Scan QR code
to read the feature.

Applied to dense urban environments, cities can be highly liveable and also possess social and ecological resilience, without losing economic viability. For instance, practitioners have demonstrated how to **design with natural processes such as water cycles and habitat networks, rather than against them.**

Notable examples around the world include Singapore's Bishan-Ang Mo Kio Park, Seoul's Cheonggyecheon Stream and Madrid's Madrid-Río Park. Each project treats the waterway not merely as infrastructure to control, but as a living system to work with and deliver multiple benefits to people while boosting economic vitality. This expands the city's capacity to harness synergies across different urban systems. Realising this potential at scale remains contingent on governance capacity, resource availability, and the degree of climate stress a city faces.

OP-ED

THE PATHWAY TO CITIES THAT LEARN FROM NATURE

AMANDA STURGEON
Chief Executive Officer, Biomimicry Institute

We don't value what we don't love. To have any significant reduction on the impacts of climate change, it is critical to repair the relationship between humans and nature.

Designing our buildings and cities with respect for the resources that they depend on, and with a love of all life at the centre of decision-making, will require a complete systemic change. It necessitates an understanding that taking care of more than the human world will always result in the best outcome for people as well. It involves the need to move away from the prevalent human-centric (ego-centric) decision-making processes that rely on measurements, reporting, checklists and silos which are dominated by metrics that add up to a prescribed answer.

Instead, we must embrace eco-centric decision making, which focuses on understanding the impacts of a decision on the whole system. This will guide us in seeking intuitive answers based on long-term thinking, and valuing nature for its own sake rather than purely for its monetary benefits. However, an eco-centric approach can feel less certain, less defined and unpredictable—like nature, which is ever-changing, dynamic and adaptive.

Putting Learning from Nature into Practice

There are time-tested practices that light the path towards an eco-centric decision-making future. Nature itself adapts and designs solutions to challenging problems constantly, and much of the life on Earth has had 3.8 billion years to perfect adaptation. There is much to learn from Nature's brilliance, strategies and systems, which the practice of biomimicry brings to light.

The indigenous communities around the world that have been able to keep their knowledge, dignity and traditions intact demonstrate that it is possible for humanity to live with a different value system. Our current dominant societal and economic systems are set up to rely on the broken relationship between humans and the more-than-human world, even though these systems are driving humans and many other species to the brink of extinction, and the ecosystems that underpin them are collapsing.

The first step in moving towards an eco-centric decision-making approach is to reconnect people with nature. Cities can play a powerful role in that reconnection, and given that most of the world's people live in cities, their potential for positive change is immense. The best cities to live in are consistently regarded as those with abundant open space, accessible rivers or waterfronts, clean air and frequent opportunities to spend time in nature. Cities can go beyond these basics to start integrating requirements for biodiversity net gain.

The Bullitt Center in Seattle is a certified "Living Building" that generates its own electricity, collects its own rainwater, avoids the use of commonly hazardous materials during construction, and beautifies the surrounding neighbourhood with a pocket park.
Photos by Nic Lehoux, courtesy of Bullitt Center

Biomimicry and Ecosystem Services

Once nature is vibrant in the city, and opportunities for reconnecting with nature are in place, utilising biomimicry can take the reconnection even deeper. Analysis and understanding of the ecosystem services that nature provides can teach us how to emulate those services in dense cities, where the addition of open space can be challenging, and in the process create a rich connection between the human and natural parts of a city.

Biomimicry can provide a functional view of how nature supports all of life to thrive. The adoption of this approach at the city scale is limited, but one of the best examples that shows its potential is the Bullitt Center in Seattle. This project undertook an ecosystem services study that shows how the building continues to reap the benefits from an eco-centric approach. The Bullitt Center reuses 487 m^3 of rainwater yearly. It also saves 323 metric tonnes of CO_2 each year through energy-efficient strategies, and a further 1,844 metric tonnes over its lifecycle through the use of responsibly managed wood in its construction.

Lastly, the reconnection between people and nature must be celebrated for eco-centric decision-making to take hold. If there is joy and play when we spend time in nature, then we can reawaken our profound relationship with the rest of life.

As we explore what a regenerative city could be, it is critical that we look at shifting our decision-making processes, that we analyse what we value and how we value it, and that we take accountability for challenging the dominant social structures that inherently do not value nature at their core.

4 From end-of-life to closed-loop planning

Conventional urban development operates on linear timescales and material flows. Buildings are designed for fixed lifespans and often demolished when deemed no longer viable or profitable. Planning often focuses on project completion, prioritising immediate outcomes rather than long-term system health.

With the greater push for urban renewal, changing social conditions and rapidly advancing technology, we are witnessing a rising trend of shrinking building lifespans. In Northern Europe, the lifespan for newer buildings tends to be 45% shorter than average,[29] while in China the average building lifespan is reportedly 25 to 35 years, which is significantly shorter than designed lifespans.[30] Buildings must be designed and constructed with a longer-term view, incorporating regular and pre-emptive upgrading to meet evolving resilience needs.

Time is a core dimension in the regenerative approach. It demands that we choose long-term, holistic approaches aligned with closed-loop models over short-term, immediate priorities that drive linear extraction. The regenerative approach moves from models of linear extraction to creating closed-loop systems where resources are reused. This enables maximising co-benefits and outcomes throughout the entire lifecycle of a development.

St Ann's Warehouse in New York City transformed a former tobacco warehouse into a performing arts venue with the addition of a new steel structural frame and a glass brick clerestory, prolonging the lifespan of the warehouse.

Photo courtesy of Wgreaves (CC BY-SA 4.0 / Wikimedia Commons)

When completed, Tuas Nexus will be an innovative water-energy-waste nexus.

Image courtesy of National Environment Agency

Planning and designing for the long term recognises that holistic outcomes take time to materialise, often beyond the immediate completion of a project. Social, economic and environmental investments are long-term commitments that require lifecycle planning. Early-stage investments in daylighting and ventilation, for instance, can yield decades of improved liveability outcomes, better health outcomes and long-term savings in energy cost.[31] Biophilic features also take time to effectively support local biodiversity and ecological resilience. **In practice, this means practitioners do not merely design a building or infrastructure, but also design the feedback loops that allow urban systems to expand the capacity to adapt and optimise over time.** Practitioners must now create dynamic systems and not static solutions.

Singapore's upcoming Tuas Nexus co-locates an Integrated Waste Management Facility (IWMF) and the Tuas Water Reclamation Plant (TWRP), synergising the urban systems of water, energy and waste to optimise land use and reduce treatment costs. Once completed, Tuas Nexus will generate enough electricity to sustain its own operations and export excess electricity back to the national grid. This approach recognises that multiple urban systems operate simultaneously and require continuous feedback loops to harness their changing synergies. The potential of such integrated systems is significant, though circular systems can face rebound effects and operational difficulties in urban renewal contexts such as market barriers, lock-in from legacy infrastructure, and high coordination costs across fragmented utilities and agencies.

OP-ED

DESIGNING CITIES THAT GIVE BACK: A REGENERATIVE CO-BENEFITS AGENDA FOR URBAN DENSITY

CHEONG KOON HEAN
Chair, Lee Kuan Yew Centre for Innovative Cities at the Singapore University of Technology and Design, and Chair, World Cities Summit Knowledge Council 2026–2028

Cities sit at the front line of climate change. They concentrate people, assets, emissions and risks, while also holding the greatest potential to drive solutions at scale. Over the past two decades, urban climate action has focused primarily on mitigation targets, efficiency gains and risk management. These efforts remain essential. Yet as climate impacts intensify and resource constraints tighten, it is increasingly clear that incremental, siloed approaches are no longer sufficient.

What is now required is a shift in how cities conceive of climate action. Regenerative design offers a powerful and practical framework for this shift—one that enables cities to reduce emissions and climate risk while simultaneously enhancing ecosystems, liveability and resource efficiency.

Rather than treating these objectives as competing priorities, a regenerative approach reframes them as mutually reinforcing outcomes. This requires four shifts in current paradigms—towards net-positive value creation, designing for synergies, human-nature co-evolution and circular, regenerative lifecycles.

From Impact Reduction to Net-Positive Value Creation

Most urban climate strategies today are grounded in impact reduction. They operate within a logic of constraint, aiming to slow degradation rather than reverse it.

Regenerative design advances a more ambitious proposition: cities can become net contributors to ecological and social systems. This means that urban development should not only reduce emissions, but also restore ecosystem services, moderate climate impacts and strengthen long-term resilience. Through a regenerative approach, buildings, districts and infrastructure are designed to generate renewable energy, enhance biodiversity and improve microclimates—creating positive feedback loops over time.

From Managing Compromises to Designing for Synergies

Urban climate policy is often framed as a balancing act: decarbonisation versus growth; density versus liveability; resilience versus affordability. These perceived trade-offs are often tension points between the general populace, interest groups, industry and policymakers.

A regenerative, co-benefits approach replaces this logic with one that designs for synergies. By integrating climate action with urban development objectives, cities can unlock shared gains across four critical domains:

- ecosystem services and biodiversity,
- decarbonisation and climate mitigation,
- liveability and human well-being, and
- resource efficiency.

From Human Dominance to Human–Nature Co-Evolution

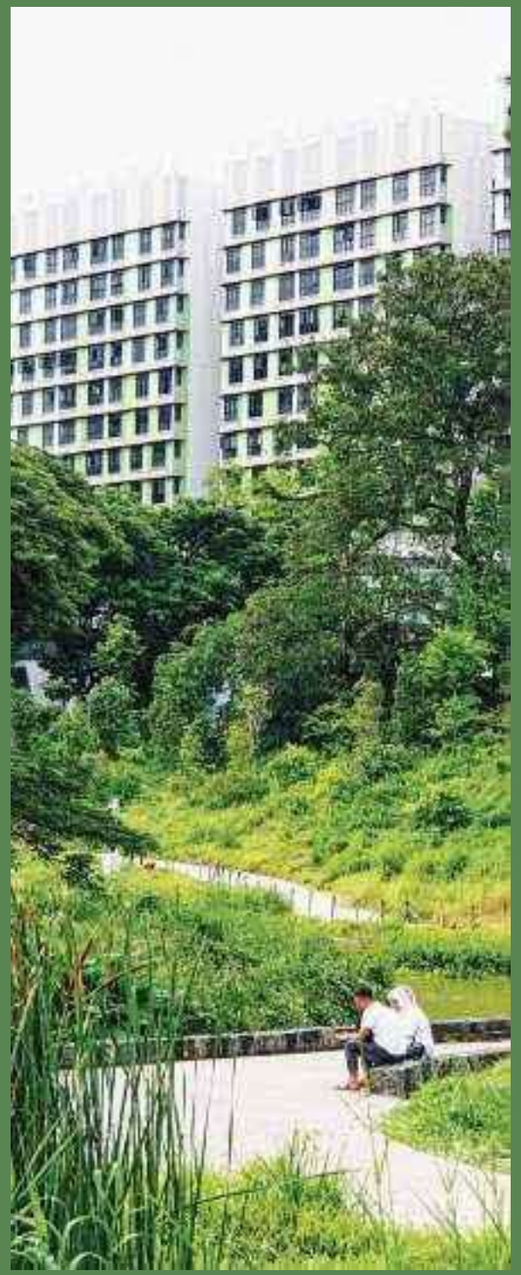
Conventional urban development has largely treated nature as an externality—something to be controlled, engineered around, or offset. This mindset has contributed to increased climate vulnerability, loss of biodiversity and reduced urban liveability.

Regenerative cities are built on a different premise, that human and natural systems co-evolve. Nature-based solutions are not aesthetic add-ons but essential climate infrastructure. Urban trees, wetlands, green roofs and permeable landscapes not only manage stormwater and sequester carbon, but reduce heat stress and support mental and physical health.

From Linear to Circular, Regenerative Lifecycles

Climate vulnerability is deeply tied to how cities use resources. Linear models of extraction, consumption and disposal increase emissions, expose cities to supply-chain shocks and lock in long-term environmental risk.

Regenerative design promotes circular, closed-loop systems across energy, water, materials and land. This includes designing buildings for adaptability and reuse, integrating district-scale energy and cooling systems, and treating waste streams as resources. Such approaches reduce emissions while strengthening resource security.



Bidadari Park's blue and green spaces not only provide areas for communal recreation and habitats for wildlife but also help absorb excess water in times of flooding.

Photo courtesy of Ng Sze Xuan

Regenerative Design in Singapore

Singapore provides a compelling illustration where land scarcity, competing urban demands and climate exposure intensify challenges such as urban heat, flooding and biodiversity loss. Density constrains the availability of large, contiguous areas for greenery, but it also creates powerful opportunities for innovation through compact, integrated systems.

Regenerative design allows ecological functions to be embedded vertically and systemically. Blue-green initiatives such as at Bishan-Ang Mo Kio Park and Bidadari Park demonstrate how naturalised waterways using a "sponge city" concept can simultaneously deliver climate resilience, recreational value and ecological restoration.

Deeper Science and Effective Governance for Climate Policy

Beyond aspirations and rhetoric, we need to develop the science behind regenerative thinking. The interactions between different elements of human interaction, nature, ecosystem services and resource chains, and the co-benefits generated by these interactions, need to be better understood before they are applied. Deeper transdisciplinary research with the involvement of academics, industry and policymakers is essential to contribute to such understanding.

The transition towards regenerative cities is not primarily a technical challenge, it is also a governance one. Delivering co-benefits at scale requires policy integration across climate, planning, health, housing and infrastructure dimensions. It also demands new decision-making tools that prioritise long-term system performance over short-term project optimisation.

The river channel that runs through Bishan-Ang Mo Kio Park, formerly a concrete canal, was redesigned to be a flood plain, incorporating plants, natural materials such as rocks, and civil engineering techniques to soften the edges of the waterway.

Photo courtesy of Wirbel1980 (CC BY-SA 3.0 / Wikimedia Commons)

Redefining Urban Climate Success

As climate risks intensify, cities can no longer afford fragmented solutions. Climate resilience and economic competitiveness increasingly depend on the ability of cities to create value across multiple systems, rather than optimising single variables in isolation.

Regenerative design offers a policy-relevant framework that aligns climate mitigation and adaptation with ecosystem restoration, liveability and resource efficiency. It enables cities to do more with every intervention, maximising shared value rather than managing competing demands.

The question facing urban leaders is no longer whether regenerative approaches are desirable, but whether climate action can succeed without them.

In our climate-changed and resource-constrained reality, the regenerative approach seeks to make positive change, harness co-benefits, steward urban ecosystems and design for circularity. It enables cities to achieve the outcomes of liveability and resilience, for people and the planet, by increasing the capacity for synergy, adaptation and optimisation. This is not to suggest that regeneration is a silver bullet. Some trade-offs around equity, affordability, land use and institutional capacity cannot be resolved through better design alone. They require sustained political will, governance capacity and long-term investment.

Our next question: How can we bridge regenerative outcomes with real-world operating capacities? In Chapter 2, we unpack the Regenerative City Framework to gear ourselves up for practical action.