URBAN RESILIENCE AND ADAPTATION
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Navigating Systemic Change

Khoo Teck Puat Hospital with integrated biodiversity.
Image: Khoo Teck Puat Hospital

We stand before unprecedented systemic challenges. The scale of change required by us is only matched by its complex nature. It is becoming ever clearer, everywhere, that the immediate challenges of everyday life are increasingly entwined with shared global systemic challenges, such as climate change, public health, social cohesion, and economic sustainability.

These challenges are not isolated to specific cities but are shared by urban centres worldwide, necessitating a shift from localised decision-making to a more holistic, systemic approach.

Singapore's Capabilities Can Describe Future Resilience

In this, Singapore presents a singular example. It has faced previous challenges through strategic capability-building, resulting in both coherent action and system resilience, developing an ability to respond to ongoing change. It has moved through the developmental gears smoothly, rapidly progressing for individuals, businesses and communities while maintaining levels of trust in government that most administrations can only dream of.

However, the Centre for Climate Research projected that Singapore could experience a rise in daily mean temperatures of up to 4.6°C towards the end of this century, along with more intense and frequent heavy rain and a mean sea level rise of up to 1 m. These findings are concerning for Singapore's public health, social cohesiveness, economic livelihood, and food security.

Singapore also relies on global networks for foundational provisions like energy, food and building materials, and is experiencing a demographic slowdown. All these factors contribute to increasing volatility and ambiguous risk profiles that make strategic long-term investment problematic.

In the face of these challenges and risks, the steps Singapore takes could be a useful reference for countries making system transitions, for the current model of importing foundational resources is no longer ideal. This applies to all of us, even among the more developed countries also known as the Global North.

For example, a typical Swede's climate footprint—around nine or 10 tonnes despite Sweden's increasingly sustainable operational emissions—is well beyond the global average and must be reduced to around 1 tonne by 2050. Many of those emissions occur outside of Sweden's formal national borders, yet we must now recognise that such borders are largely irrelevant to shared global challenges.

> This requires a radical shift towards circular regenerative systems, both local and global.

Transport and Housing in Singapore as Systems

Singapore's success in managing transport and housing systems, to this point, allows us to reflect on its capability for systems thinking while speculating about future resilience.

While the Economist Intelligence Unit frequently lists Singapore among their "world's most expensive cities" survey findings, the results are largely based on equating transport costs with the ownership costs of private cars—a most 20th-century idea. The survey does not capture the broader public value resulting from radically reducing the number of private cars on the road—which is instead a necessary 21st-century move. The cost of owning a car in Singapore directly relates to the societal cost of car ownership. In this sense, vehicle-permit systems are a sign of good leadership, not bad.

Large cities like Singapore and Tokyo have around 0.3 cars per household. By contrast, countries like USA or Australia have car ownership rates of around 1.8 cars per household. If we take a societal and systemic perspective, rather than an individualistic one, Singapore and Japan would be examples of how to transition to a mobility future comprising public, shared and active transport.

Singapore's high-quality public transport costs relatively little by global standards. Of course, riding a bike is lower cost again—in energy, material, and spatial terms too—and Singapore could move significantly further in this direction given its density, climate, and living patterns, now multiplied by the transformative capabilities of e-bikes (for both people and logistics).

On top of that, Singapore's approach to ensure physical mobility is linked systemically to the city's urban design and planning policies and practices. The foresight of Singapore's public housing strategy is increasingly recognised worldwide, as most other cities struggle with this most basic of urban elements. Since the late 1960s, Singapore has developed public housing on government-owned land. Its public housing blocks are designed and planned to integrate with facilities and public transport.

With the majority of its population living in public housing, the Singapore government enabled value uplift of its land for the common good. In this aspect, the scale and output quality of public housing by the government agency in charge, the Housing & Development Board (HDB), is perhaps parallel only to Vienna.

Transitions to Circular Regenerative Systems

So Singapore clearly "does systems". And yet challenges remain. Generally speaking, construction, of housing, commercial property and infrastructure, is perhaps our most extractive sector globally, with impacts not only on greenhouse gas emissions, but also on biodiversity, ecosystem loss and population displacement. Hence, to provide housing that does not exacerbate the climate crisis, we need to explore the transition to circular regenerative systems.

In buildings, this means switching the focus from operational emissions to the reduction of embodied emissions, and focusing on radically minimising extractive processes upstream of construction and occupation. The Danish Reduction Roadmap suggests that embodied carbon in housing will need to be reduced by as much as 90%.

Another way to achieve low-carbon housing is by not constructing many new buildings at all, and instead transitioning towards zero-carbon retrofits and reallocation of existing under-used space. In either case, construction materials must be reworked fundamentally around biomaterials or from recycled materials saved from existing construction or agricultural waste streams.

This requires a radical shift towards circular regenerative systems, both local and global. Indeed, where production cannot be local, a systems-stewardship approach must ensure circular and regenerative activities elsewhere. We can no longer ignore what the Australian geographer Val Plumwood called the "shadow places" that produce the materials that the Global North relies upon, usually through highly disruptive processes across much of the Global South, but stay out of sight and out of mind.

Denmark was recently estimated to be only 4% circular overall, which reinforces the sheer magnitude of the shift needed. It is not possible to frame such a transformation as simply an engineering challenge; it is a fundamental question of re-design, and a reorganisation of our societies, industries, economies, and systems of governance.

Naturally-cooled green city.
Image: Mark Stoop / Unsplash

Redeploying Strategic Assets

Existing publicly-owned assets which can take on multiple functions—like housing, streets, schools, public spaces—can be thought of as "strategic levers" from a system design perspective. Singapore's greatest lever might be the housing and neighbourhoods built by the HDB. Their key issue now, as many buildings approach the end of their original leases, is how to cultivate these approaches to retrofit over new-build by using circular biomaterials.

There are numerous emerging examples of building innovation that could work here. For example, if timber, in its myriad forms, is prioritised, then carbon capture is an outcome of building, alongside its further benefits in terms of health, adaptability, and aesthetic qualities.

Cities and forests can become symbiotic carbon sinks. Singapore's forests have been decreasing in recent decades due to population growth. Perhaps this could be reversed by focusing on using and re-using timber as a building material? Given an ageing population, the balance may swing towards fewer, lower, and higher quality timber buildings, immersed in walkable and accessible green public spaces. The question for Singapore is: how might the goal of making a building also achieve the goal of making a forest?

In terms of innovation levers for the HDB, that parallel with Vienna's public housing may be interesting. Having helped establish the energy-efficient building standards of "Passivhaus" and the use of mass timber structures, perhaps Vienna can steer the transition of its industries towards a more sustainable supply of construction materials.

These more careful links between buildings and materials suggest substantial mindset shifts, requiring us to practise long-term stewardship of our housing, the built environment and neighbourhoods by using circular and regenerative practices.

Car-free streets.
Image: Bna Ignacio / Unsplash

> How might local-scale community-oriented action positively affect the wider global systems that they rely on for the everyday?

Social and Cultural Transitions

For neighbourhoods made up of utilities, social and cultural infrastructures, and biodiverse public spaces, examples of mindset shifts include the:

- Generation, use and storage of fully renewable energy as locally as possible, instead of energy from imported fossil fuels—this requires innovation in both demand and supply
- Greater emphasis placed on locally-grown food
- Use of land, water and what we currently call waste (human and otherwise) in reworked nutrient cycles

Again, the transition to these circular regenerative systems is not easy as they present not only technical challenges, but also social and cultural ones. Yet, embracing the complexity of social and cultural change might be part of the answer to building future resilience.

Singapore recently announced a range of strategies to adapt to the rising temperatures in their tropical climate zone. These include designing buildings and neighbourhoods woven with natural green and infrastructure and also raising awareness among its population of the impact of rising temperatures.

In assessing Singapore's climate readiness, The Lancet recently published research describing the need for future studies to better understand how "community knowledge, attitudes and practices would improve the design and focus of community initiatives to reduce the risk of heat-driven adverse health outcomes." We might add, how might such local-scale community-oriented action positively affect the wider global systems that Singapore relies on for the everyday?

> Can Singapore reorient its considerable expertise in long-term strategy and quality delivery towards upstream challenges?

Future Cities as Global Actors

Can Singapore reorient its considerable expertise in long-term strategy and quality delivery towards upstream challenges, moving well beyond the mitigation of local operational impacts and the management of reliable supply chains?

This would require systems stewardship, predicated on more careful relational rather than transactional approaches to these resources and flows, along with new forms of economic thinking and practice. In addition, Singapore would need to reorient its enviable capabilities in mobility, housing, technology and governance to address their global and local impact. So the question for Singapore is not only whether it can evolve and transform its approach to genuine systems transformation at home, but do so in a way that produces good outcomes elsewhere too.

Singapore's strong public sector capacity, together with continuing efforts to design, build, and maintain its everyday public infrastructures, could help this city state retain its strategic levers to address systemic challenges. And yet, the scale of the challenges now facing Singapore, and other cities, far surpasses that experienced during their earlier developmental stages.

Traditional approaches to urban policy-making and delivery will yield only limited and ineffective outcomes. The decision-making cultures that produced the climate crisis are unlikely to be those that can reverse it.

Recognising that decisions taken by cities of the future are not confined to political and geographical boundaries, but enmeshed in global flows of resources will take systems acting and thinking—at local and global scales simultaneously.