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Reinventing the Asian Megacity: Absorbing Climate Change with Sponge Design

Cities and Urban Development



Foreword and Acknowledgements

2020 was a year like no other as the pandemic changed many aspects of our lives. In a sense, that made early 2021 an ideal time to ask the question: how would you address some of the biggest challenges in Asia in the coming decade? In January 2021, the Asia Business Council joined hands with Nikkei Asia and the Blavatnik School of Government at the University of Oxford to launch the Asia's Challenge 2030 Global Essay Competition, open to students aged 18-22 anywhere in the world.

Given the many obstacles facing young people pursuing their studies during a global pandemic, we did not know how many essays we would receive. Yet we were impressed by thoughtful submissions from universities across Asia and as far afield as California and London. We pored over essays on topics ranging from artificial intelligence and aquaculture to smart cities and virus sequencing and learned a lot in the process.

The essays reflect a generation that is asking hard questions about the challenges facing Asian societies and optimistic about the prospects for creating a better world through new modes of doing business and innovative approaches to policymaking.

Young people from Asia are increasingly globally aware. They want policymakers to adopt international best practices in public health and environmental protection, especially in areas like sustainable finance and mental health awareness. But they reject the uncritical adoption of Western models, from urban design to economic development. Many call for a celebration of their unique national and regional identities, whether through locally inspired architectural designs or the increased representation of indigenous perspectives.

Participants in the Economy, Trade, and Finance category want to improve existing economic models so that a balance is struck between economic growth and a fairer, more sustainable, and more stable world.

In the Public Health and the Natural Environment category, respondents called for holistic approaches to health. Concerns about mental wellness reflect the pressures brought about by increasingly competitive academic and professional environments, while essays about communications and interpersonal relationships demonstrate the desire for a more intentional focus on modeling healthy relationships. Still other submissions addressed the existential crisis posed by climate change and the complicated web of interrelated challenges, from plastic waste to fossil fuel use. Proposed solutions range from changes in consumer behavior to an entirely new model of development.

In the Cities and Urban Development category, the essays we received reflected a desire for smarter, more walkable, climate resilient cities, and urban environments that reflect their unique local character. Whether as consumers, as employees, or as entrepreneurs themselves, this younger generation will demand that businesses and governments adopt sustainable practices and modes of operation that benefit their communities.

This global essay competition would not have been possible without the support of the former and current Chairmen of the Asia Business Council, Lim Boon Heng of Temasek and Daniel Tsai of Fubon Group. We are also indebted to Vice-chairman Tak Niinami of Suntory Group and Council Trustee Nazir Razak of Ikhlas Capital, who made key introductions to Nikkei Asia and the Blavatnik School.

Special thanks must also go to Shigasaburo Okumura and Daisuke Akazawa, Editor-in-chief and Chief Producer of Nikkei Asia, and Ngaire Woods and Luna Sidhu, Founding Dean and Director of Development of the Blavatnik School, for making this competition possible.

We would also like to thank our judges who generously volunteered their time and energy.

Economy, Trade, and Finance category:

- Nobuyoshi John Ehara, Co-founder, Unison Capital
- Emily Jones, Associate Professor, Blavatnik School of Government
- Katsuhiko Hara, Chief Desk Editor, Nikkei Asia

Public Health and the Natural Environment category:

- George Tahija, Principal, PT Austindo Nusantara Jaya Tbk
- Maya Tudor, Associate Professor, Blavatnik School of Government
- Futoshi Kuwamoto, Business & Market News Editor, Nikkei Asia

Cities and Urban Development category:

- Zhang Xin, Founder and CEO, SOHO China
- Sir Paul Collier, Professor, Blavatnik School of Government
- Shin Nakayama, News Editor, Nikkei Asia

Finally, we would like to acknowledge the assistance of Ashleigh Au of SOHO China Scholarships and Ruth Collier of Oxford University in publicizing the contest.

There is no doubt that this generation will be profoundly shaped by the experience of living through the world-altering events of 2020 during their formative years. But most essays took the longer view instead of focusing solely on the pandemic, looking ahead to the challenges of the next decade and beyond. Policymakers and business leaders around the world should take note of their ideas as this young generation comes of age and begins to lead local and international development in multiple fields.



Pauline Yeung
Program Director
Asia Business Council



Colleen Howe
Program Associate
Asia Business Council

Award-winning Essays

Economy, Trade, and Finance

Krati Gupta (India)

Rajiv Gandhi National University of Law

The Three Pillar Multi-Stakeholder Approach to Responsible Financing:
Addressing Asia's Challenges in the "Decade of Action"

Chloris Jiaqi Kang (Singapore)

National University of Singapore

Private Money for the Public Good –
Unlocking Private Equity for Asia's Sustainable Finance

Henry Michael Mayhew (United Kingdom)

University College London

Asian Central Bank Mandates: What about Equality?

Public Health and the Natural Environment

Hanun Thalia (Indonesia)

Universitas Indonesia

KomU as a Strategy to Improve Family Communications

Yao Yuanchen (China)

Tokyo University of Foreign Studies

Meeting the Challenge of Plastic Waste Recycling in Japan and China

Suzu Yokoyama (Japan)

Tsuda University

Tackling Unrealistic Beauty Standards in Japan and South Korea

Cities and Urban Development

Matthew Flores (Philippines)

Ateneo de Manila University

Indigenous Cities: Reframing Modernity and Our Cities

Rya Jetha (United States)

Pomona College

Reinventing the Asian Megacity: Absorbing Climate Change with Sponge Design

Ranita Ma Tsz Yu (Hong Kong SAR)

Chinese University of Hong Kong

From a City-scale Beauty Pageant to a Continent-wide Diversified Gallery

Ashley Faith Santoso (Indonesia)

Atma Jaya Catholic University of Indonesia

The Neglected Effects of Gender-based Violence towards Jakarta's Urban Walkability

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Reinventing the Asian Megacity: Absorbing Climate Change with Sponge Design

In 2016, the Boston Museum of Fine Arts held an exhibition called *Megacities Asia*. The Museum invited eleven artists from six Asian megacities to respond to the political, environmental, and social changes unfolding in their home cities. The artists, hailing from Beijing, Shanghai, Delhi, Mumbai, and Seoul, produced immersive sculptures capturing both the utopian hopes and dystopian anxieties of their metropolitan homes. Through visual experiments with material, texture, proportion, and juxtaposition, the artists evoked critical questions about urban migration, displacement, development, preservation, globalization, and climate change.

The curators of *Megacities Asia* wrote in the exhibit introduction that “megacities are not only seen, but also felt.” Indeed, they are — and more so every year. The percentage of people who will intimately feel rather than remotely see cities globally is set to increase from 47% at the beginning of the century to 60% in 2030 according to the United Nations. This is historic — over the course of three decades, approximately two billion people will have migrated from rural to urban areas, predominantly in Asia and Africa. In Asia, the rate of urbanization is the highest in the world at 1.5 percent per year, meaning that more than 55 percent of the Asian population will be urban by 2030. Much of Asia’s urban movement will be to megacities — broadly defined by the United Nations as “a metropolitan area with a total population in excess of ten million people” — which will increase in size and abundance over the next decade.

Current and Future Megacities in the World, 2018 and 2030 (Source: UNESCO)





Super-Natural, 2011/2016, Han Seok Hyun, Museum of Fine Art, Boston (Source: New Scientist)

Of the 37 global megacities in 2018 seen in the map above, 22 are in Asia. By 2030, 10 more megacities will emerge, of which seven — including Chengdu, Surat, and Kuala Lumpur — will be in Asia. This will bring the proportion of global megacities in Asia to nearly two-thirds, all while most of Asia’s existing megacities will continue to grow.

Asia’s ever-expanding megacities are grappling with many of the problems highlighted by the installations at the Museum of Fine Arts, Boston in 2016, where Seoul-based Han Seok Hyun asked arguably the most daunting question of this century in his installation *Super-Natural*. By constructing a bright green landscape of rice wine bottles and dishwasher detergent packages, Hyun

challenged the viewer to consider how urban development can be reconciled with environmental preservation and climate security.

Megacities of Asia are uniquely exposed to the effects of climate change. Many of Asia’s megacities are situated on low-lying coastal areas frequently hit by strong storms and heavy flooding. By 2030, 200 million people will live in flood plains across Asia. Global insurer Allianz has estimated that in the next 50 years, Asia will have eight of the world’s 10 most exposed cities to coastal flooding from storm surges and wind damage including Mumbai, Tianjin, Bangkok, and Tokyo. The Intergovernmental Panel on Climate Change noted in 2014 that without adaptation, the majority of people affected by coastal flooding by the year 2100 will be in East, Southeast and South Asia, while McKinsey Global Institute warned in a 2020 report that “Asia is on the frontline of a changing climate.” The report added that infrastructure and urban areas are still being constructed in many parts of Asia, making the region well-positioned to develop structures and implement technologies that are resilient in the face of inevitable extreme climate events.

Estimated cost of natural disasters

Storms can have a devastating impact on businesses. Here’s a look at the damages disasters bring and the prospect of greater losses.

Top 10 cities ranked by asset exposure to coastal flooding in the 2070s (US\$bn)



		Year	
		2005	2070
1	Miami	416	3,513
2	Guangzhou	84	3,358
3	New York - Newark	320	2,147
4	Kolkata (Calcutta)	32	1,961
5	Shanghai	73	1,771
6	Mumbai	46	1,598
7	Tianjin	30	1,231
8	Tokyo	174	1,207
9	Hong Kong	36	1,164
10	Bangkok	39	1,118

In 2070, Asian cities are projected to dominate the top 10. In 2005, the top 10 cities with exposure to coastal flooding as a result of storms and strong winds were in the United States (including New Orleans), the Netherlands and Japan.

NOTE: OECD Ranking Port Cities with High Exposure and Vulnerability to Climate Extremes.

How can Asian countries prepare to face the disproportionate impacts of climate change over the next decade while the largest urban migration in human history transpires? How can megacities, many of which lie in low-elevation zones and near major rivers be more resilient, equitable, livable, and sustainable spaces? Reputed urban geographer and social scientist Terry McGee writes in *Living in the Megacity: Towards Sustainable Urban Environments* that megacities must transform into “low-carbon cities” with new lifestyles, consumption, practices, and technological innovations. In this essay, I will discuss how the ‘sponge city’ model pioneered by Peking University Professor Konghian Yu is an economically viable pathway to transform Asian megacities into spaces that produce less carbon, have adequate clean water access and protection against rising tides, and better social, environmental, and public wellbeing.

The idea of the sponge city began when Konghian Yu was receiving his Doctor of Design Degree at Harvard University. His dissertation, which explored ecological security through landscape planning in South China, laid the foundation of his pioneering concept of designing and redesigning cities based on environmental ethics.

“Floods are not enemies,” explained Professor Yu to the World Economic Forum. “We can make friends with floods. We can make friends with water.”

Yu’s philosophy is that cities are prone to flooding because there is nowhere for water to go. Grey infrastructure, made of concrete and steel, cannot absorb large amounts of water, and use it to improve life of the city’s inhabitants. In addition, building grey infrastructure is carbon-intensive, creates pollution, depletes green spaces, and degrades natural ecosystems. Sponge cities, however, are cost-effective, nature-based solutions to traditional grey infrastructure. Made from green or blue-green infrastructure defined as ‘building with nature,’ components include vegetative parks, permeable pavements, and urban forests. Sponge cities reimagine urban environments as working with rather than against rainwater, stormwater, and floodwater, which are captured, controlled, and reused to replenish aquifers, irrigate urban farms, flush our toilets, and be processed into drinking water.



Following Beijing’s disastrous flooding in 2012 that claimed dozens of lives, the Chinese government launched the Sponge City Initiative in 2015 with 16 “model sponge cities,” later expanded to 30. Wuhan, the largest city in central China and one of the pilot cities, has emerged as China’s “leading sponge city.” Wuhan’s experience designing and implementing a Sponge City Program (SCP) provides valuable lessons for other Asian megacities looking for practical ways to adapt to the climate challenge.

View of flood-prone Wuhan, China. Photograph: Sino/Getty

The economic case for adopting SCP is strong and is further bolstered by a host of other social, environmental, and health benefits. According to a cost analysis by the Coalition for Urban Transitions, Wuhan's project of converting a rubbish dump into an urban "sponge" was US\$600 million cheaper than a traditional grey-infrastructure project, while the value of land surrounding the project doubled after it was completed. The project is 30 square kilometers and collects 70% of rainfall, saving the city US\$220,000 per year in watering posts. In 2019, researchers from Stockholm Environment Institute Asia commented that Asian cities are "mired in policy inertia when it comes to climate action". For example, the Indonesian government has committed US\$40 billion in 2019 to save 30 million people living in Jakarta from rising sea levels and increasingly severe floods. However, no comprehensive plan has been released by the government about how the megacity will be redesigned. Implementing an SCP, which has been tested in more than 250 cities in China, India, and Russia already, may be the most cost-effective method of redesigning megacities over relatively short timespans (Wuhan's project was completed in three years). SCPs also offer megacities a pathway to meet the United Nations 2030 Sustainable Development Goals (SDGs) of improving human well-being (SDG3), offering clean water and sanitation (SDG 6), building sustainable cities and communities (SDG 11), adapting and mitigating climate change (SDG 13) and improving the health of ecosystems (SDGs 14 and 15).

While many Asian megacities face the common challenge of adapting to climate change and large-scale urbanization, megacities also face specific challenges depending on meteorological and hydrological conditions, migration patterns, coastal exposure, and the existing built environment. SCPs have proved themselves versatile, able to cater for different urban landscapes across countries and continents. Wuhan's implementation of its SCP provides a valuable lesson for Asian megacities looking to tailor SCPs to their built environments. In 2015, the Chinese national government provided Sponge City Application Guidelines, Technical Guidelines, and other documents to guide private sector involvement in local projects across pilot programs in China. These documents were foundational for local SCPs, and Wuhan's success lied in applying national guidelines to the local context to produce its own planning document, the Planning and Design Guidelines for the Sponge City Program. While Wuhan was able to successfully adapt national guidelines to suit the local context, China's nationally-imposed sponge city model has been criticized for a lack of flexibility and for not allowing local goals to be incorporated into SCPs. These mixed results are a lesson for megacities across Asia that building successful SCPs requires national-local cooperation within countries, as well as inter-Asian initiatives involving the public and private sector to establish best practices for SCPs.

Currently, there are a variety of disparate efforts scattered across the public and private sector working on sponge city designs in current or emerging megacities. Architects at Landprocess are experimenting with sponge technologies in Bangkok to conserve water in the monsoon season and prevent flooding. The Indian city of Hyderabad has also adopted sponge city planning as central to its urban redesign project. Interest in implementing SCPs across Asia to future-proof megacities and protect urban inhabitants is a pivotal first step in confronting Asia’s biggest challenge over the next decade. Sponge cities symbolize a shift away from “greenwashing” toward more effective urban planning and governance. However, blindly adopting China’s guidelines or the “Wuhan model” will result in SCPs that are not optimized to their settings. Just as Wuhan converted a rubbish dump into a sponge by building parkland, urban forests, and permeable pavements, other megacities, such as my home Mumbai, may choose to approach SCPs differently by integrating already existing slum-relocation projects into versatile SCPs of various kinds. One of the installations at the Museum of Fine Arts, Boston, Hema Upadhyay’s 8’ x 12’, showed an aerial view of Mumbai’s urban density, packed with informal settlements, skyscrapers, and religious centers. She challenges the existence of a “typical” Asian city by depicting Mumbai’s challenge with urbanization and regionalization, reminding us that Asia’s megacities occupy dramatically diverse built environments demanding unique design solutions.



Designing SCPs that are optimized for Asia’s varied megacity landscapes requires cooperation from various stakeholders, programs, and jurisdictions. SCPs will not always be contiguous across Asian megacities, as Wuhan’s 30 square kilometer project was. Creative, localized approaches coordinated across national and local government agencies and private sector actors will ensure the best results for “sponge-ifying” megacities. For example, Singapore’s “mandatory roadside plantings” policy has provided tree cover across the city through the private sector despite urban growth. SCPs provide flexibility to governments to retrofit sponge designs where necessary through innovative policy solutions and urban planning. Each megacity must holistically consider how best to incorporate sponge elements into its existing urban environments, and this can be best achieved through comprehensive information sharing platforms with open, transparent data from governments and private firms across Asia.

Hema Upadhyay’s 8’ x 12’, Museum of Fine Art, Boston
(Source: Times of India Blog)

Asia needs a “Blue and Green Cities” initiative. The stakes are too high for Asian countries to act in isolation when disparate, innovative initiatives are already underway. Cross-fertilization of ideas, technologies, and human capital will benefit the interconnected economies, societies, and future of Asia. Climate change is the biggest challenge that Asian countries will face individually and collectively in the next decade. Investing in livable megacities where millions of urban dwellers are vulnerable to extreme weather events should be the top priority of national governments and Asian regional initiatives. Asian megacity economies are already larger than the economies of single European nations. Tokyo’s US\$1.5 trillion economy is larger than Spain’s US\$1.42 trillion, while Shanghai’s US\$495 billion economy is larger than Norway’s US\$439.5 billion, meaning that vast amounts of economic and human capital are concentrated in Asian megacities. Futureproofing them against climate change should be Asia’s priority in the lead up to 2030. SCPs provide an economically viable option for megacities that can be achieved in the short-term while providing long-term protection against climate change and a transition to lower-carbon societies. They are one part of an evolving answer to the question artist Han Seok Hyun asked at the Museum of Fine Arts, Boston in his Super-Natural greenscape. Finally, the long-term social, environmental, and health benefits that inhabitants receive from SCPs cannot be quantified — they make megacities more prosperous, more productive, healthier, and happier urban homes.

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