



Source: Asian Correspondent



# Adapting to Climate Change on Scale

*Addressing the Challenge and Understanding the Impacts in  
Southeast Asian Megacities*



A vibrant, colorful illustration of a building facade. The image features a series of arched windows and doorways, each framed by intricate, multi-colored patterns. Above the arches, there are decorative elements resembling small, colorful pots or vases. The overall style is reminiscent of traditional Indian or South Asian architecture, with a rich palette of reds, yellows, blues, and greens. The text is overlaid on a semi-transparent white background.

I have grown to love cities.

They alarm me and give me hope.







SPRING 2007



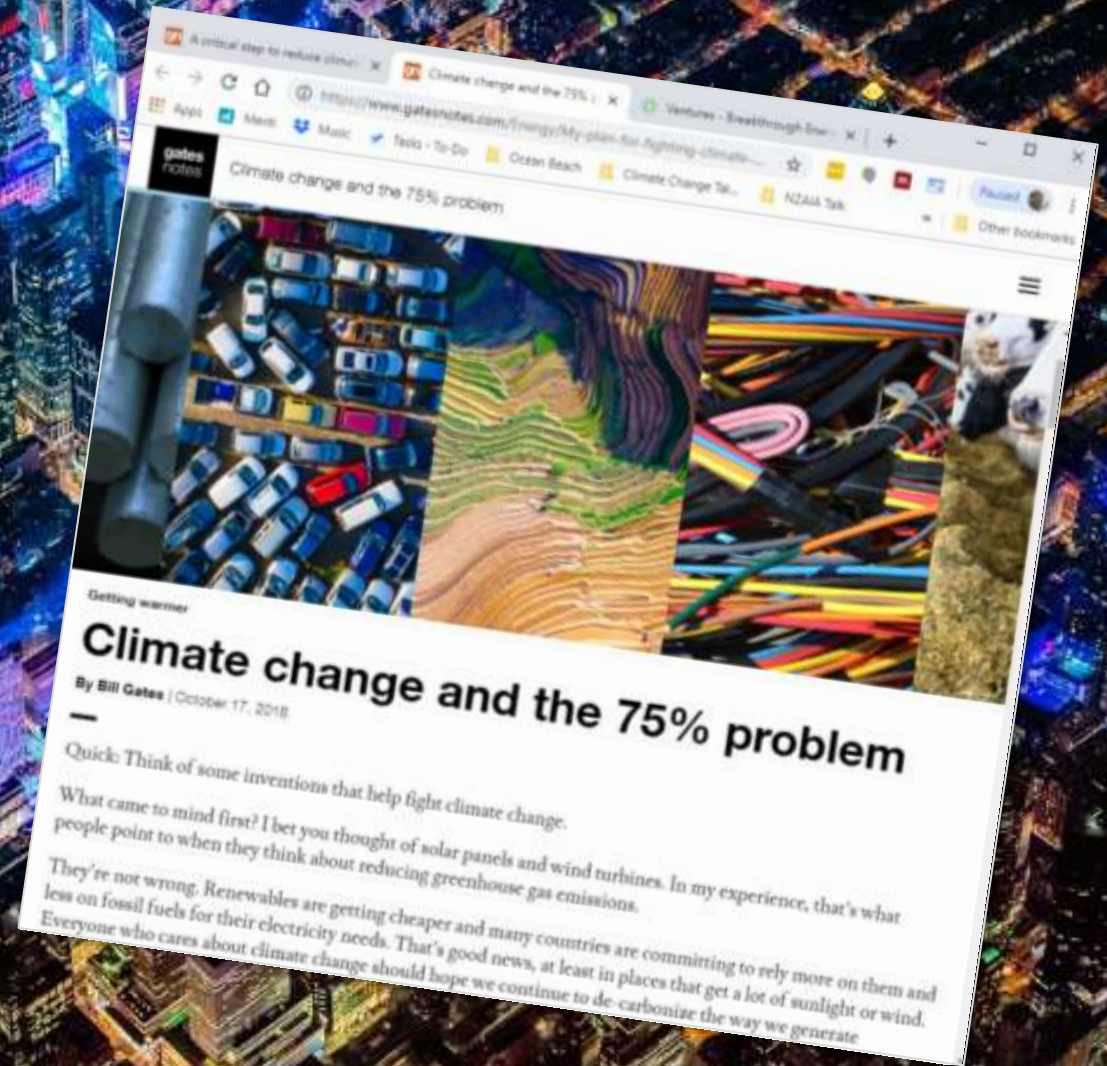
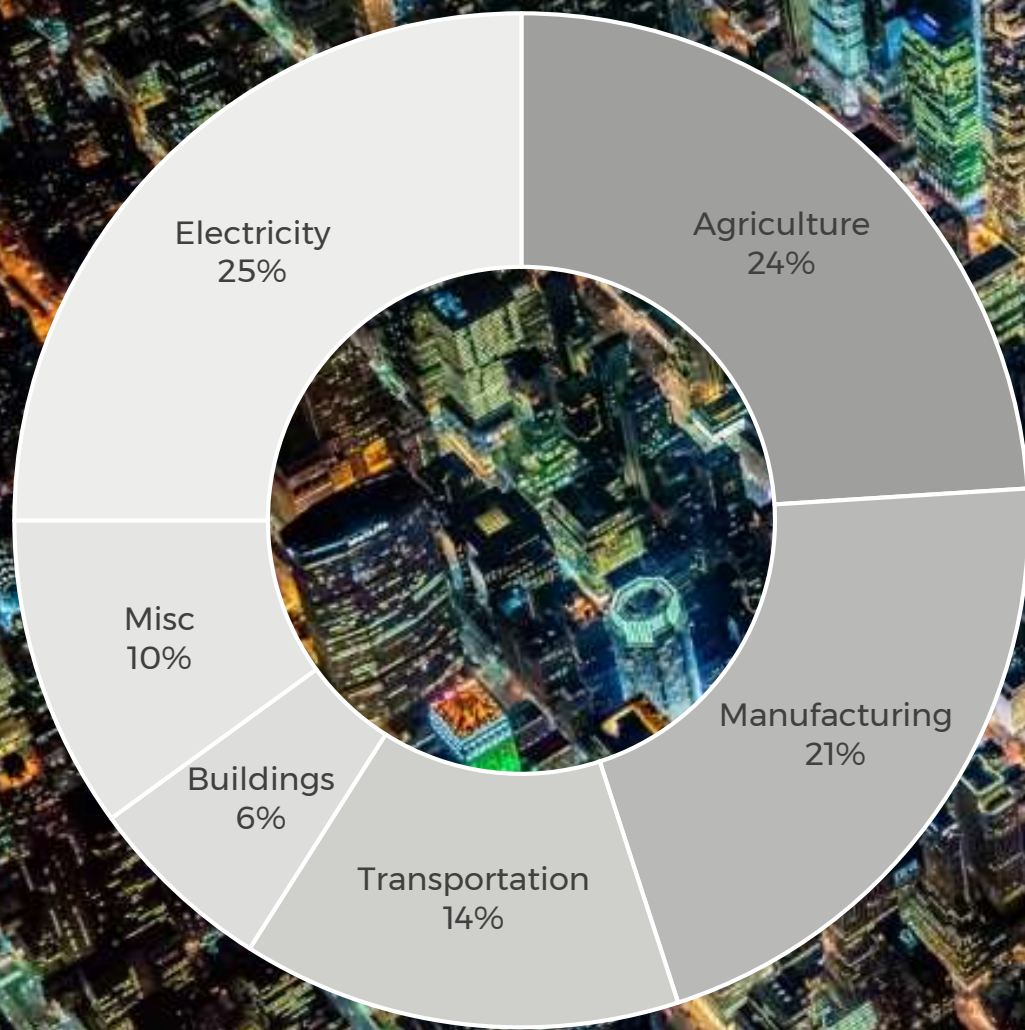
©2007 Union of Concerned Scientists



An aerial photograph of a sprawling, dense urban landscape, likely Tokyo, Japan. The city is filled with a vast number of buildings, ranging from low-rise residential structures to tall skyscrapers. A prominent river, the Arakawa River, winds through the center of the city. The sky is blue with scattered white clouds. A semi-transparent text box is overlaid on the lower half of the image.

*While greenhouse gas emissions on a per capita basis can be lower in dense urban areas, cities are still responsible for 70 percent of emissions worldwide.*





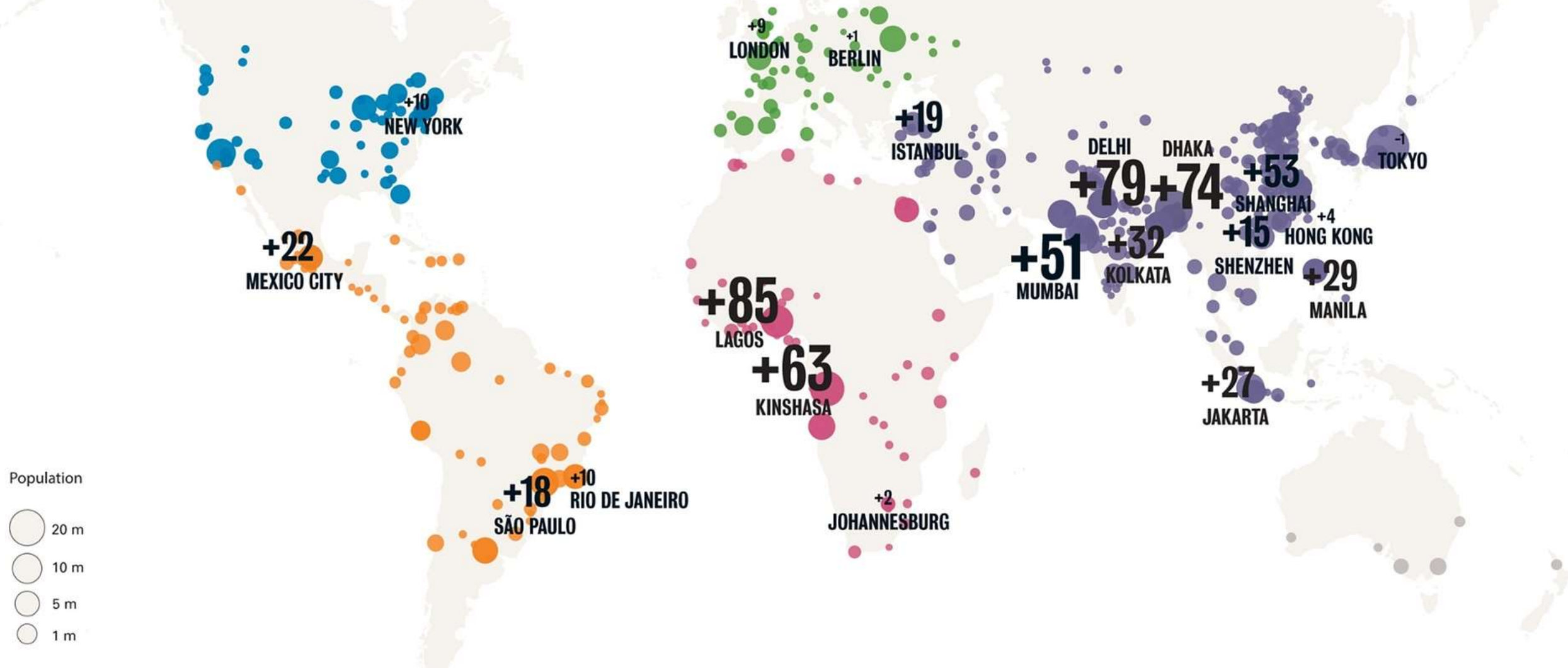


## CURRENT AND FUTURE MEGACITIES 2015 - 2030



Source: World Urbanization Prospects: The 2014 Revision

# URBAN GROWTH PER HOUR

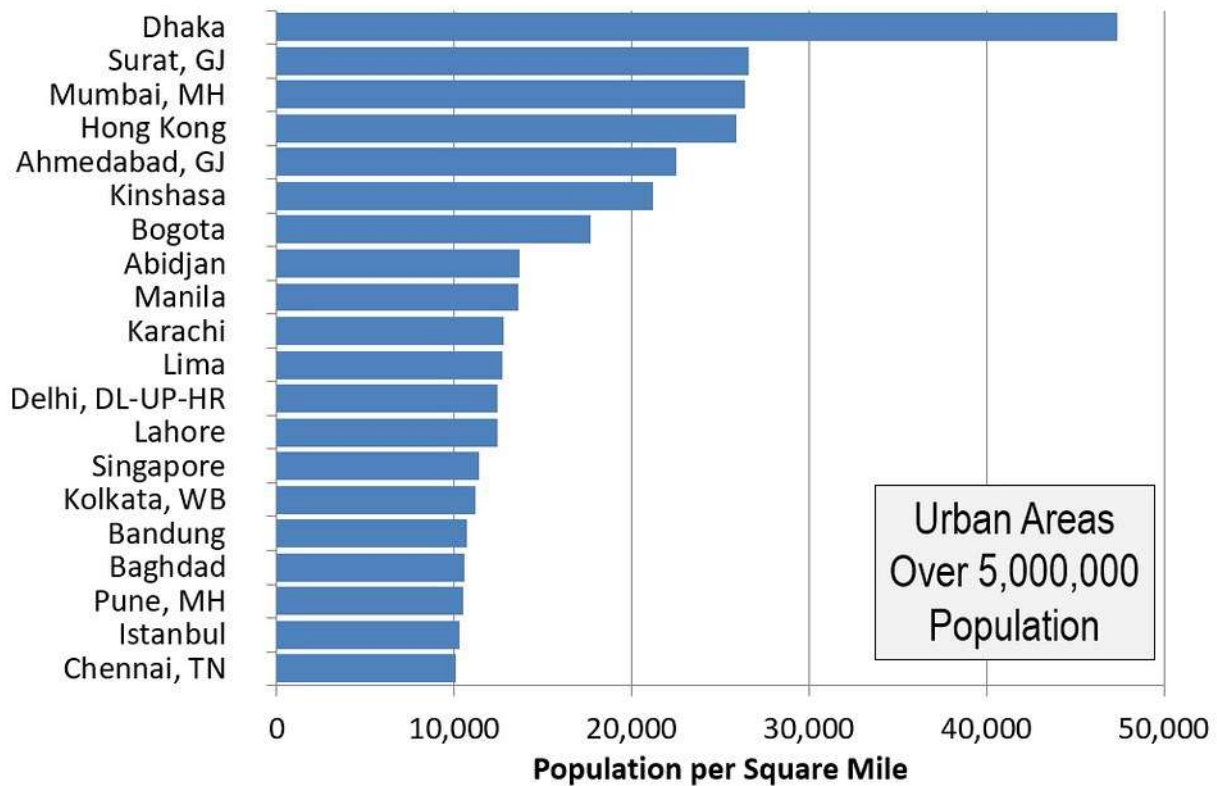






# World's Densest Built-Up Urban Areas

POPULATION DENSITY: PER KM<sup>2</sup>: 2018 ESTIMATES



Source: Demographia World Urban Areas, 2018

15 out of 20 in Asia and only two are in the “high-income world” (Hong Kong and Singapore)





## Lagos: The 100 Million Mega-City by 2100?

“The city stretches so far. It is like a new world where I know no one and nothing”




# Megacities

- Projected to be 41 megacities by 2030.
- They can wreak havoc on the atmosphere, resources, and the environment.
- ... but they can also be a source of environmental good and critical innovation.
- One day they will be more important and influential than countries.

[www.smithsonianmag.com](http://www.smithsonianmag.com)



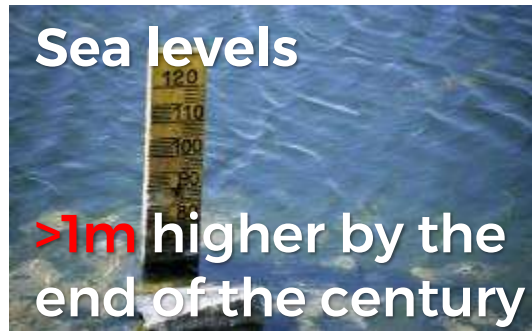


A high-angle photograph showing a vast, dark pile of plastic waste, likely a beach cleanup site. Several people are visible on the right side, sorting through the debris. The waste consists of numerous small, colorful plastic fragments, including bottle caps, shards, and unrecognizable pieces of plastic. The scene is dimly lit, with the ground appearing dark and the plastic pieces providing some contrast.

China, Indonesia, Philippines, Thailand, and Vietnam are dumping more plastic into oceans than the rest of the world combined.



## Climate



## Society



## Technology



## Resources





# The Current Global Risk Outlook

Types of Risks:  ENVIRONMENTAL  GEOPOLITICAL  SOCIETAL  TECHNOLOGICAL  ECONOMIC

## Top 5 Global Risks in Terms of **Impact**



## Top 5 Global Risks in Terms of **Likelihood**



SOURCE: World Economic Forum – Global Risks Report 2019



# The RISK Formula & Decision-making

$$\boxed{RISK} = f(H, \boxed{E, V})$$

RISK to what we value  
and what we want to  
achieve?

A measure of the impact  
of something that has  
not yet occurred.

A measure of loss,  
damage, or missed  
opportunity

Highly Variable Geospatially  
and Over Time

Models Still Simplistic

Evidence Base Developing



## EXPOSURE

### ***What, where, & value?***

- People & Communities
- Cultural Heritage
- Infrastructure
- Habitats & Resources
- Economic Production

## HAZARD

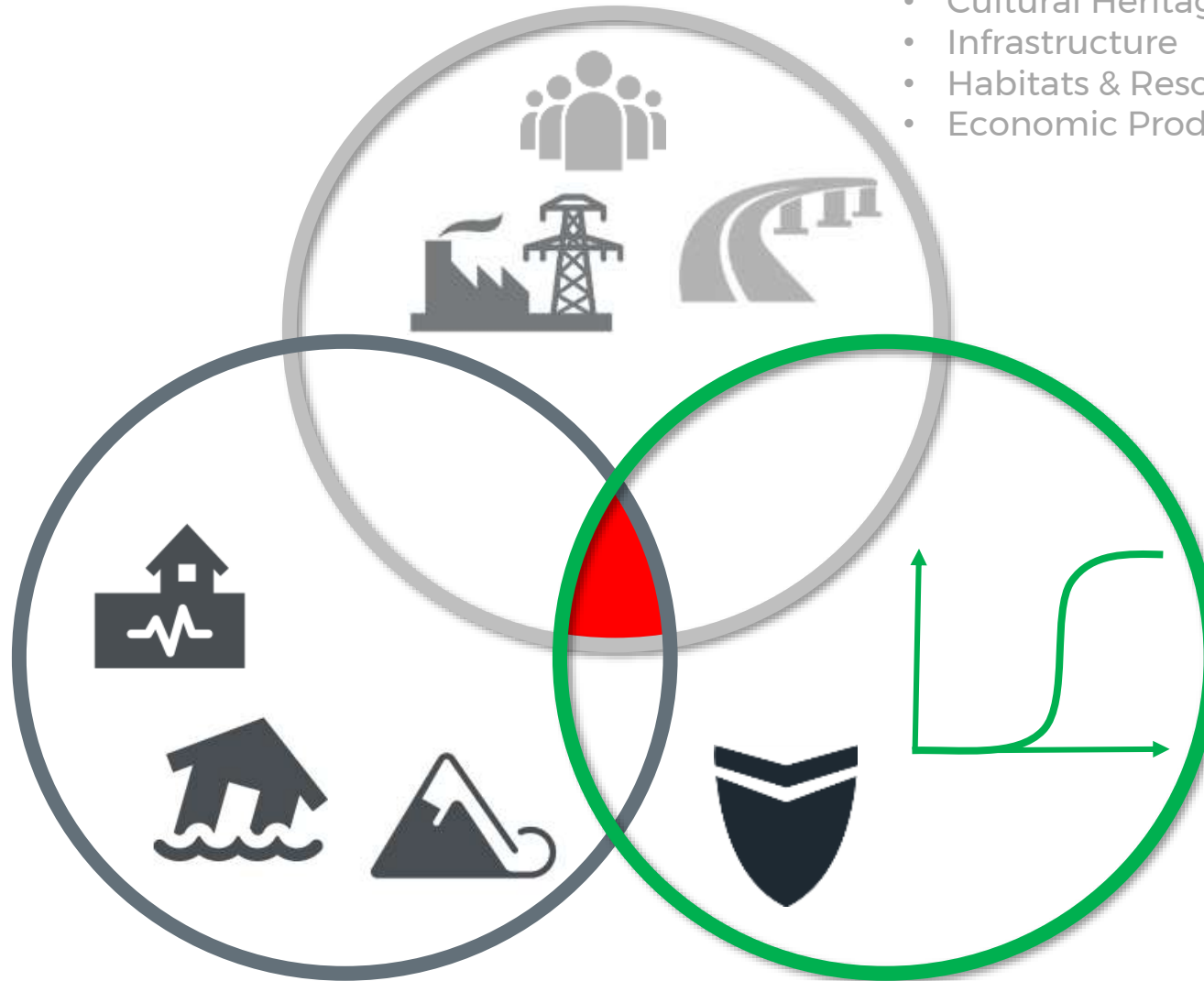
***How intense, extensive, and frequent?***

## VULNERABILITY

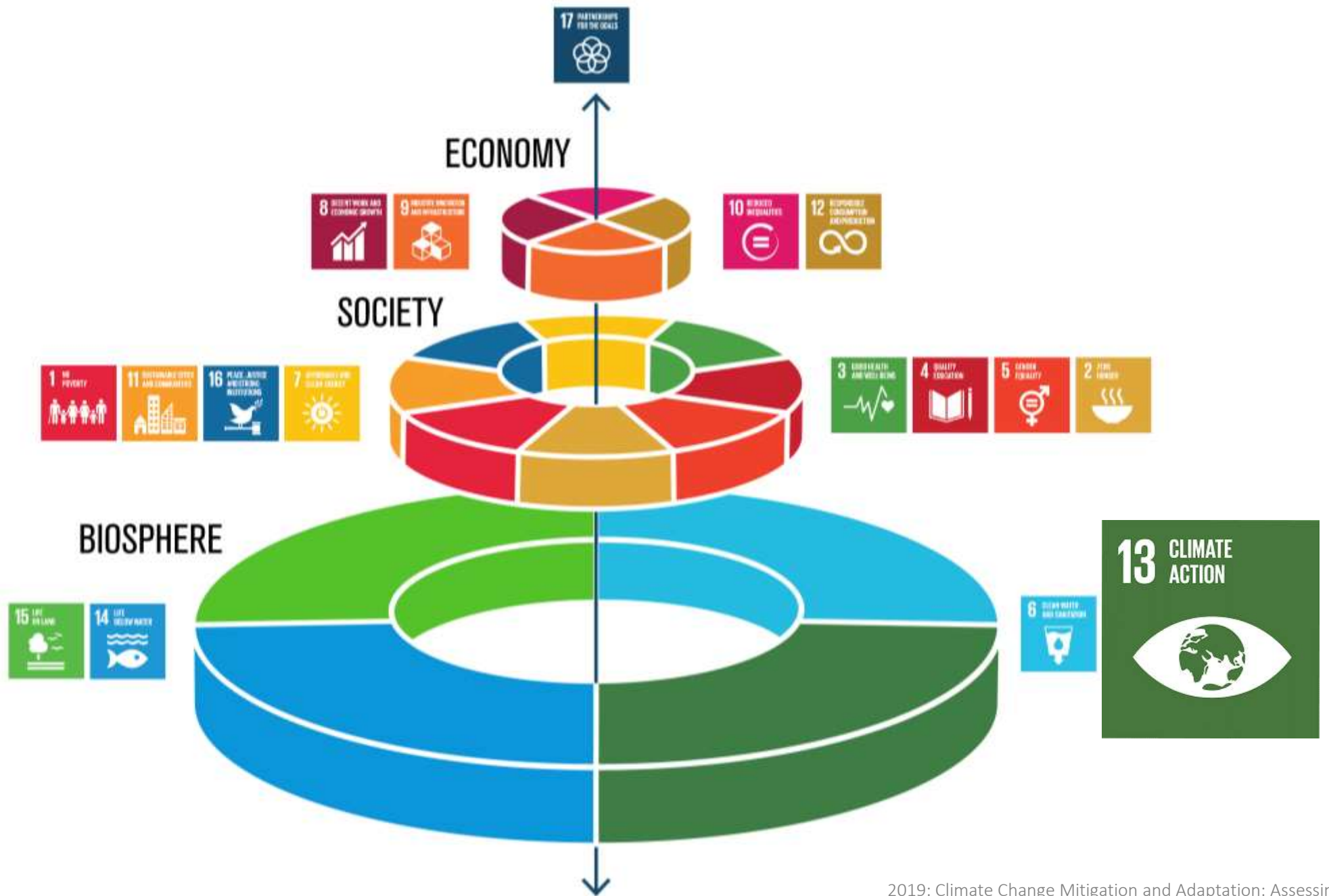
***How fragile & how sensitive?***

- **Social**
- **Economic**
- **Infrastructure**
- **Natural habitats**

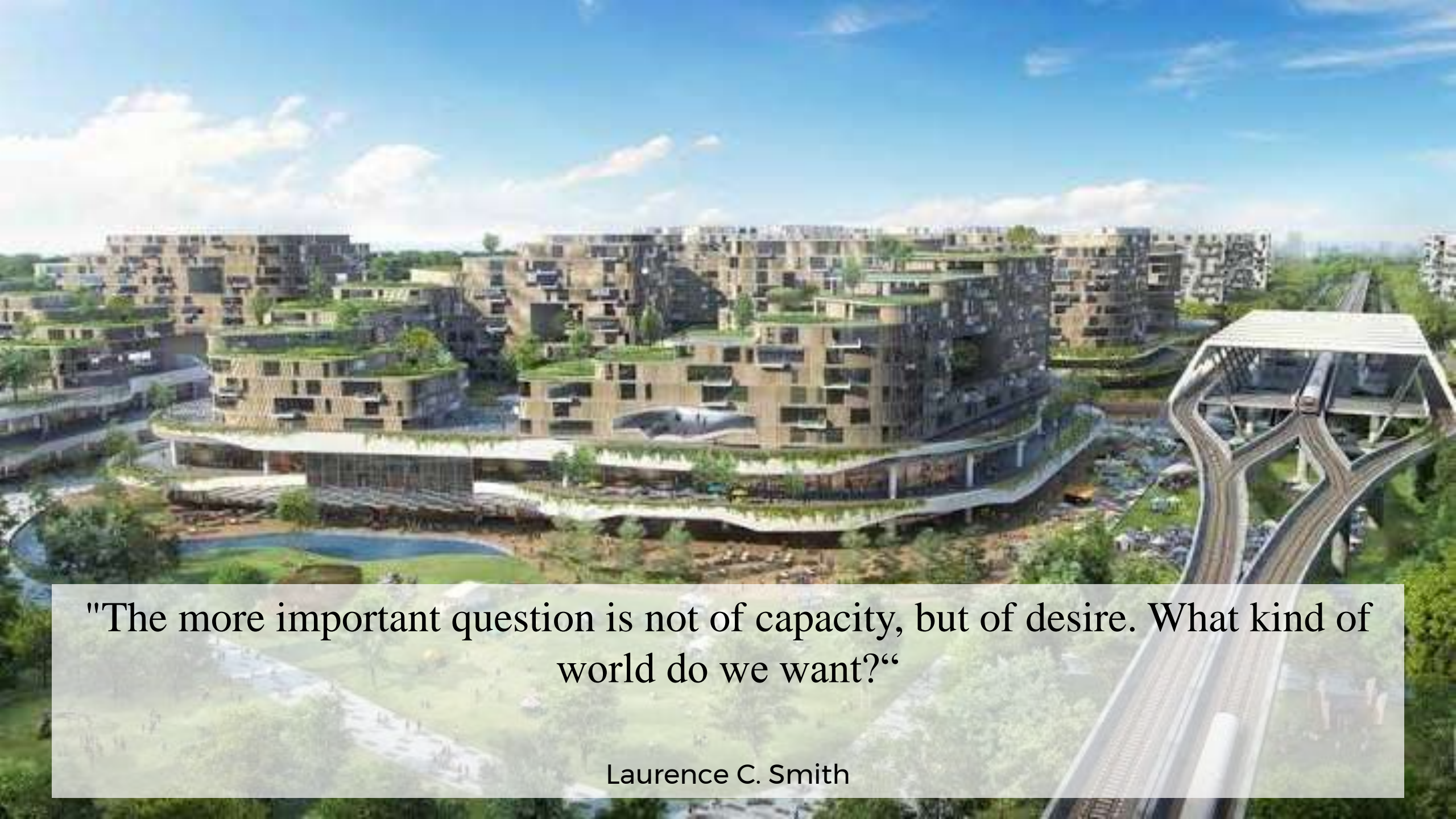
***Adaptive Capacity?***









An aerial photograph of a modern, multi-story residential complex. The buildings are arranged in a cluster, featuring green roofs and balconies. A winding road or path runs through the complex, and a large, curved structure is visible on the right side. The sky is blue with scattered clouds.

"The more important question is not of capacity, but of desire. What kind of world do we want?"

Laurence C. Smith





Source: Cumballa Hill, Mumbai (2010). From the series "BRICS" © Marcus Lyon





Source: Wadi, Mumbai (2009). From the series "BRICS"© Marcus Lyon



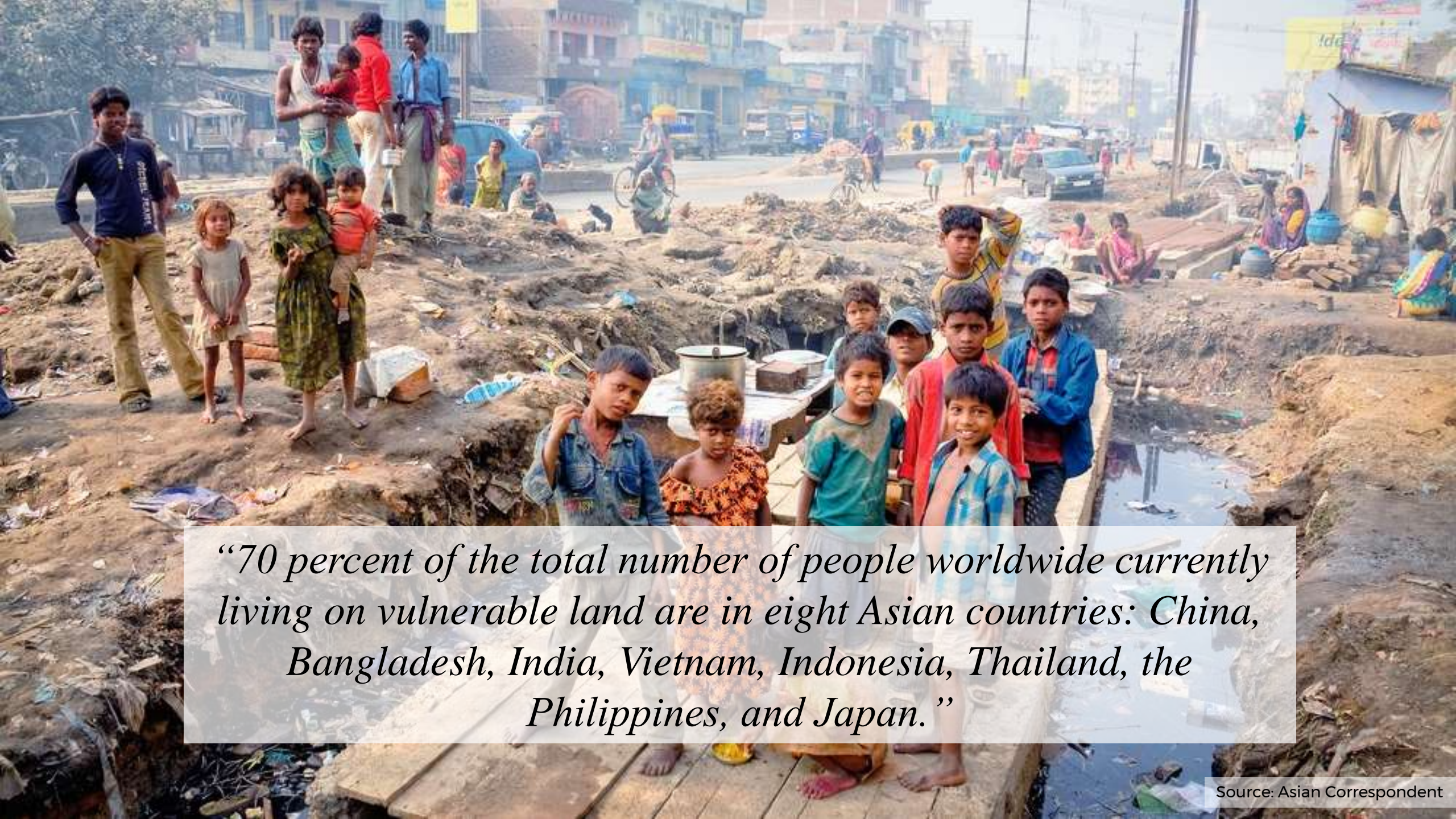


Source: Mumbai, Johnny Miller



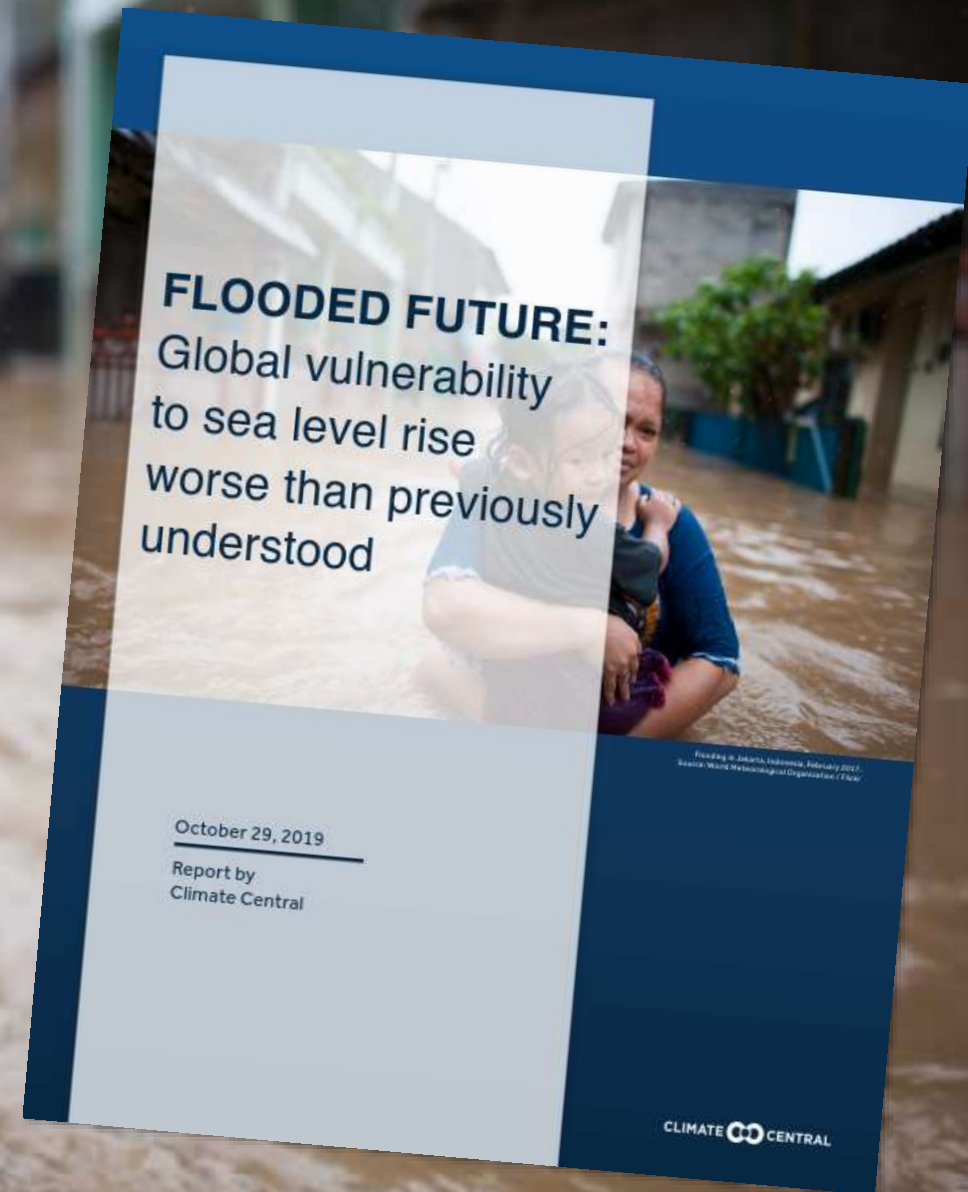






*“70 percent of the total number of people worldwide currently living on vulnerable land are in eight Asian countries: China, Bangladesh, India, Vietnam, Indonesia, Thailand, the Philippines, and Japan.”*





Flooding in Jakarta, Indonesia, February 2017.  
Source: [World Meteorological Organization / Flickr](#)



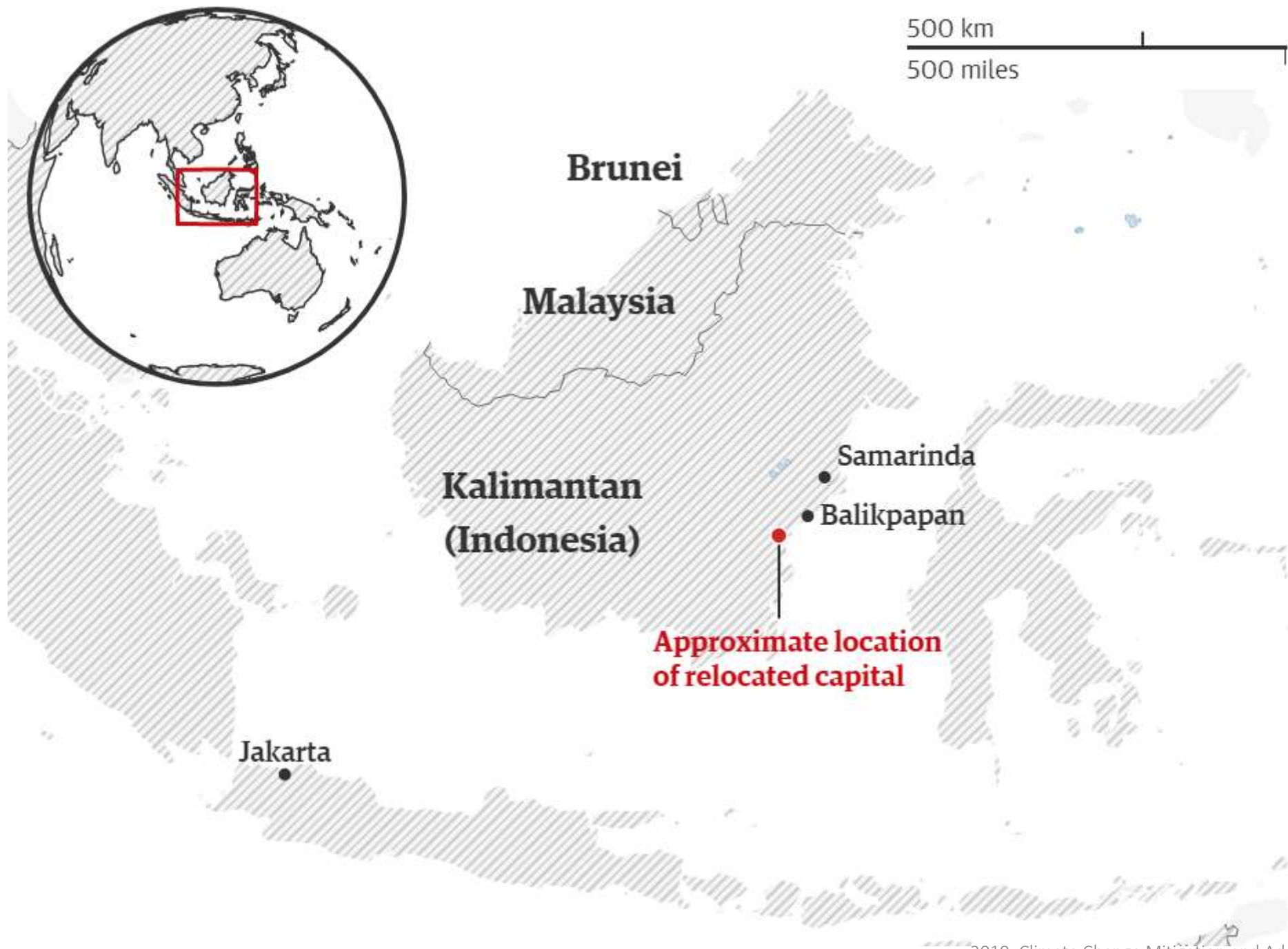
**Chart 1. Current population below the elevation of an average annual flood in 2050, top six countries**

Country	SRTM	CoastalDEM	Change
1. China (mainland)	29 million people	93 million people	+67 million people
2. Bangladesh	5 million people	42 million people	+37 million people
3. India	5 million people	36 million people	+31 million people
4. Vietnam	9 million people	31 million people	+22 million people
5. Indonesia	5 million people	23 million people	+18 million people
6. Thailand	1 million people	12 million people	+11 million people
Total, global	79 million people	300 million people	+221 million people

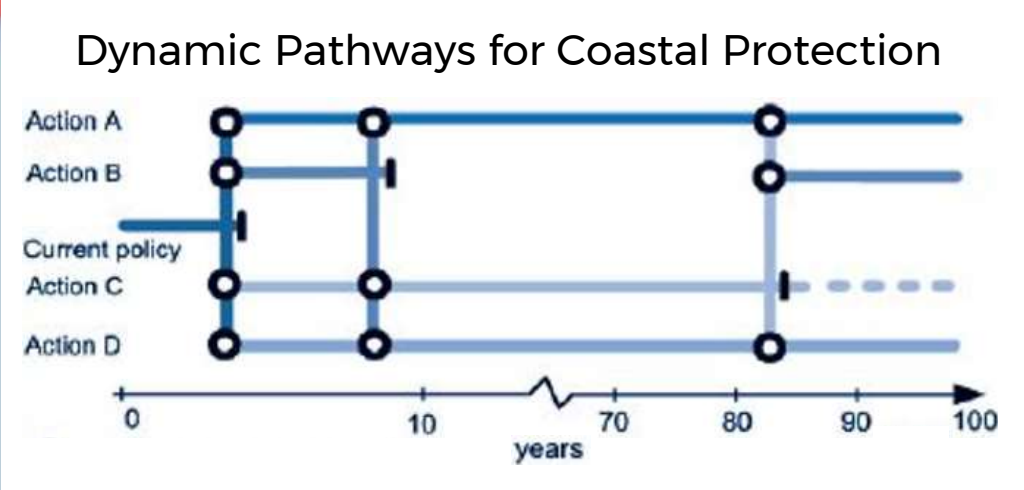
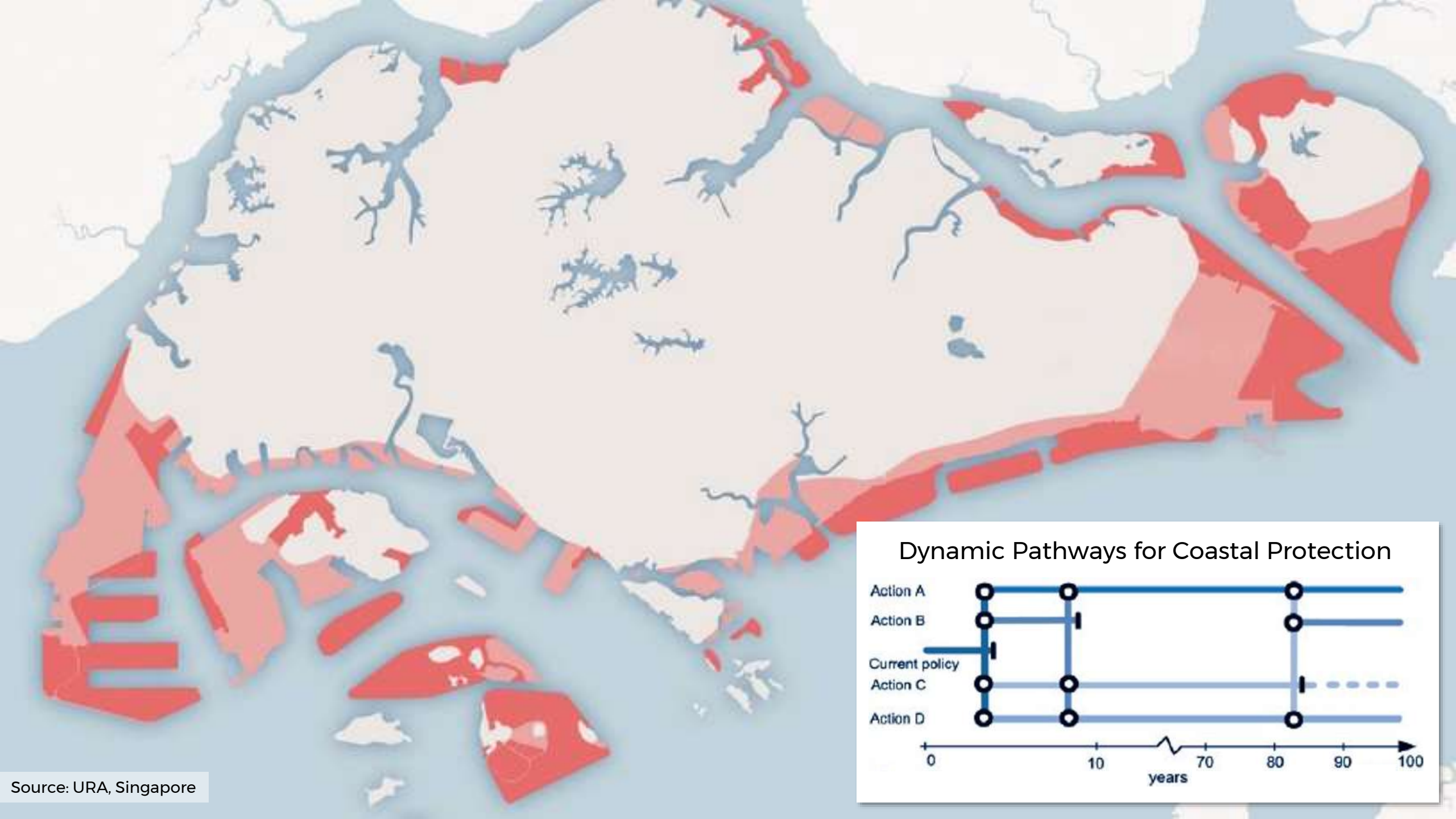
***“The threat is concentrated in coastal Asia and could have profound economic and political consequences within the lifetimes of people alive today”***

Source: Kulp, S.A., Strauss, B.H. New elevation data triple estimates of global vulnerability to sea-level rise and coastal flooding. *Nat Commun* **10**, 4844 (2019) doi:10.1038/s41467-019-12808-z











# Singapore

Green & Clean Built  
Environment

Climate Resilience

New Energy

New Transport

Resource Efficiency

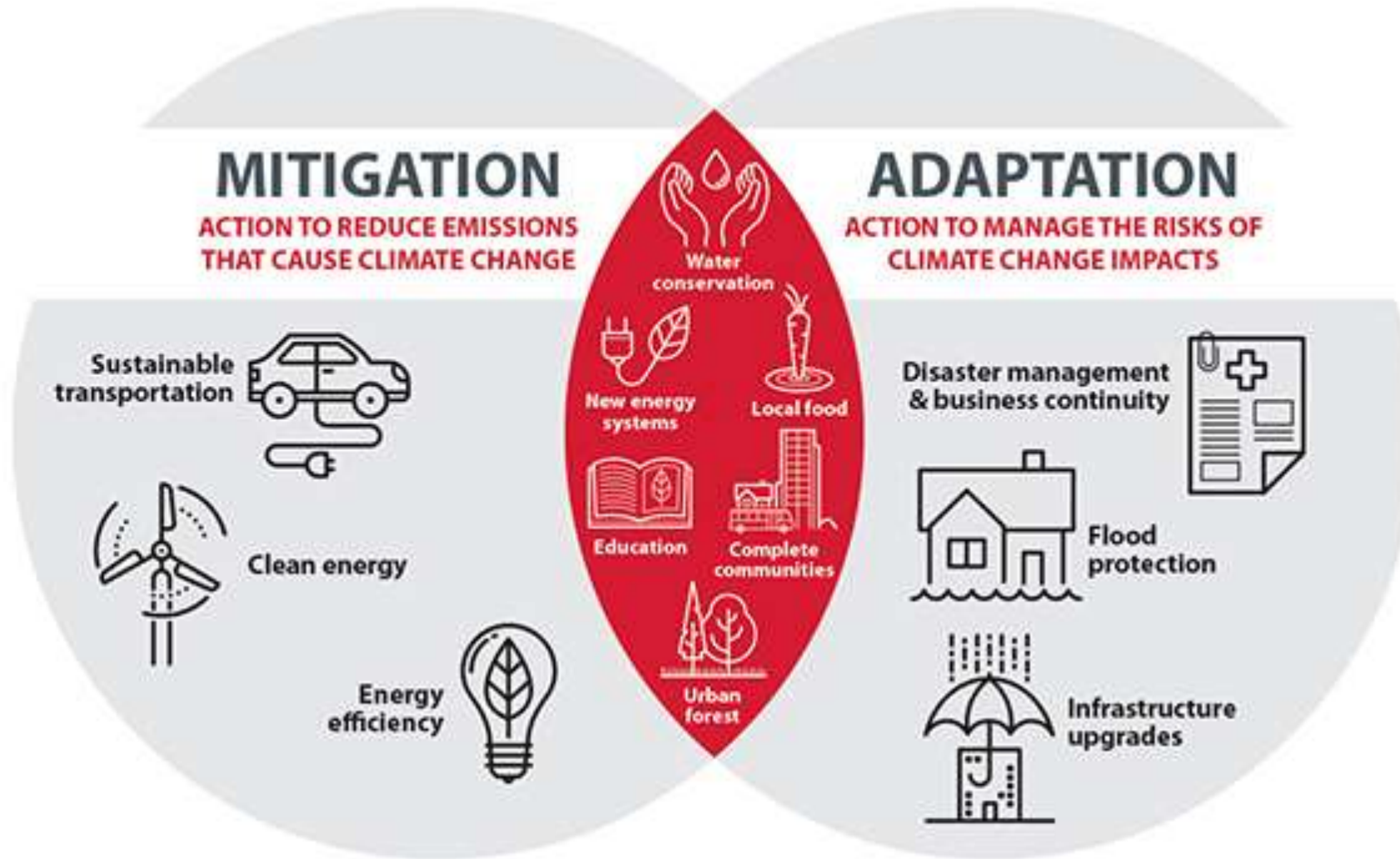
Exceptional Food Security

Self Sufficiency for Water  
Supply





# Building Climate Resilience



Source: City of Calgary Climate Resilience Strategy



## ADAPT OR MITIGATE? THE DILEMMA FOR CITIES

# Adaptation and Mitigation Interaction Assessment (AMIA)

- **Synergies:** the win-win situation, when actions reduce both carbon emissions and climate risks.
- **Trade-offs:** when actions have contrary effects on adaptation and mitigation, so when mitigation actions increase climate risk or adaptation actions increase emissions.
- **Risks of mal-investment:** when actions can be undone or rendered less effective by the effects of climate change if they are not sufficiently resilient.
- **Piggybacking opportunities:** when actions are coupled in their design or implementation and additional mitigation or adaptation actions are added at a small marginal cost.



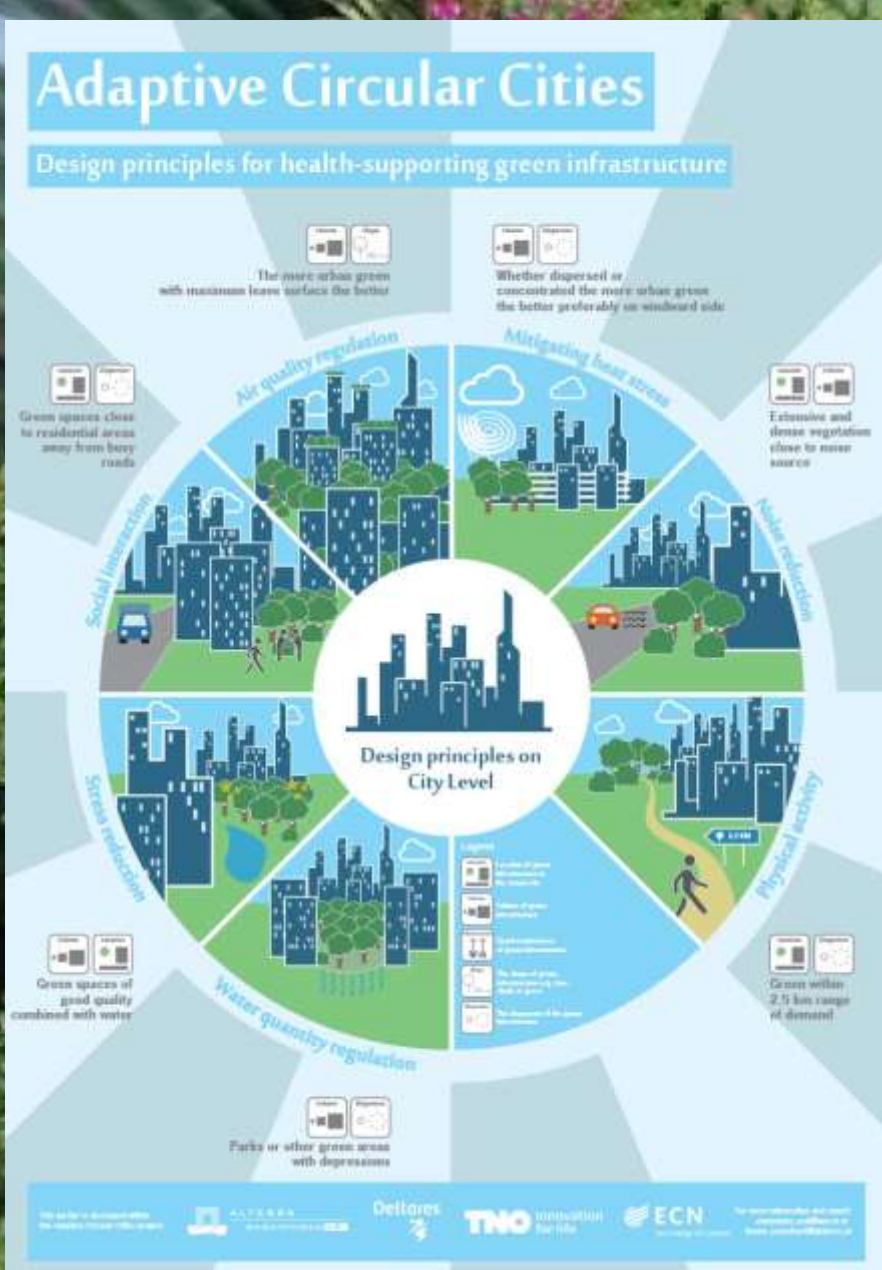




# Towards Adaptive & Circular Cities







[www.adaptivecircularcities.com](http://www.adaptivecircularcities.com)



- 
1. Requires Vision & Requires Determined Leadership
2. *Decarbonise, Decongest, and Design* for people
3. Adopt & encourage resilience thinking at all levels
4. Maximise Synergies Between Mitigation and Adaptation
5. Collaborate towards “*Adaptive & Circular Cities*”



“It’s no use preparing for one probable future. It’s better to think of the future not as a destination, but a pathway — one best navigated with small, nimble steps.”

**Professor Iain White, University of Waikato in New Zealand.**  
**[www.the-possible.com](http://www.the-possible.com)**





(THE ART AND SCIENCE OF)

# THE POSSIBLE

All Stories Connected Thinking Spaces The Human Factor Ingenuity



CONNECTED THINKING

## 12 PEOPLE WHO CAN SAVE THE WORLD

Let's think of the energy transition as a mission to save the Earth. It's an impossible situation, writes Susan Krumdieck, but drastic times call for unlikely heroes.

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The technology behind cryptocurrencies could hold the key to managing complex networks of all kinds, from supply chains and energy microgrids to the internet itself, writes Robbie Epsom.

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Historian Poomima Paidipaty explains how new data streams give a more nuanced picture of how cities work, and why they fail.

[READ MORE](#)



Cities by numbers: How to make urban metrics count **LINKING**

## FIVE COMPONENTS OF THE MODULAR FUTURE

Factory-built homes could make affordable, healthy city living possible for all, argue Narada Golden and Chris Edmonds.

[READ MORE](#)

*The Possible explores the changing nature of buildings and cities, and the ideas and innovations that can help them to function better.*

*It is published by WSP. Our goal is to inspire, inform and entertain, to encourage discussion about what the future holds, and to bridge the gap between blue-skies thinking and what's possible now.*


*It asks 'what if we can?'*



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*“What if we set the world on fire, not by burning fossil fuels, but by our burning desire to understand our environment?”*

*Laura Tenenbaum*

*Former Senior Science Editor for NASA’s Global Climate Change website at NASA’s Jet Propulsion Laboratory*