

SIXTH ASSESSMENT REPORT

Working Group II – Impacts, Adaptation and Vulnerability

ipcc

INTERGOVERNMENTAL PANEL ON climate change

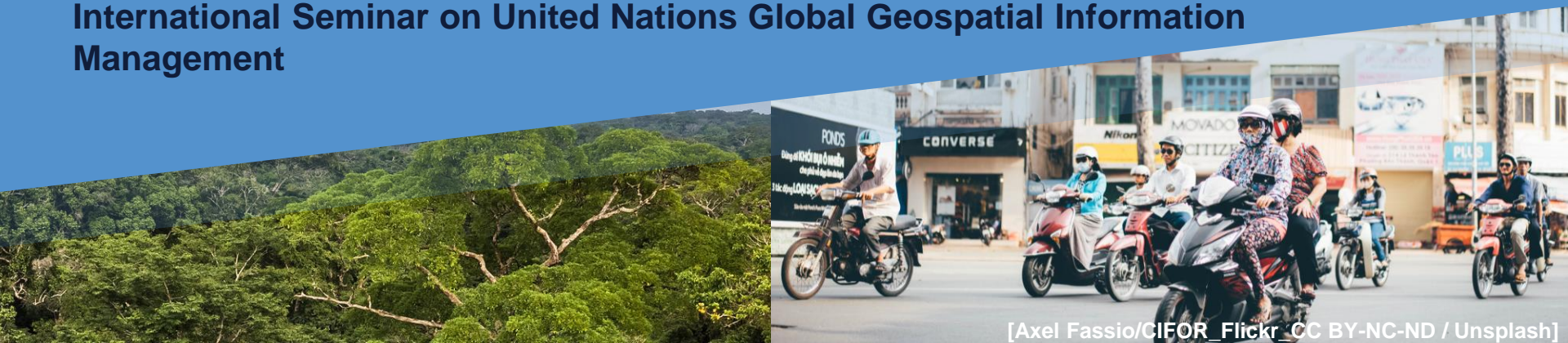


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Land Administration and Urban Climate Change Adaptation & Mitigation

17 May 2022

International Seminar on United Nations Global Geospatial Information Management



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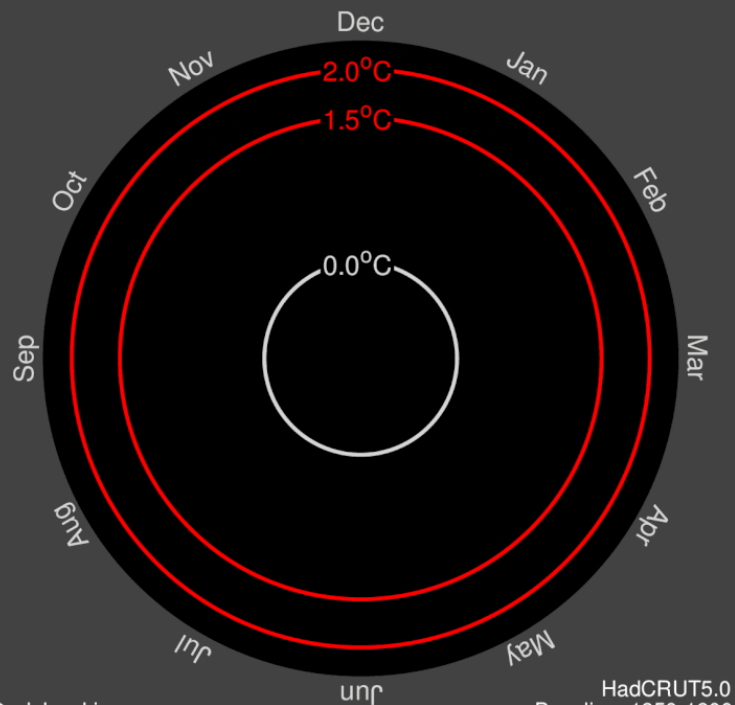
[Toomas Tartes / Unsplash]

We are seeing two processes collide in the 21st Century – that of climate change and urbanisation



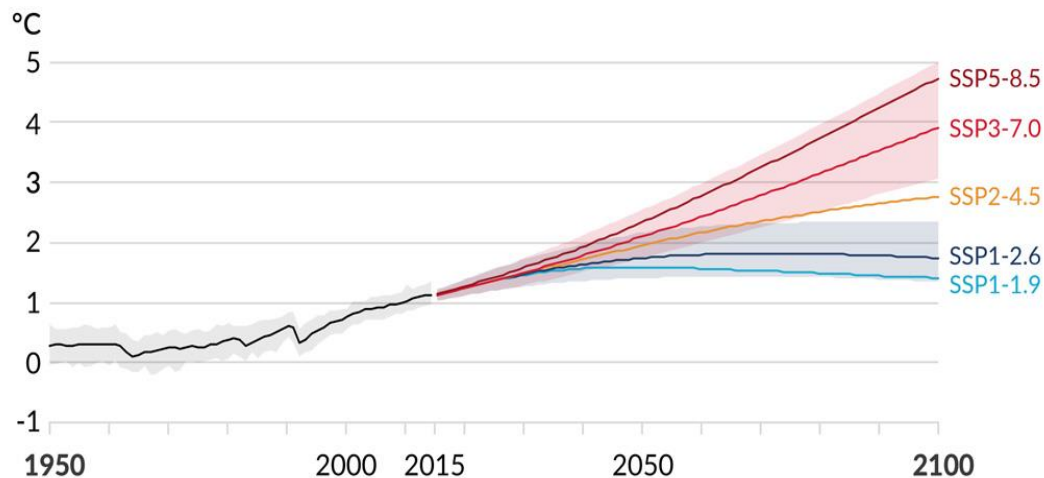
Warming beyond Paris and Glasgow limits of 1.5 °C

Global temperature change (1850-2020)



We are already at **1.1 °C above** pre-industrial temperatures from Greenhouse Gas Emissions & land cover change

Our future is still unwritten but we have a choice of emissions pathways over the next 80 years

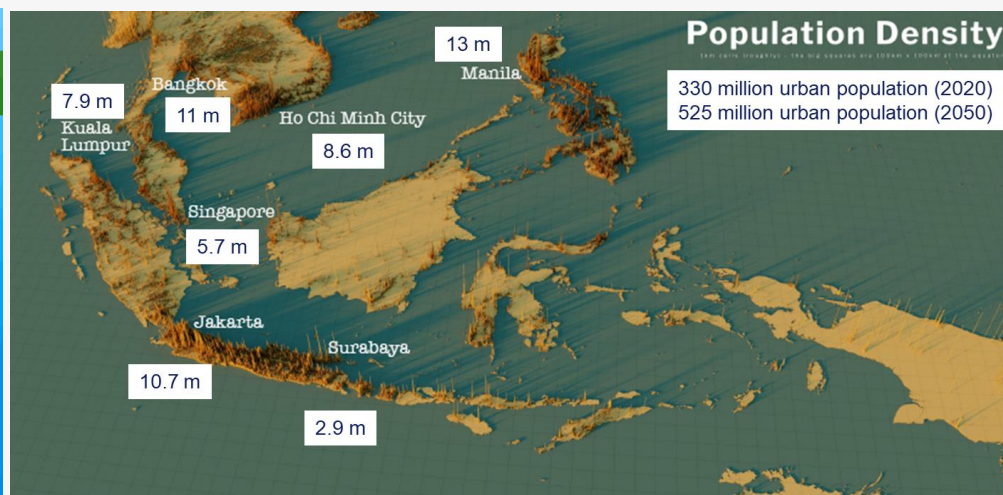


We also live in a urban century

Rapid urbanisation at global scales since 1950

Future “new” urbanisation will largely occur in two continents

Growth is not homogenous – secondary cities growing fast esp. in Asia

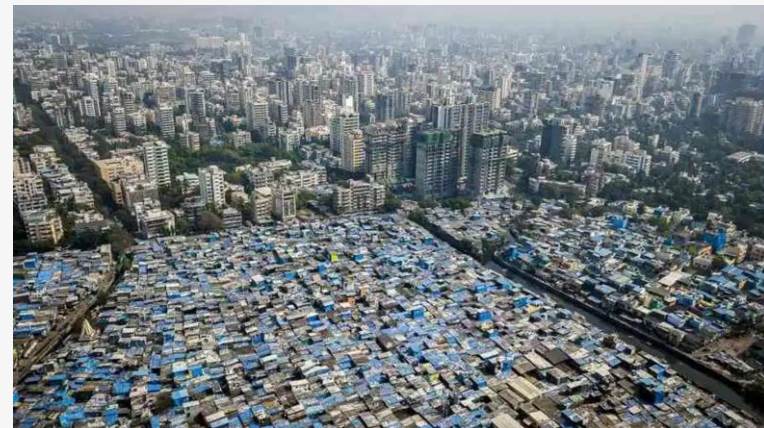


Growth is not homogenous

Rural poverty is being replaced by **urban poverty + rising income inequality** (ADB, 2013)

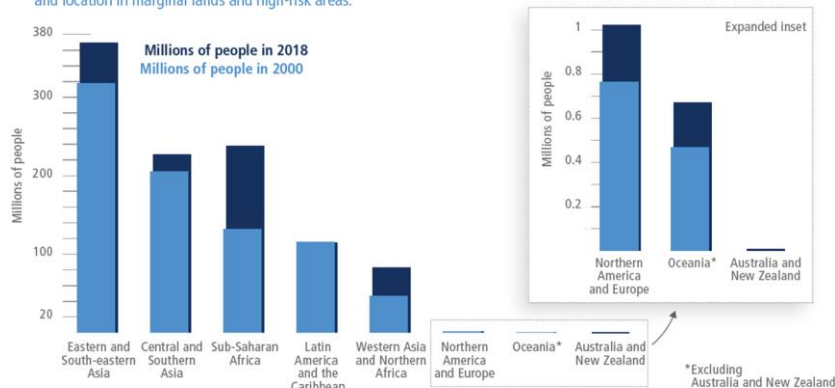
High and growing inequality within Indian and Chinese settlements (Baker & Gadgil 2017; Imai & Malaeb 2018)

Insecure land tenure rights and absence of landuse planning that is cognisant of climate change (Mitchell et al. 2015)



Climate change in cities and settlements

(a) Urban poor populations residing in informal settlements are highly vulnerable to climate hazards given their housing characteristics and location in marginal lands and high-risk areas.



Urban heat risks

Warmer temperatures from climate change and urbanization

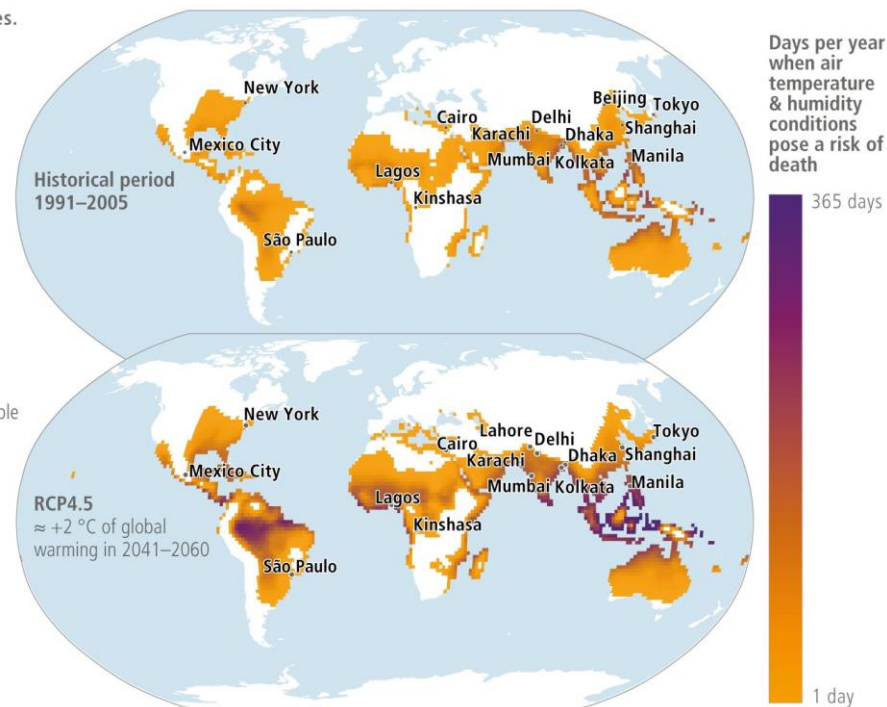
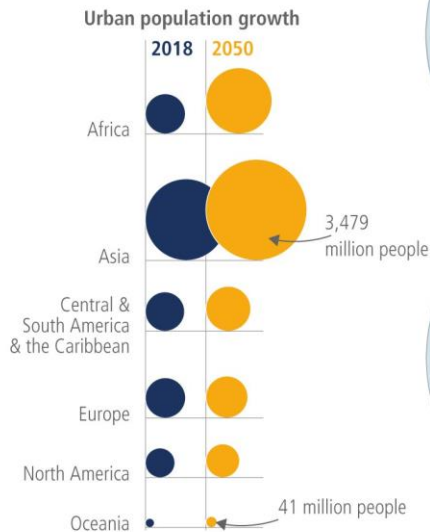
Greater exposure to daily conditions where combined heat + humidity significantly increases heat-related injuries

Populations like elderly & very young, outdoor workers & disabled are at **greater risk**

Cascading risks to health infrastructure in cities

Map data without accounting for heatwaves.

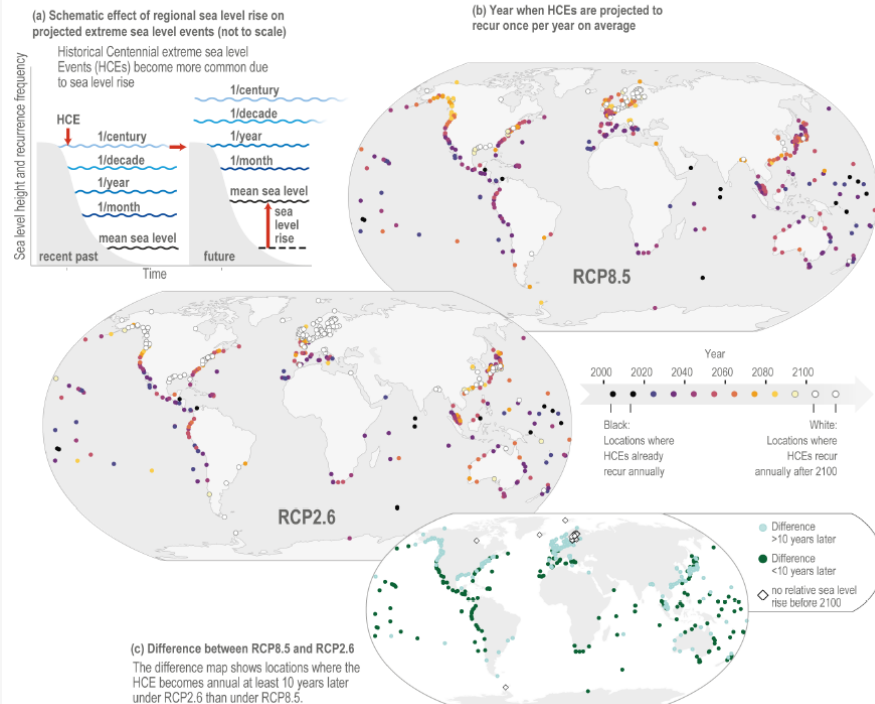
Named cities are the largest 15 urban areas by population size.



Sea level rise & flooding risks to cities

Extreme sea level events

Due to projected global mean sea level (GMSL) rise, local sea levels that historically occurred once per century (historical centennial events, HCEs) are projected to become at least annual events at most locations during the 21st century. The height of a HCE varies widely, and depending on the level of exposure can already cause severe impacts. Impacts can continue to increase with rising frequency of HCEs.



(c) Projected number of people at risk of a 100-year coastal flood.

Calculated for sea level rise under SSP2-4.5, based on current protection levels.

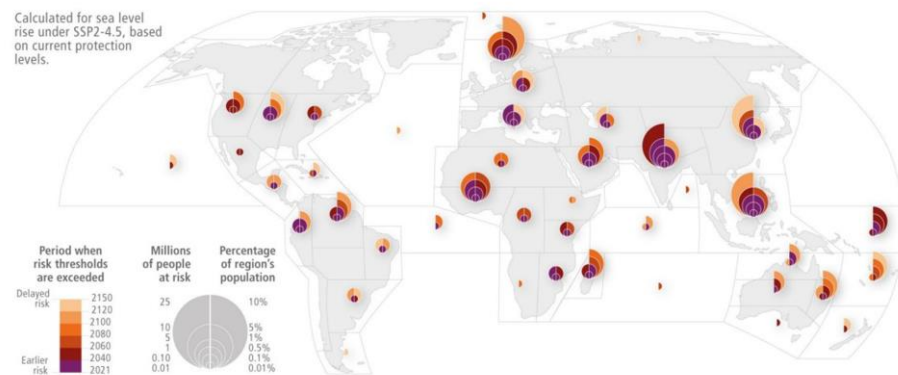


Figure 1: The size of the circle represents the number of people at risk per IPCC region and the colours show the timing of risk based on projected sea-level rise under SSP2-4.5. Darker colours indicate earlier in setting risks. The left side of the circles shows absolute population at risk and the right side the share of the population in percentage. (Figure CCP2.4; Figure 13.6; Figure 15.3; Annex 1: Global to Regional Atlas; TS.9c).

Coastal cities are subject to **higher flood risks**, especially from sea level rise (SLR)

Current 1-in-100 year extreme sea level events will likely **become annual events** depending on emissions

>1 billion people and **\$\$\$ infrastructure** at risk from SLR



What can we do to reduce these risks, and how can land administration contribute to climate action?



“

We have a narrowing time window to reach climate targets through ambitious reductions in GHG emissions, deal with climate risks, stop biodiversity loss and, at the same time, improve peoples' wellbeing – for example by reducing poverty and hunger, improving health and livelihoods and providing more people with clean energy and water. This is **climate resilient development**.

What can cities do?

Reduce risk via adaptation – examine not just infrastructure but also **nature-based solutions with planning and social policy** as solutions

e.g. security of land tenure to reduce vulnerability, “green” standards for new/retrofitted buildings, and/or planning for land protection from Sea Level Rise

Reduce emissions not just by technologies but also **via policies that reduce demand-side/carbon-intensive behaviour**

e.g. policy shift to electric vehicles

(d) Contributions of urban adaptation options to Climate Resilient Development.

Nature-based solutions and social policy as innovative domains of adaptation show how some of the limitations of grey infrastructure can be mediated. A mixture of the three categories has considerable future scope in adaptation strategies and building climate resilience in cities and settlements.



Figure 2: The figure is based on Table 6.6 which is an assessment of 21 urban adaptation mechanisms. Supplementary Material 6.3 provides a detailed analysis including definitions for each component of Climate Resilient Development and the evidences. (Table 6.6; 6.3.1; 6.3.2; 6.3.3; TS9.d)

What can cities do?

Improve livelihoods not just by ad hoc decision making but also **via inclusive, long-term partnerships that reduce poverty and enables transformation**

e.g. “green” employment transition with new tech & infrastructure

Look for co-benefits across adaptation options that **enhance mitigation and sustainable development**

e.g. green spaces & water sensitive urban design

Integrated, inclusive planning works

(d) Contributions of urban adaptation options to Climate Resilient Development.

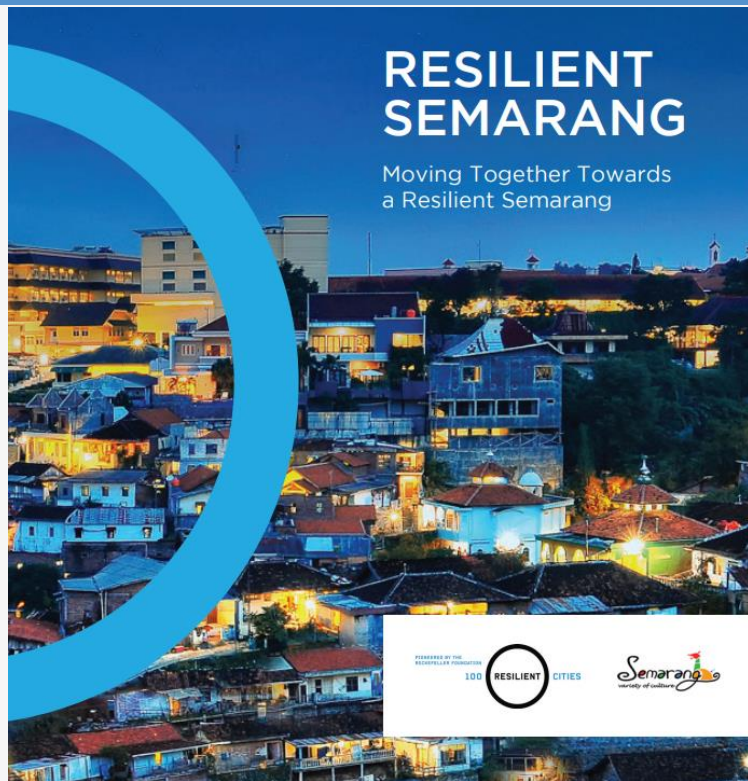
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RESILIENT SEMARANG

Moving Together Towards a Resilient Semarang



PRODUCED BY THE
RESILIENT CITIES INITIATIVE

100 RESILIENT CITIES

Semarang
city of culture

SG GREEN PLAN

The Singapore Green Plan 2030 is a national sustainability movement which seeks to rally bold and collective action to tackle climate change.

It is a living plan which will evolve as we work with Singaporeans and partners from all sectors to co-create solutions for sustainability. Let's work together to make Singapore a green and liveable home.

City in Nature

- Green, Liveable and Sustainable Home for Singaporeans
- Plant 1 million more trees, and have every household within a 10-minute walk from a park by 2030
 - Develop over 130 ha of new parks, and enhance around 170 ha of existing parks with more lush vegetation and natural landscapes by end-2026
 - Add 1000ha of green spaces by 2035

Green Government

- Public sector will lead on sustainability
- Be exemplary in taking sustainability action, including to peak public sector carbon emissions around 2025, ahead of national target
 - Encourage and enable citizens and businesses to adopt sustainability practices, such as through green procurement

Sustainable Living

- Strengthen Green Efforts in Schools
- Introduce an Eco Stewardship Programme to enhance environmental education in all schools
 - Work towards two-thirds reduction of net carbon emissions from schools sector by 2030
 - At least 20% of schools to be carbon neutral by 2030
- Green Commutes
- 75% of trips during peak periods to be on mass public transport by 2030
 - Triple cycling path network to 1,320km by 2030, from 460km in 2020
 - Expand rail network to 360km by early 2030s, from around 230km today
- Green Citizenry:
- Reduce waste and consumption
 - Reduce amount of waste to landfill per capita per day by 20% by 2026, and 30% by 2030
 - Reduce household water consumption to 130 litres per capita per day

Energy Reset

- Cleaner-energy Vehicles
- New diesel car and taxi registrations to cease from 2025, with all new car and taxi registrations to be of cleaner-energy models from 2030
 - Further revise road tax structure to bring down road tax for mass-market electric cars
 - Target 60,000 electric vehicle (EV) charging points by 2030, with 8 EV-Ready Towns by 2025
- Greener Infrastructure & Buildings
- Green 80% of Singapore's buildings (by Gross Floor Area) by 2030
 - 80% of new buildings (by Gross Floor Area) to be Super Low Energy buildings from 2030
 - Best-in-class green buildings to see 80% improvement in energy efficiency (over 2005 levels) by 2030
- Sustainable Towns & Districts
- Reduce energy consumption in HDB towns by 15% by 2030
- Green Energy
- Quadruple solar energy deployment to 1.5 gigawatt-peak by 2025
 - Tap on cleaner electricity imports, and increase R&D on renewable energy and emerging low-carbon technologies

Green Economy

- Sustainability as New Engine of Jobs and Growth
- New Enterprise Sustainability Programme to help local enterprises adopt sustainability practices
 - Develop Singapore to be a carbon services hub, and a leading centre for green finance in Asia and globally
 - Develop Jurong Island to be a sustainable energy and chemicals park
 - Leverage opportunities in sustainable industries to create good jobs for Singaporeans
- New Investments to be Carbon and Energy Efficient
- Seek new investments to be among the best-in-class in energy/carbon efficiency

Resilient Future

- Safeguarding our Coastlines against Rising Sea Levels
- SS50 dedicated to coastal and drainage flood protection measures
 - Formulation of coastal protection plans for City-East Coast, North-West Coast (Lim Chu Kang and Sungei Kadut) and Jurong Island by 2030
- Safeguarding Food Security
- Produce 30% of our nutritional needs locally and sustainably by 2030, through developing land and sea space and skilled workers, funding support, and promoting R&D
- Keeping Singapore Cool
- Moderate the rise in urban heat, such as with cool paint and by increasing greenery

Jointly led by:



www.GreenPlan.gov.sg

Examples of potential resilient cities in Southeast Asia – the important role of land administration in climate resilient urban development

Climate resilient policies requires urban planning informed by robust research

In Singapore, the multi-agency **Cooling Singapore 2.0 Initiative** (National Research Foundation) that contributes to SG Green Plan – “Resilient Future”

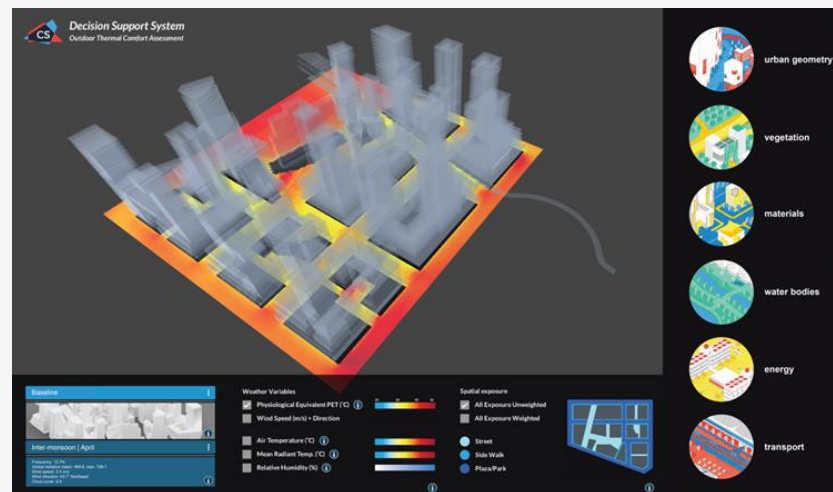
CS2.0 develops a **digital urban climate twin** (based on climate, energy, building, traffic and vegetation models) to aid agency stakeholders in Singapore in examining what solutions can effectively reduce urban heat & thermal discomfort

COOLING SINGAPORE

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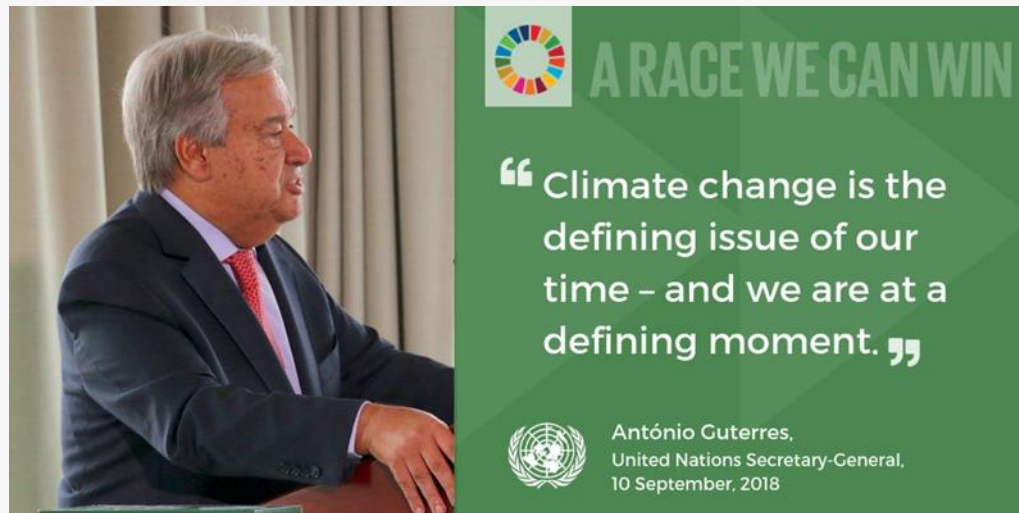
Cooling Singapore is a research project dedicated to developing solutions to address the urban heat challenge in Singapore.

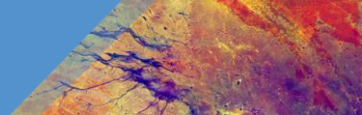


In conclusion...

Land administration is **an important component in enabling climate resilient development**, especially in cities that are facing high levels of risk to their residents and infrastructure

Policies related to land use planning should be **based on robust research, inclusive of all stakeholder viewpoints, and should not be ad hoc/short-term in duration** to deal with the climate emergency facing humanity





THANK YOU

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