CLIMATE RESILIENT AND INCLUSIVE CITIES

ISOCARP INSTITUTE
Centre for Urban Excellence

PLANNING FOR CLIMATE ACTION & IMPROVED URBAN ENVIRONMENT

PERENCANAAN UNTUK AKSI IKLIM DAN PENINGKATAN KUALITAS LINGKUNGAN PERKOTAAN

SESI 3 | RABU 22 JULI 2020 | 15:15-16:45 WIB

SESSION 03 | WEDNESDAY 22 JULY 2020 | 15:15-16:45 PM WIB/JAKARTA TIME

Pilot4DEV

UCLG ASPAC
United Cities and Local Governments Asia Pacific

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ISOCARP INSTITUTE *ENVIRONMENTAL SESSION*

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COURSE OUTLINE
AGENDA PELATIHAN

- Learning Objectives | **Tujuan Pembelajaran**
- Introduction – Theory | **Pengenalan - Teori** | 20 min
- Case-Study Examples | **Studi Kasus** | 20 min
- Tools and Methods | **Instrument dan Metode** | 10 min
- Useful Resources and References | **Sumber Bacaaan dan Referensi** | 20 min
- Questions to Participants |**Pertanyaan untuk Peserta** | 10 min
- Recap Take-Away Lessons | **Kesimpulan Pembelajaran**
- Q&A | **Tanya Jawab** | 20 min

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LEARNING OBJECTIVES
TUJUAN PEMBELAJARAN

- Understand the drivers and impacts of climate change on cities
  Memahami penyebab dan dampak perubahan iklim di kota
- Understand urban climate risk and vulnerability
  Memahami risiko iklim dan kerentanan di perkotaan
- Understand key terms: Mitigation, Adaptation, Resilience
  Memahami istilah kunci: Mitigasi, Adaptasi dan Ketangguhan
- Understand different approaches to climate change planning in cities
  Memahami berbagai pendekatan dalam perencanaan perubahan iklim di kota
- Understand climate change planning process and tools
  Memahami proses dan instrumen dalam perencanaan aksi iklim
- Review best-practice case-studies of planning for climate change in cities
  Mengulas studi kasus praktik baik tentang perencanaan perubahan iklim di kota
- Gain an overview of planning for climate change resources
  Memperoleh informasi tentang bahan-bahan belajar untuk merencanakan aksi perubahan iklim

THEORY

TEORI

Cities and Climate Change

Main drivers and impacts

Vulnerability

City Climate Action Planning

CITIES AND CLIMATE CHANGE
KOTA DAN PERUBAHAN IKLIM

- Human activities are changing the Earth's climate in ways that increase risk to cities.
- Different types of evidence (climate history and records, emerging new patterns of climate extremes, global climate models).
- Cities and their citizens already have begun to experience the effects of climate change.
- Understanding and anticipating these changes will help cities prepare for a more sustainable future.

- **Aktivitas manusia turut mengubah iklim Bumi yang berdampak pada peningkatan risiko ke kota.**
- **Berbagai jenis bukti (sejarah dan catatan iklim, kemunculan pola baru terkait cuaca ekstrem, model iklim global).**
- **Kota-kota dan warganya telah mengalami efek dari perubahan iklim.**
- **Memahami dan mengantisipasi perubahan ini akan membantu kota mempersiapkan masa depan yang lebih berkelanjutan.**

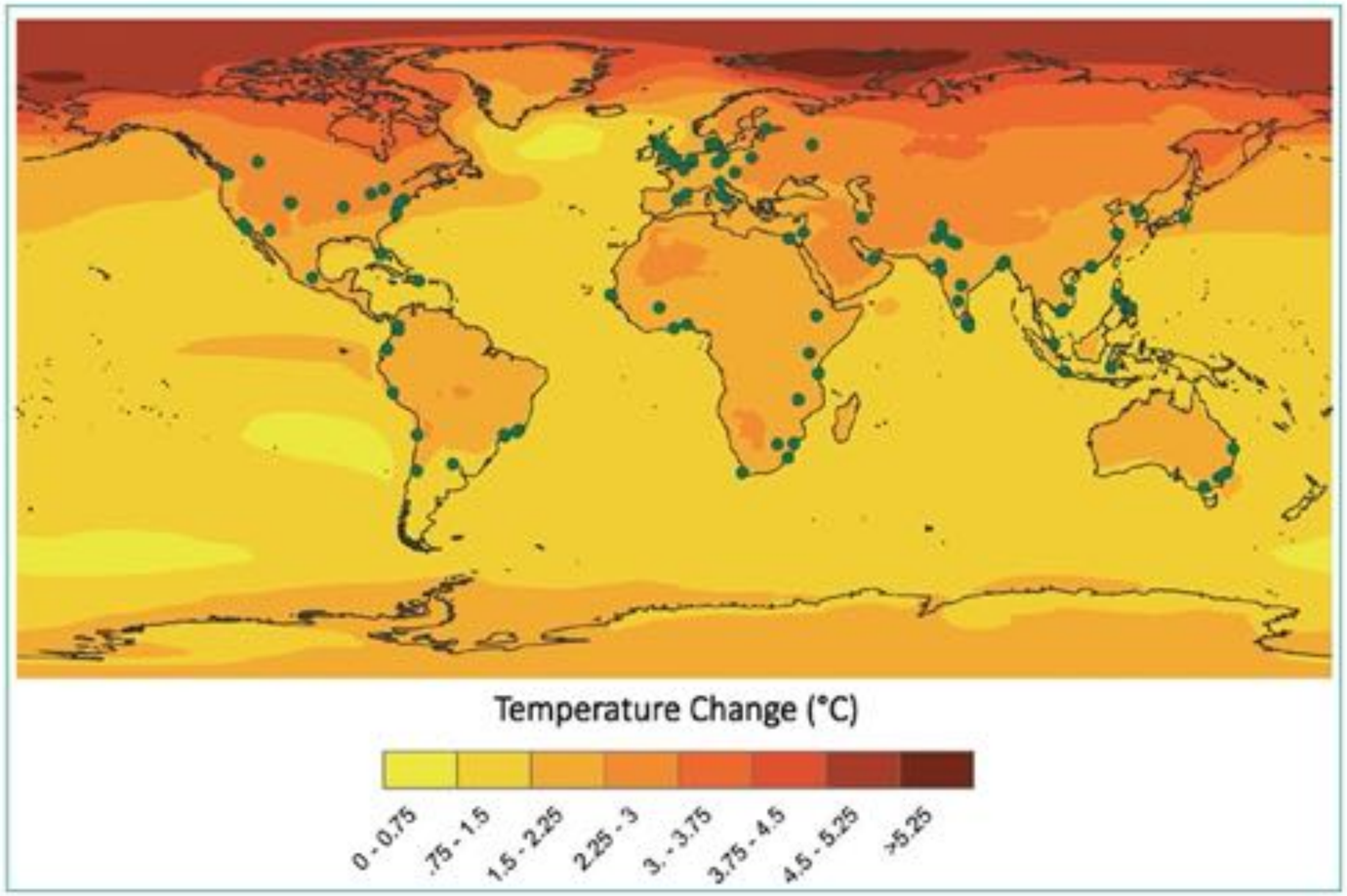


Figure 2: *Projected temperature change in the 2050s and ARC3.2 Cities. Temperature change projection is mean of 35 global climate models (GCMs) and one representative concentration pathway (RCP4.5). Colors represent mean annual temperature change for a mid-range scenario (RCP 4.5), from CMIP5 models (2040-2069 average minus 1971-2000 average).*

Source: UCCRN Climate Change and Cities, ARC3, (2015), p.3

Projected temperature change in 2050

Proyeksi perubahan temperatur tahun 2050

+ 1.5 °C target of maximum increase of global temperature fixed in Paris Agreement.

Heat-mortality in cities

Tingkat kematian akibat cuaca panas ekstrem perkotaan

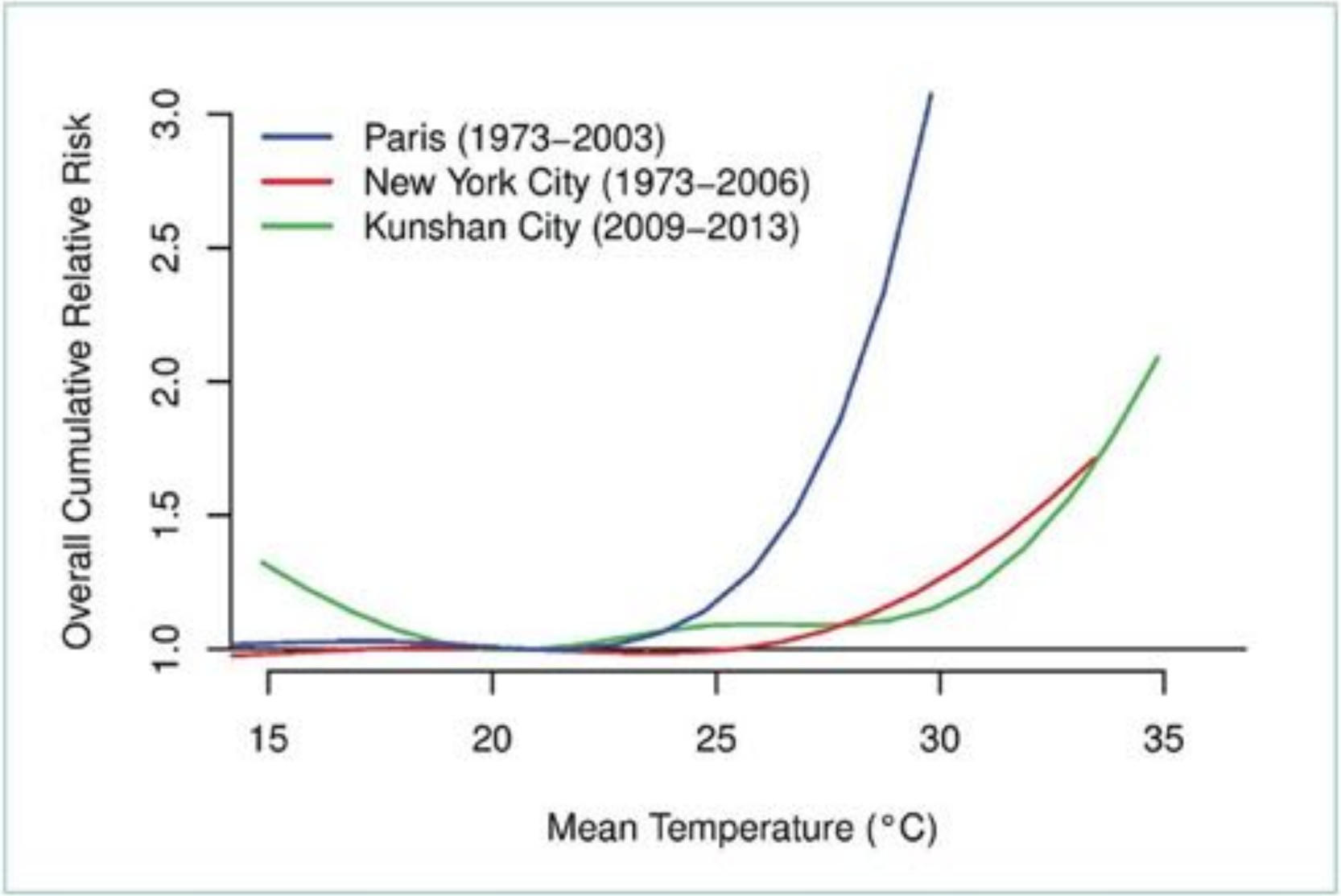


Figure 10: *Overall cumulative heat-mortality relationships in Paris (France), New York City (USA), and Kunshan City (China).*

Source: UCCRN, *Climate Change and Cities*, ARC3, (2015), p.12.

CITIES AND CLIMATE CHANGE
KOTA DAN PERUBAHAN IKLIM

- Unprecedented level of global urbanisation in XXI century.
- Greater risk (cities have the highest concentration of people, assets and resources).
- Cities are the largest emitters of GHGs.
- Unequal contribution to climate change and unequal distribution of its effects.
- Largest cities in the world are located by the coast (sea level rising).

- **Tingkat urbanisasi global yang belum pernah terjadi sebelumnya di abad 21.**
- **Risiko yang lebih besar (kota-kota memiliki konsentrasi orang, aset, dan sumber daya tertinggi).**
- **Kota-kota adalah penghasil emisi gas rumah kaca terbesar.**
- **Kontribusi yang tidak sama terhadap perubahan iklim dan distribusi efeknya yang tidak merata.**
- **Kota-kota terbesar di dunia terletak di pesisir (naiknya permukaan air laut).**

CITIES AND CLIMATE CHANGE
KOTA DAN PERUBAHAN IKLIM

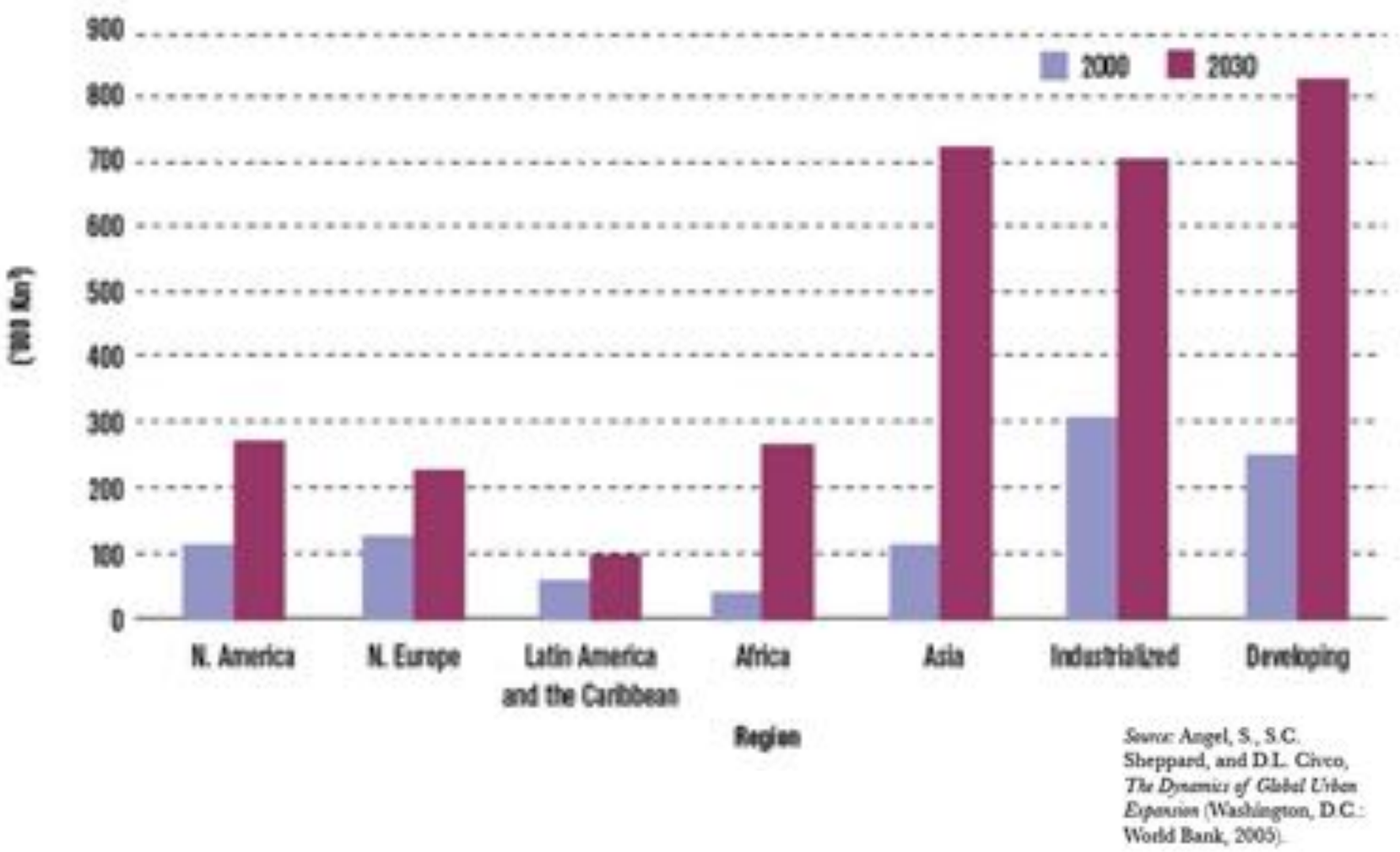
- Pressing need to make cities more resilient to climate related disasters and manage long-term climate risks in ways that protect people and encourage prosperity.
- It also means improving cities' abilities to reduce greenhouse gas emissions.
- UN SDG 11 (2015): *'Make cities and human settlements inclusive, safe, resilient and sustainable.'*
- UN SDG 13 (2015): *'Take urgent action to combat climate change and its impacts by regulating emissions and promoting developments in renewable energy.'*

- **Urgensi untuk menyiapkan kota agar lebih tangguh menghadapi bencana terkait iklim dan mengelola risiko iklim jangka panjang melalui berbagai upaya yang dapat melindungi manusia dan meningkatkan kesejahteraan.**
- **Meningkatkan kemampuan kota untuk mengurangi emisi gas rumah kaca.**
- **TPB PBB 11 (September 2015): 'Membangun kota dan permukiman yang inklusif, amam, Tangguh dan berkelanjutan.'**
- **TPB PBB 13 (September 2015): 'Mengambil aksi segera untuk memerangi perubahan iklim dan dampaknya.'**

UN Sustainable Development Goals (SDGs)

Tujuan Pembangunan Berkelanjutan (TPB)

FIGURE 1.6 / Built-up area projections by region



Source: World Bank, *Climate Resilient Cities* (2009), p.7

Demographic projections

Poyeksi demografis

68% world population projected to live in urban areas by 2050 (UN-Habitat).

Population Growth and Biodiversity Hotspots

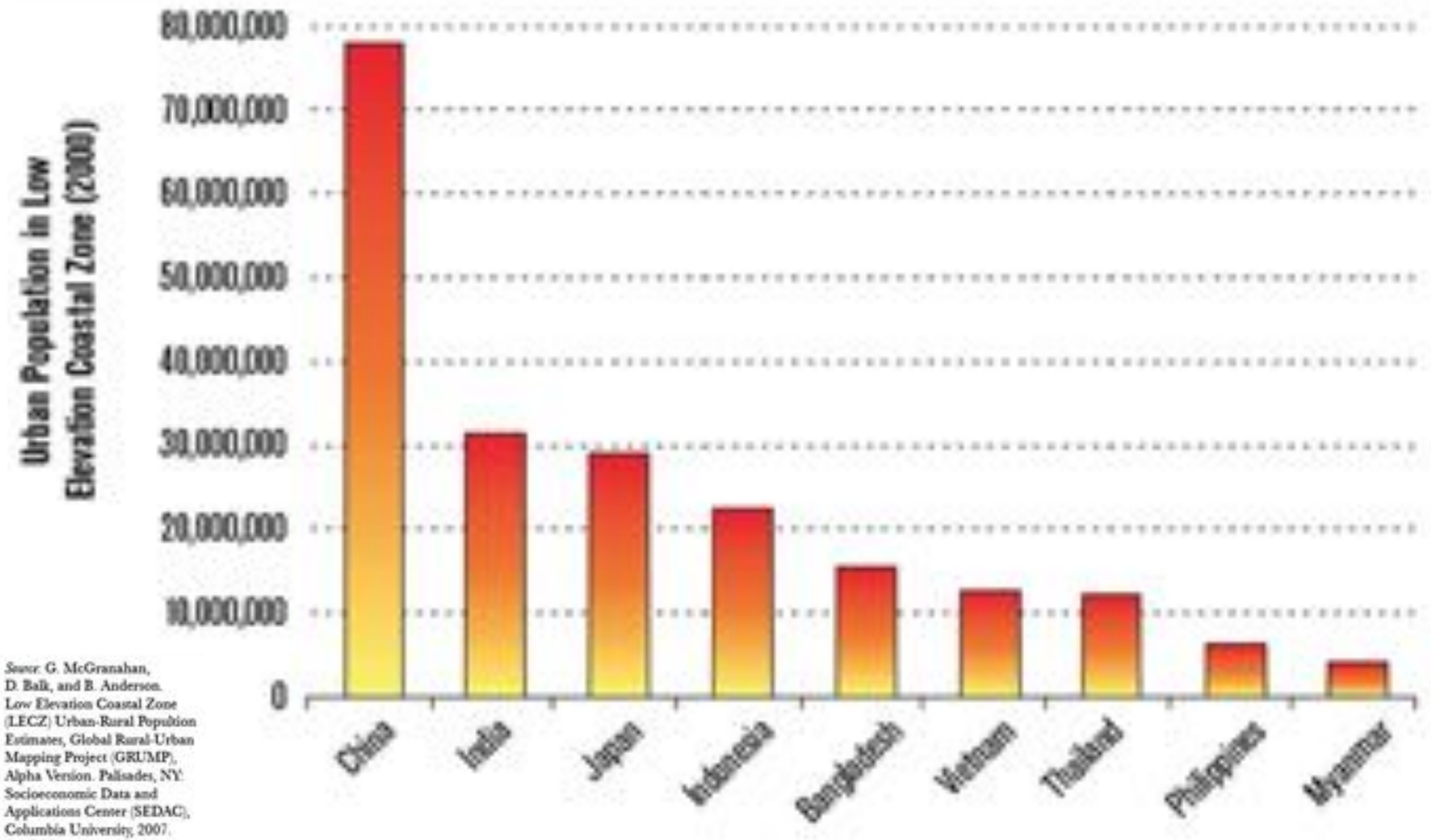
Pertumbuhan Populasi dan Hotspot Keanekaragaman hayati

Source: UCCRN Climate Change and Cities, ARC3, (2015), p.10. (adaptation)

Coastal population

Populasi wilayah pesisir

FIGURE 2.5/ Coastal population of select countries that are highly vulnerable to sea-level rise



Source: G. McGranahan, D. Balk, and B. Anderson. Low Elevation Coastal Zone (LECZ) Urban-Rural Population Estimates, Global Rural-Urban Mapping Project (GRUMP), Alpha Version. Palisades, NY: Socioeconomic Data and Applications Center (SEDAC), Columbia University, 2007. Available at: http://sedac.ciesin.columbia.edu/gpw/lecz.jsp.

Source: World Bank, *Climate Resilient Cities* (2009), p.29

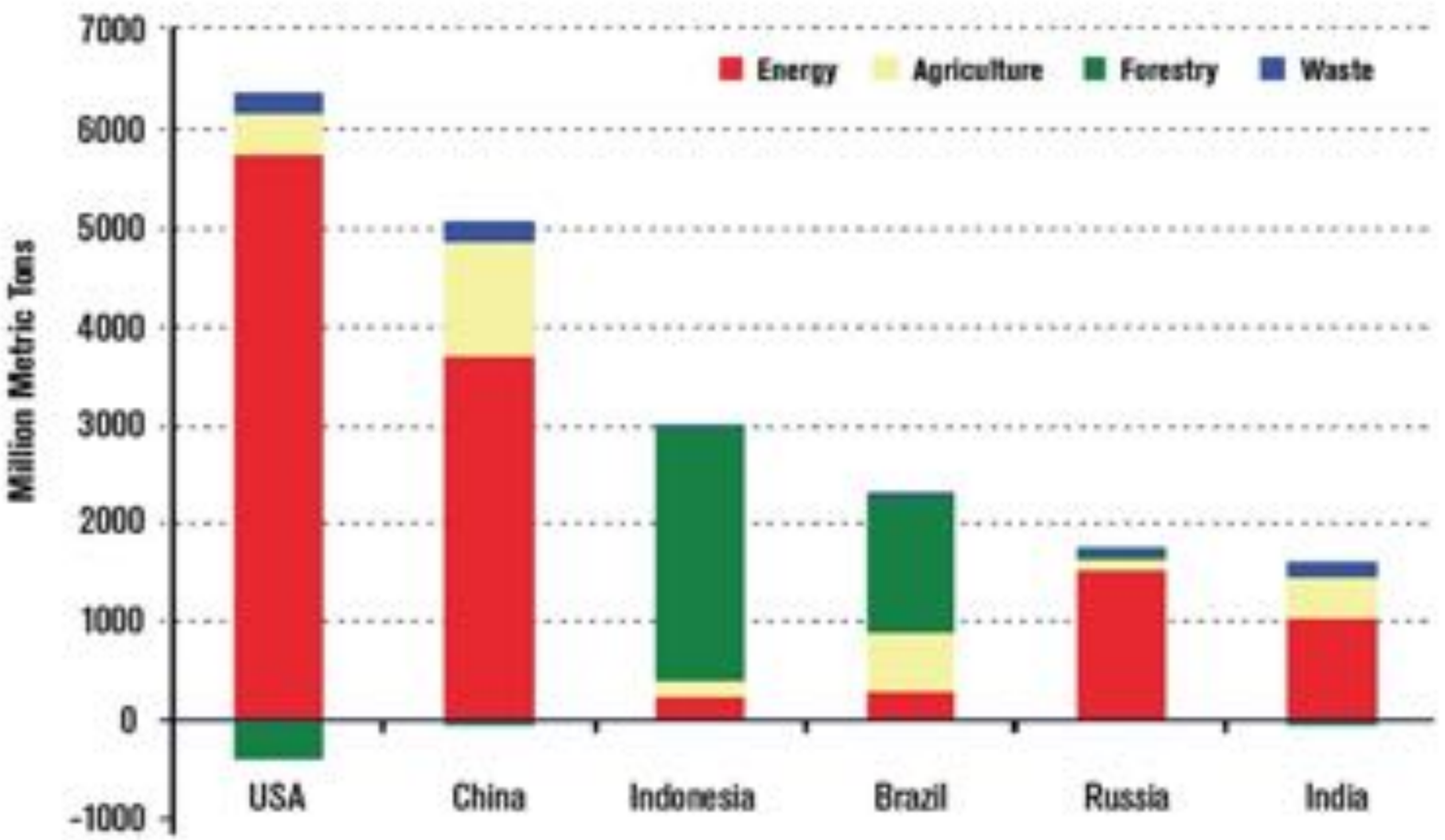
MAIN DRIVERS GHGs IN CITIES

PENYEBAB UTAMA GRK DI KOTA

- Economic base (ex. manufacturing, industrial, services, tourism…).
- Carbon intensity.
- Individual consumption lifestyles and citizens behaviour patterns.
- Urban form, morphology and density (urban environment).
- Energy use pattern related to weather conditions.

- **Basis ekonomi (misalnya manufaktur, industri, jasa, pariwisata, …).**
- **Intensitas karbon.**
- **Gaya hidup konsumsi individu dan pola perilaku masyarakat.**
- **Bentuk perkotaan, morfologi dan kepadatan (lingkungan perkotaan).**
- **Pola penggunaan energi terkait dengan kondisi cuaca.**

FIGURE 1.2 / Largest global CO_2 emitters



Source: World Bank, *Climate Resilient Cities* (2009), p.3

CO_2 countries emitters

Negara-negara penghasil CO2

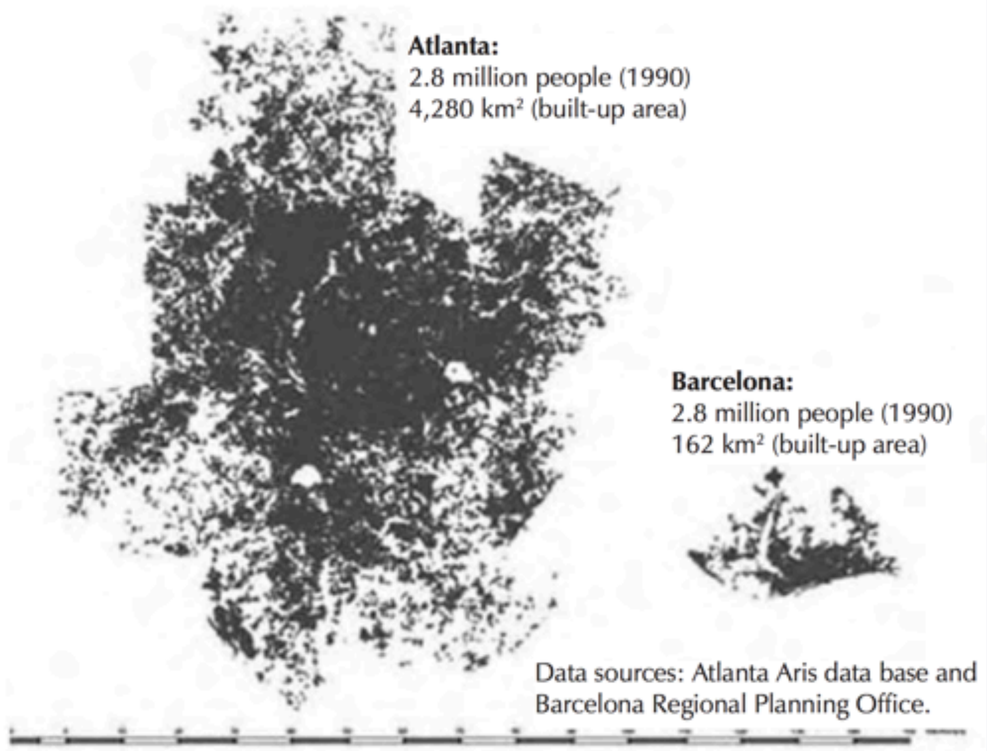
Cities consume 78% of the world's energy and produce more than 60% of total GHG emissions (UN)

Source: World Bank, *East Asia Environmental Monitor: Adapting to Climate Change* (Washington, D.C. 2007) and IEA, *World Energy Outlook* (Paris, France, 2007) for energy except for Indonesia, which uses 2005 PIE data; 2005 USEPA data for agriculture; Houghton, J., "Modeling Technological Change in Climate Policy Analyses," *Energy Economics*, Vol. 28, Issue 5-6, November 2006 for forestry data; and 2005 USEPA data for waste.

Urban form and GHGs emissions

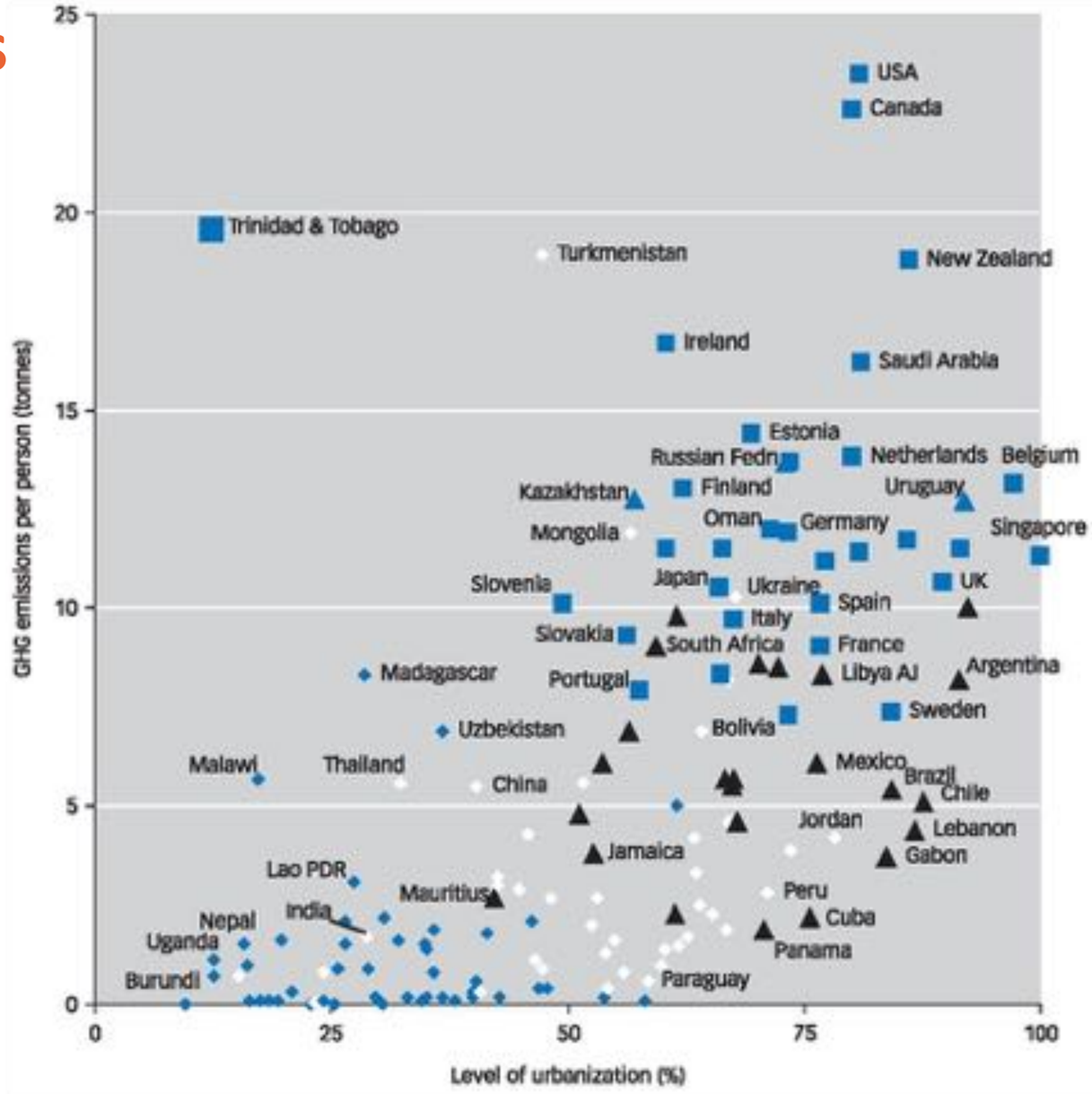
Bentuk kota dan emisi GRK

Figure 2: The Built-Up Area of Atlanta and Barcelona Represented at the Same Scale



2.5	4,280	7.5	2.8	162	0.7

Source: Bertaud, A., and T. Pode, Jr., *Density in Atlanta: Implications for Traffic and Transit* (Los Angeles: Reason Foundation, 2007).



Source: Satterthwaite, D., *The implications of population growth and urbanization for climate change (2009)*

IMPACTS OF GHGs ON CITIES
DAMPAK GRK TERHADAP KOTA

Direct / Primary

Casualties
Famines
Economic loss
Diseases
Biodiversity loss
Water scarcity

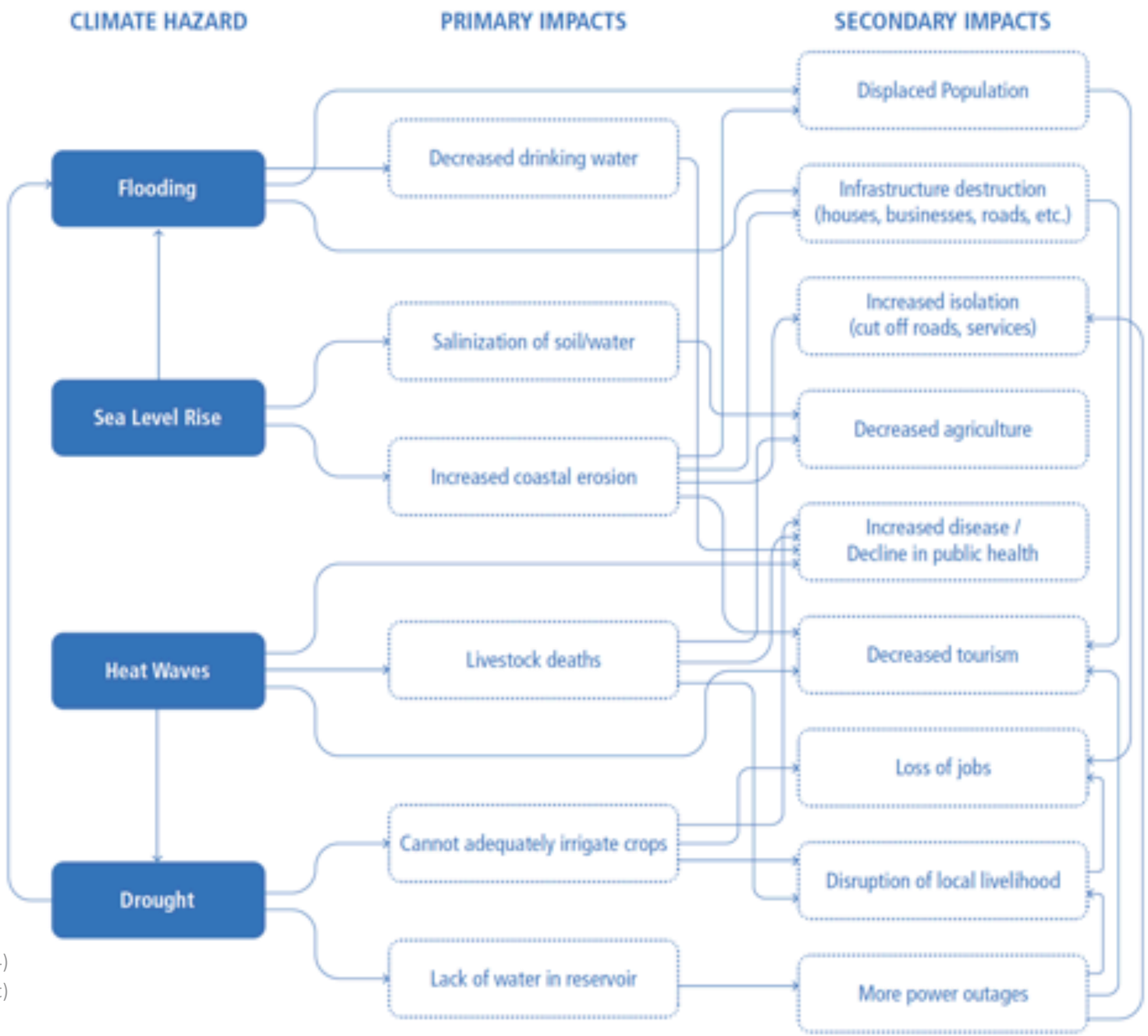
Indirect / Secondary

Environmental refugees
Accelerated urbanisation
Epidemic
Worsening public health
High energy demand for cooling

- **Langsung / Primer: korban jiwa, kelaparan, kerugian ekonomi, penyakit, hilangnya keanekaragaman hayati, kelangkaan air.**
- **Tidak langsung / Sekunder: pengungsi lingkungan, percepatan urbanisasi, epidemi, kesehatan publik memburuk, permintaan energi tinggi untuk pendingin.**

Primary & Secondary impacts of climate hazard

Dampak primer dan sekunder dari ancaman bahaya iklim

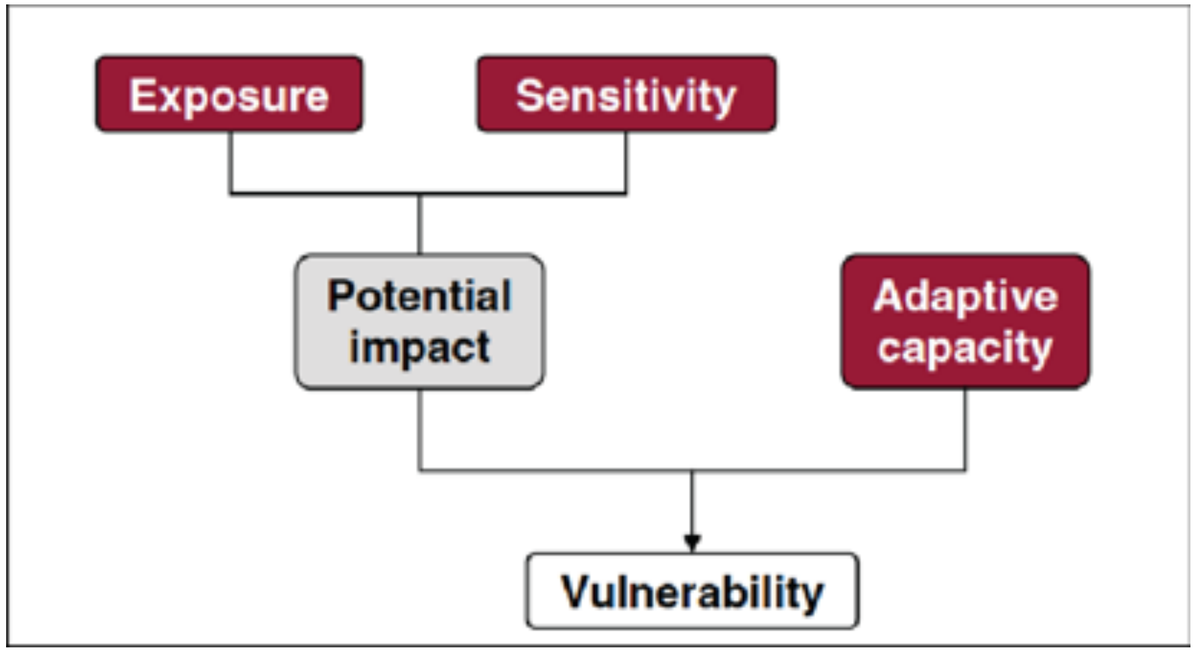


Source: UN-Habitat, Planning for Climate Change (2014) (vulnerability assessment)

VULNERABILITY
KERENTANAN

- Urban climate risk.
- Different categories of climate hazards.
- Adaptive capacity: *'The ability of a system to adjust to climate change (including climate variability and extremes) to moderate potential damages, to take advantage of opportunities, or to cope with the consequences.'* (IPCC)

- **Resiko iklim kota**
- **Berbagai kategori ancaman bahaya iklim**
- **Kapasitas adaptif: 'Kemampuan suatu sistem untuk menyesuaikan diri dengan perubahan iklim (termasuk variabilitas iklim dan ekstrem iklim) untuk mengurangi potensi kerusakan, untuk mengambil keuntungan dari peluang yang ada, atau untuk mengatasi konsekuensinya.' (IPCC)**



Source: Becken, S. et al., Weather, Climate and Tourism: a New Zealand perspective (2014), p.1

Hazard Exposure + Sensitivity + Adaptive Capacity = Vulnerability

Paparan terhadap bahaya + Sensitivitas + Kapasitas adaptif = Kerentanan

'The degree to which a system is susceptible to, or unable to cope with, adverse effects of climate change, including climate variability and extremes. Vulnerability is a function of the character, magnitude, and rate of climate variation to which a system is exposed, its sensitivity, and its adaptive capacity.'
(IPCC, 2001, p. 995) (IPCC Def. 1)

'Tingkat kerentanan dan ketidakmampuan suatu sistem dalam mengatasi dampak buruk perubahan iklim, termasuk variabilitas iklim dan ekstrem iklim. Kerentanan dibentuk dari beberapa unsur yang saling tergantung seperti karakter, ukuran, dan tingkat variasi iklim di mana suatu sistem terpapar, sensitivitas sistem, serta kapasitas sistem tersebut untuk beradaptasi.'
(IPCC, 2001, p. 995) (IPCC Def. 1)

Hazard vulnerability over time

Kerentanan terhadap bahaya dari waktu ke waktu

SUMMARY OF GLOBAL NUMBERS

Vulnerability	Time Period	Population Estimate	City Estimate
EXTREME HEAT	Present Day	Over 200 million people	Over 350 cities
	2050s	Over 1.6 billion people	Over 970 cities
EXTREME HEAT AND POVERTY	Present Day	Over 26 million people	Over 230 cities
	2050s	Nearly 215 million people	Over 490 cities
WATER AVAILABILITY	2050s	Over 650 million people	Over 500 cities
FOOD SECURITY	2050s	Over 2.5 billion people	Over 1,600 cities
SEA LEVEL RISE	2050s	Over 800 million people	Over 570 cities
SEA LEVEL RISE AND POWER PLANTS	2050s	Over 450 million people	Over 230 cities

Source: C40 Cities, *The future we don't want*, (2018), p.6

SOCIAL EXPOSURE
KETERPAPARAN SOSIAL

- Social vulnerability: social groups have different characteristics and exposure to climate change.
- Low-income households and neighborhoods (poor quality housing, located in floodplains, underlying health and nutrition problems, lack of alternatives.
- Women, children, elderly, minorities, indigenous groups.

Source: Development Workshop in Burkina Faso (https://dwf.org/en/content/risk-vulnerability-poverty)

- **Kerentanan sosial: kelompok sosial memiliki karakteristik dan tingkat paparan yang berbeda terhadap perubahan iklim.**
- **Rumah tangga dan lingkungan berpenghasilan rendah (perumahan berkualitas buruk, terletak di dataran rawan banjir, kesehatan dan pemenuhan gizi yang bermasalah, tidak punya pilihan alternatif).**
- **Perempuan, anak-anak, lansia, minoritas, masyarakat adat.**

DISASTER RISK MANAGEMENT
MANAJEMEN RISIKO BENCANA

Focus on social systems and social vulnerability factors:

- *Common factors*: ex. age, gender, lack of employment.
- *Specific factors*: ex. weather events, rate and persistence.
- *Other factors*: ex. inadequate access to resources or decision-making, poor social capital, cultural beliefs, population increases, etc.

Source: International Alliance of Inhabitants © David Swanson/IRIN
Cotabato City, Mindanao
(https://fre.habitants.org/nouvelles/info_globales/disasters_new_risk_index_helps_identify_vulnerability)

Fokus pada sistem sosial dan faktor kerentanan sosial:

- **Faktor umum: misalnya usia, jenis kelamin, kurangnya lapangan pekerjaan.**
- **Faktor spesifik: misalnya peristiwa cuaca, laju dan ketahanan.**
- **Faktor-faktor lain: misalnya akses yang tidak memadai ke sumber daya atau proses pengambilan keputusan, modal sosial yang buruk, budaya, peningkatan populasi, dll.**

CITY CLIMATE ACTION PLANNING
PERENCANAAN AKSI ICLIM KOTA

- Cities and urban areas as strategic arenas for climate change action (Castan Broto, 2015).
- Cities primary places where to reach sustainability and liveability.
- Climate mitigation, climate adaptation, resilience.

- **Kota dan daerah perkotaan adalah arena strategis untuk aksi perubahan iklim (Castan Broto, 2015).**
- **Kota adalah tempat utama untuk mencapai keberlanjutan dan kelayakan hidup.**
- **Mitigasi Iklim, Adaptasi Iklim, Ketangguhan.**

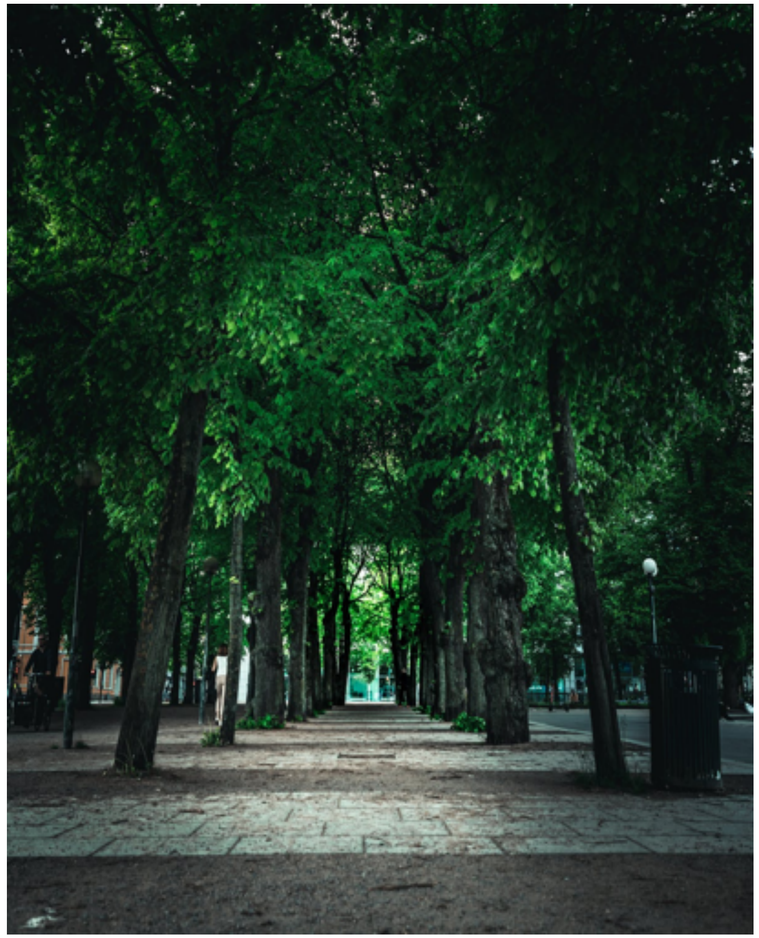
MITIGATION
MITIGASI

'Mitigation of climate change: a human intervention to reduce the sources or enhance the sinks of greenhouse gases'
(IPCC Glossary).

'Mitigasi perubahan iklim: intervensi manusia untuk mengurangi sumber-sumber atau menurunkan emisi gas rumah kaca.'
(Glosarium IPCC)

- Ex. mitigation measures: improving energy efficiency and use of renewable energy, promoting public transport and sustainable mobility, etc.
- **Contoh tindakan mitigasi: meningkatkan efisiensi energi dan penggunaan energi terbarukan, mempromosikan transportasi umum dan mobilitas berkelanjutan, dll.**

ADAPTATION
ADAPTASI



'Adaptation: The process of adjustment to actual or expected climate and its effects. In human systems, adaptation seeks to moderate or avoid harm or exploit beneficial opportunities. In some natural systems, human intervention may facilitate adjustment to expected climate and its effects.'

(IPCC Glossary).

'Adaptasi: Proses penyesuaian terhadap perubahan iklim, baik yang sedang maupun yang akan terjadi, dan dampak yang ditimbulkannya. Dalam sistem manusia, adaptasi bertujuan mengurangi atau menghindari bahaya atau memanfaatkan peluang. Dalam sistem alam, intervensi manusia dapat membantu penyesuaian terhadap perubahan iklim dan dampaknya.'
(Glosarium IPCC).

- Anticipatory or reactive adaptation to reduce vulnerability
- Ex. adaptation measures: landscape restoration, green roofs, reforestation, etc.

- **Adaptasi antisipatif atau reaktif untuk mengurangi kerentanan**
- **Contoh tindakan adaptasi: restorasi bentang alam, atap hijau, reforestasi, dll.**

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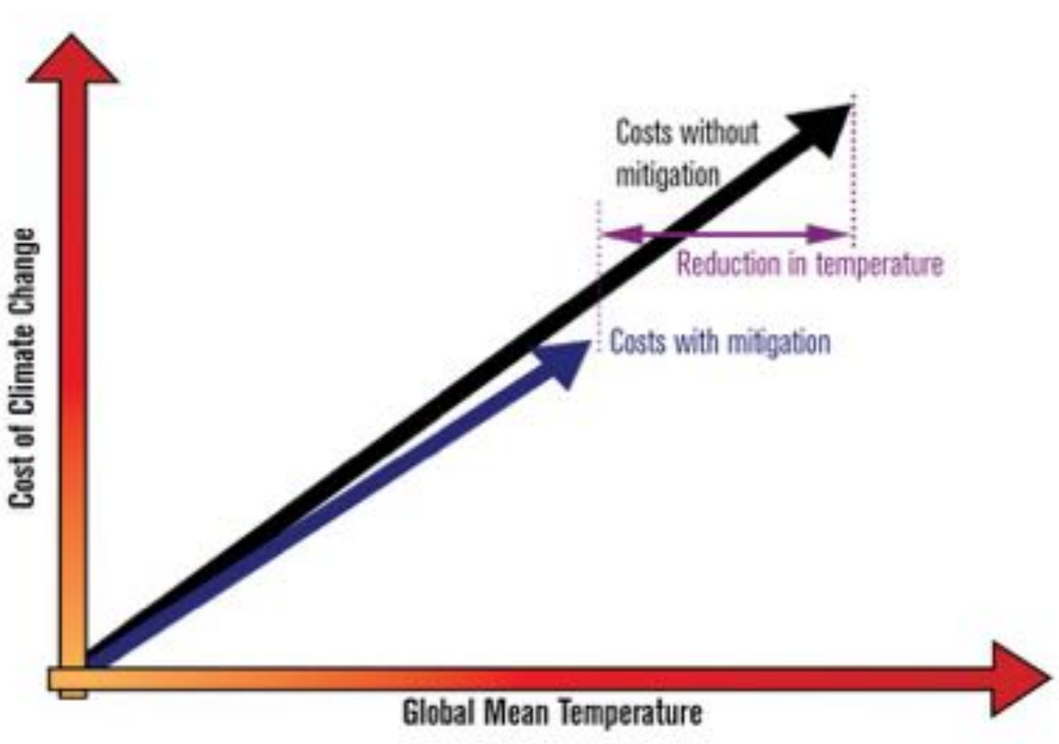
We need both
Kita butuh keduanya

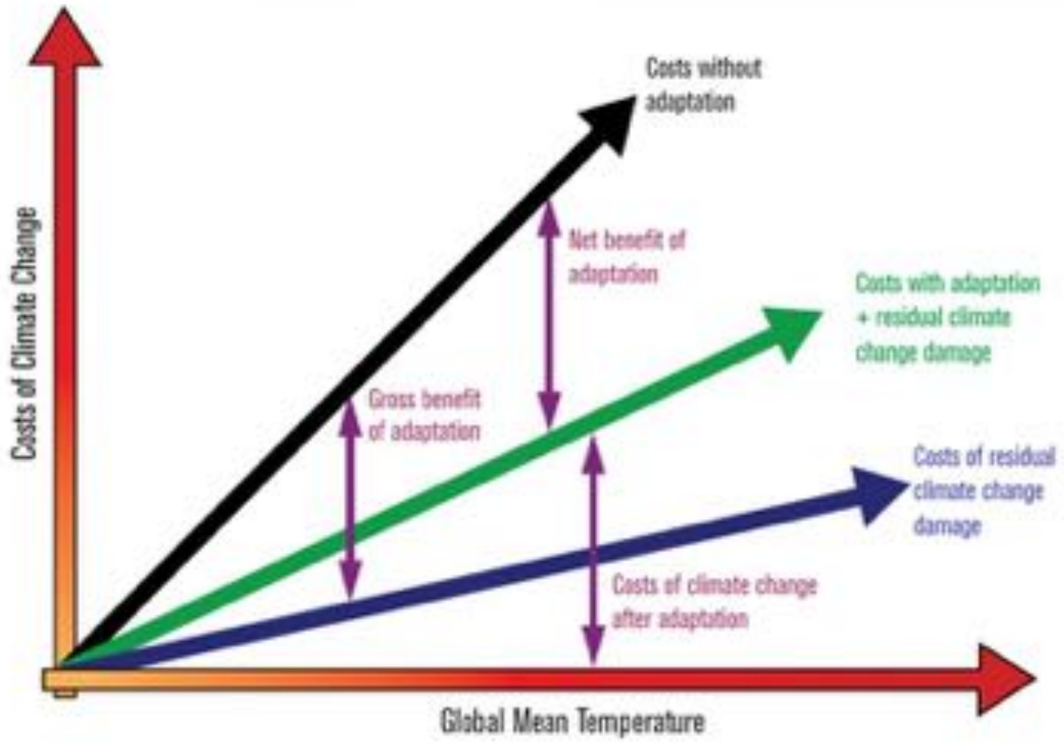
'Many adaptation and mitigation options can help address climate change, but no single option is sufficient by itself. Effective implementation depends on policies and ***cooperation at all scales*** *and can be enhanced through* ***integrated responses*** *that link mitigation and adaptation.'* (IPCC, 2014)

'Banyak opsi adaptasi dan mitigasi dapat membantu mengatasi perubahan iklim, tetapi satu opsi saja tidaklah cukup. Implementasi yang efektif bergantung pada kebijakan dan kerja sama di semua skala/tingkatan dan diperkuat melalui respons terpadu yang menghubungkan mitigasi dan adaptasi.'
(IPCC, 2014)

Relationship between the cost of Mitigation and Adaptation and Climate Change Impacts

Relasi antara Biaya Mitigasi & Adaptasi dan Dampak Perubahan Iklim

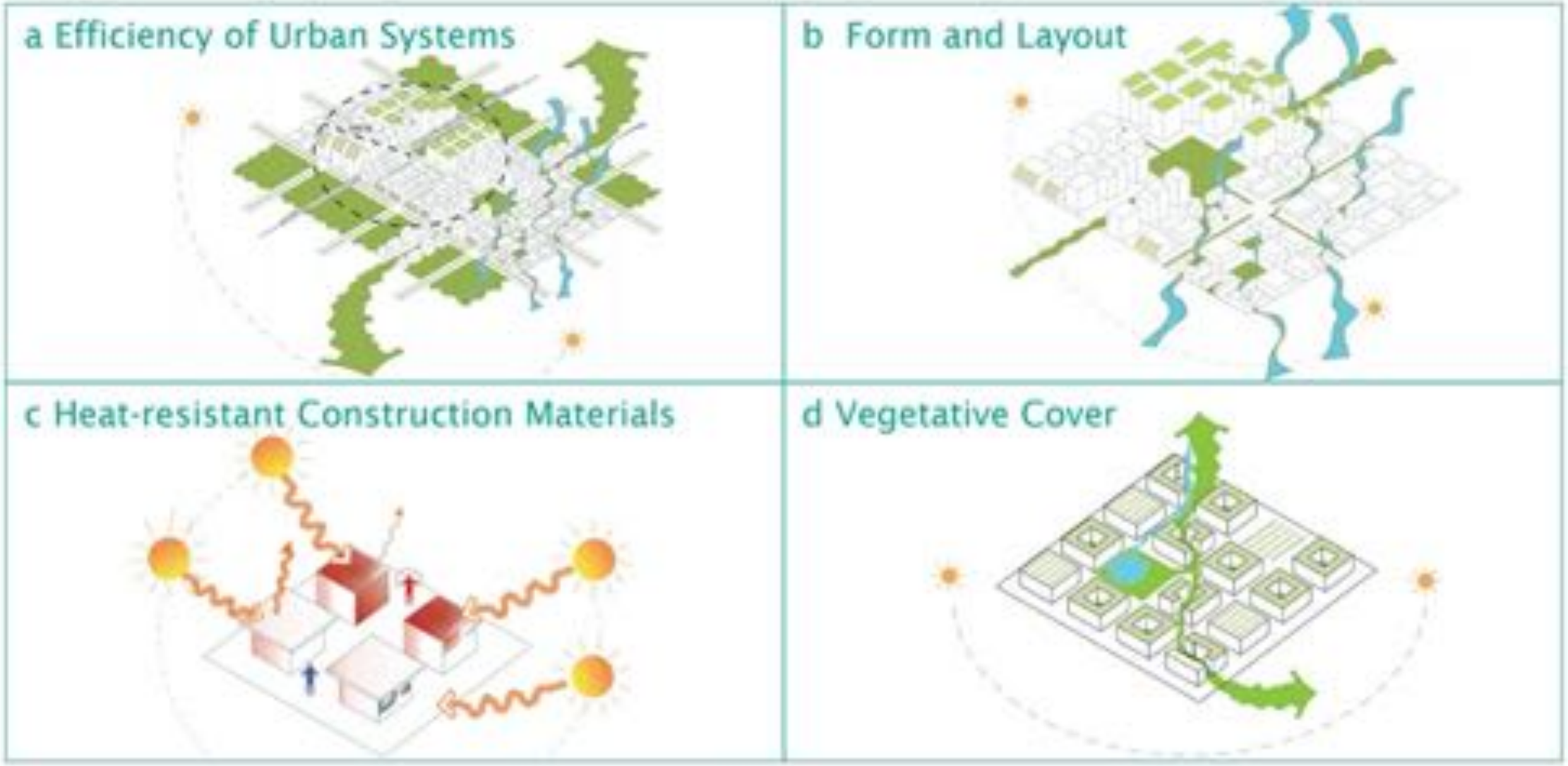




Source: World Bank, *Climate resilient Cities* (2009), pp.16-24

Mitigation & Adaptation

Mitigasi & Adaptasi



Source: UCCRN Climate Change and Cities, ARC3 (2015), p.7

RESILIENCE
KETAHANAN

Source: Marines (2012), © Master Sgt. Mark Olsen, https://www.marforres.marines.mil/Marine-Reserve-News-Photos/Marine-Reserve-Photos/igphoto/265434/

'The capacity of social, economic, and environmental systems to cope with a hazardous event or trend or disturbance, responding or reorganizing in ways that maintain their essential function, identity, and structure, while also maintaining the capacity for adaptation, learning and transformation.' (IPCC Glossary).

'Ketahanan: kapasitas sistem sosial, ekonomi, dan lingkungan untuk mengatasi peristiwa, tren atau gangguan yang berbahaya; kemampuan merespons atau mengatur ulang dengan tujuan mempertahankan fungsi, identitas, dan struktur esensial sistem tersebut, sambil juga mempertahankan kapasitas untuk adaptasi, pembelajaran dan transformasi.' (Glosarium IPCC)

Elements of Urban Resilience

Elemen Ketahanan Perkotaan

Source: ACCCRN, *Responding to the Urban Climate Challenge* (2019), p.5

APPROACHES | AD HOC PLAN

PEDENKATAN | RENCANA AD HOC

- Focus on technical specifications.
- Address one specific opportunity.
- Climate is the main goal.
- Case-by-case basis.
- Rarely uses public input.
- Advantages: quick to implement, limited stakeholder. involvement.
- Disadvantages: does not address core issues comprehensively.

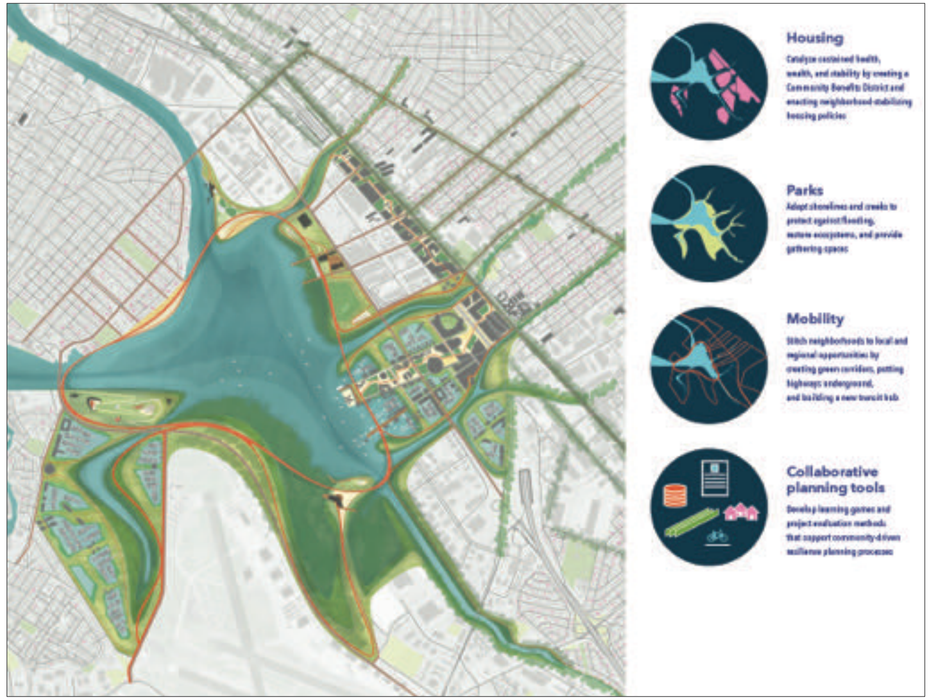
Source: Mississippi WMO Fickr

Fokus pada spesifikasi teknis; Menangani satu peluang spesifik; Iklim adalah tujuan utama; Berlandaskan kasus per kasus; Keuntungan: cepat diimplementasikan, keterlibatan pemangku kepentingan yang terbatas; Kerugian: tidak menangani masalah inti secara menyeluruh; Jarang mempertimbangkan masukan public.

APPROACHES | STRATEGIC PLAN

PEDENKATAN | RENCANA STRATEGIS

- Comprehensive process.
- Integrated policies.
- Provide clear implementation path.
- Extensive stakeholder (public) involvement.
- Advantages: flexibility, visibility, coordination of different sectors.
- Disadvantages: may not be effective, may not be linked to existing planning efforts, may be sidelined.



Source: Resilient-by-Design Bay Area Challenge The Estuary

Proses yang komprehensif; Kebijakan yang terintegrasi; Menyediakan jalur implementasi yang jelas; Keterlibatan pemangku kepentingan (publik) yang luas; Keuntungan: fleksibilitas, visibilitas, koordinasi antarsektor; Kerugian: kemungkinan tidak efektif, bisa jadi tidak terkait dengan perencanaan yang ada, dapat dikesampingkan.

APPROACHES | MAINSTREMAING
PEDENKATAN | PENGARUSUTAMAAN

- Applies a climate lens to existing measures.
- How are existing measures affected by climate change?
- What further changes are needed to address climate change?
- Advantages: fit into existing planning cycles, budget and hierarchies, institutionally anchored.
- Disadvantages: requires cross-sector coordination, existing plans and budgets too restrictive; no adjustment to long planning cycles; climate change lower priority than other issues.

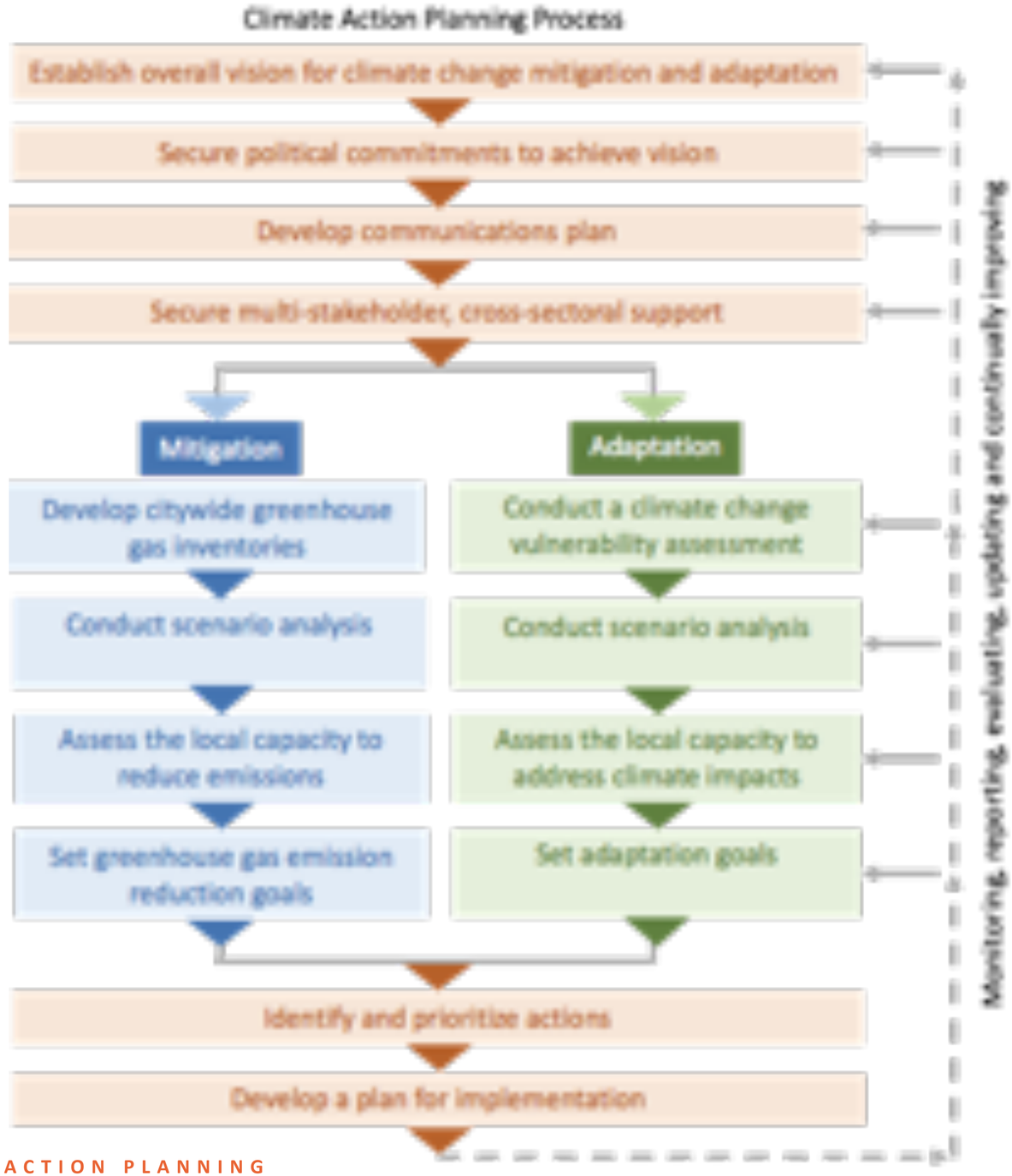
Source: Maryland Board of Public Works Flickr

Menerapkan kacamata iklim untuk tindakan nyata; Bagaimana langkah-langkah tersebut dipengaruhi oleh perubahan iklim?; Bagaimana dampaknya dapat diatasi dengan penyesuaian terhadap tindakan yang ada; Apa perubahan lebih lanjut yang diperlukan untuk mengatasi perubahan iklim di masa depan; Keuntungan: cocok dengan siklus perencanaan, anggaran, dan hierarki yang ada, terlembaga; Kerugian: membutuhkan koordinasi lintas sektor, rencana dan anggaran terlalu membatasi; tidak menyesuaikan dengan siklus perencanaan jangka panjang; prioritas rendah isu perubahan iklim.

ISOCARP INSTITUTE *ENVIRONMENTAL SESSION*

The Climate Action Planning Process

Proses Perencanaan Aksi Iklim



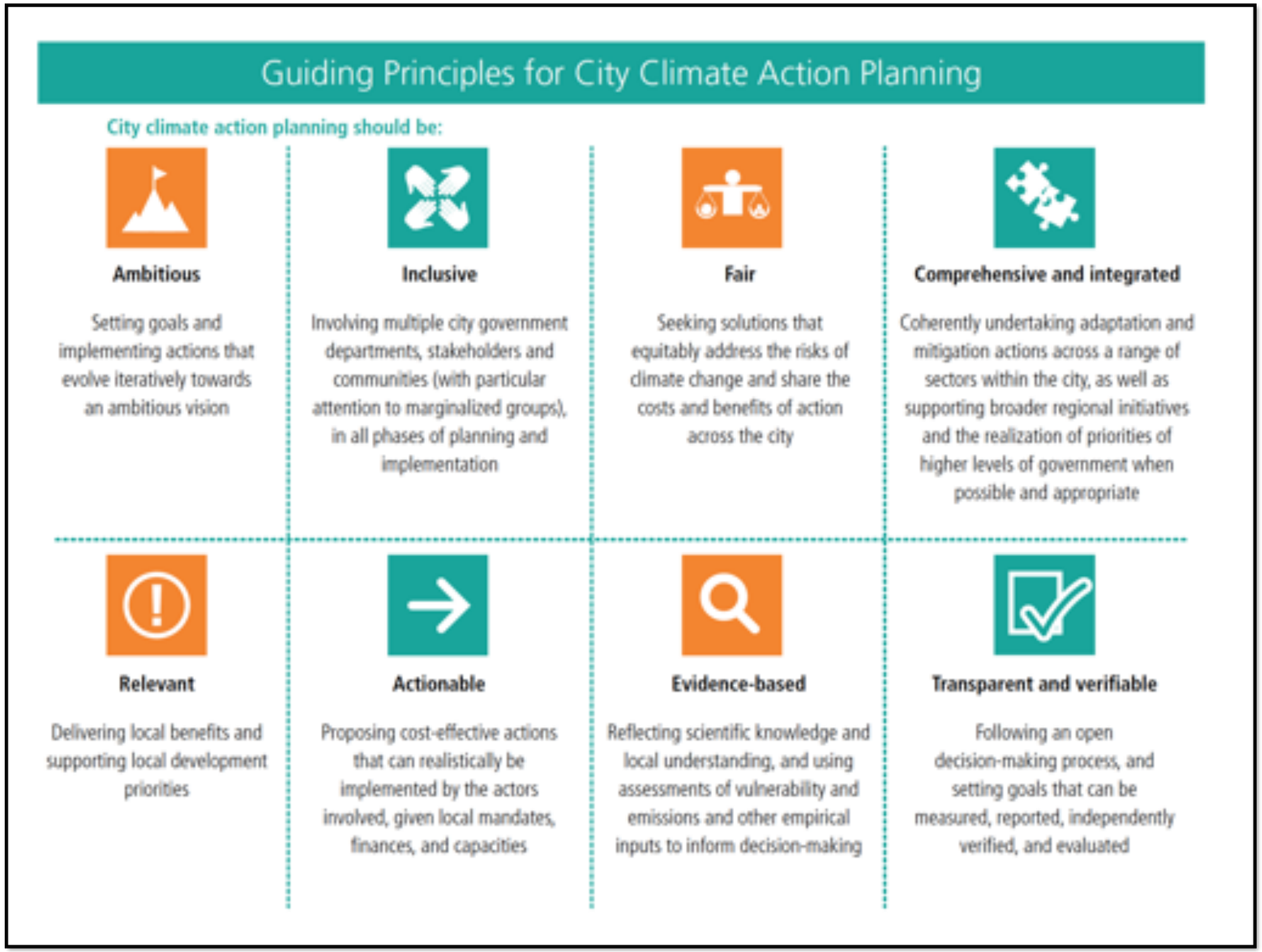
Source: UCCRN Climate Change and Cities, ARC3, (2015), p.25

PRINCIPLES

PRINSIP

1. Ambitious
2. Inclusive
3. Fair
4. Comprehensive and integrated
5. Relevant
6. Actionable
7. Evidence-based
8. Transparent and verifiable

1. **Ambisius**
2. **Inklusif**
3. **Adil**
4. **Komprehensif dan terintegrasi**
5. **Relevan**
6. **Realistis/dapat dilaksanakan**
7. **Berbasis bukti**
8. **Transparan dan dapat diverifikasi**



Source: UCCRN Climate Change and Cities, ARC3, (2015), p.XXII

ISOCARP INSTITUTE *ENVIRONMENTAL SESSION*

The Climate Action Planning Process

Proses Perencanaan Aksi Iklim

FIGURE 3: Climate Change Planning Process – Potential time requirements

STEP	ESTIMATED TIME	NOTES
Module A: What is Happening?		
Step 1: Getting started	2-3 months	Typically 2 to 3-months. If climate change planning is a new undertaking, this step could take more time.
Step 2: Stakeholders and participation	Ongoing	An ongoing task over the course of the project, with several days of meetings at the beginning to get organized.
Step 3: Vulnerability assessment	1-2 days + several months	A 1 or 2-day workshop followed by several months to a year of study. External technical support may be required at this step and could help speed the process.
Module B: What Matters Most?		
Step 4: Issues and objectives	1-2 days to several months	From a 1-day workshop with stakeholders, to several months or more. The greater the level of community engagement, the more time it will take.
Module C: What Can We Do About It?		
Step 5: Option identification	1-2 days	Initial options can often be identified in a 1 or 2-day workshop.
Step 6: Option assessment	1-2 days to several months	Options can be evaluated in a 1 or 2-day workshop with several days of advance preparation. More comprehensive assessment can take several months.
Step 7: Implementation	Several months	Depending on organizational capacity, development of the final Climate Change Action Plan can take several months. Actual implementation timelines will vary depending upon the scale and scope of the actions.
Module D: Are We Doing It?		
Step 8: Monitoring and evaluation	1 day + several months	Initial framework could be developed in a 1-day workshop. Development of full plan will likely take 1 or 2 months.
Step 9: Adjust and modify	Ongoing	Ongoing. As climate change impacts evolve and change, corresponding adaptation actions may require modification.

Source: UN-Habitat, Planning for climate change (2014) (adaptation)

ISOCARP INSTITUTE *ENVIRONMENTAL SESSION*

The Climate Action Planning Process

Proses Perencanaan Aksi Iklim

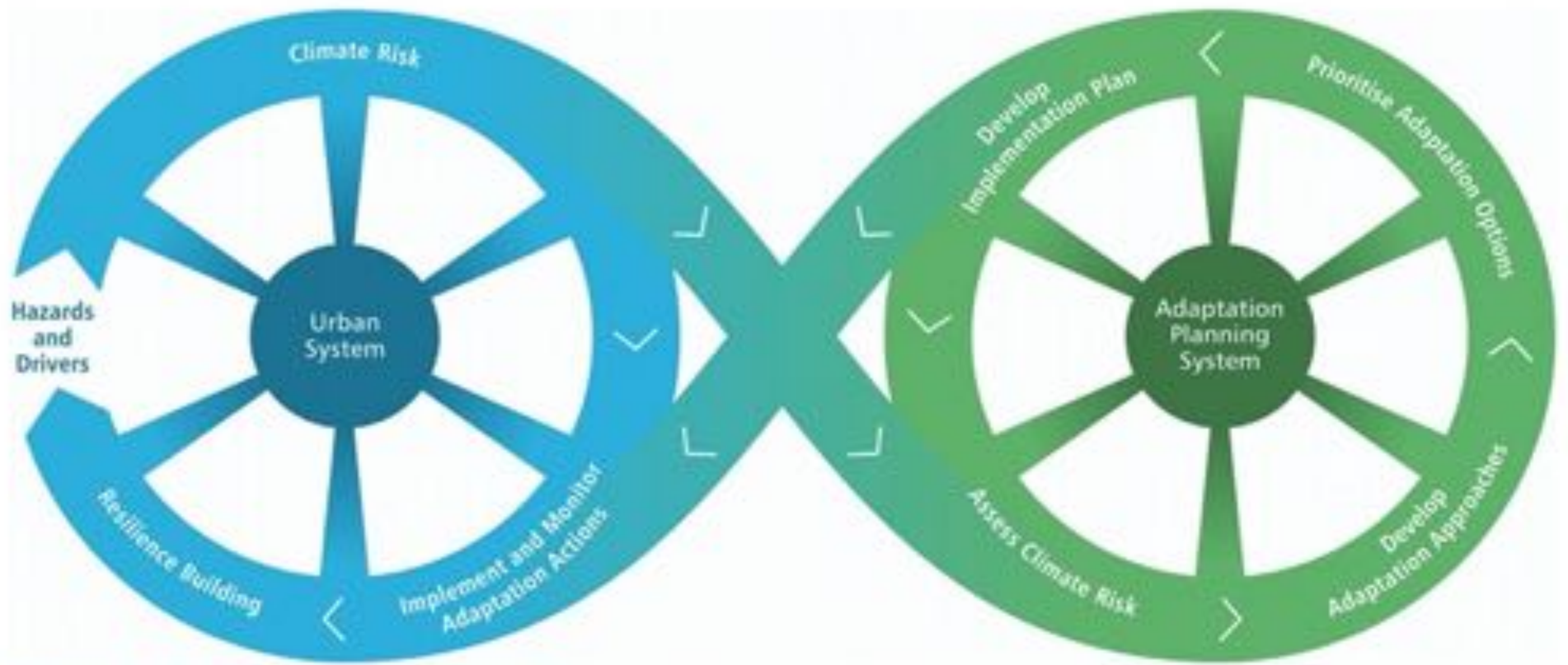


Figure 1: The RESIN Conceptual Framework.

Source: The RESIN Decision Support Tools for Climate Change Adaptation (2015), p.5

CASE STUDIES

STUDY KASUS

Extreme heat
Renewable energy
resilient landscape
Coastal flooding
Multimodal transport
Integrated infrastructure
Sea level rise

EXTREME HEAT

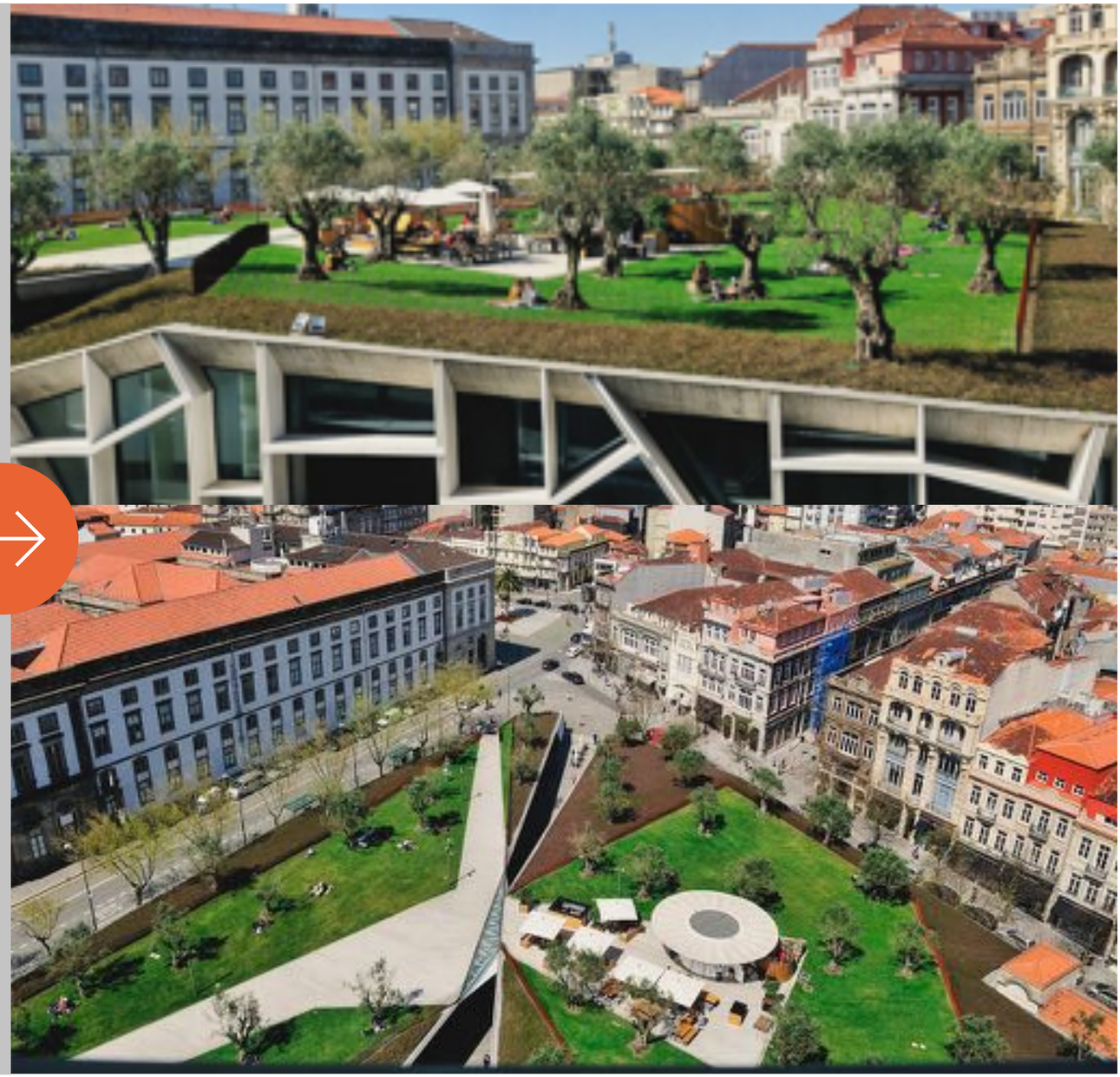
Panas ekstrem

Jardim das Oliveiras, Porto (Portugal)

- Originally intended as a strictly commercial development.
- 50 olives trees and a public garden on top of a semi-open retail gallery.
- Has created a new open space in a formerly disadvantaged neighborhood.

- **Awalnya ditujukan hanya untuk pengembangan komersial**
- **50 pohon zaitun dan taman publik di atap sebuah galeri ritel yang semi-terbuka**
- **Telah menciptakan ruang terbuka baru di lingkungan yang dulunya tidak terurus**

Impacts: reduced heat island effect and stormwater run-off, CO_2 sequestration, climate adaptation, public space and increased connectivity.



Source: Gail at Large 2016

Source: Rooftop solar in Rio de JaneiroPhoto: Insituto Ideal

RENEWABLE ENERGY

Energi terbarukan

Rio de Janeiro (Brazil)

- Decentralized solar energy strategy
- Mandatory for new and renovated buildings
- Energy reduction policies and smart grid programs implemented

- **Strategi energi surya terdesentralisasi**
- **Wajib bagi gedung baru dan yang direnovasi**
- **Kebijakan penurunan energi dan jaringan listrik hemat energi diimplementasikan**

Impacts: reduced GHG emissions, adaptation to increased temperatures and drought conditions, power disruptions, coastal flooding impacts on infrastructure.

Source: © José Eduardo Nucci Photography Flickr

RESILIENT LANDSCAPE

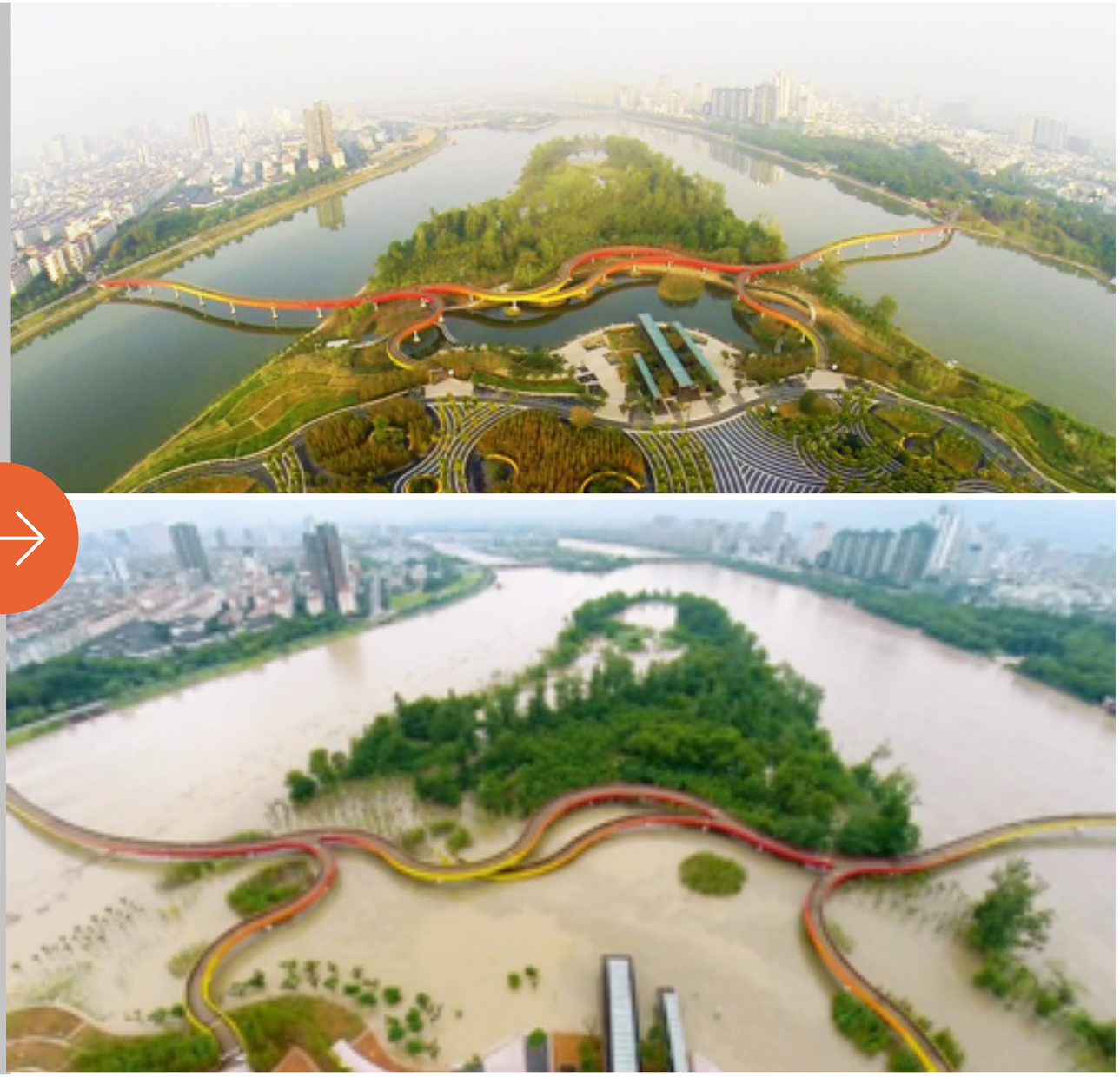
Bentang alam yang berketahanan

Yanweizhou Park in Jinhua City, 2015

- Water resilient terrain and plantings designed to adapt to the monsoon floods.
- A resilient bridge and pathway system designed to adapt to the dynamic water currents and people flows.

- **Lahan dan tanaman tahan air yang dirancang untuk beradaptasi terhadap angin monsun**
- **Jembatan kokoh dan sistem jalur dirancang untuk beradaptasi terhadap arus air dan aliran manusia**

Impacts: disaster risk management, water management, climate adaptation, improved public spaces.



Source: Turenscape Landscape Architecture (in Landezine)

COASTAL FLOODING

Banjir rob

Norther Java, Indonesia, 2015-2019

- Designing with nature to mitigate coastal flooding impacts
- Semi-permeable barrier made of tree branches, sand and nets to trap mud and sediment against the shore, preventing coastal erosion and allowing mangroves to grow.

- **Merancang bersama alam untuk memitigasi dampak banjir rob pesisir**
- **Pembatas semi-permeable dari dahan pohon, pasir dan jaring untuk memerangkap lumpur dan sedimen, guna mencegah erosi pesisir dan memberi ruang tumbuh untuk pohon bakau**

Impacts: coastal resilience, ecosystem restoration, support local economy, tourism.

Wageningen University, Building with nature Indonesia

MULTI-MODAL TRANSPORT

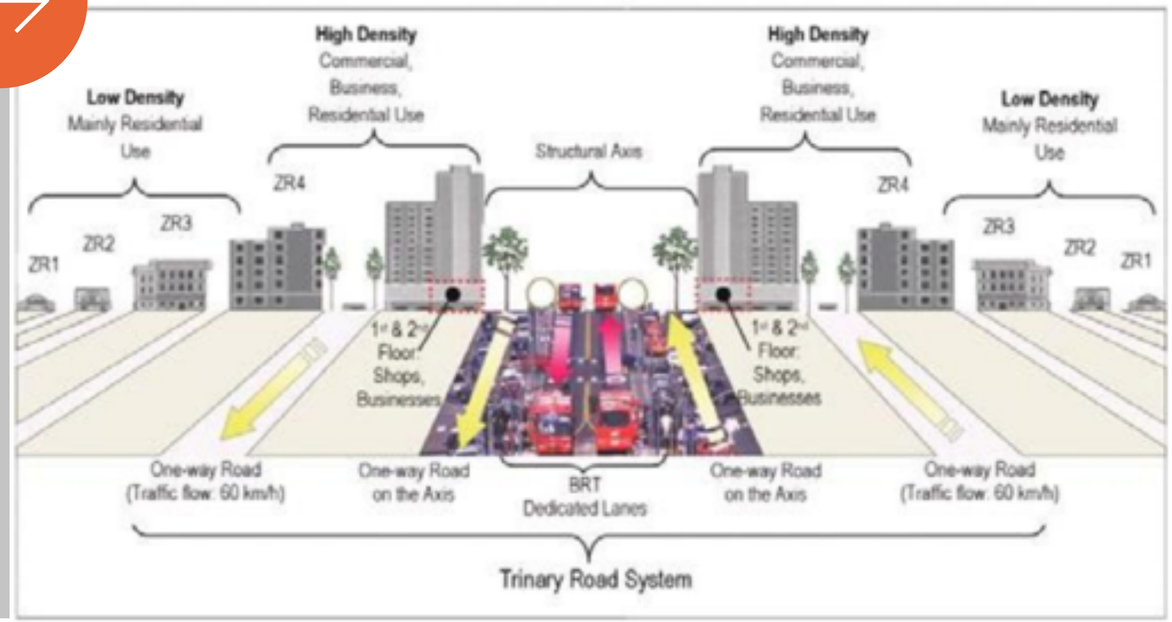
Transportasi multimoda

Curitiba, Brazil – Bus Rapid Transit System (BRT)

- First city in Brazil to have dedicated bus rapid transit system.
- System far less expensive than an underground.
- Carries 2 million passengers a day.
- No one lives more than 400 meters from a bus stop.
- Urban growth restricted to corridors of growth - along key transport routes and tall buildings allowed only along bus routes.

- **Kota pertama di Brazil dengan sistem BRT**
- **Membutuhkan biaya jauh lebih mahal daripada sistem bawah tanah**
- **Mengangkut 2 juta penumpang tiap hari**
- **Tidak ada yang tinggal lebih dari 400 meter dari perhentian bus**
- **Pertumbuhan kota dibatasi dalam koridor-koridor – mengikuti jalur transportasi kunci**
- **Bangunan tinggi hanya diizinkan di sepanjang jalur bus**

Impacts: accessibility, lower GHG emissions, walkability, lower infrastructure costs.



Source: Jaime Lerner Associated Architects

INTEGRATED INFRASTRUCTURE

Infrastrukture terintegrasi

Copenhagen, Denmark – Cloudburst Formula

- 2011 Copenhagen hit by an extreme 1000-year storm event (150mm rain and city under one meter of water).
- Event caused damage of approximately USD $1 billion.
- Blue-Green solutions integrate urban public open space, traffic reduction and hydraulic analysis.
- Implementing a surface-first approach to mitigating. cloudbursts over solely pipe-based systems reduced. investment costs by over $200 million.
- **Tahun 2011, Copenhagen diterjang badai ekstrem, yang terburuk dalam 1.000 tahun, (curah hujan 150mm dan kota terendam air setinggi satu meter)**
- **Kerugian ekonomi hingga 1 miliar dollar AS**
- **Solusi Blue-Green memadukan ruang terbuka publik, pengurangan lalu lintas dan analisis hidraulik**
- **Menerapkan pendekatan pengukuran air di permukaan lebih dulu, guna memitigasi hujan deras, menggunakan sistem berbasis pipa, mengurangi biaya investasi sampai 200 juta dollar**

Impacts: improved flood protection, water management, public open spaces, reduced heat island effect.

Source: Ramboll Studio

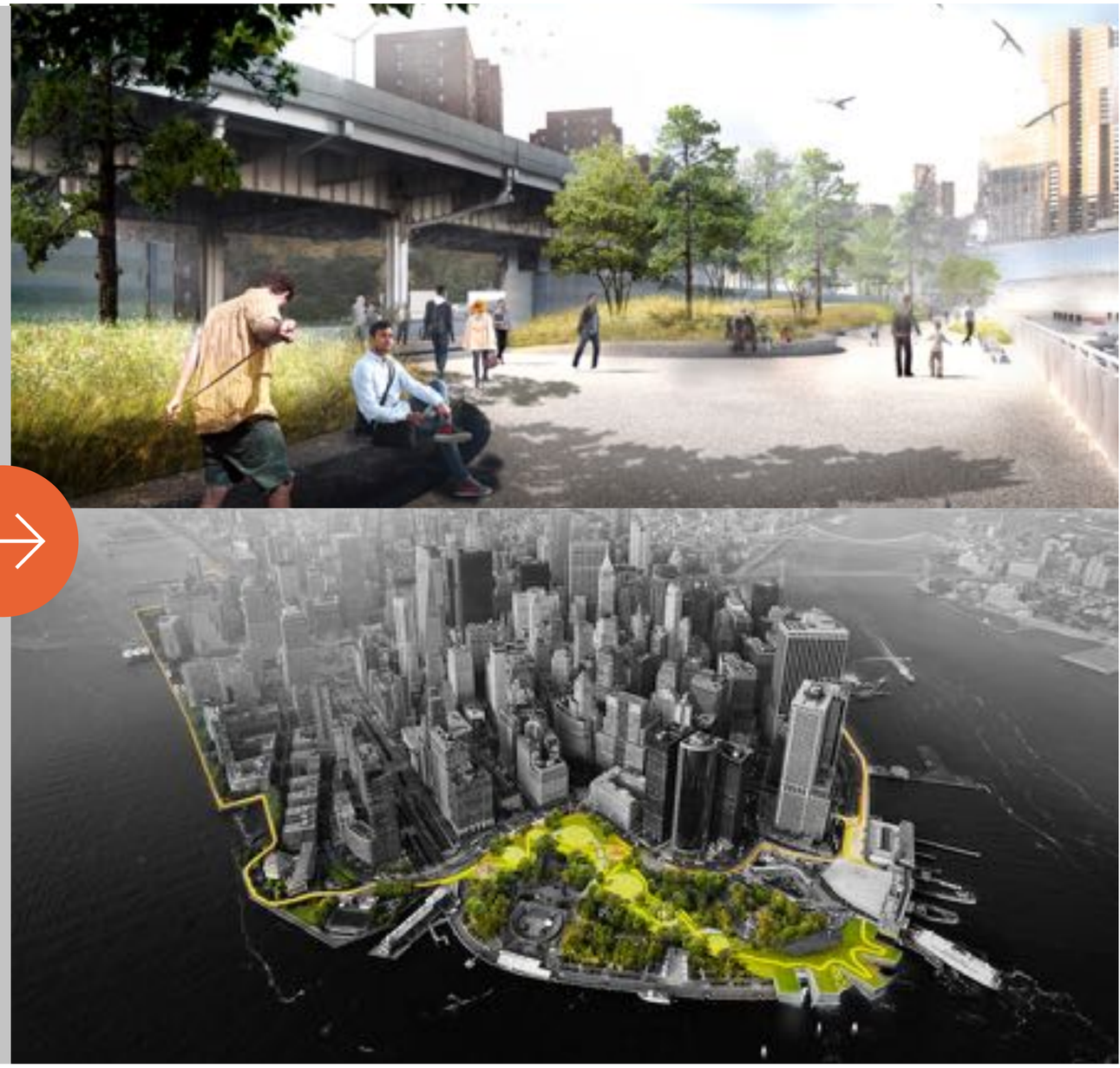
SEA-LEVEL RISE

Kenaikan permukaan air laut

New York City (USA)

- 1:100-year storm event Hurricane Sandy 2012.
- Critical city assets lie along waterfront.
- Vulnerable residents living within flood zones.
- Major new coastal flooding protection and adaptation projects.
- New city design guidelines to foster resilience.
- Improved public open spaces along waterfronts.
- Local-communities engaged in planning efforts.
- **Badai Sandy menerjang tahun 2012, terjadi sekali dalam 100 tahun**
- **Aset penting kota ada di sepanjang tepi laut**
- **Kelompok rentan tinggal di zona banjir**
- **Proyek adaptasi dan perlindungan baru menghadapi banjir**
- **Pedoman rancangan kota yang baru mempromosikan ketangguhan**
- **Perbaikan ruang terbuka publik di wilayah tepi laut**
- **Masyarakat terlibat dalam perencanaan**

Impacts: improved flood protection, climate adaptation, public open spaces, community engagement.



Source: BIG Architects

METHODS & TOOLS

METODE & INSTRUMEN

Decision-support system
Climate Finance
Nature-based solutions
Intermodality

ISOCARP INSTITUTE *ENVIRONMENTAL SESSION*

DECISION SUPPORT SYSTEMS
SISTEM PENDUKUNG KEPUTUSAN

PHASES:

1. Assess Climate Risk
2. Develop Adaptation Approaches
3. Prioritise Adaptation Options
4. Develop Implementation Plan

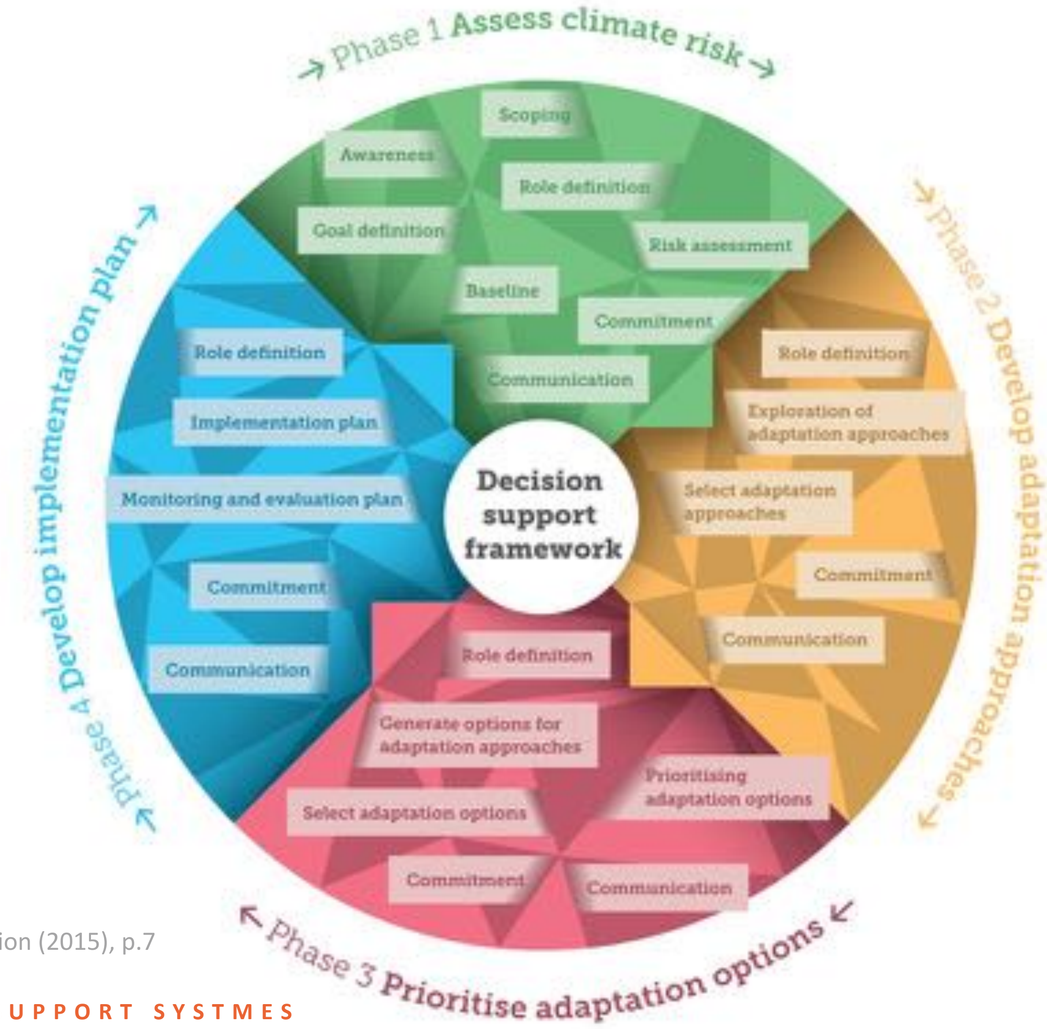
Tahap:

1. Menilai Risiko Iklim;

2. Mengembangkan Pendekatan Adaptasi;

3. Prioritaskan Pilihan Adaptasi;

4. Mengembangkan Rencana Implementasi



Source: The RESIN Decision Support Tools for Climate Change Adaptation (2015), p.7

Cost-benefits analysis (CBA)

A systematic process for calculating and comparing benefits and costs of a decision, policy or project. CBA assigns a monetary value to the measure of effect.

Proses sistematis untuk menghitung dan memperkirakan manfaat dan biaya dari sebuah keputusan, kebijakan atau proyek, CBA menetapkan nilai moneter sebagai alat ukur efek keputusan.

Cost-effectiveness analysis (CEA)

A form of economic analysis that compares the relative costs and outcomes (effects) of different courses of action.

Bentuk analisis ekonomi yang membandingkan biaya dan hasil relatif (efek) dari berbagai tindakan.

Multi-criteria analysis (MCA)

Utilizes a set of evaluation to assess different policies, measures and options that may reflect different stakeholders.

Menggunakan seperangkat alat evaluasi untuk menilai berbagai kebijakan,tindakan dan pilihan yang dapat mencerminkan pemangku kepentingan yang berbeda-beda.

Cost-benefits analysis (CBA)

Example: Street Trees | **Contoh: Pohon di jalan**

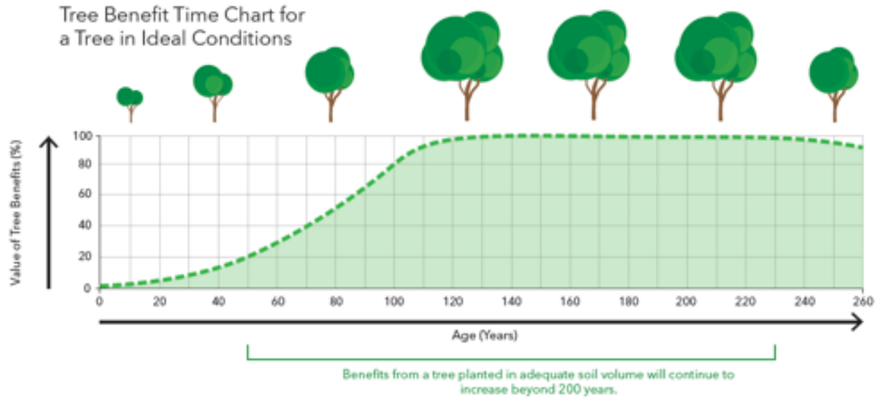


Table 1: Cost Profile

	01		02	
Item	**Street Tree - 50yrs**	**Notes**	**Tree with RSS - 50yrs**	**Notes**
Installation Costs	-£8,634.00 (-$11,665.75)	Tree replaced 4 times over the study period[1]	-£4,946.00 (-$6,679.99)	GBU planting spec[2]
Total Accumulated Benefits after 50yr period	£139.50 ($188.41)	Air pollution filtration, carbon sequestered and stormwater attenuated from the tree canopy	£8,123.00 ($10,970.80)	Air pollution filtration, carbon sequestered and stormwater attenuated from both the tree canopy and RSS
Total Maintenance	-£1,667.00 (-$2,252.17)	15% Failure Insurance (Yrs1-3), Inspection, leaf clearing and formative pruning	-£405.00 (-$547.17)	Inspection, leaf clearing, formative pruning
Removal Costs	-£1,740.00 (-$2,350.80)	End of life felling (3 times) and stump grinding	£0.00 ($0.00)	Still growing at 50 years
Net Life Cycle Cost	-£11,901.50 (-$16,078.99)		£2,772.00 ($3,743.63)	

Source: GreenBlue Urban, *Street Tree Cost Benefit Analysis*

Cost-effectiveness analysis (CEA)

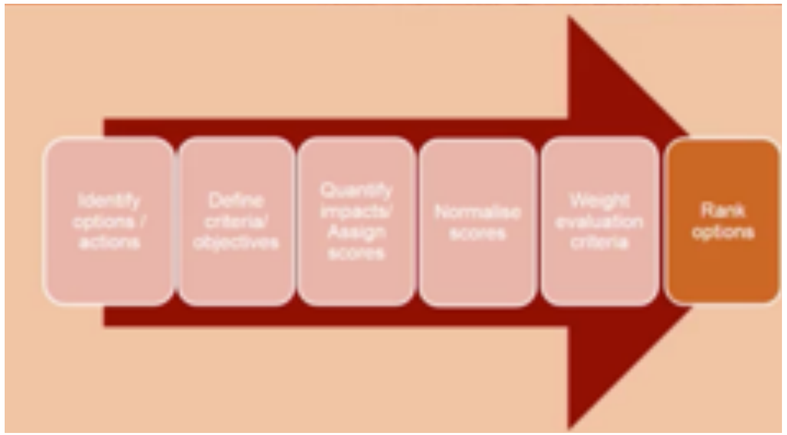
Example: Flood risk reduction | **Contoh: Pengurangan risiko banjir**

Flood risk reduction	Costs (EUR)	Benefits (number of beneficiaries)	Costs/benefits (EUR/number of beneficiaries)	Benefits/costs (number of beneficiaries/EUR)
Insurance scheme	200	1000	0.2	5
Flood forecasting system	100	2000	0.05	20
Retreat from hazardous areas	50	1500	0.03	30

Source: Planning for Climate Change in African Cities, Institute for Housing and Urban Studies (IHS), Erasmus University Rotterdam
Also see: Climate Adapt, Shaping climate-resilient development: a framework for decision-making (2009)

Multi-criteria analysis (MCA)

Example: Flood risk reduction | **Contoh: Pengurangan risiko banjir**



Criteria	Green area			Flood wall with green area			Flood wall		
	Weight of the criterion	Normalized score	Weight of the criterion x Normalized Score	Weight of the criterion	Normalized score	Weight of the criterion x Normalized Score	Weight of the criterion	Normalized score	Weight of the criterion x Normalized Score
Cost	0.36	0.33	0.12	0.36	0.67		0.36	1	
Effectiveness	0.36	1	0.36	0.36	0.75		0.36	0	
Implementation	0.16	0	0	0.16	0.33		0.16	0.67	
Flexibility	0.06	1	0.06	0.06	0.5		0.06	0	
Co-benefits	0.06	0.5	0.03	0.06	1		0.06	0	
		Weighted Sum	0.57						

Source: Planning for Climate Change in African Cities, Institute for Housing and Urban Studies (IHS), Erasmus University Rotterdam
Also see: https://climate-adapt.eea.europa.eu/knowledge/tools/urban-ast/step-4-3

CLIMATE FINANCE
PEMBIAYAAN PERUBAHAN IKLIM

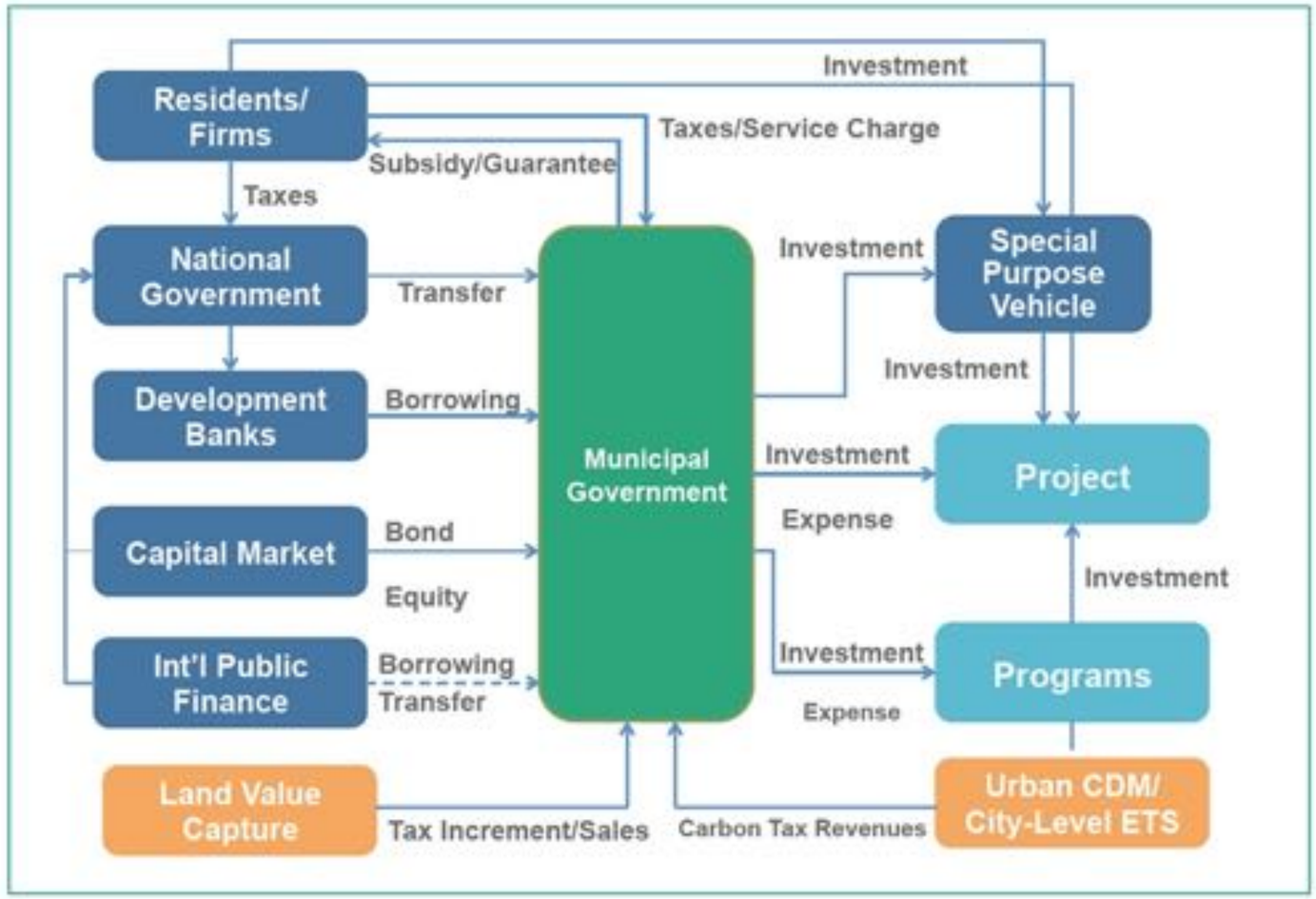


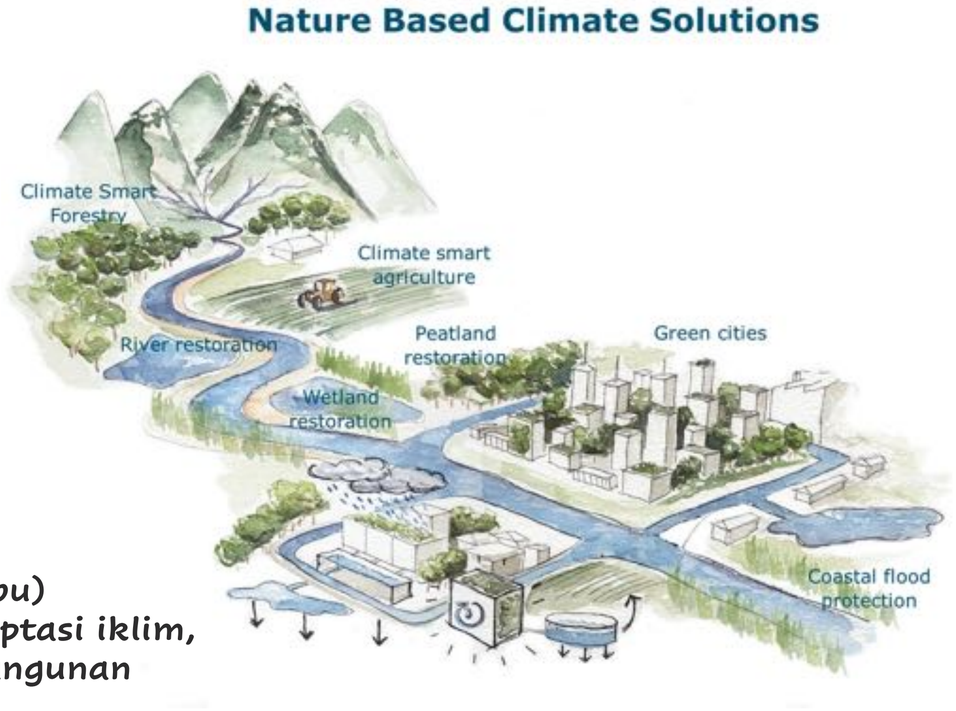
Figure 7: *Opportunities of climate finance for municipalities.*

Source: UCCRN Climate Change and Cities, ARC3, (2015), p.9

NATURE-BASED SOLUTIONS (NBS)

SOLUSI BERBASIS ALAM (NBS)

- ‘Integrated and systemic approach (vs traditional grey infrastructure).
- Multifunctionality and co-benefits (ex. climate mitigation and adaptation, disaster risk management, water security, human health, social and economic development).
- Locally adapted, flexible and resource-efficient.
- Closely related to "ecosystem services" (supporting, provisioning, regulating, cultural).



Source: Natasha de Sena, WER (graphic)

- **Pendekatan terintegrasi dan terpadu (vs infrastruktur abu-abu)**
- **Multifungsi dan berbagi keuntungan (misal: mitigasi dan adaptasi iklim, manajemen risiko bencana, keamanan air, kesehatan, pembangunan sosial dan ekonomi).**
- **Disesuaikan dengan kebutuhan lokal, fleksibel dan hemat sumber daya**
- **Terkait dengan ”jasa ekosistem" (dukungan, penyediaan, pengaturan, budaya).**

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Nature-based Solutions
Solusi Berbasis Alam

'solutions inspired and supported by nature, which are cost-effective, simultaneously provide environmental, social and economic benefits and help build resilience. Such solutions bring more, and more diverse, nature and natural features and processes into cities, landscapes and seascapes, through locally adapted, resource-efficient and systemic interventions'
(EU Research and Innovation agenda on Nature-based Solutions).

'Solusi yang terinspirasi dan didukung oleh alam, yang hemat biaya dan secara bersamaan memberikan manfaat lingkungan, sosial dan ekonomi serta membantu membangun ketangguhan. Solusi semacam itu membawa fitur dan proses alam yang lebih banyak dan beragam ke dalam kota, bentang darat dan laut, melalui intervensi sistemis yang disesuaikan dengan kearifan lokal dan efisiensi sumber daya.'
(Agenda Penelitian dan Inovasi UE tentang Solusi Berbasis Alam).

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INTERMODALITY

INTERVIEW

Joachim Bergerhoff

Team Leader
Sustainable Mobility in Medium-Sized Metropolitan Regions
www.smmr.asia

Video available at: https://youtu.be/P8qDPwM_uKQ

FURTHER MATERIALS

MATERI LANJUTAN

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RESOURCES

GUIDES AND WEBSITES

Guidebooks

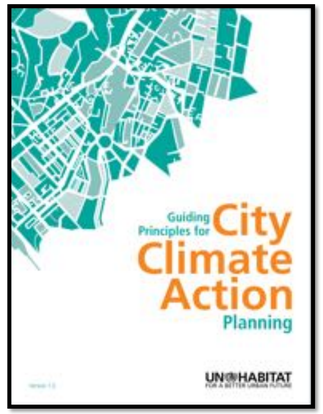
UCCRN – Climate Change and Cities, Summary for City Leaders
UN-Habitat – Guiding Principles for City Climate Action Planning
World Bank – Climate Resilient Cities
CAWG – Shaping Climate Resilient Development
ICLEI – Preparing for Climate Change: A Guidebook for Local, Regional and State Governments

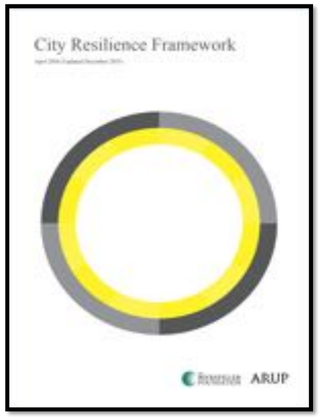
Frameworks & Toolkits

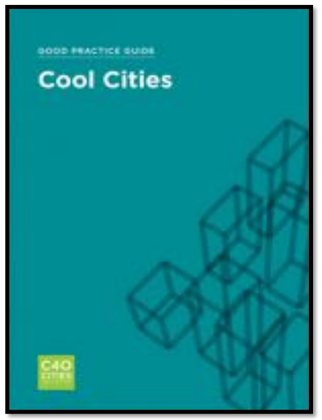
Rockefeller Foundation – City Resilience Framework
UN-Habitat – Planning for Climate Change. A Strategic, Value-based Approach for Urban Planners
RESIN – Climate Resilient Cities and Infrastructures

References & Case study

ACCCRN – Responding to the Urban Climate Challenge
C40 Cities – Cool Cities
Ecoshape – Building with nature
ThinkNature – Platform for NBS







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DISCUSSION
Q&A

DISKUSI &
TANYA JAWAB

RECAP | WHAT WE LEARNED

KESIMPULAN | PEMBELAJARAN

- *'Cities and urban areas are the strategic arenas for climate change action'* (Castan Broto, 2015).
- Cities are the primary places where to reach sustainability and liveability.
- Closely integrate climate mitigation, adaptation and resilience.
- Combine strategic long-term visions and short-term action plans.
- Building with nature and not in nature.

- **'Kota dan daerah adalah arena strategis untuk memulai aksi perubahan iklim' (Castan Broto, 2015).**
- **Kota adalah tempat utama untuk mencapai keberlanjutan dan kualitas hidup yang baik.**
- **Integrasikan mitigasi, adaptasi, dan ketangguhan iklim.**
- **Gabungkan visi strategis jangka panjang dan rencana aksi jangka pendek.**
- **Membangun bersama alam dan bukan di alam.**

QUESTIONS?

PERTANYAAN?

DISCUSSION

PERTANYAAN

What element of environmental sustainability will be your city's priority?

Unsur keberlanjutan lingkungan apa yang akan menjadi prioritas kota Anda?

Where do you see the highest potential for fast impact?

Area manakah, menurut Anda, yang berpotensi mengalami dampak/perubahan tercepat?

Which tools or approaches can you apply in your city?

Instrument atau pendekatan apa yang dapat Anda terapkan di kota Anda?

CONTACT

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