Virtual Workshop
Cooling Cities: Action Planning for Extreme Heat

24th October 2024, 13:00-15:30 hrs (CET)

Welcome Remarks

Eleni Myrivili (Lenio)

Global Chief Heat Officer, UN Habitat and Arsht-Rock

Opening Remarks

Arun Jacob

Senior Advisor, Climate Action Team,
Executive Office of the UN SG

Setting the Stage

Mirey Atallah

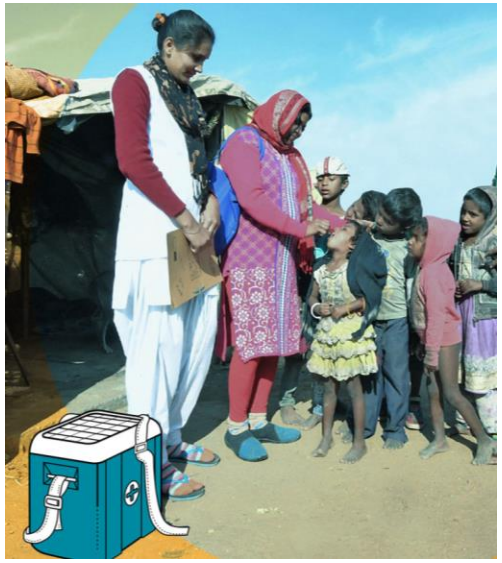
Chief of Resilience And Adaptation Branch
UNEP

Cooling is Critical

It’s our food system and nutrition

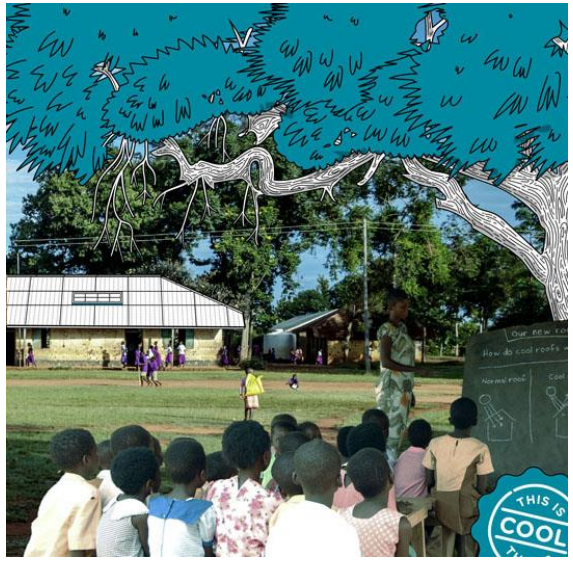
It’s our changing built environment

It’s a health crisis unfolding



It’s an energy problem

It’s prosperity and opportunity



UN environment programme

We need **3x** more cooling equipment under BAU by 2050

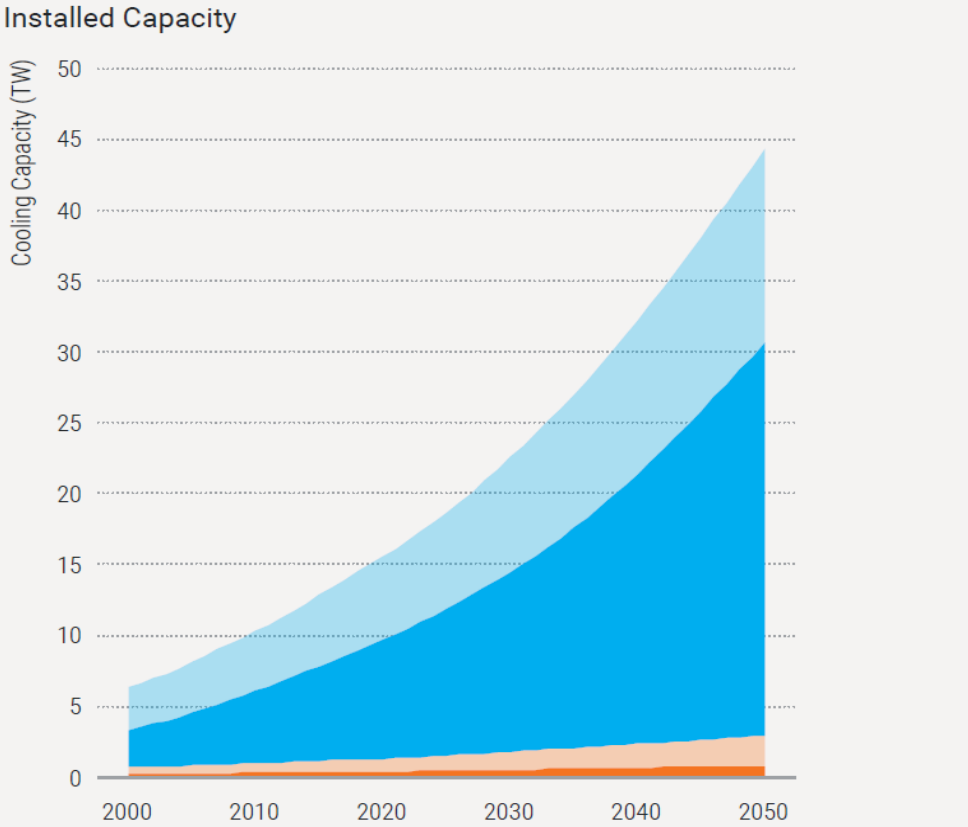
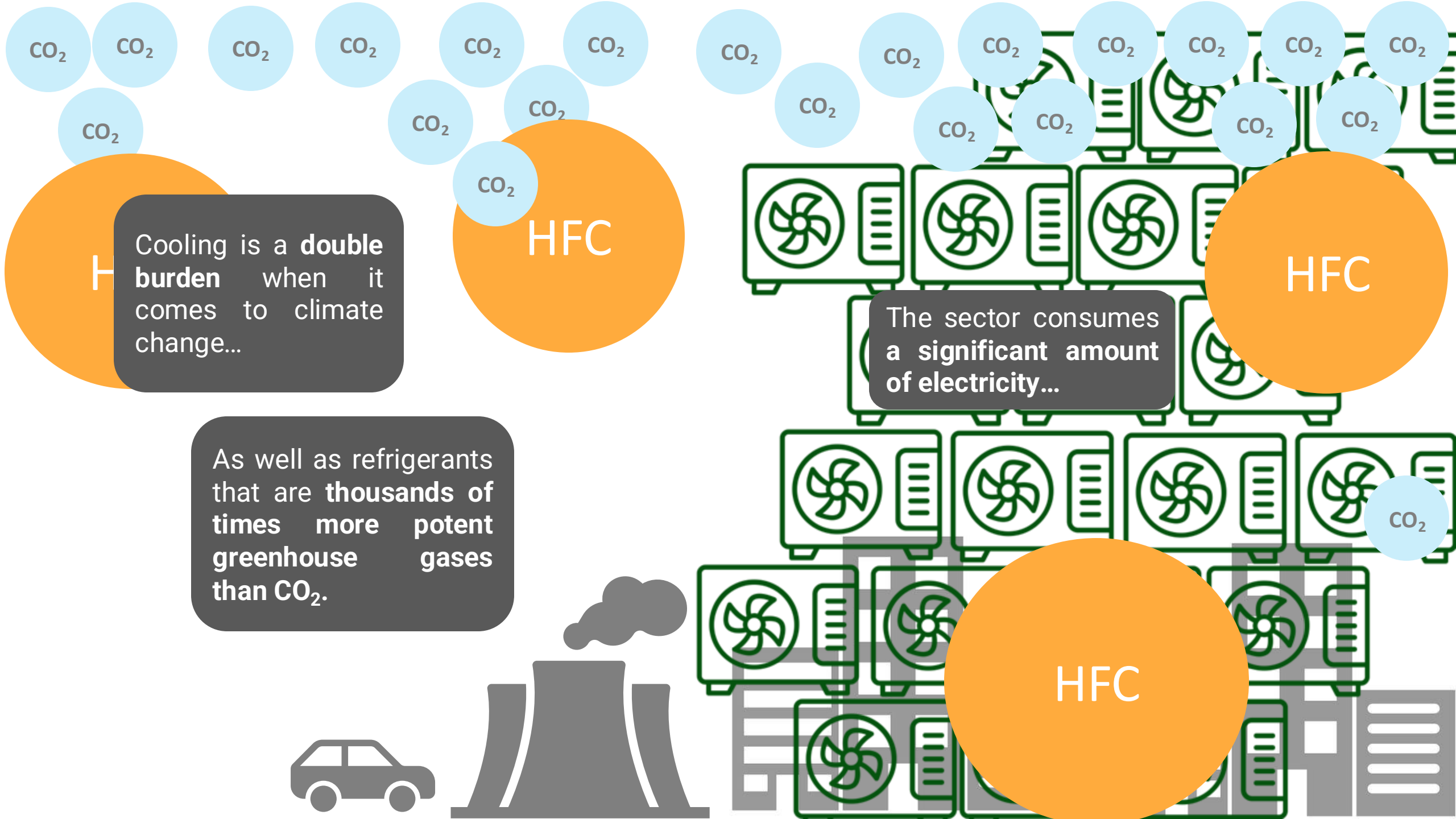
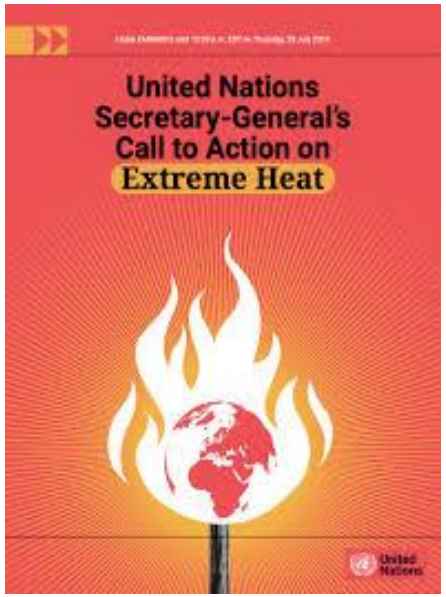


Figure 2-2: Installed capacity under the BAU Growth scenario, 2000-2050
Source: UNEP Cool Coalition 2023 Global Cooling Watch Report


CO_2
HFC
Cooling is a **double burden** when it comes to climate change…
The sector consumes **a significant amount of electricity…**
As well as refrigerants that are **thousands of times more potent greenhouse gases than CO_2.**

Secretary General's Call to Action on Extreme Heat



Cooling is a core message -- to "redesign" our cities, buildings, energy infrastructure to be cool and heat resilient in the long term while breaking the viscous cycle of cooling (typically AC) – leading to energy – and emissions – leading to heat.

"Extreme heat amplifies inequality, inflames food insecurity, and pushes people further into poverty.

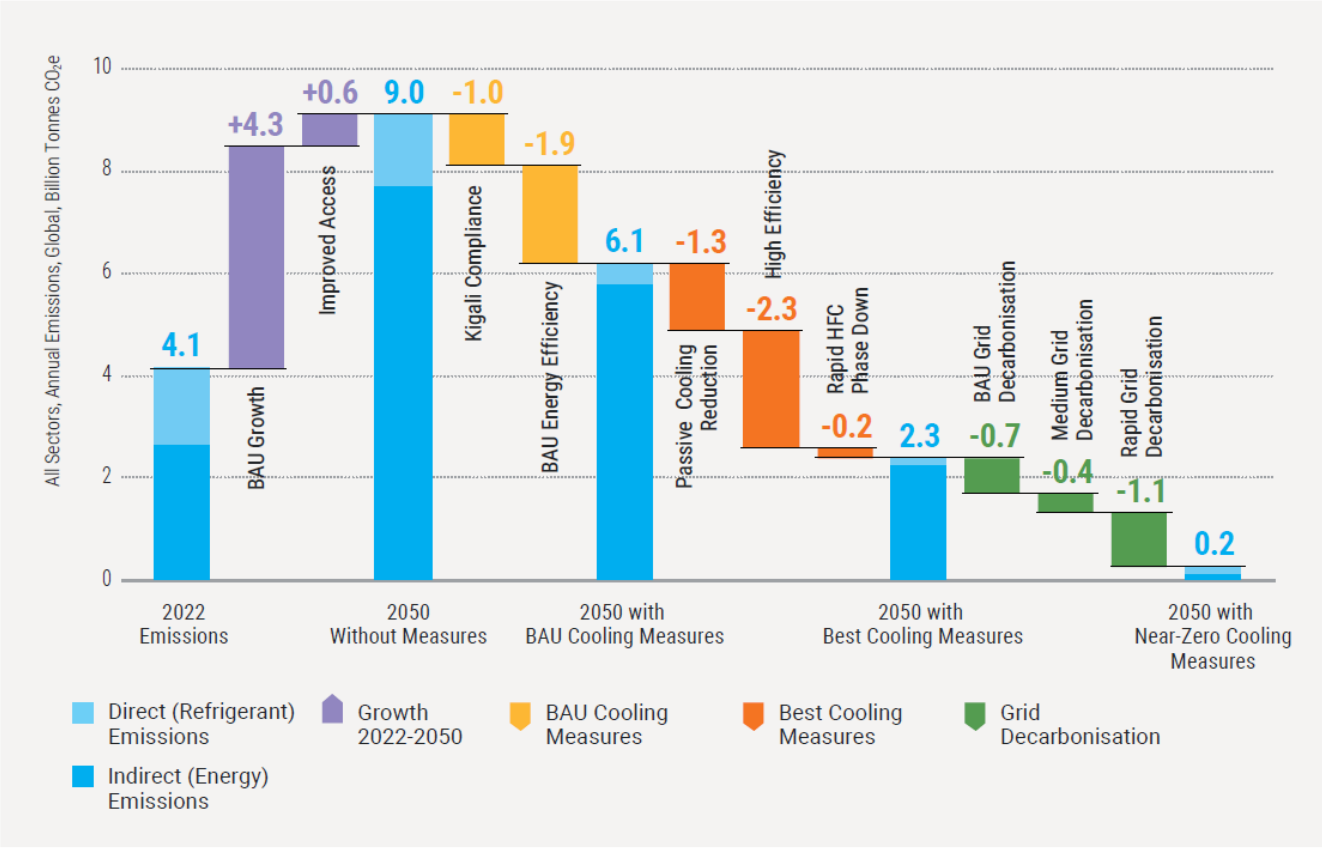
***We must respond by massively increasing access to low-carbon cooling**; expanding **passive cooling** – such as natural solutions and urban design; and **cleaning up cooling** technologies while **boosting their efficiency**.*

*UNEP estimates that, together, these **measures could protect 3.5 billion people** by 2050, while slashing emissions and **saving consumers $1 trillion a year**."*

Antonio Guterres, UN Secretary General, July 25 2025

Global Cooling Watch 2023 - Keeping it Chill: Biannual Tracking

Figure ES-1: **Global pathway and key steps to achieve near-zero GHG emissions from cooling, 2022-2050**



Note: Blue bars show emissions in 2022 and 2050. Purple bars indicate growth. Yellow bars indicate BAU Cooling Measure emission reductions. Orange bars indicate Best Cooling Measure emission reductions. Green bars indicate emission reduction due to electricity grid decarbonisation.

UNEP-led Cool Coalition assessment for cooling emissions and policy of all **UN Member States**

Through a **triple strategy** of passive cooling, efficiency and phase of HFCs can achieve more than **60% reduction below projected 2050 emissions while protecting 3.5 billion people from heat through access to cooling**

1/3 of this emission reduction is delivered through passive measures (nature, urban design, smart buildings, reflecting materials)

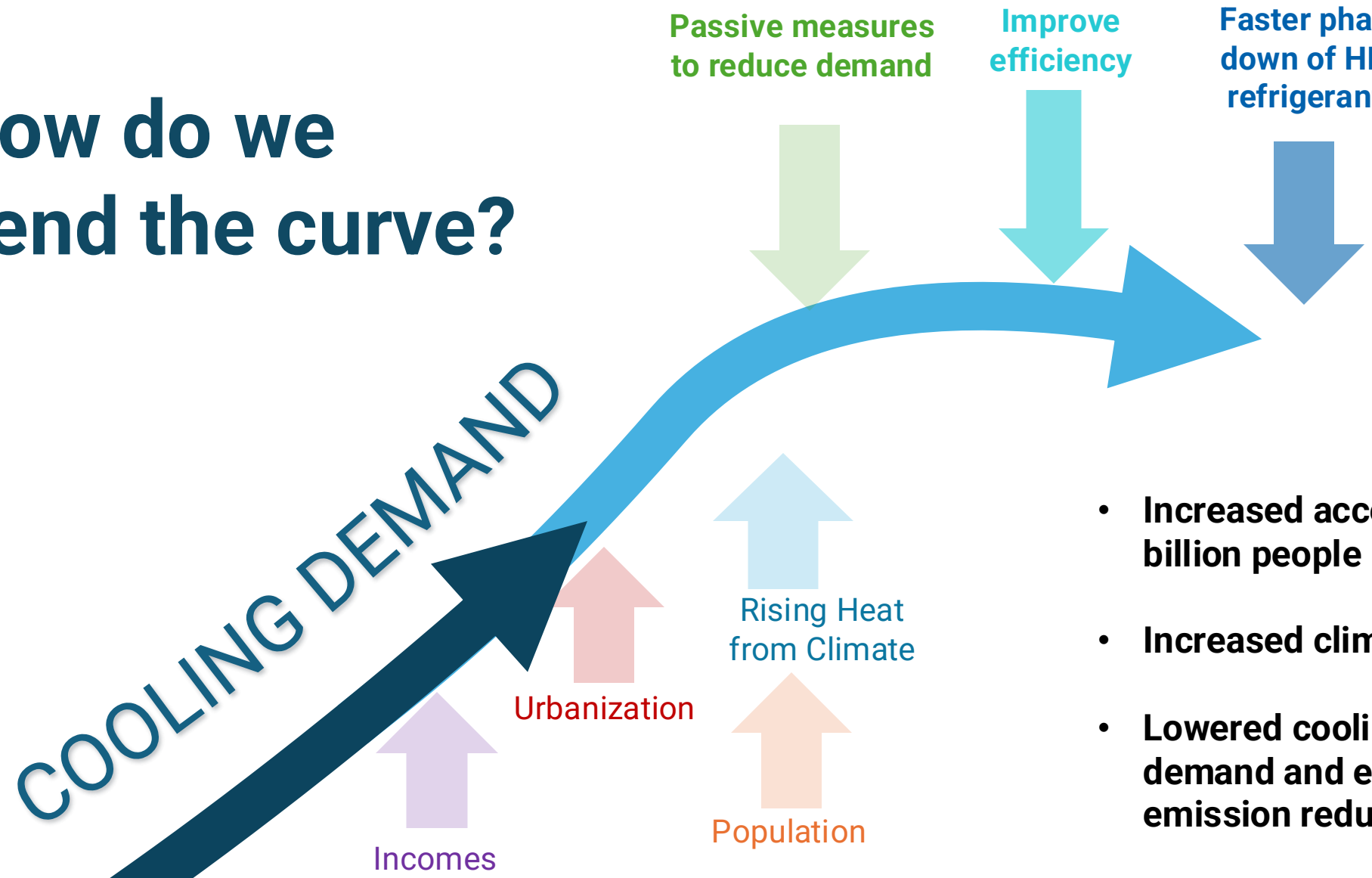
Global Cooling Pledge: Delivering Heat Adaptation within 1.5ºC

- **Targets based on the science of UNEP's Global Cooling Watch Report**
- Reduce emissions by 68% by 2050
- Significant expansion of **access** by 2030.
- **70+ countries** - G7 /G20
- **Over 60** private sector, financial institutions, and IGOs

Cross-cutting commitments on NDCs, passive cooling, building codes, procurement, Heat/Cooling Action Plans, nature etc.

Delivering Heat Adaptation while keeping to 1.5ºC

How do we bend the curve?



- **Increased access to cooling: 3.5 billion people**
- **Increased climate resilience**
- **Lowered cooling-related energy demand and emissions: 60% emission reduction from 2050**

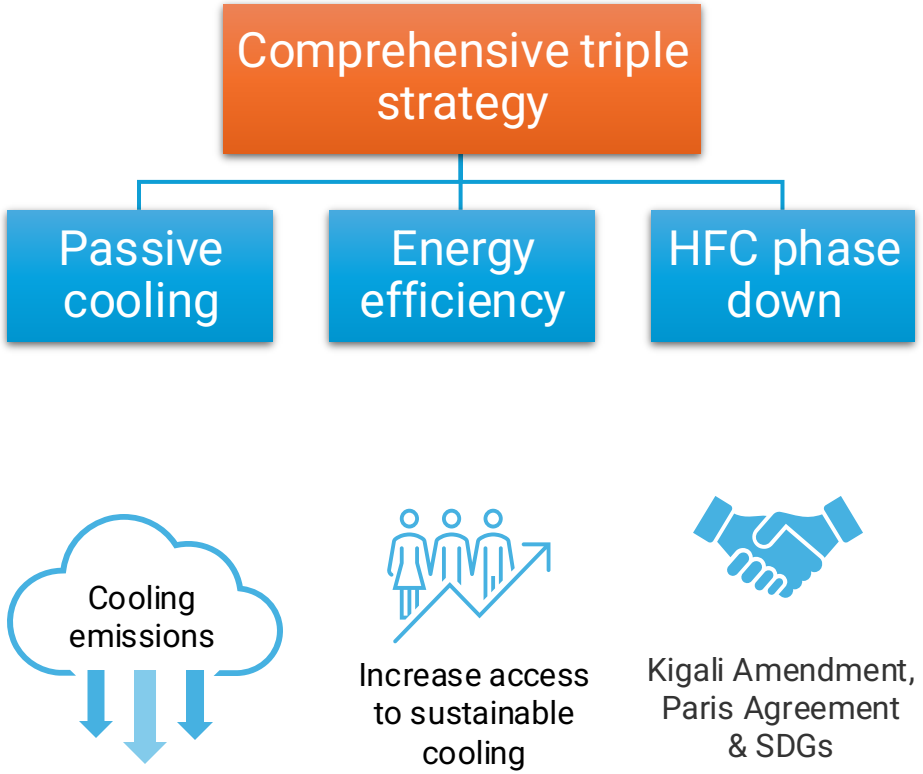
The Global Platform for Comprehensive Action

•The **Cool Coalition**, launched at the 2019 UN Climate Action Summit, brings together **over 250 stakeholders**, including **80+ countries**

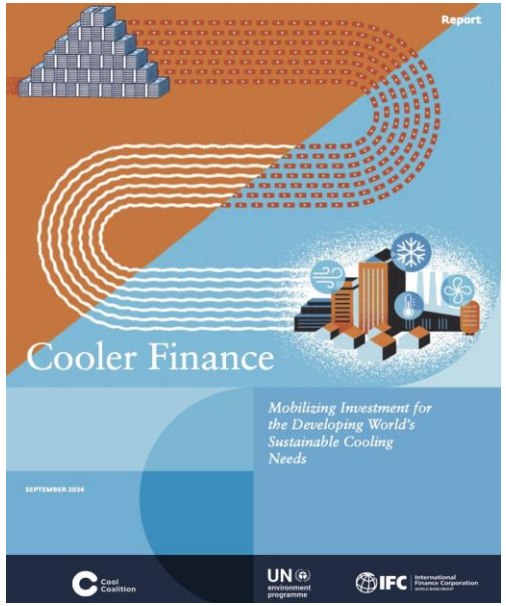
•The leading **global platform for comprehensive action on sustainable cooling and extreme heat**

•**Comprehensive Approach**: awareness, preparedness and redesign delivered through **advocacy, science, and joint action** to support countries on the triple strategy

•**Secretariat of the Global Cooling Pledge** working with 70+ government signatories



Awareness: Establishing the Science for Action



Redesign: Delivering in Partner-led Working Groups

Upcoming:
Energy Efficiency and Innovation With the Clean Energy Ministerial

Modelling Advisory Group

Cooling and Refrigeration Emissions and Energy Data

Communications & Advocacy

NDCs

National Cooling Action Plans

Private Sector Mobilization

Passive Cooling

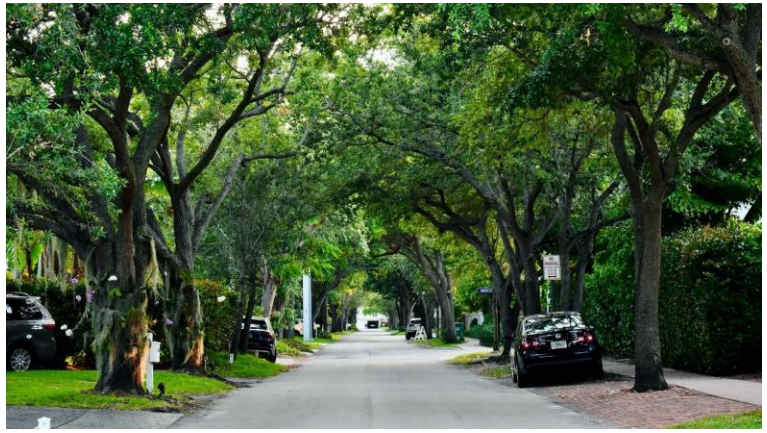
Nature for Cooling

Urban Heat Adaptation

MEPs and Procurement

Global Standard Approach Urban Heat/Cool Planning

- Urban Heat Adaptation Working Group identified gaps in urban heat planning approaches
    - lack of agreed methodologies
    - resource and data constraints
    - limited exchange on learnings and approaches
- Diverse approaches are being tested in cities and states globally by partners on preparing heat / cooling plans .
- Need an approach to learn from these partners and bring it together to develop a global standard approach
- Today is a platform to begin joint preparation of a global approach
- UNEP and its Cool Coalition partners have been working in several countries to develop Urban Cooling/ Heat Action Plans



Urban Heat/Cooling Action Planning: Key Areas

Awareness and Preparedness

Heat wave readiness

- UHIE mapping
- Vulnerability mapping
- Governance structures
- Social programs
- Climate & industrial strategy
- Skilling and innovaton

Redesign the built environment

- Integrated Heat Action/Cooling Plans
- Heat-resilient urban design
- Cool surfaces
- Nature-based solutions
- District cooling
- Traffic reduction

- Shading
- Cool/green roof
- Insulation
- Orientation
- Window area and glazing
- Rooftop shading

- Efficient ACs, fans and coolers
- District cooling
- Chiller replacement
- Thermal storage
- Cooling as a Service

Redesign health and food logistics

Expand clean cold chains

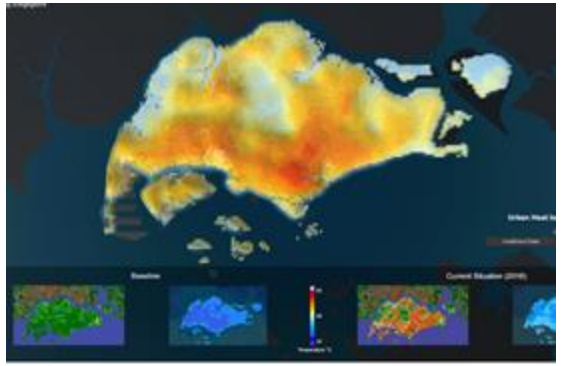
- Farm-to-fork integrated cold chain
- Packhouses, reefer transport, large-scale cold storage
- Reduce vaccine wastage – factory-to-arm integrated cold chain

Urban Heat/Cooling Action Plans: Multi-level Action

National Actions

- Climate Plans and Commitments (NDCs)
- Cooling Action Plans
- Disaster Planning
- Building Energy Codes
- Heat-resilient Urban Design Guidelines
- Standards, labels
- Social housing programs

Subnational Actions



- State climate targets
- State disaster, greening, industrial, urban policies
- Urban planning
- Building byelaws
- Vulnerable populations and social housing programs
- On ground implementation

Private Sector and Finance

- Innovation
- Local manufacturing and jobs
- Skilling
- Public Private Partnerships
- Targeted finance programs
- Pilots
- Incentives

Individuals

- Community engagement
- Consumer awareness
- Increase demand for passive & green integration
- Sustainable consumption

Country Projects: Addressing Gaps in the Triple Strategy

Goal: Address cooling demand / extreme heat through **implementation** of "triple strategy" - in line Global Cooling Pledge

Model: In partnership with Cool Coalition members (direct partners or coordinated):

MARKET TRANSFORMATION

Enhance policy design and policy implementation: national / sub-national

Demonstrate Business Case: techno-economic feasibility, project pipeline, learnings for finance and policy

Scale up & Regional Replication: finance mechanisms, training/capacity building, coordination hubs

Outcome: Over 60% GHG reductions while increasing universal access and saving 1Billion annually in energy costs

The GlobalABC

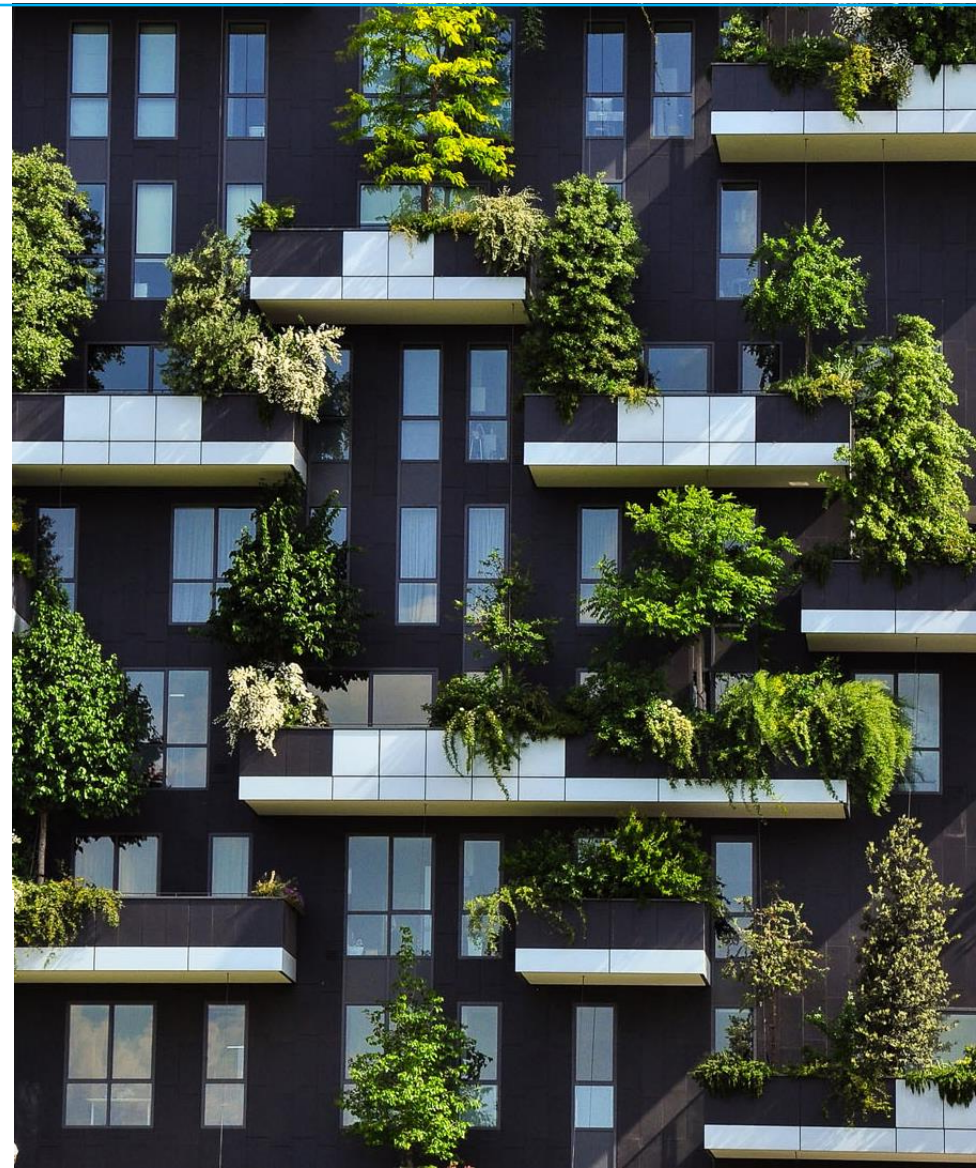
Founded at COP21, hosted by UNEP with 339 members, including 42 countries, the Global Alliance for Buildings and Construction (GlobalABC) is the leading global platform for all buildings stakeholders committed to a common vision: **A zero-emission, efficient and resilient buildings and construction sector**.

Generation Restoration project-
Catalysing nature-based transformations in cities

The UNEP led programme **implements a package of measures to address selected political, technical, and financial challenges to promote restoration at scale, particularly in urban areas, a**s a contribution to the UN Decade on Ecosystem Restoration and the Global Biodiversity Framework.

The project aims at **empowering and inspiring city stakeholders around the world to upscale ecosystem restoration initiatives** to deliver climate and biodiversity benefits, for both people and the planet.

- **12 Role Model Cities** help drive engagement and serve as champions of restoration.
- **14 Pilot Cities** that were selected for project-funded catalytic grants to make the case, develop innovative policy approaches, and initiate implementation of NbS in their cities.
- In total **24 different cities are joining**, with 3 cities joining as both Pilot and Role models.



UN environment programme

ICLEI Local Governments for Sustainability | CBC Cities Biodiversity Center

A contribution to: UNITED NATIONS DECADE ON ECOSYSTEM RESTORATION 2021-2030

Supported by: Federal Ministry for Economic Cooperation and Development

Thank you!

Join us in taking joint action on extreme heat and cooling

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Lily Riahi Coordinator, Cool Coalition, lily.riahi@un.org

UNEP Cool Coalition Secretariat unep-coolcoalition@un.org

Urban Heat Adaptation Working Group Co-Chairs

Eleni Myrivili, Global Chief Heat Officer, Arsht Rock / UN Habitat emyrivili@atlanticcouncil.org

Graeme Maidment, Department for Energy Security and Net Zero, Graeme.Maidment@energysecurity.gov.uk

Minni Sastry, Advisor, Heat and Cool Planning, minni.sastry@un.org

Awareness & Preparedness:

Urban Heat Mapping, Exposure & vulnerability

Moderator

Dr.Graeme Maidment
Co-lead Mission Innovation, UK Department for Business

Panel speakers

Prof. Rajan Rawal
Senior Advisor,
CARBSE
CEPT University

Dr. Joy Shumake-Guillemot
Lead- WHO/
WMO Joint Climate and Health Office

Mr. Sanjaya Bhatia
Head of Office
UN Office Disaster Risk Reduction (UNDRR)

Awareness & Preparedness: Urban Heat Mapping, Exposure & vulnerability

Prof. Rajan Rawal

Senior Advisor, CEPT University

Virtual Workshop: Cool Coalition

Cooling Cities: Action Planning for Extreme Heat

Awareness & Preparedness: Urban Heat Mapping, Exposure and Vulnerability

Rajan Rawal, CEPT University

Thursday, October 24, 2024, Chennai

The Nature And The extent of the
Recommendations Following

Level of Details

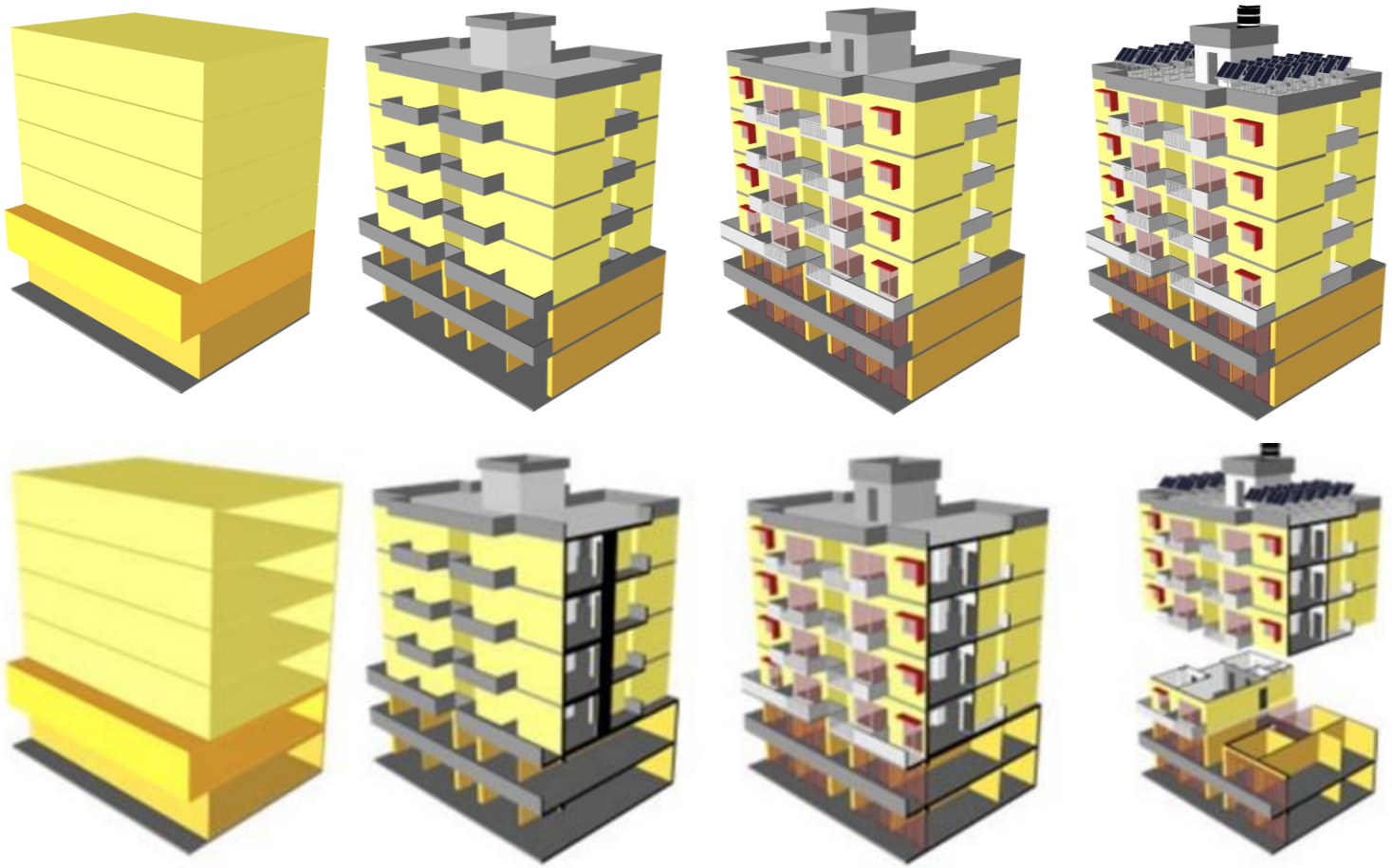
Needed to

Fit the Purpose

Fit-for-purpose (FFP)

- **define** specific aim and objective, and navigate the study towards an evidence-based solution
- **customize** the FFP methodology for suitable LoDs selection based on the resources.
- **access and ensure** methodology's functionality, performance, and reliability for a successful outcome.
- **allow** stakeholders to develop common strategies and enable cross-learning at the national level.

Level of Details : Building



LoD 1 | LoD 2 | LoD 3 | LoD 4

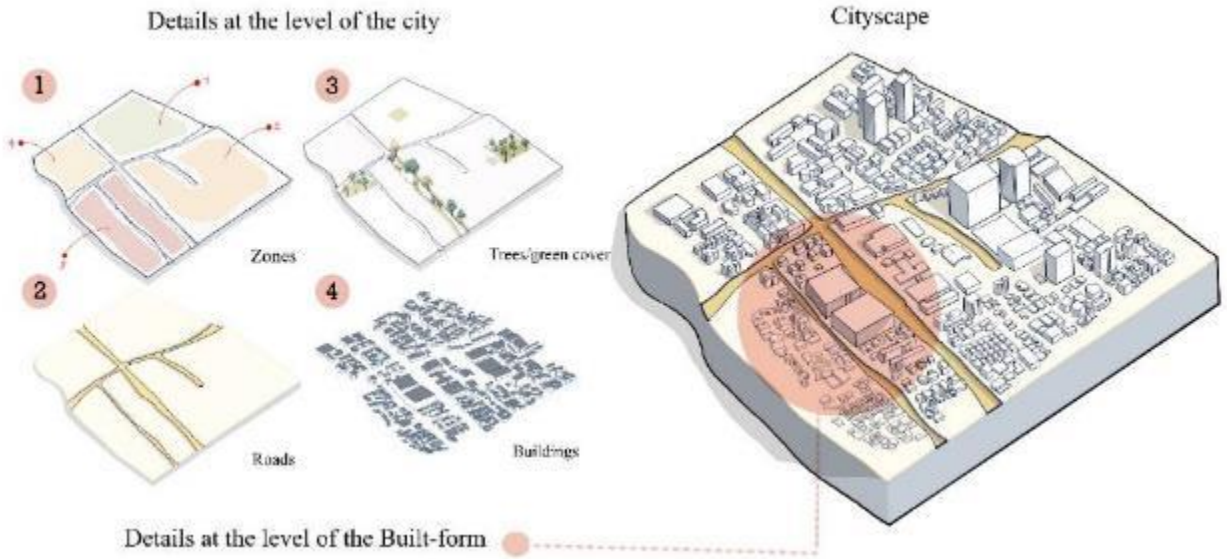
Geometry

- Block
- Refined Geometry
- Internal Layout

Semantic

- Climate
- Building Use
- Envelop Const.
- Occupancy
- Energy Systems
- RE Systems - SPV

Level of Details: Cities



LoD1 Basic heights and form of the building

LoD2 Building with envelope details like windows and doors

LoD3 Building with window shading details and renewables

- **representation** of data at different level of complexity
- **enable** a highly targeted data collection approach
- **aid** in persistent gaps in modelling and simulation for-
  - accuracy
  - complexity of input parameters
  - standardized metrics
  - reliability of calibration methods
- **strike** a suitable trade-off between data fidelity and decision-making efficiency

FFP-UHIE study method: LoD characterization

Level of Detail	Study Parameters						
	Meteorology	**Urban Infrastructure**	**Semantic**	**Operational profile**	**Energy consumption**	**Spatial resolution**	**Temporal resolution**
LoD 1	Surface temperature	Land use land cover	Surface Characteristics	Deterministic-Single profile	Connected loads	1000 m.	Decadal
LoD 2	**LoD1** + Air temperature	**LoD 1** + Plot boundaries	**LoD 1** + Building use and type	**LoD 1** + Deterministic-Multiple profile	**LoD 1** + Load profiles	100 m	Annual
LoD 3	**LoD 2** + Relative humidity + Mean wind speed and direction + Solar radiation	**LoD 2** + Building footprint + Building height	**LoD 2** + Age of property	**LoD 2** + Stochastic-Space based	**LoD 2** + Metered data	30 m	Monthly
LoD 4	**LoD 3** + Wet bulb globe temperature + Cloud cover	**LoD 3** + Sky view factor + Vegetation properties	**LoD 3** + Building archetype	**LoD 3** + Stochastic- Agent based	**LoD 3** + Submeter end-use data	10 m	Daily/hourly

Note: Each parameter is assigned a colour palate to differentiate from the table, and the hues of the colour become darker as the LoD increases for the datasets concluded in each parameter for mapping and assessing the UHIE.

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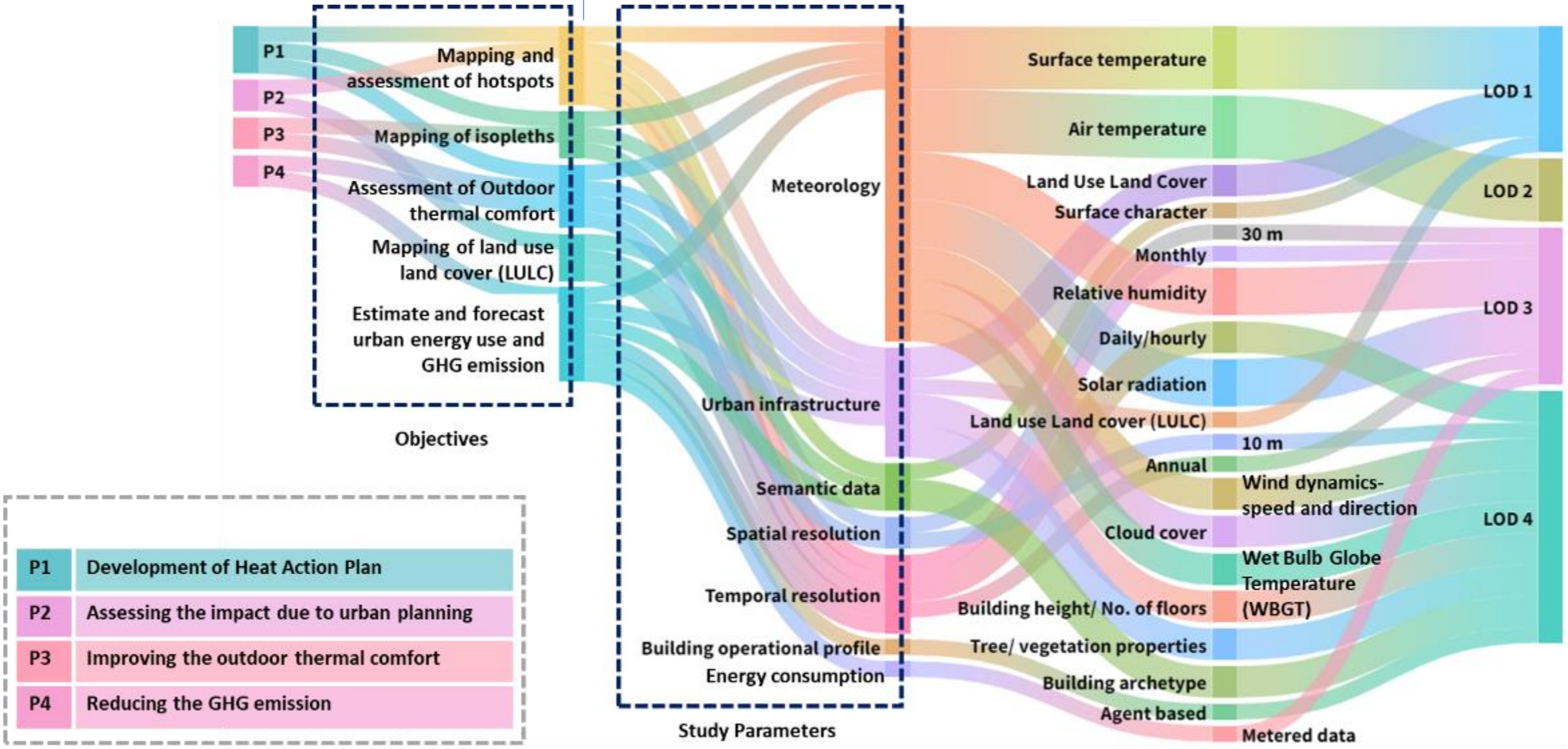
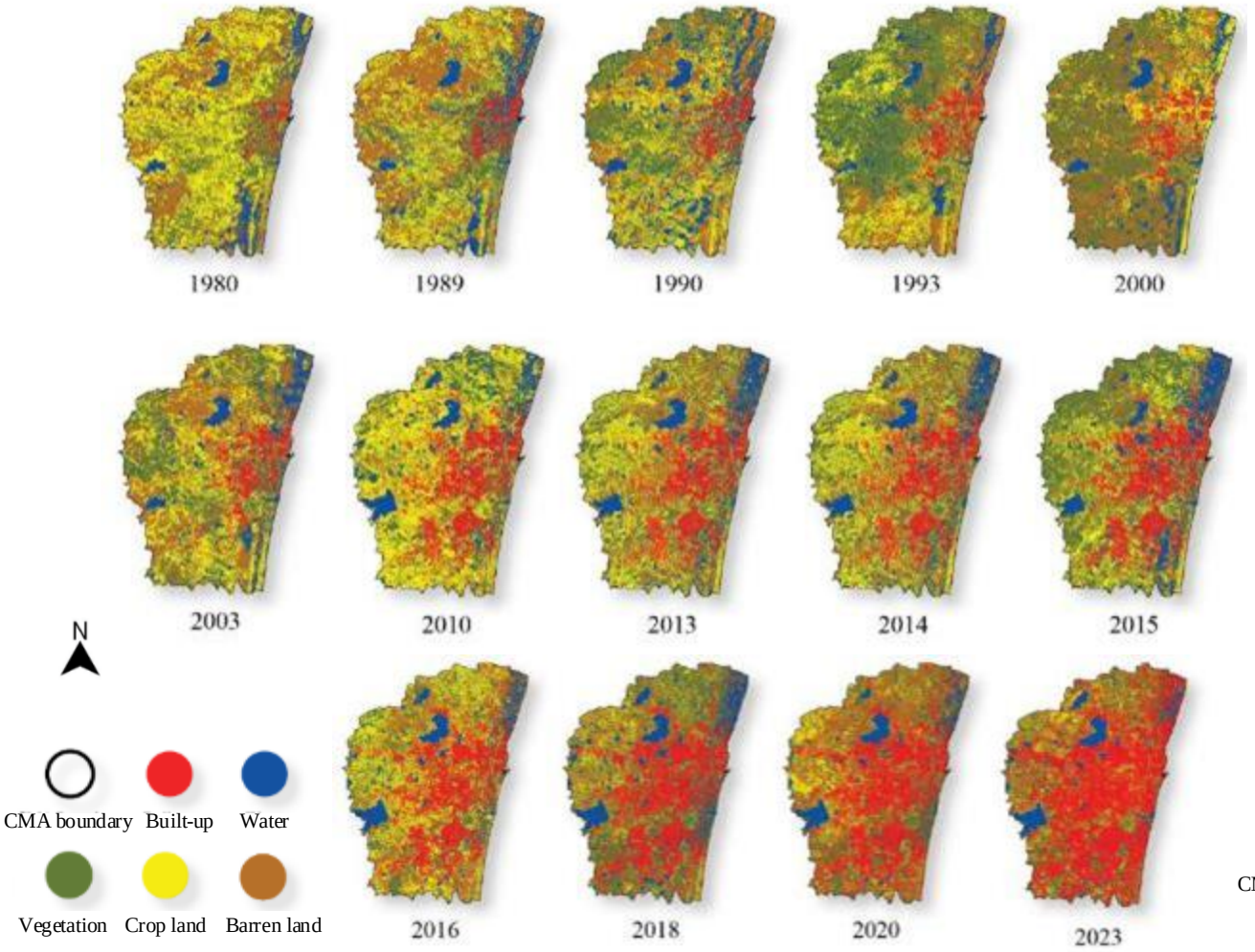
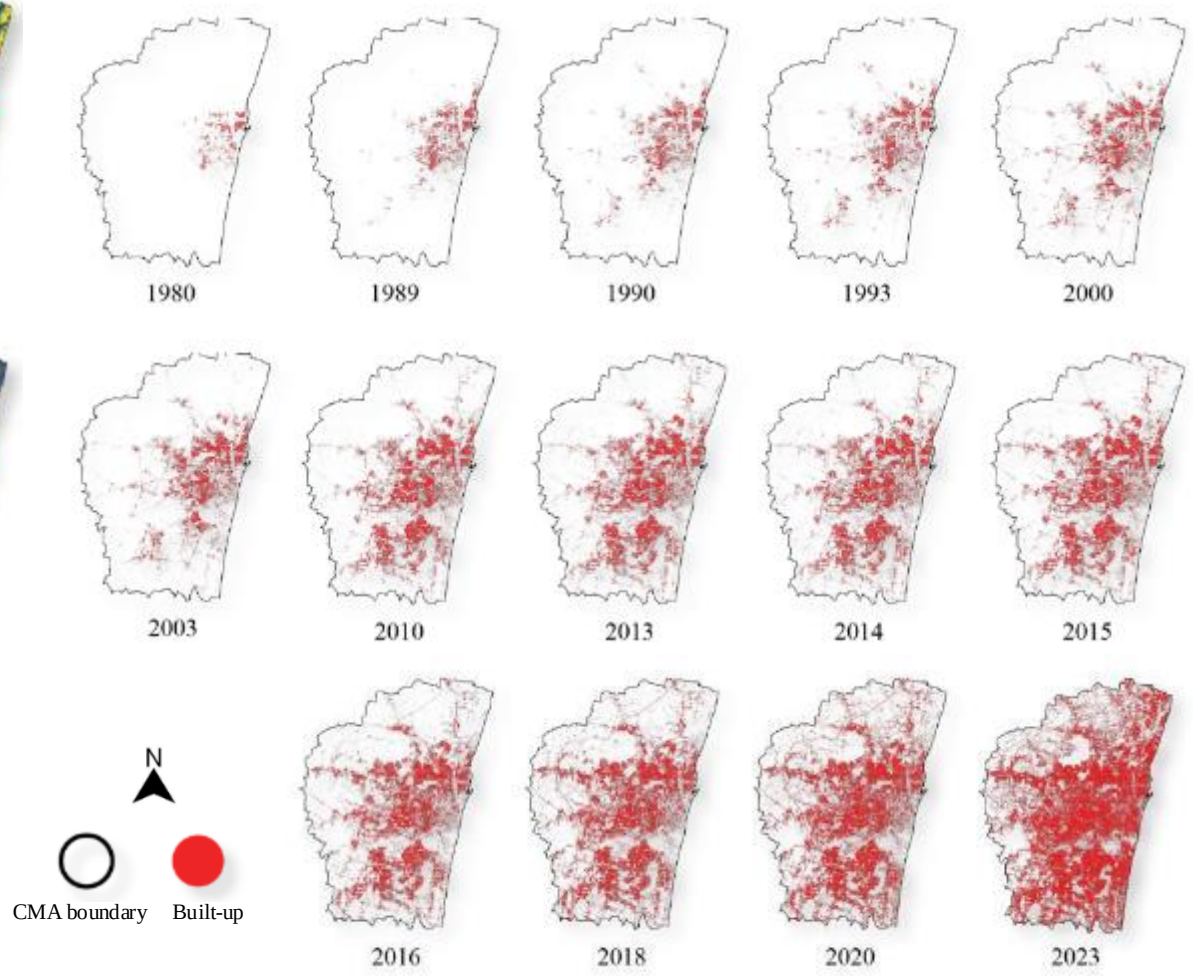


Chennai: Science-Based Approach

LULC Classification and urban sprawl

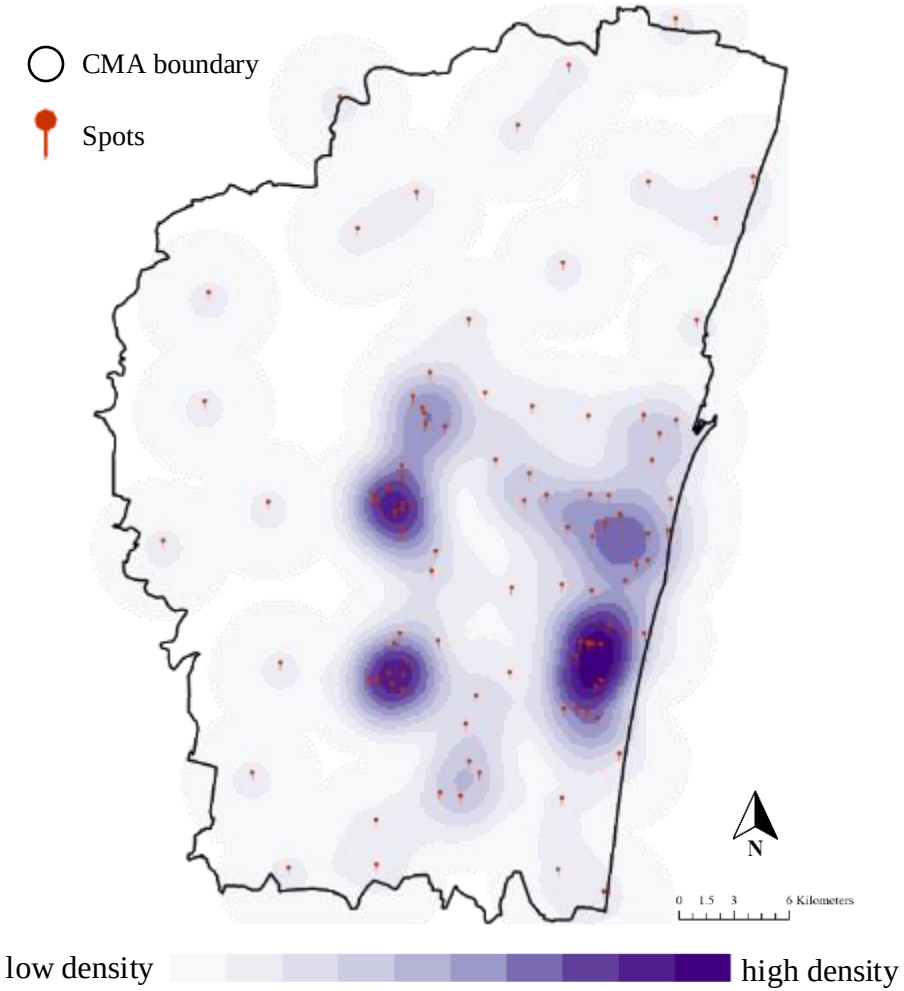


LULC classification- from 1980 to 2023

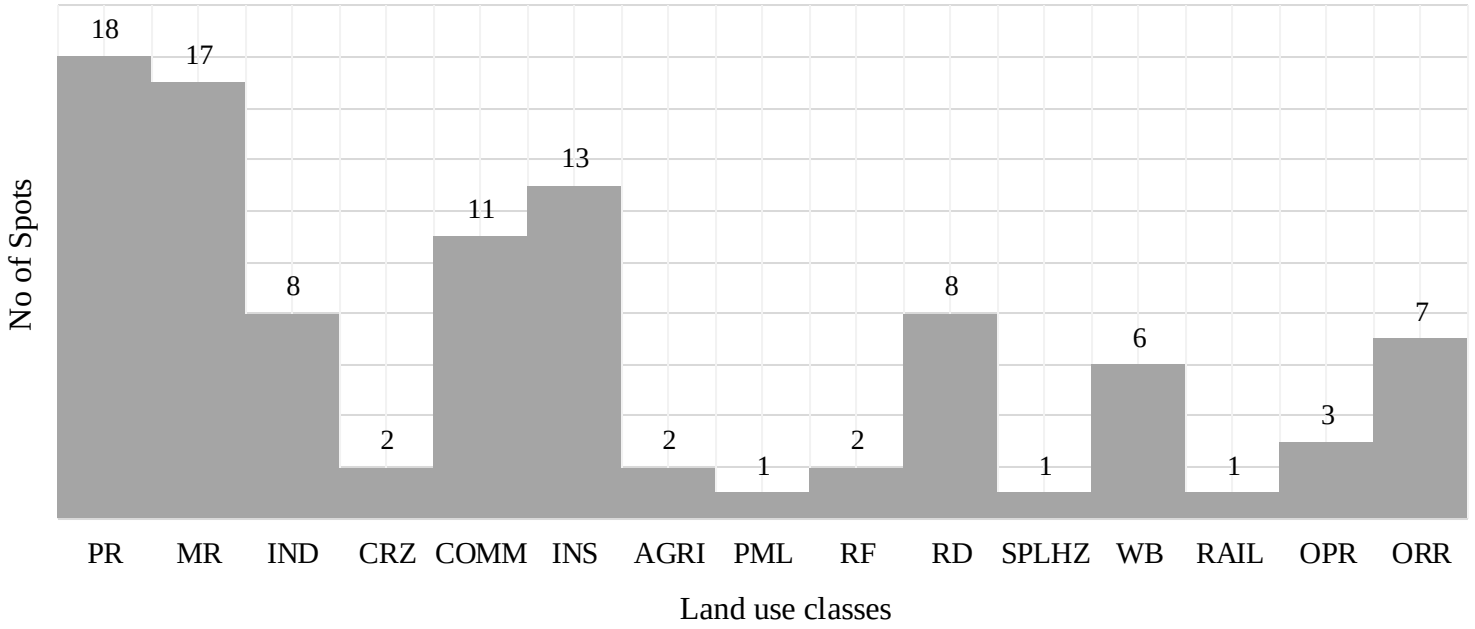


Urban sprawl (trend in built up changes)- from 1980 to 2023

Selection of 100 Spots (hotspot and heat sinks)

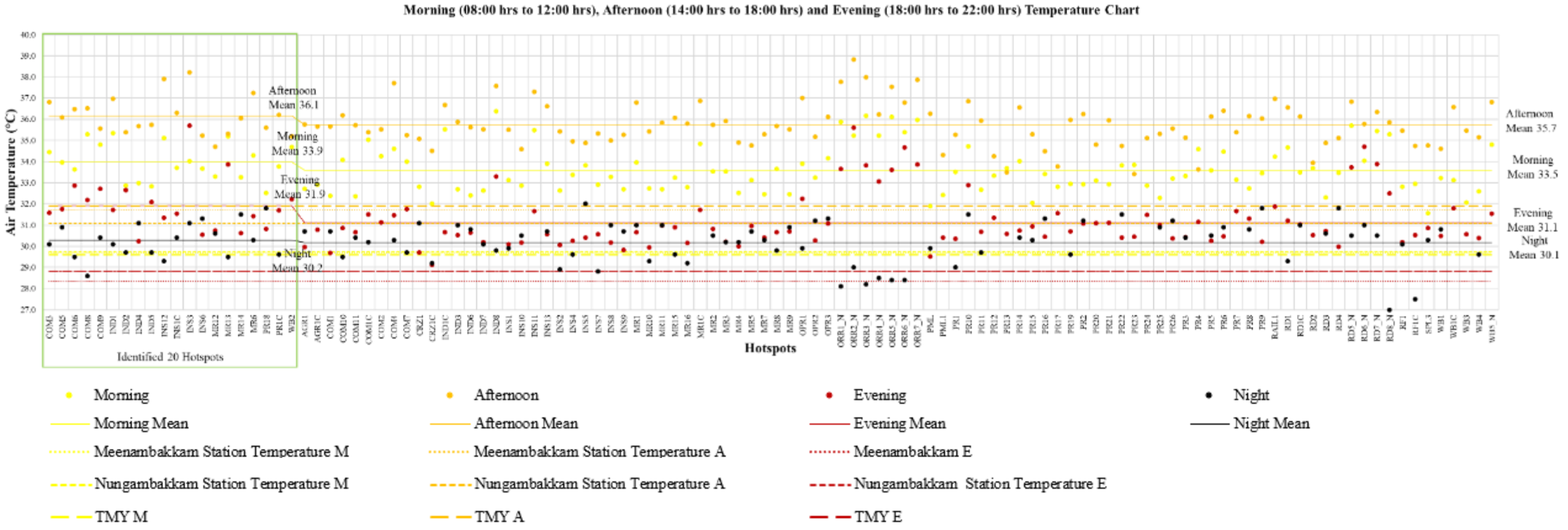


Spatial distribution of 100 spots across CMA



Distribution of 100 spots across various landuse of CMA

Selection of 100 Spots (hotspot and heat sinks)

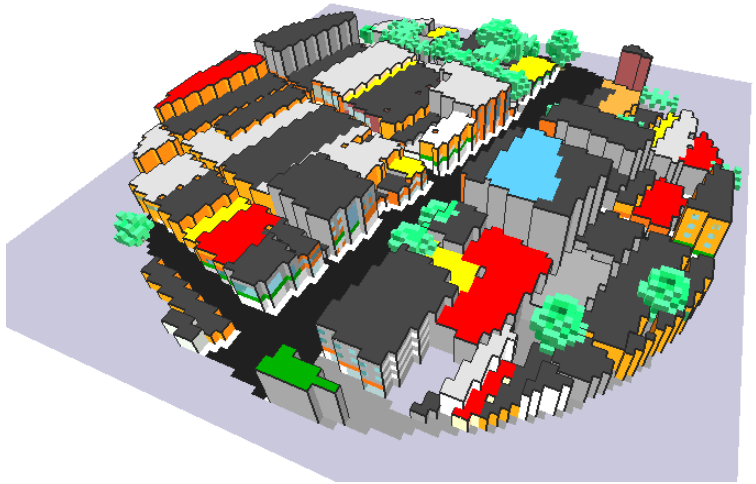


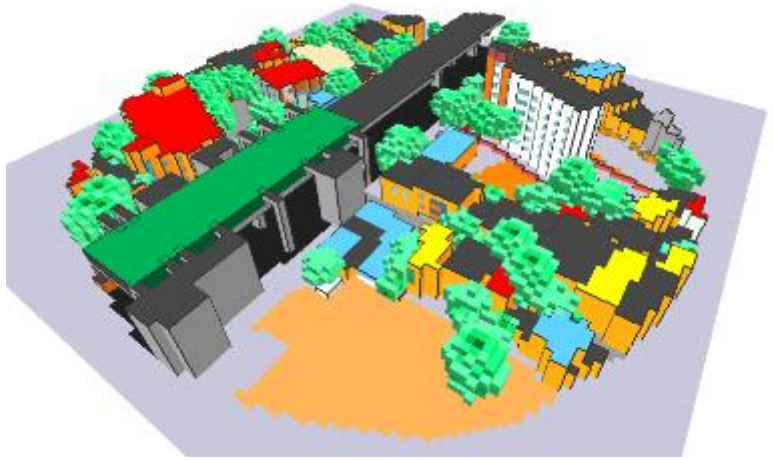
Data Analysis of 20 spots: Ranking of spots

Morning Temperature	IND1	COM8	MR13	INS12	COM9	WB2	COM3	MR6	INS3	COM5	PR1C	INS1C	INS6	COM6	MR12	MR14	IND4	IND2	IND5	PR18
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Afternoon Temperature	INS3	INS12	MR6	IND1	COM3	COM8	COM6	INS1C	PR1C	COM5	MR14	IND5	IND4	PR18	COM9	IND2	MR13	INS6	WB2	MR12
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Evening Temperature	INS3	MR13	COM6	COM9	IND2	WB2	COM8	IND5	COM5	IND1	PR1C	COM3	INS1C	MR6	INS12	PR18	MR12	MR14	INS6	IND4
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Night Temperature	PR18	MR14	INS6	IND4	INS3	COM5	MR12	COM9	INS1C	MR6	COM3	IND1	IND2	IND5	PR1C	COM6	MR13	INS12	COM8	WB2
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Building Footprint Area (%)	COM5	MR14	COM8	PR18	INS3	MR6	IND4	MR12	COM3	MR13	IND5	COM6	IND1	INS1C	IND2	COM9	PR1C	INS12	WB2	INS6
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Vegetation Area (%)	IND5	MR13	IND1	COM3	MR6	IND4	INS6	INS3	COM6	COM9	IND2	INS1C	MR12	COM8	MR14	COM5	PR1C	INS12	PR18	WB2
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Paved Surface Area (%)	PR18	IND4	IND2	MR12	MR13	WB2	IND5	COM9	INS6	COM6	INS12	MR6	MR14	INS1C	PR1C	COM5	COM8	INS3	IND1	COM3
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20

Highest ← → Lowest

Urban Microclimate Modelling





Thermo-physical properties of materials	
1	Thickness
2	absorption
3	transmission
4	reflection
5	emissivity
6	specific heat
7	thermal conductivity
8	density

Soil Surface Properties	
1	Roughness length
2	Albedo
3	Emissivity

Unique Masonry Database of -

i. Brick Wall with Cement Plaster
ii. Brick Wall with lime plaster
iii. Concrete hollow block with cement plaster
iv. AAC block with cement plaster
v. Concrete Slab with cement plaster
vi. Cool roof over concrete slab
vii. ACP cladding over AAC wall
viii. Burnt brick roof with cement plaster
ix. Concrete masonry- with plaster
x. Granite clad composite wall
xi. Curtain Wall- Tinted
xii. Ceramic Clad over brick roof
xiii. Wooden Masonry
xiv. Cement Board Decking
xv. Asbestos Roof

Thank You

Rajan Rawal, CEPT University
rajanrawal@cept.ac.in

UN environment programme

Cool Coalition

Awareness & Preparedness: Urban Heat Mapping, Exposure & vulnerability

Dr. Joy Shumake-Guillemot

Lead - WHO/ WMO Joint Climate and Health Office

WORLD METEOROLOGICAL ORGANIZATION | World Health Organization

GLOBAL HEAT HEALTH INFORMATION NETWORK

UNDERSTANDING URBAN HEAT VULNERABILITY

Cool Coalition: Action Planning for Extreme Heat

24 October 2024

Joy Shumake-Guillemot, DrPH |
Head, WMO-WHO Joint Office for Climate and Health
Lead, Global Heat Health Information Network
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Climate Centre

THE UNIVERSITY OF ARIZONA

HEAT.gov

Duke

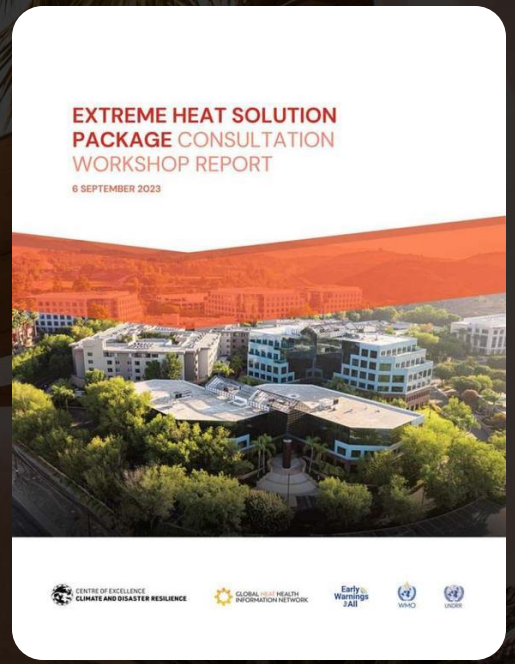

GLOBAL HEAT HEALTH
INFORMATION NETWORK
PART ONE
HOW CAN WE INFORM HEAT POLICY AND PLANNING ?
TOSHIBA
INVERTER
Panasonic
INVERTER
R32

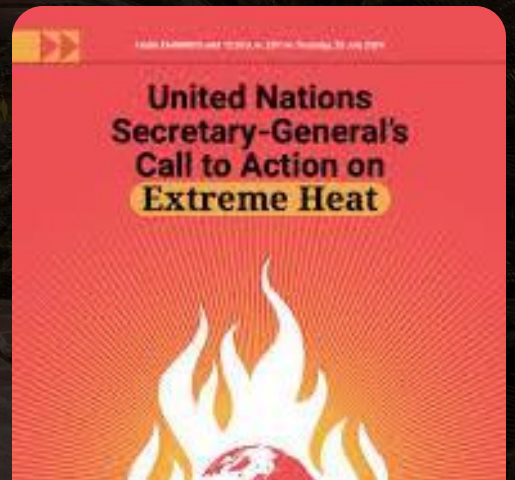
ACCELERATING HEAT ACTION

WORLD METEOROLOGICAL ORGANIZATION | World Health Organization | NOAA

GLOBAL HEAT HEALTH INFORMATION NETWORK

GHHIN is an independent, voluntary, and member-driven forum of scientists, practitioners, and policy makers focused on improving capacity to protect populations from the avoidable health risks of extreme heat.





- **Ongoing Activites Heat Governance**
  - Inventory and review of Heat Action Plans
  - Scoping of governance models
  - Scoping of UN system readiness to support heat risk
- Toward → Common Framework for Heat Action

SELECTED FINDINGS

HEAT RESILIENT POLICY AND PLANNING NEEDS

GLOBAL HEAT HEALTH INFORMATION NETWORK

LIMITED PROBLEM AWARENESS

Low awareness prevents individual and policy-level action.

INSUFFICIENT LOCAL DATA

Locally-relevant information is insufficiently available for evidence-based decision-making.

UNCOORDINATED POLICY

Legislative frameworks and policy mechanisms for heat-centered planning are lacking and uncoordinated at national and subnational levels.

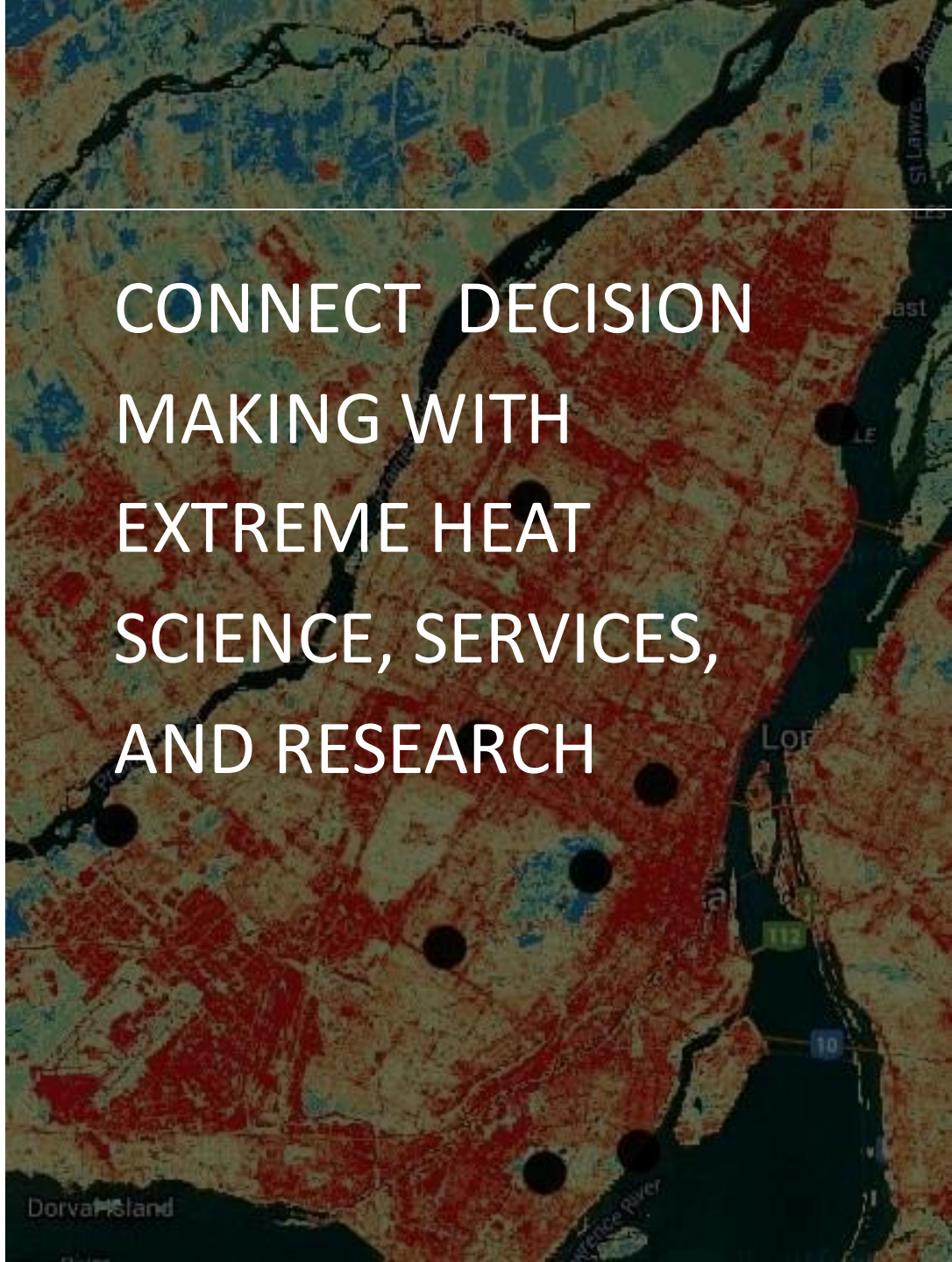
NEED › SUFFICIENT LOCAL INFORMATION

Only 54% of countries have heat warning systems.

(WMO, 2023)

Areas of opportunity:

- Heat vulnerabilty and risk studies
- Impact-based warnings and forecasting
- Hazard science & technology
- Standardized impact metrics
- Impact studies
- Intervention effectiveness studies
- Climate attribution studies
- Material science and remote and personal sensor technologies

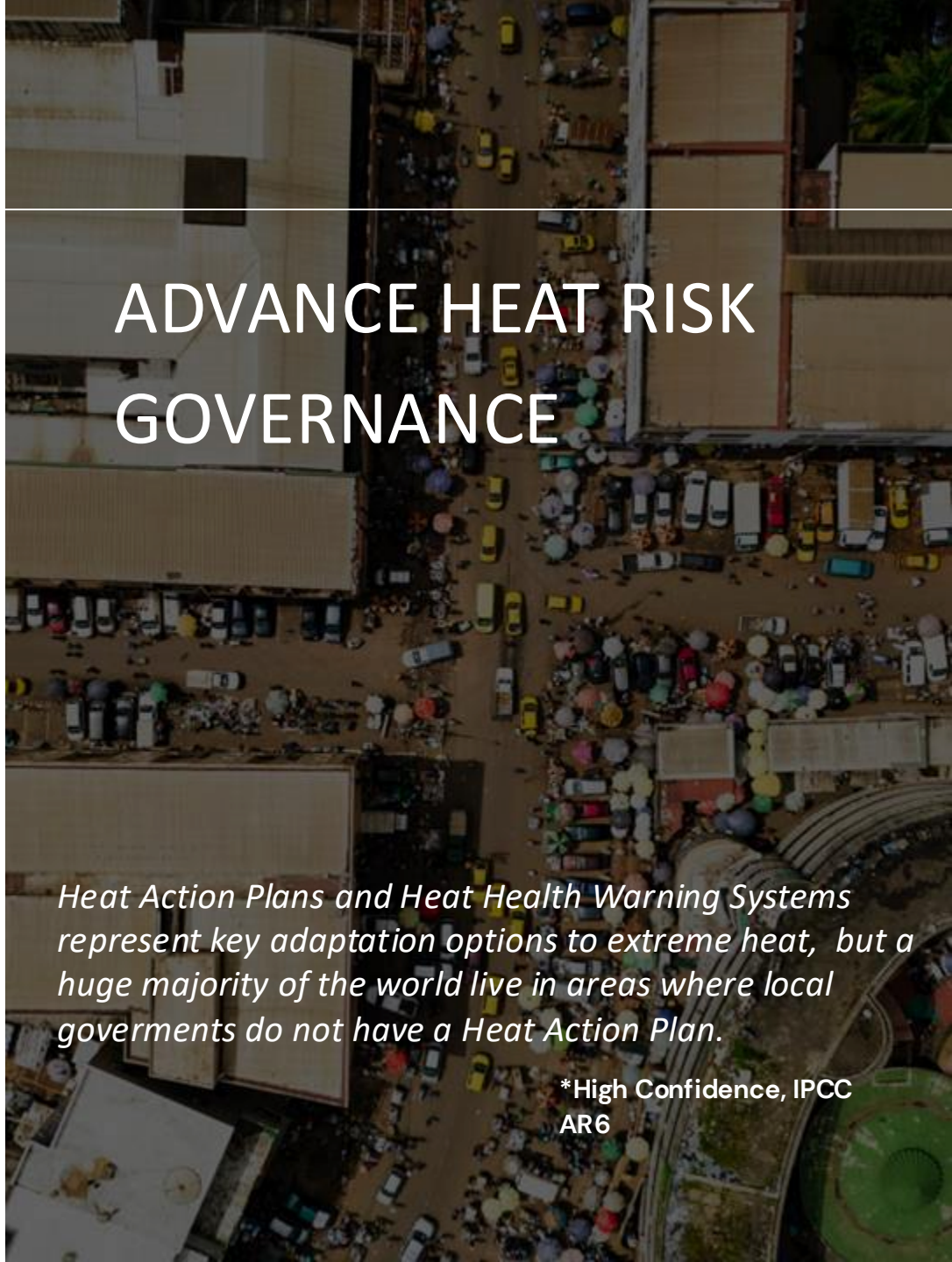


NEED COORDINATED POLICY

Only 24 countries have heat action plans. (WMO, 2024)

Areas of opportunity:

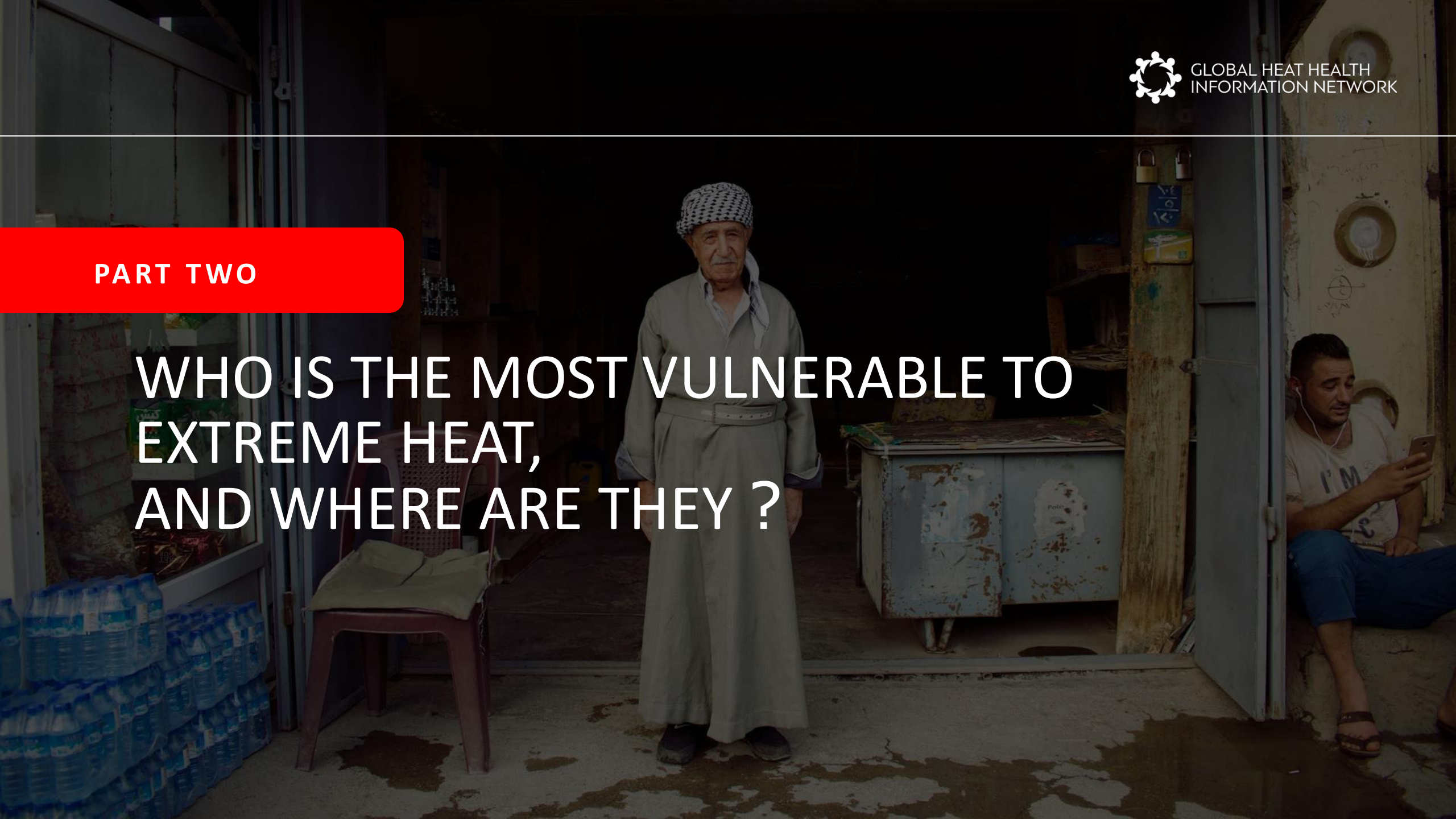
- Develop and invest in Heat Action Plans at all levels
- Protocols and regulations for worker, athlete, and vulnerable groups protections
- Enhance multi-hazard and intersectoral coordination
- Policy alignment across city, state, to national levels
- Heat-centered urban planning, building codes, and utility regulation
- Evidence-based policy advocacy



ADVANCE HEAT RISK GOVERNANCE

Heat Action Plans and Heat Health Warning Systems represent key adaptation options to extreme heat, but a huge majority of the world live in areas where local goverments do not have a Heat Action Plan.

*High Confidence, IPCC AR6



GLOBAL HEAT HEALTH INFORMATION NETWORK

PART TWO

WHO IS THE MOST VULNERABLE TO EXTREME HEAT, AND WHERE ARE THEY ?

HEAT IS AN ALL-OF-SOCIETY PROBLEM

GLOBAL HEAT HEALTH INFORMATION NETWORK

PEOPLE

Heat exacerbates risks of:
Social inequity, illness and death.

Requiring information and action from:
Public health; labour, social sectors, physiology, medicine, etc.

ENVIRONMENT

Heat exacerbates risks of:
Fires; poor air quality; water scarcity and drought; cyclones; UV radiation

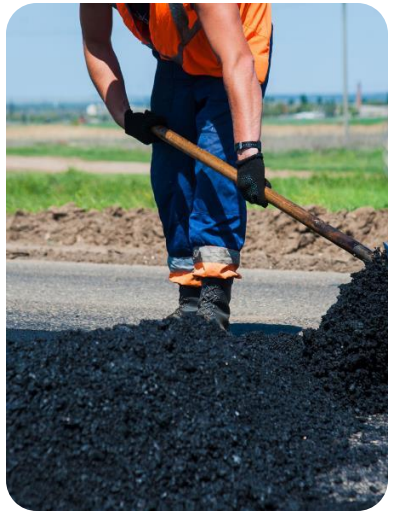
Requiring information and action from:
Environment; meteorology; climatology, etc.

INFRASTRUCTURE

Heat exacerbates risks of:
Urban Heat Islands; emergency and power service disruptions; poor quality housing

Requiring information and action from:
Architecture; engineering; urban planning, etc.

Action is required across sectors, with regional, national, subnational and local policy alignment



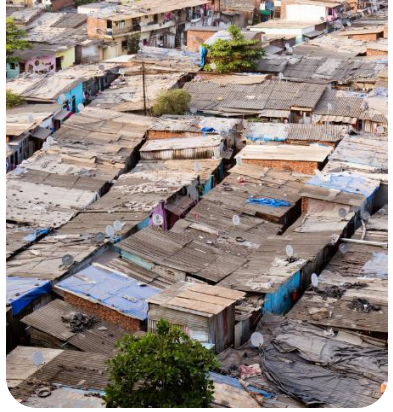
Some groups are more vulnerable to heat stress than others. Social and physiological factors determine vulnerability.

- **Age:** Young children and the elderly
- **Health status:** People with disabilities, pregnant or already infirm
- **Activity:** Outdoor workers & athletes
- **Socioeconomic status:** Impoverished, marginalized, and homeless
- **Housing type:** access to cooling, ventilation, thermal insulation, access to green space

Do we know where these groups live within our own city?

What services are targeted to support them?

Are there protocols to protect these groups during extreme heat events?



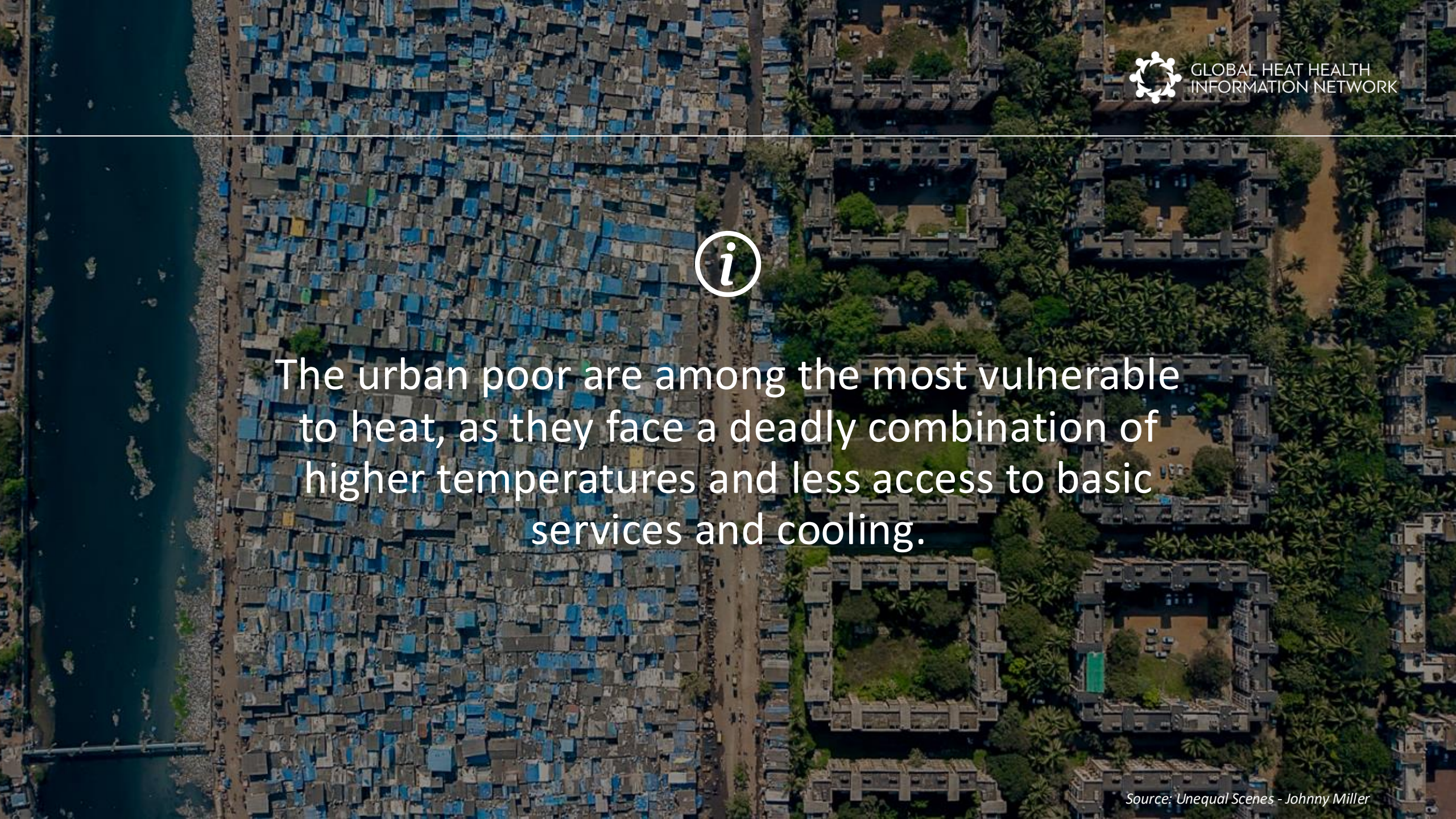
Ecosystems, cities and the built environment are vulnerable to heat and create social vulnerability.

- Hotter, drier conditions make fires far more likely and dangerous.
- Transport, technology and utilities fail under high temperatures.
- Urban environments amplify micro-climate conditions.
- Housing conditions and materials expose/protect populations inequitably

Have you assessed which cascading effects occur during periods of extreme heat?

Have you run heatwave crisis scenarios to understand how your city will be impacted?

Are there protocols to avoid infrastructure shutdowns during a heatwave?



GLOBAL HEAT HEALTH INFORMATION NETWORK

The urban poor are among the most vulnerable to heat, as they face a deadly combination of higher temperatures and less access to basic services and cooling.

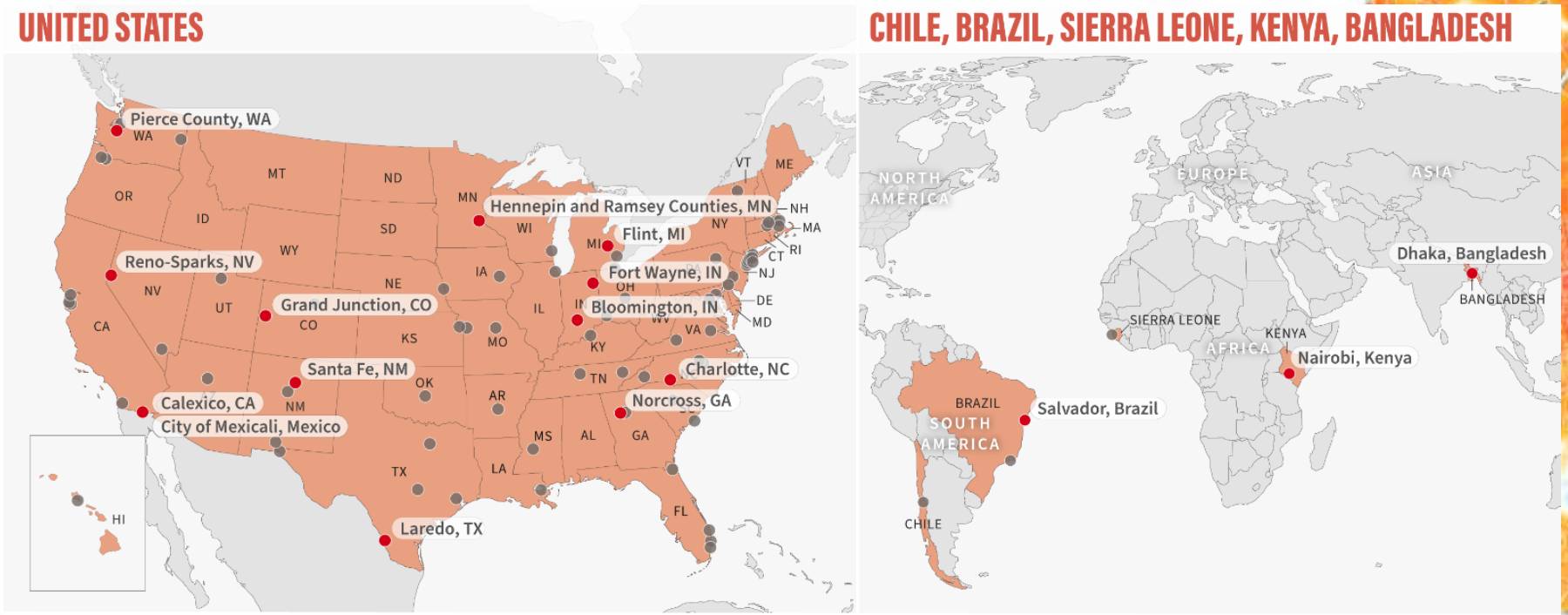
Source: Unequal Scenes - Johnny Miller

GLOBAL HEAT HEALTH INFORMATION NETWORK

PART THREE

HOW CAN WE IDENTIFY LOCAL HEAT VULNERABILITY ?

EXAMPLE: NIHHIS URBAN HEAT ISLAND MAPPING (USA)



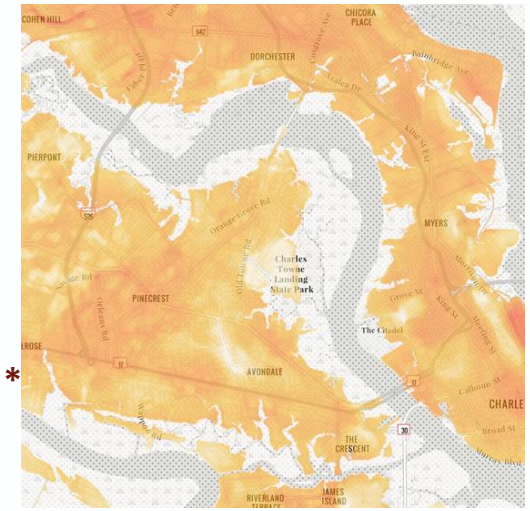
NIHHIS Heat Watch NOAA Climate.gov

https://www.heat.gov/pages/mapping-campaigns

EXAMPLE: NIHHIS URBAN HEAT ISLAND MAPPING (USA)

Community/Citizen Science **centers understanding and action on populations that are at-risk** and promotes solutions that work.

Campaigns **make heat visible**, improving risk perception, understanding, and awareness among volunteers and beyond due to media attention.

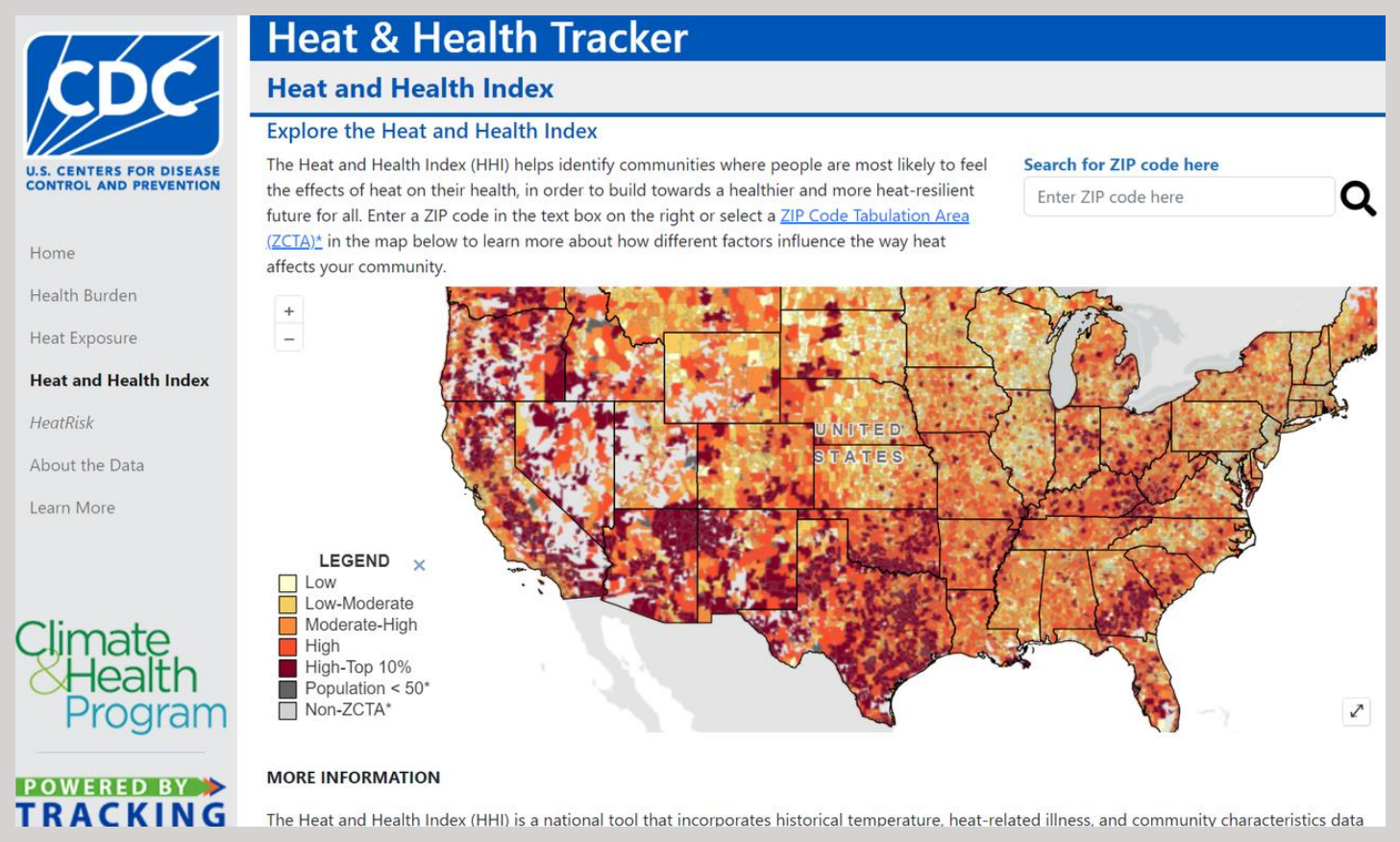


Outcomes inform heat action **planning**, museum and school curricula, and **heat island mitigation** such as tree planning and cool surfaces.

https://www.heat.gov/pages/mapping-campaigns

EXAMPLE: CDC HEAT AND HEALTH INDEX (USA) 1/2

Federal scale cooperation for understanding heat vulnerability by zip code



Collaboration / Data in the HHI

Centers for Disease Control and Prevention (CDC)
National Emergency Medical Services Information System (NEMSIS)
United States Census Bureau
Multi- Resolution Land Characteristics Consortium (MRLC)
Environmental Protection Agency (EPA)

https://www.cdc.gov/heatrisk

EXAMPLE: CDC HEAT AND HEALTH INDEX (USA) 2/2

Social and Health Vulnerability Indicators - by zip code

1 **Historical Heat and Health Burden Module:** Measures of previous experience with heat at the local level

- Number of extreme heat days
- Heat related illnesses

2 **Sensitivity Module:** Pre-existing health conditions that may increase the risk of negative health outcomes when the individual with the condition is exposed to heat.

- Coronary Heart Disease
- obesity
- diabetes
- COPD
- asthma
- poor mental health

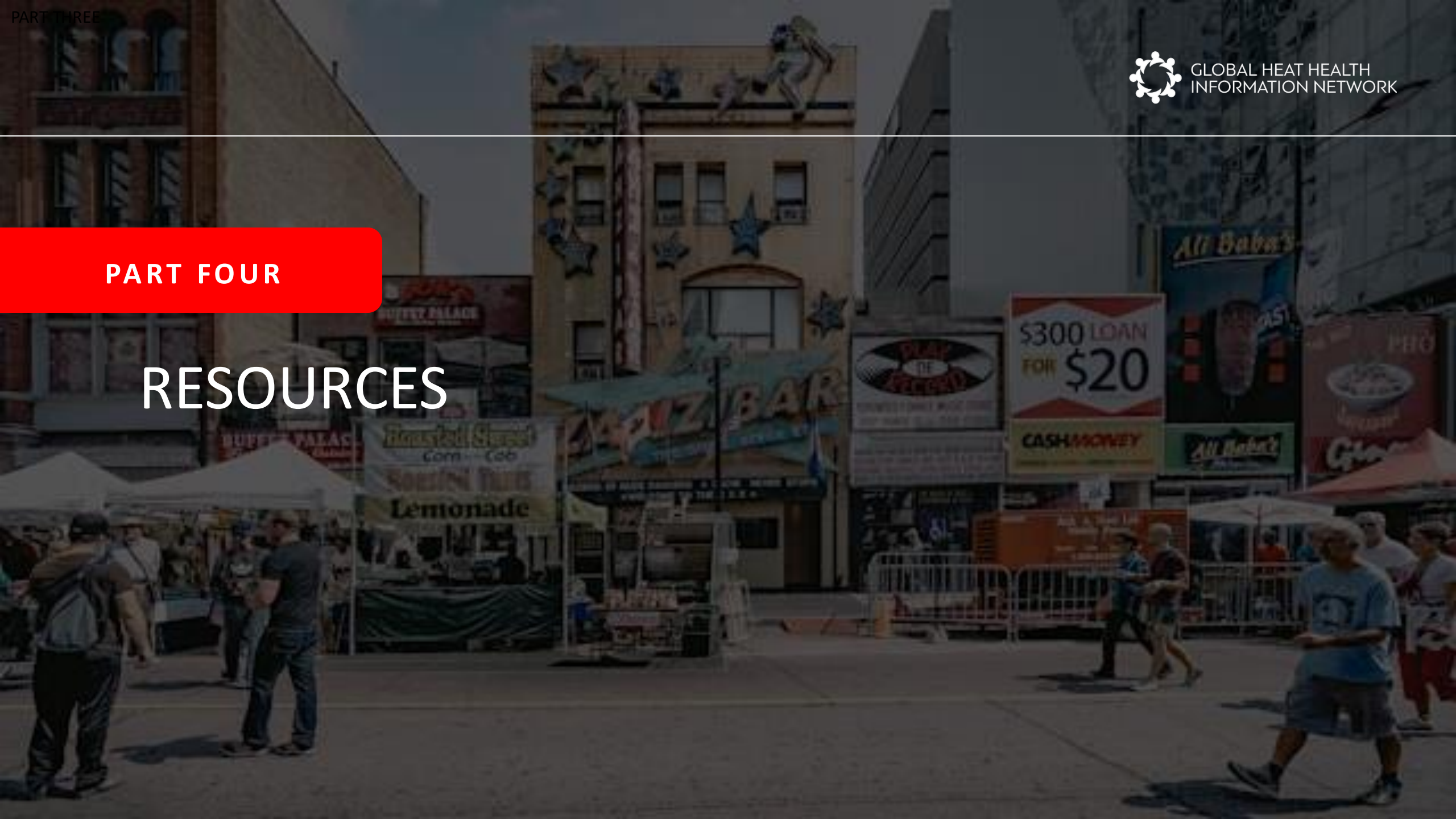
3 **Sociodemographic Module:** Social and demographic characteristics that increase exposure or sensitivity to heat or lessen one's ability to cope with heat.

- Lack of Health Insurance
- Poverty
- Unemployment
- No high school diploma
- Living alone
- speaks english "less than well"
- Civilian with a disability
- Outdoor work
- Age 65 and over
- Age 5 and under

4 **Natural and Built Environment Module:** Characteristics of the natural and built environment that increase exposure or sensitivity to heat or lessen one's ability to cope with heat.

- Impervious surfaces
- Tree canopy
- No vehicle
- Mobile homes
- Renters
- Ozone
- PM2.5

GLOBAL HEAT HEALTH INFORMATION NETWORK



PART FOUR

RESOURCES

ONLINE LEARNING

GHHIN Masterclasses

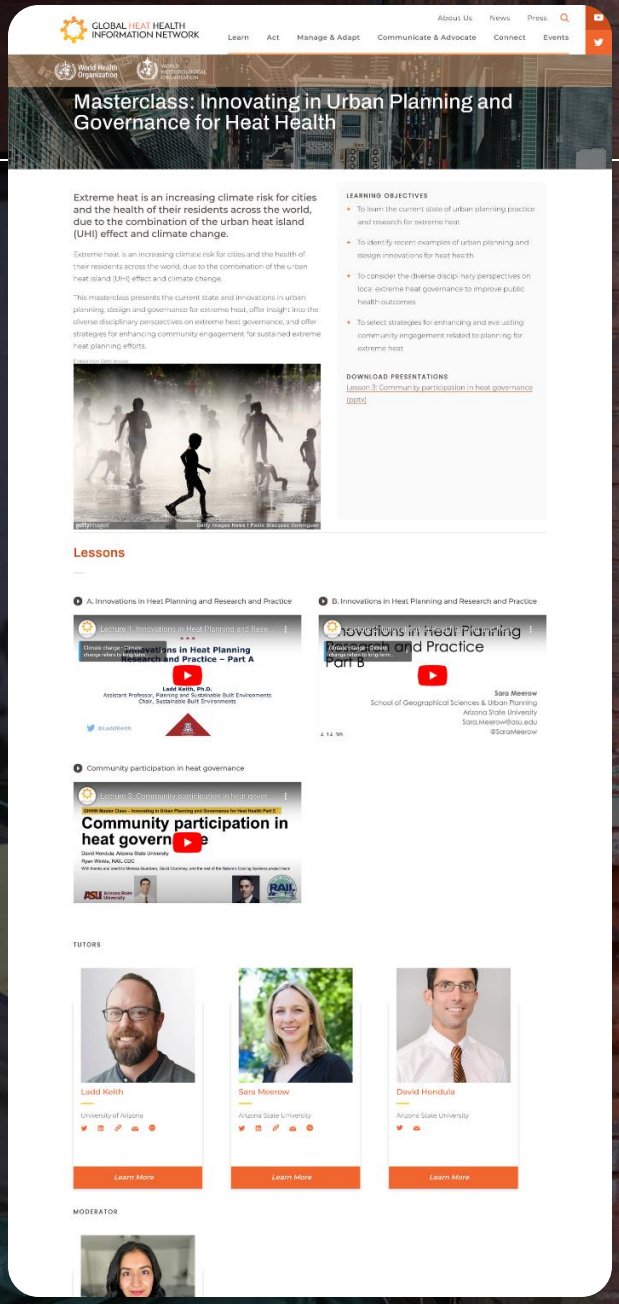
Explores strategies for understanding, modeling, and mitigating urban heat islands, setting operational thresholds for heat early warning systems, innovative urban planning for heat health, economic valuation of heat-health impacts, and developing effective heat health action plans.

ghhin.org/masterclasses

NOAA Urban Heat Island Webinar Series

Explores heat hazards, building heat vulnerability indices, developing policies and standards, enhancing structural and green infrastructure, fostering community engagement, and prioritizing the integration of heat planning.

heat.gov/pages/nihhis-urban-heat-island-community-of-practice-webinar-series



ONLINE LEARNING

Technical Guidance

WMO Integrated Urban Hydrometeorological, Climate & Environmental Services

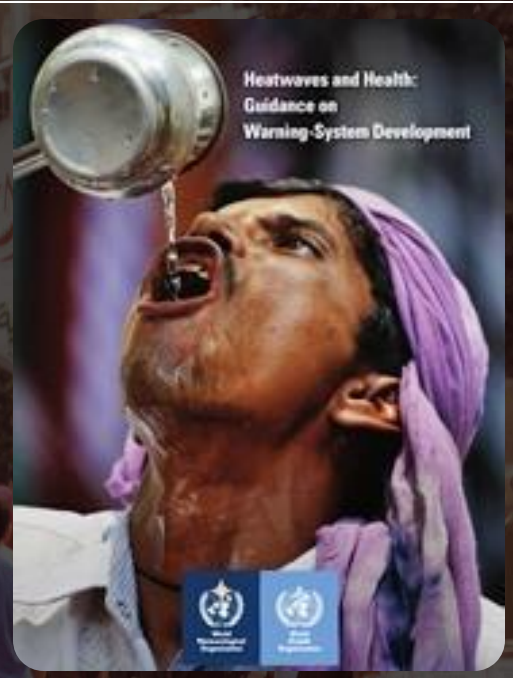
1. Volume I: Concept and Methodology
2. Volume II: Demonstration Cities
3. **Guidance on Measuring, Modelling and Monitoring the Canopy Layer Urban Heat Island**
4. **Good practices on high-resolution modeling for integrated urban services**

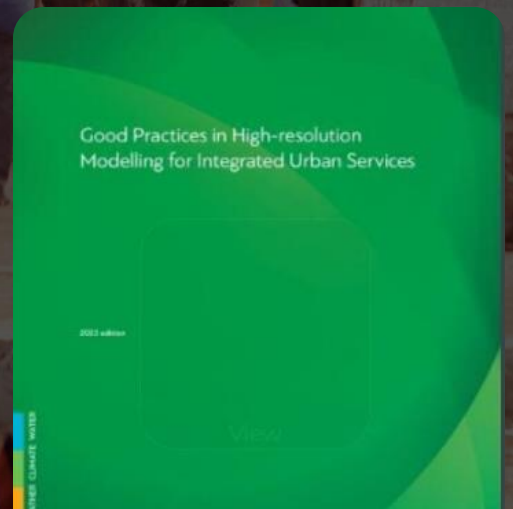
WHO Heat Health Action Planning (revision in progress)

WHO Climate and Health Vulnerabilty and Adapation Assessment

WHO-WMO Heatwave Warning Systems (revision in progress)

ghhin.org/resource-library





Thank you

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GLOBAL HEAT HEALTH INFORMATION NETWORK

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- **Global Heat Health Information Network**
- **Global Heat Health Discussion Space**

WORLD METEOROLOGICAL ORGANIZATION

World Health Organization

NOAA

Awareness & Preparedness: Urban Heat Mapping, Exposure & vulnerability

Sanjaya Bhatia

Head of Office, UNDRR

Awareness & Preparedness: Urban Heat Mapping, Exposure & vulnerability

Cooling Cities: Action Planning for Extreme Heat

UNDRR
UN Office for Disaster Risk Reduction

MCR 2030 Making Cities Resilient

SENDAI FRAMEWORK
FOR DISASTER RISK REDUCTION 2015-2030

With the support of
Ministry of the Interior and Safety
Incheon Metropolitan City

ADB ASIAN DEVELOPMENT BANK · C40 CITIES · ICLEI Local Governments for Sustainability · IFRC · JICA · RESILIENT CITIES NETWORK · THE WORLD BANK IBRD • IDA

UCLG United Cities and Local Governments · UN-HABITAT FOR A BETTER URBAN FUTURE · UNDP · UNDRR UN Office for Disaster Risk Reduction · UNOPS · WCCD

Core Partners

Regional Partners

Supporting Entities

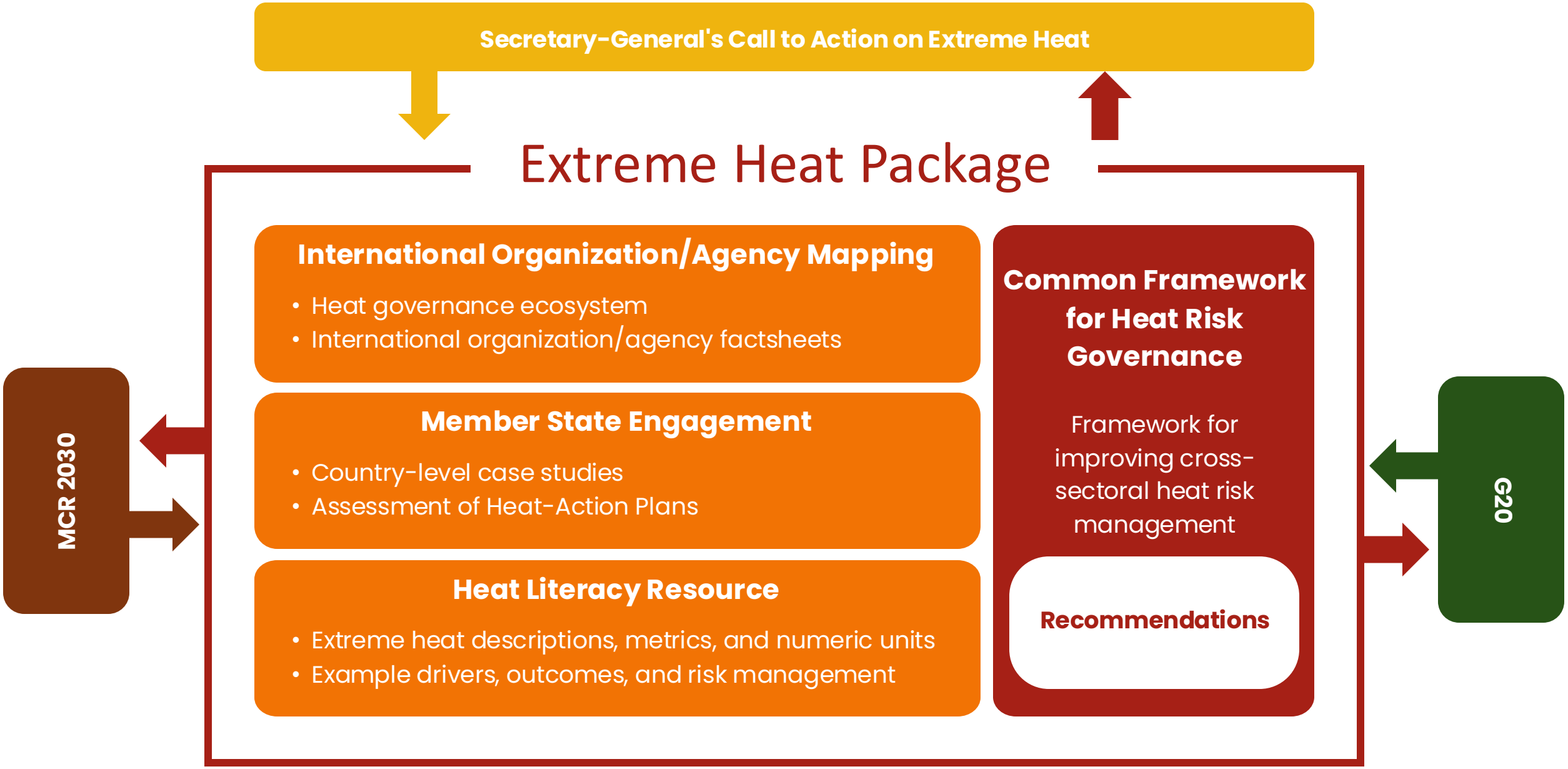
National Government and Association of Municipalities

Resilience Hubs

https://mcr2030.undrr.org/

1,761 cities

Over 571 million people



CENTRE OF EXCELLENCE
CLIMATE AND DISASTER RESILIENCE

Urban heat risk management resource package

1. 5 case studies and lessons learned on urban heat risk management and heat early warning.
    - What early warning mechanisms, and design and planning steps has the city taken to reduce heat risks?
    - Was the building code and land use plan adapted, and were nature-based solutions adopted?
    - What support did the city receive from the national government and other stakeholders?
    - What were the key success factors?
    - What were the key lessons learned?
    - What are the key areas of capacity that must be strengthened?
2. A concise framework for cities on urban heat risk management including the role of national government in supporting the local government, the role of design and planning, land use, building codes and early warning.

Planned for launch on 16 December 2024

MCR 2030 Making Cities Resilient

Anticipatory design adaptations adopted by cities, measures taken to respond to extreme heat events, tools available to address extreme heat, and recommendations for urban and national governments

Urban Heat Case Compilation

Table of Contents

MCR 2030 Making Cities Resilient

Key Recommendations

Build Awareness on Heat Risk Reduction

Capacity development and education programs to support enhanced understanding of heat risks are essential.

Establish a Heat Alert System (with heat mapping)

Reduces strains on public health facilities during heat waves.

Engage All Relevant Stakeholders

The success of cooling solutions requires **active and cross sectoral agency participation**.

Utilize Heat Resilience Strategies

Cities can reduce urban heat by using **reflective surfaces and materials,** adding **shading structures** in key public areas**,** increasing **street tree coverage,** preserving and establishing **green and blue spaces,** and **increasing ventilation through cooling urban geometry**.

Ensure Cooling Solutions are Sustainable and Climate Friendly

Implement a variety of passive cooling techniques, **ensuring that buildings are energy and thermally** efficient, and retrofitting dense urban environments

Kai Tak's district cooling system using seawater from the Kowloon Bay

Hong Kong, China

Hong Kong is building a second central business district on the site of the old Kai Tak airport. This new Kai Tak development will be entirely supported by a **district cooling system that uses seawater** from the surrounding Kowloon Bay.

This system is 35% more energy efficient than standard air conditioning.

Vertical greenery attached to a building in Singapore

The focus of the fight against extreme heat is **urban forestry**.

The city's Green Plan 2030 aims to allocate 1,000ha of **green space** within the next 15 years - every residential building is within a 10-minute walk of a park.

Vertical greenery and green roofs have led to reductions of 10% to 31% in energy cooling loads.

Focused on building **more parks** such as the 250-acre "Gardens by the Bay." These green spaces are connected by a network of **green corridors** to allow cool air to flow effectively through the city.

Toolkits and Guides

- **Urban Heat Toolkit (Georgetown Climate Center):** a useful toolkit for local governments that outlines of the benefits, challenges, and policy frameworks with a focus on cool roofs, green roofs, cool pavements, and urban forestry.
- **Turn Down the Heat Strategy and Action Plan (Western Sydney, 2018):** A cool suburbs tool and urban heat planning toolkit that can freely be used to strengthen resilience.
- **Guide to Living Terrace Roofs and Green Roofs (C40, 2015):** Barcelona has produced a guide to living terrace roofs and green roofs to explain the steps that the city has taken.
- **Achieving a Decarbonized and Climate-Resilient Built Environment (C40, 2023):** outlines the importance of low-carbon climate resilience, providing best practices.
- **How Cities Can Encourage Private Sector Adaptation Finance (C40, 2022)**: describes how cities can secure private funding for climate adaptation.
- **Financing and implementing nature-based solutions in urban areas: A guide for local actors in the Global South (C40, 2023)**: how to convert ideas for nature-based solutions into feasible business proposals to attract public, private, and international financing.
- **Heatwave Guide for Cities (IFRC, 2019)**: provides a comprehensive overview of how to prepare for the heat season, create a heat-health early warning system.
- **Sustainable Cooling in Support of a Resilient and Climate-Proof Recovery (Cool Coalition, 2021)**: outlines how cities can support cooling initiatives.
- **Policy Activation Brief, Fostering Urban Biodiversity through Local Actions (ICLEI, 2020)**: provides a list of solutions to foster urban biodiversity.
- **Heat Resilience Toolkit (ICLEI, 2021)**: ICLEI has prepared this toolkit to facilitate the identification of the causes of heat stress in Indian cities and provide relevant solutions for preventing them.
- **10 Protocols for Nature-based Solutions Implemented in Urban and Peri-Urban Areas (CityAdapt, 2024):** a comprehensive guide on 10 specific nature-based solutions for urban areas.

Thank You

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UNDRR
UN Office for Disaster Risk Reduction

MCR 2030 Making Cities Resilient

SENDAI FRAMEWORK
FOR DISASTER RISK REDUCTION 2015-2030

With the support of
Ministry of the Interior and Safety
Incheon Metropolitan City

Redesign: Using heat mapping for urban planning

Moderator

Dr. Graeme Maidment
Co-lead Mission Innovation, UK Department for Business

Panel speakers

Dr. Matthias Roth
Professor
National University of Singapore

Ms. Sudha S
Member Secretary,
State Planning Commission,
Tamil Nadu

Ms. Jaya Dhindaw
Executive Program Director, Sustainable Cities and Director, WRI India Ross Center

Dr. David Fork
Research Scientist
Google

Redesign: Using heat mapping for urban planning

Dr. Matthias Roth

Professor of Urban Climatology,

National University of Singapore

Redesign: Using heat mapping for urban planning

Science perspective from Singapore

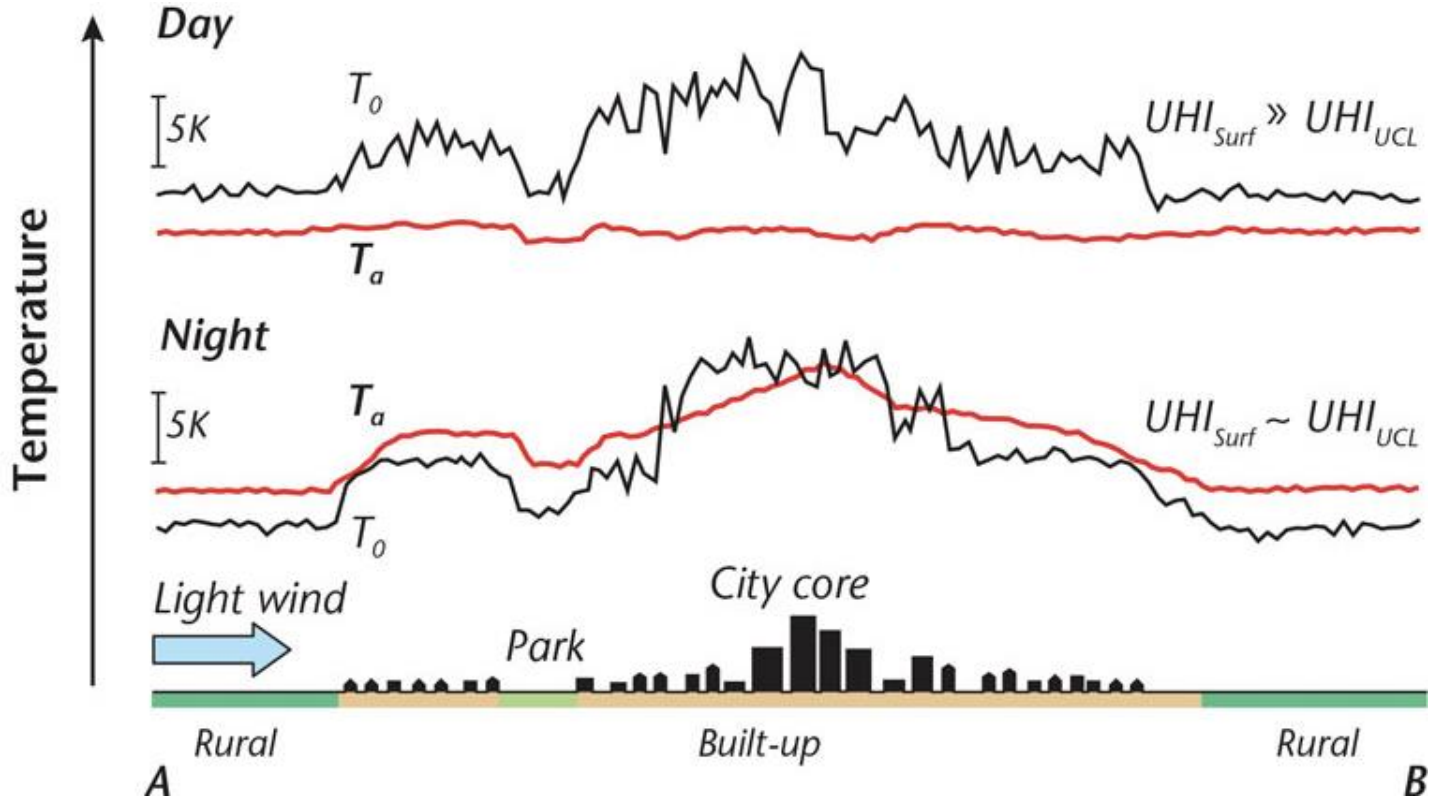
Cooling Cities: Action Planning for Extreme Heat
24th October 2024 (Virtual Workshop)

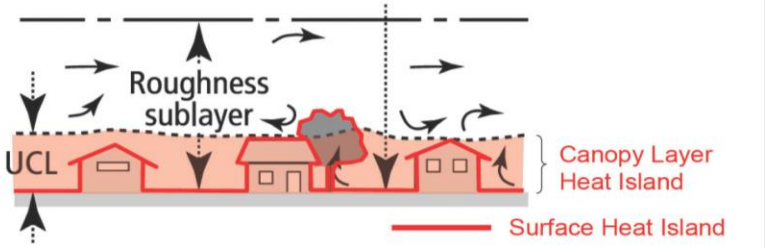
Matthias Roth
Department of Geography
National University of Singapore

1. UHI types
2. Relevant metrics
3. Example

1. Urban temperatures and heat island types

When defining urban heat, it is essential to distinguish between surface temperature and urban canopy layer (UCL) air temperature and different types of urban heat islands (UHIs) which have different diurnal signatures:





T_0 – surface temperature (from remote sensors on e.g. aircrafts and more likely satellites)

T_a – air temperature (from properly placed weather stations or air temperature sensors)

Daytime: $T_0 > T_a$

Nighttime: $T_0 \sim T_a$

(after Voogt: http://www.epa.gov/hiri/index.html; Oke et al. 2017)

2. Relevant metrics – to avoid misconceptions

- Background climate (air temperature matters):
  - Numerous cities exhibit strong UHIs during many or all seasons, yet have mild climates and therefore would not benefit from heat mitigation.
  - Conversely, there are numerous cities that exhibit weak UHIs but have serious problems with heat and a distinct lack of thermal comfort during daytime; these cities benefit from heat mitigation measures (e.g. cities surrounded by desert or semi-arid land cover)
  - Conversely, cities like Moscow and many in North American may experience a helpful heat island during the winter.

  → Urban heat island (UHI) intensity has little relevance for urban heat mitigation; strongest UCL air temperature UHI is are often observed at nighttime, but the worst thermal stress is during daytime.

- Aim should be to reduce the negative impacts of urban heat, rather than mitigate the UHI magnitude, i.e. "urban heat mitigation"
  - Good thing: most heat mitigation strategies that are proposed are effective during daytime, which is appropriate. While they are unlikely to substantively reduce the maximum UHI magnitude, they will lower city temperatures at times of day when they reach their diurnal maximum.

  → Use air not surface temperature! But even air temperature is not an ideal proxy for thermal comfort, exposure, heat stress or risk assessments, since it ignores the effects of wind, humidity and radiation. Should use WBGT (wet-bulb globe temperature), PET (physiologically equivalent temperature), UTCI (universal thermal climate index).

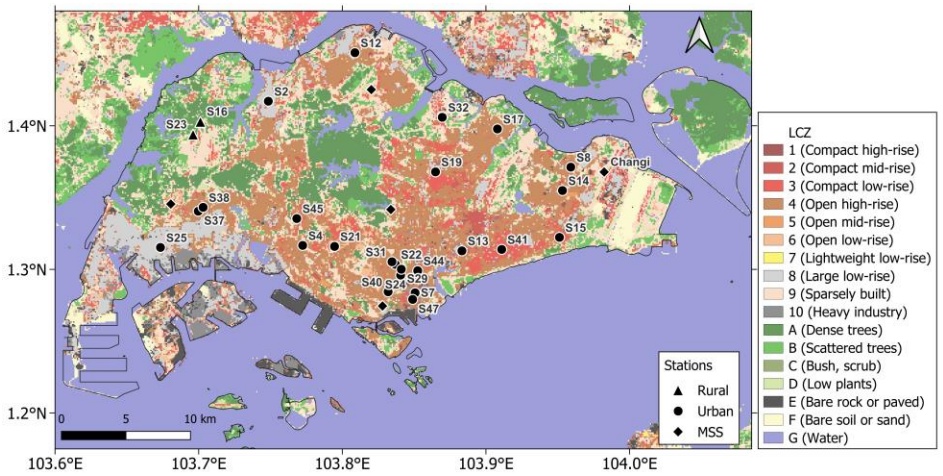
(e.g. Martilli et al. 2020)

4. Example of UHI mapping for Singapore

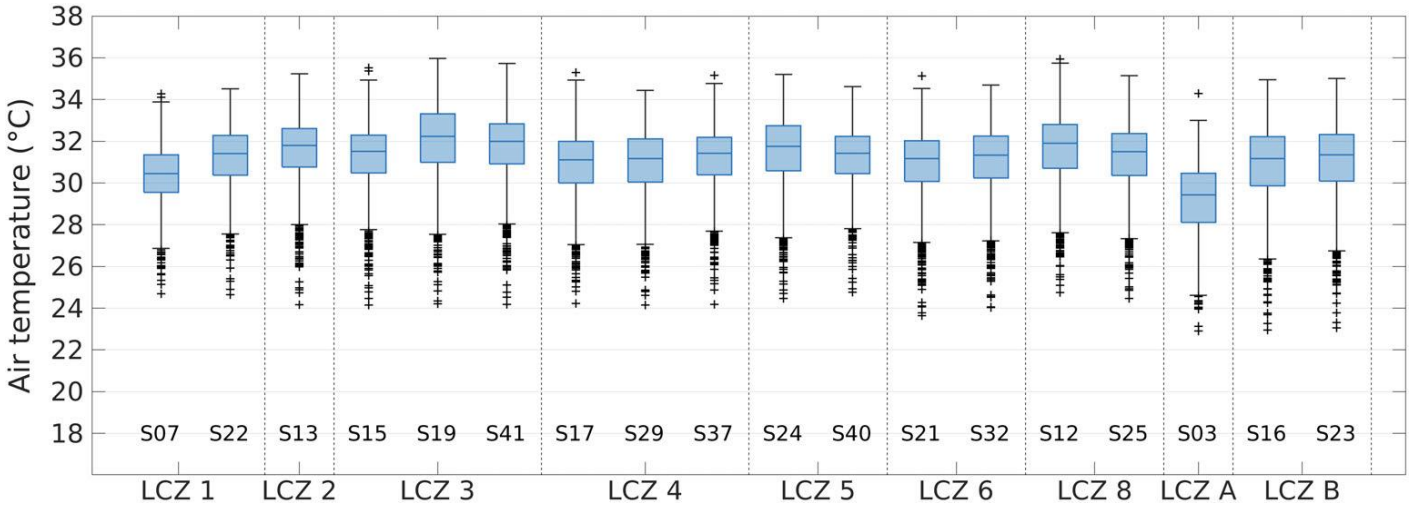
Step 1: Long-term measurements of canopy-layer air temperature across well-defined urban built types, using, e.g:

- local climate zone (LCZ) classification, defined as urban built and rural land cover types which produce a unique air temperature response
- 3-D building morphology data

Map of local climate zones (LCZ):



Boxplot of daily maximum (for 6 yrs) near-surface air temperature for stations grouped according to LCZ for all-weather conditions ($T_{a,max,all}$):



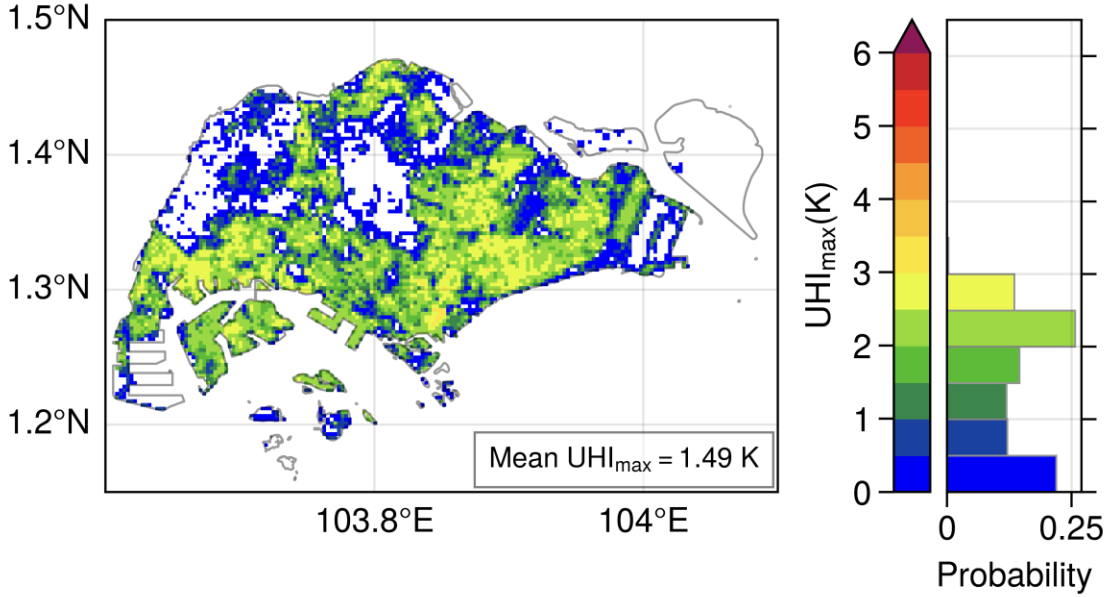
(Roth et al. 2022; Sanchez et al. 2023)

4. Example of UHI mapping for Singapore

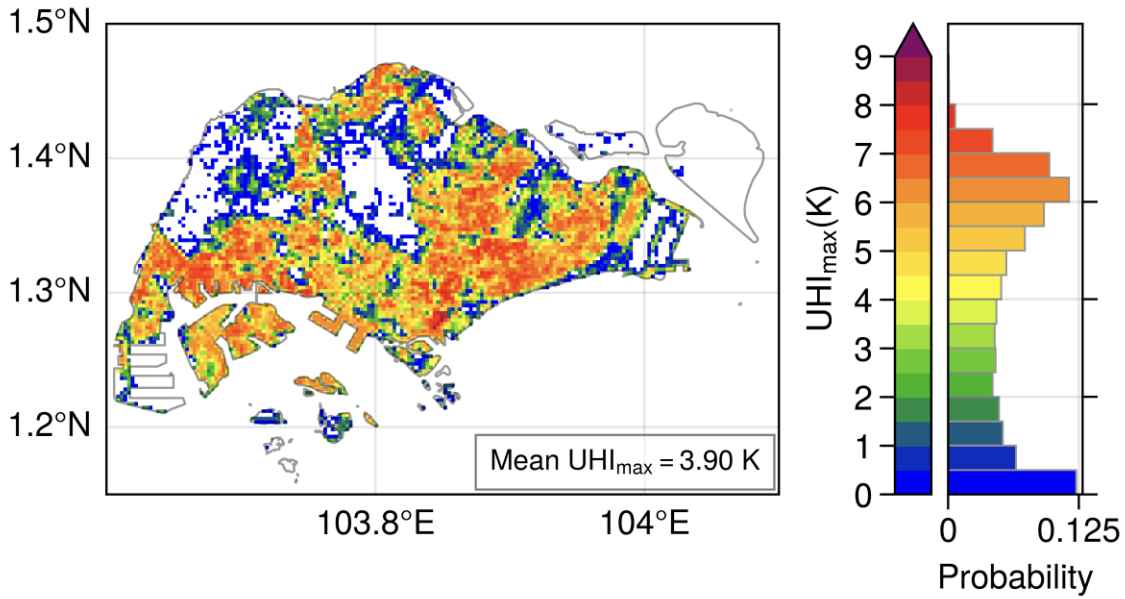
Step 2: Application of simple statistical model to map intra-urban CL-UHI variability:

- empirical-statistical relationship between LCZ/building morphology data and air temperature/UHI observations
- separate into training and application dataset, i.e. model is "verified"
- can be done for different times of the day, seasons or weather conditions

Map for lowest UHI_{max} intensity observed 0n 05/02/12:



Map for highest UHI_{max} intensity observed on 19/06/13:



- Maps need to consider purpose of application (e.g. mitigation for hottest period of the day; long-term heat exposure; etc.)
- A complete urban heat vulnerability (UHV) assessment and map needs to consider (i) physical exposure indicators such as air temperature, humidity or amount of vegetation, and (ii) socio-economic indicators such as age, employment, occupation, language, economic status, etc. all of which relate to one's capacity to adapt to heat.

(Sanchez et al. 2023)

Redesign: Using heat mapping for urban planning

Tmt. Sudha S

Member Secretary, State Planning Commission,

Tamil Nadu State, India

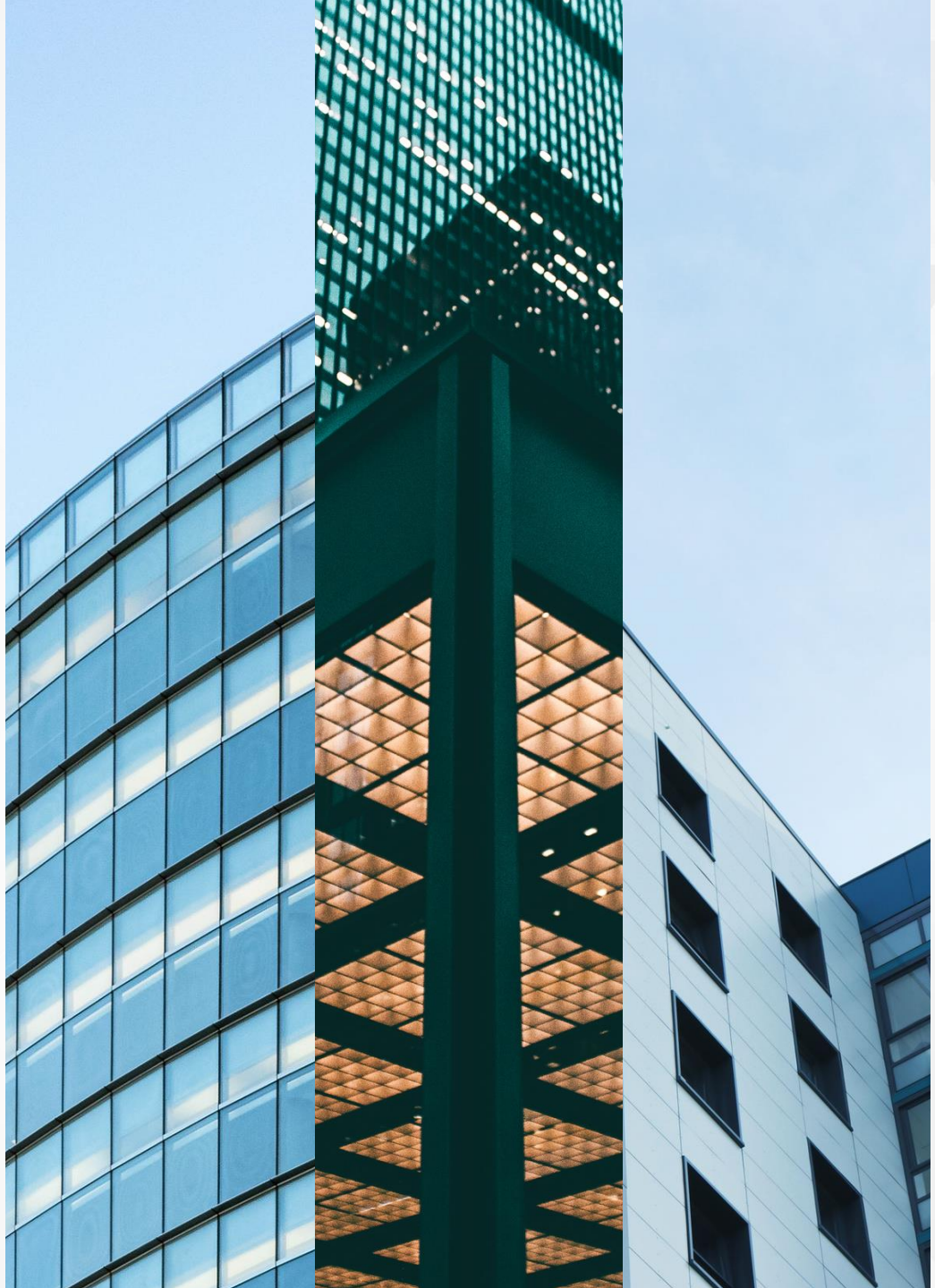
Government of Tamil Nadu
State Planning Commission

COOLING CITIES : ACTION PLANNING FOR EXTREME HEAT

Virtual Workshop on 24.10.2024

Redesign : Using Heat Mapping for Urban Planning

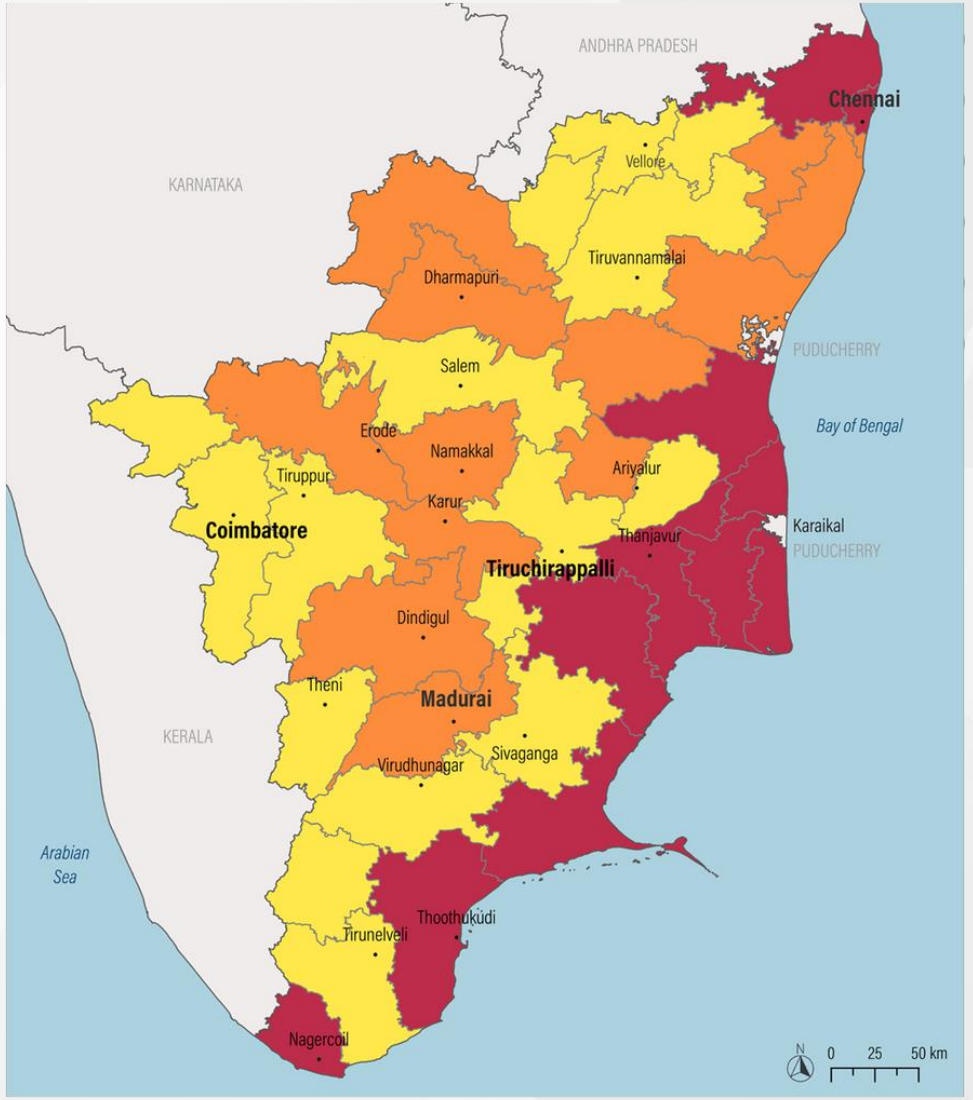
Sudha S. IFS.,
Member Secretary,
State Planning Commission
Government of Tamil Nadu



TAMIL NADU STATE LAND USE RESEARCH BOARD
STATE PLANNING COMMISSION

WHY HEAT IS A CONCERN TO TAMIL NADU

- 12 lives lost due to heat wave in Tamil Nadu in 2023
- 41.7 million population of Tamil Nadu exposed to high intensity of Urban Heat Island.
- Change in maximum temperature to increase by 1.1°C, 2.0°C and 3.1°C in the years 2040, 2070 and 2100, respectively.
- Agriculture in the state projected to reduce 30-35% by 2050, 80% by 2080 due to rising temperature and change in rainfall.



TAMIL NADU HEAT MITIGATION STRATEGY

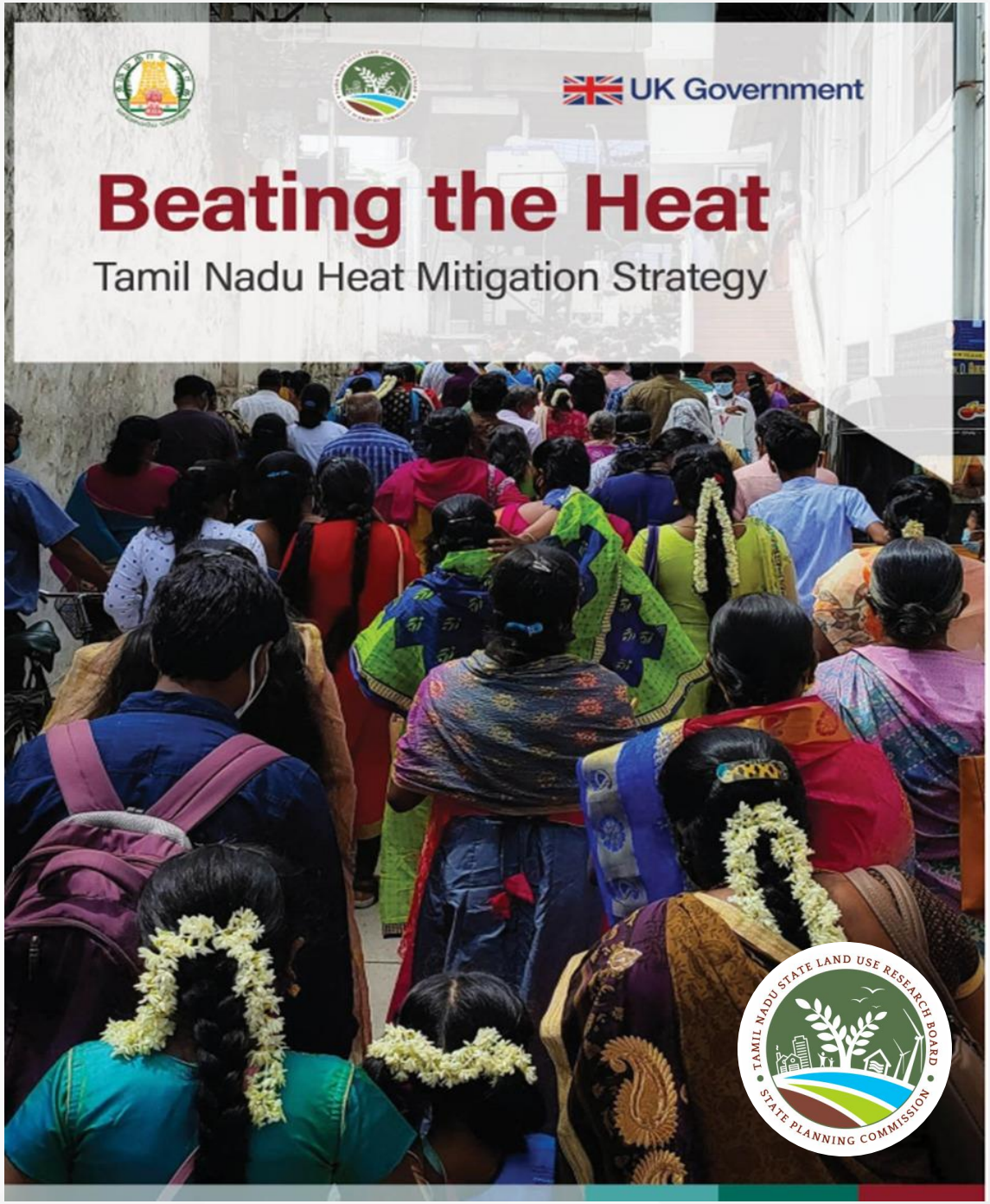
AIM

- The goal of the heat mitigation strategy is to manage and mitigate heat.
- Identify measures and provide enabling mechanisms to reduce heat stress and prevent vulnerable groups from increasing heat's impacts.

Document is shaped on the three guiding principles

- Design, planning and governance.
- Interventions at scale.
- Accelerated access to all.
- Tailor made solutions aligned to government departments for heat mitigation and adaptation

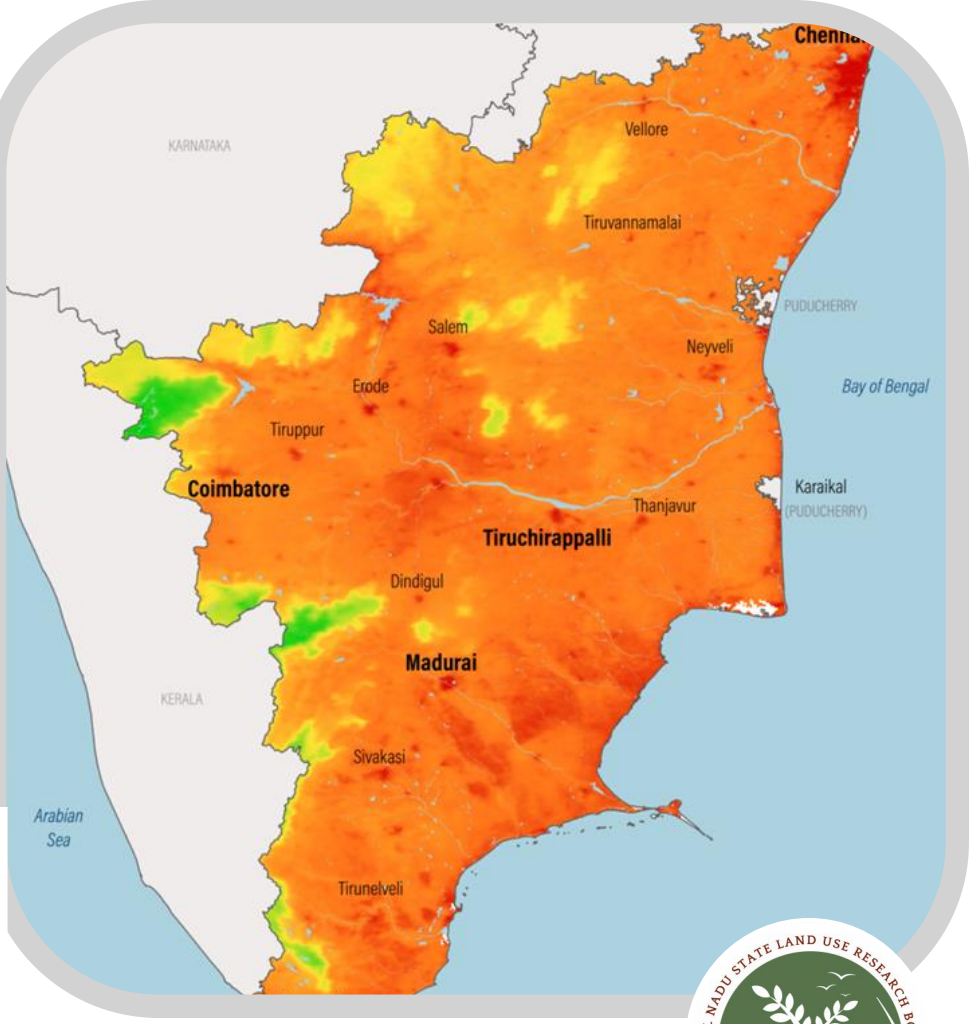
Govt. of Tamil Nadu declared heat as a disaster to formally address its impacts



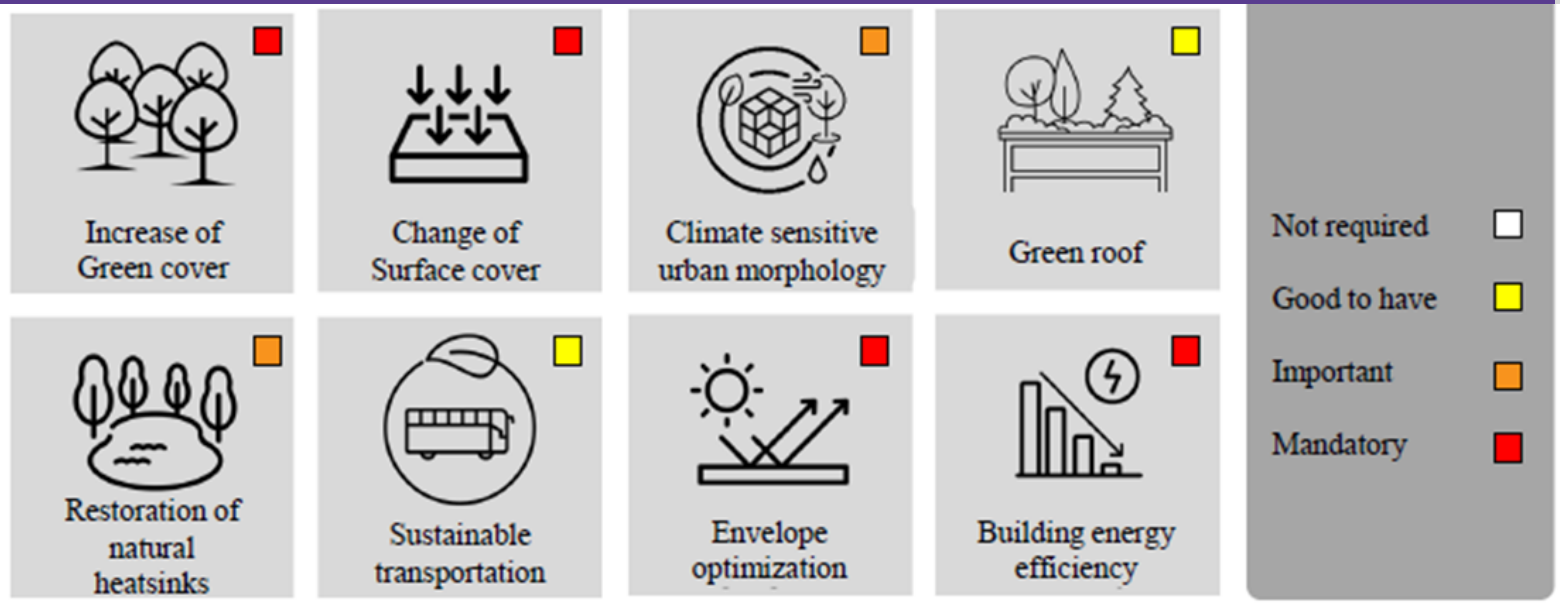
IDENTIFICATION AND ASSESSMENT OF HOTSPOTS ACROSS URBAN AREAS OF TAMIL NADU AND RECOMMENDATIONS FOR UHIE MITIGATION

AIM OF THE STUDY :

- MAPPING THE URBAN HOTSPOTS ACROSS THE TAMIL NADU STATE BASED ON BUILT-UP, VEGETATION COVER, WATER BODIES, AND BARREN LAND CLASSIFICATION.
- IDENTIFYING AND ASSESSING HOTSPOTS ACROSS THE URBAN AREAS OF TAMIL NADU AND PROVIDING RECOMMENDATIONS FOR MANAGING UHIE MITIGATION OF DESIGNATED SMART CITIES.



KEY RECOMMENDATION OF THE STUDY



- **Complex urban geometry**
- **Surface properties**
- **Reduction in blue-green cover**
- **Increase in anthropogenic heat emission**

FRAMEWORK FOR NATURE-BASED SOLUTIONS FOR ENHANCING URBAN RESILIENCE IN

Tier 2 Cities of Tamil Nadu

FOCUS AREAS

PROCESS ORIENTED

1. Nature for Nature & Nature for Cities
2. Disaster Risk Reduction, Climate Change, Sustainable Development
3. Urban Resilience with NbS Information Networks

POLICY ORIENTED

4. Monitoring, Evaluation and Adaptation
5. Strategies for NbS Implementation
6. Streamlining the Integration of NbS

OBJECTIVE

Mainstream NbS Principles

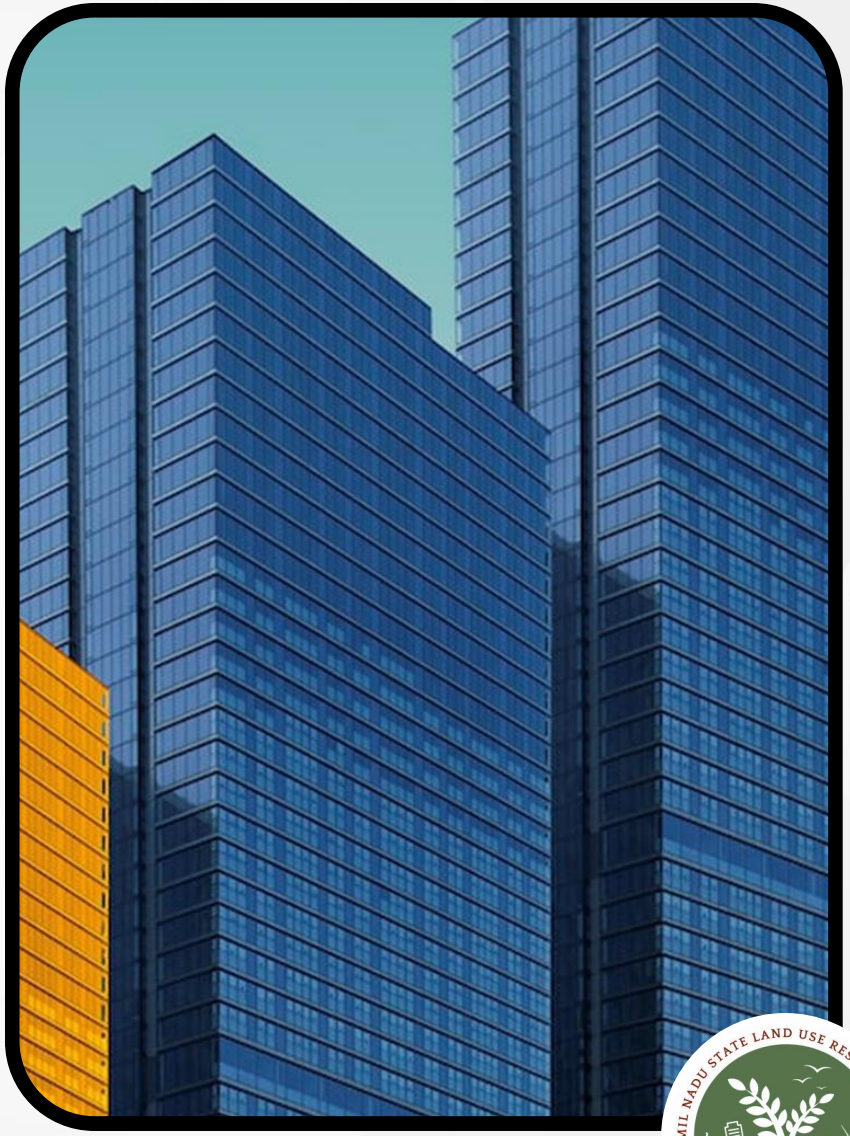
NbS Framework as a Planning Tool

Facilitate Knowledge Exchange and Capacity Building

ADOPTION OF DISTRICT COOLING SYSTEM

STATE LEVEL STRATEGIES

- Enabling Policy and Regulatory Framework
- Integration with Development Regulations
- Innovative business models and financing instruments
- Integrating DCS within the scope of infrastructure development
- Feasible Partnership with international / national companies with expertise in district cooling
- Exploring the option for “Cooling as a Service”



TAMIL NADU'S BLUE - GREEN INFRASTRUCTURE : POTENTIAL MAPPING AND DEVELOPMENT OF FRAMEWORK FOR EFFECTIVE MANAGEMENT

FRAMEWORK

- Mapping: Identifying existing networks.
- Opportunity Identification: Enhancing or expanding these networks.
- Prioritization: Using multi-criteria assessment to select areas for conservation efforts.

IDENTIFICATION OF OPPORTUNITIES

- Increasing green cover within existing networks.
- Establishing new biodiversity corridors, Unused lands with high ecological potential are prioritized for reforestation and connectivity creation.

LAND USE INFORMATION SYSTEM – PREDICTIVE MODELLING FOR SUSTAINABLE LAND USE IN TAMIL NADU

- To centralize and present comprehensive, multidisciplinary data in a user-friendly format, ensuring accessibility and usability for all stakeholders.
- To simplify complex data through visualizations, interactive maps, and tools that enhance understanding of land use dynamics and trends.
- To provide a robust decision support system that uses evidence-based insights to empower policymakers and planners in making strategic, informed decisions about land use and development.
- To leverage predictive models for analyzing data and projecting sector-specific growth trends, facilitating proactive planning.

Government of Tamil Nadu
State Planning Commission

THANK YOU

Redesign: Using heat mapping for urban planning

Jaya Dhindaw

Executive Program Director, Cities Program, WRI India

WRI INDIA
ROSS CENTER

URBAN HEAT RESILIENCE

Oct 24, 2024

PRESENTED BY JAYA DHINDAW

WRI INDIA ROSS CENTER FOR SUSTAINABLE CITIES

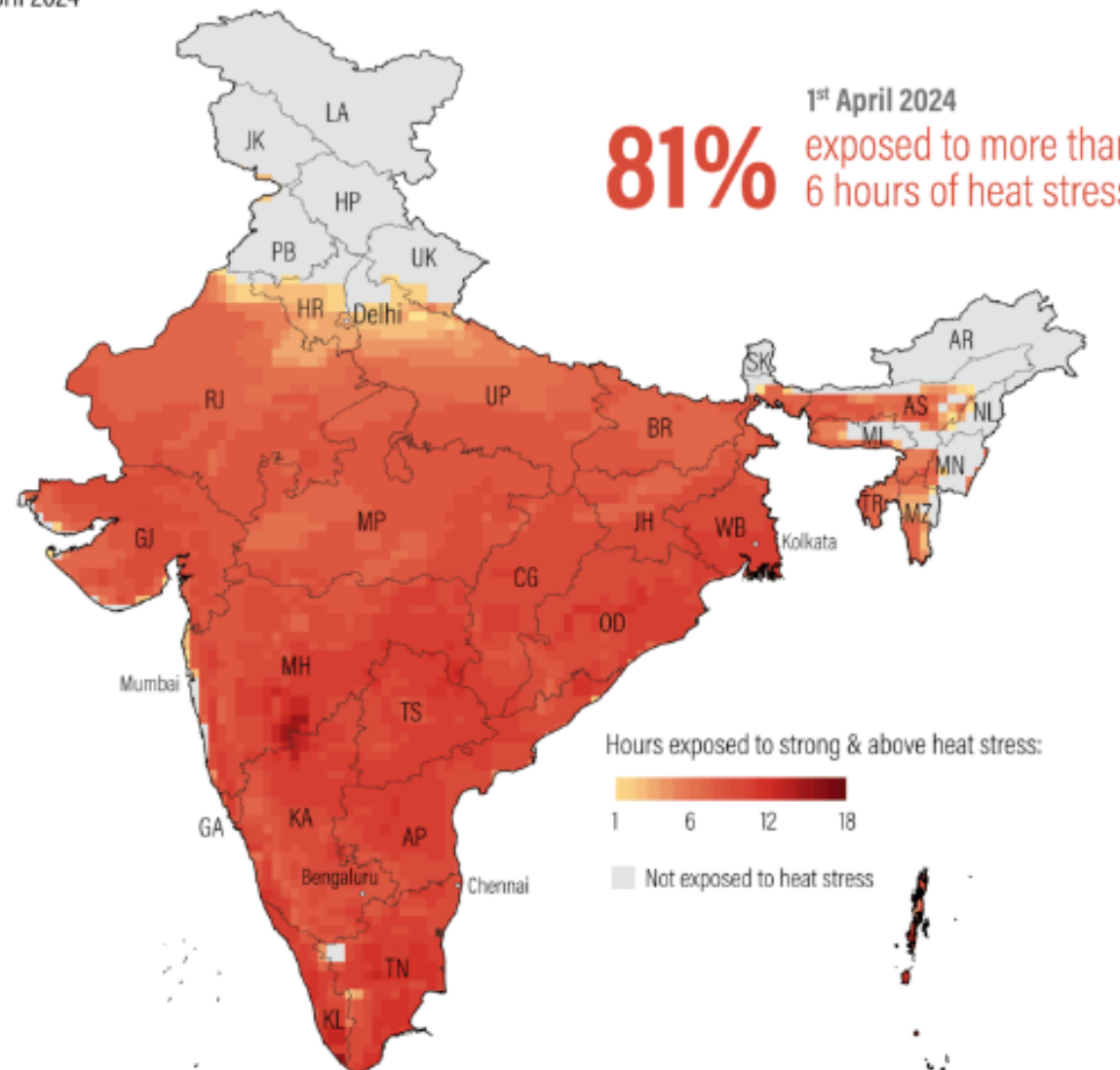
Photo credit: Shutterstock

Nearly 80% were found to be exposed to **strong and very strong heat stress** for more than 6 hours in the first 15 days of April alone.

CHARTING 15 DAYS OF HEAT

WRI INDIA
ROSS CENTER

Map of daily number of hours in strong (32-38 °C) and very strong heat stress (38-46 °C) from 1-15 April 2024



Data and Method: Based on hourly UTCI data (ERA5 reanalysis) from 1-15th April 2024, aggregated to daily number of hours in strong and very strong heat stress categories, overlaid with the population dta from GHSL 2020.

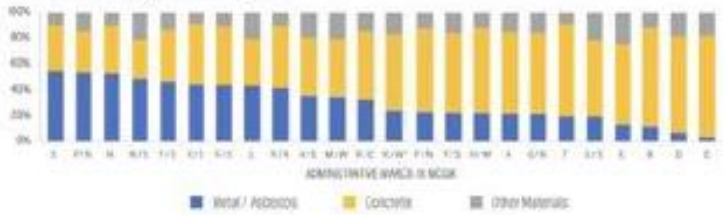
Analysis and Visualization by Jyoti, Raj Bhagat Palanichamy and Nileena.S/ WRI India.

This map is for illustrative purpose and does not imply the expression of any opinion on the part of WRI India, concerning the legal status of any country or territory or concerning the delimitation of frontiers or boundaries.

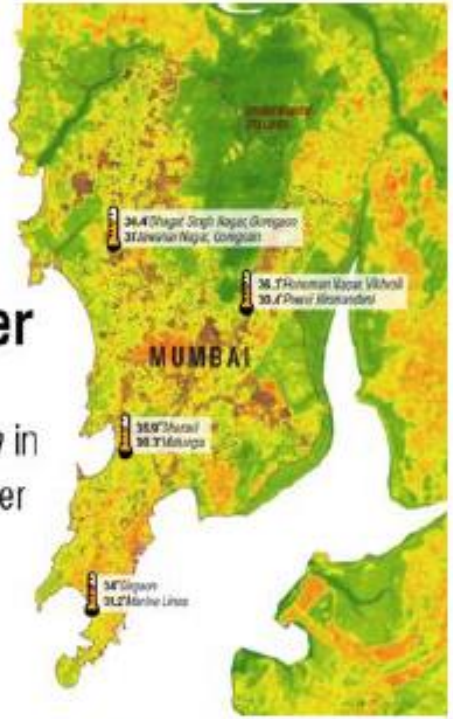
MEASURING SPATIAL VULNERABILITY

~37% *of Mumbai's households live under metal roofs* and are exposed to higher heat risk*

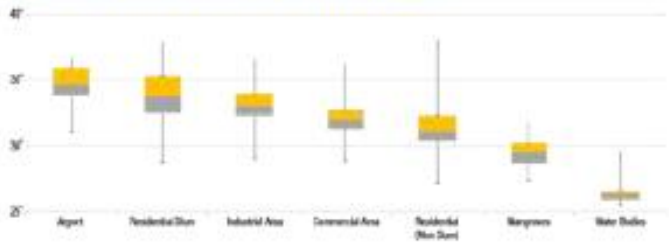
Share of Roofing Material by Ward*



Dharavi is typically **over 5°hotter** than its immediate neighbour *Matunga* in the month of October



Difference in Surface Temperature by Land Use in Mumbai



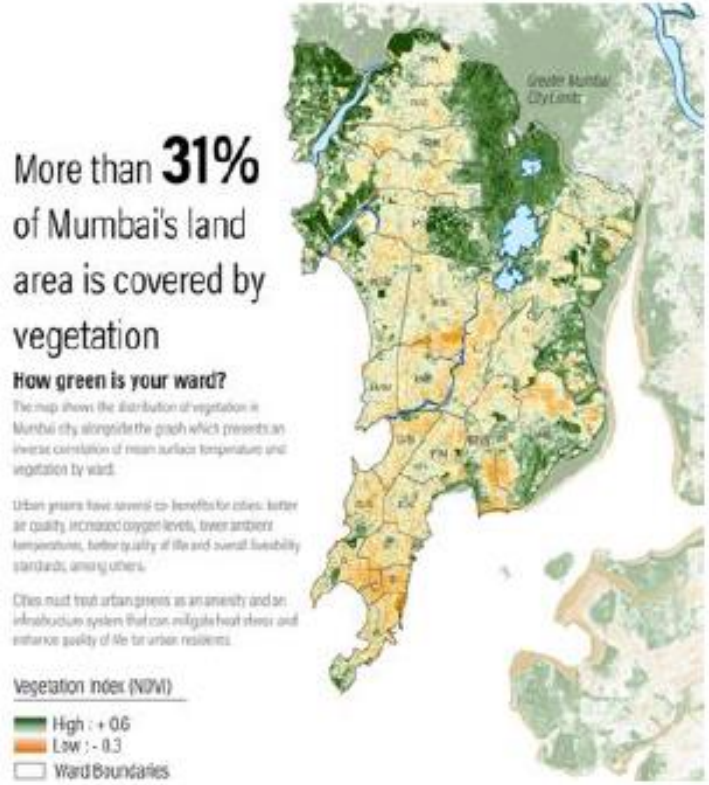
More than **31%** of Mumbai's land area is covered by vegetation

How green is your ward?

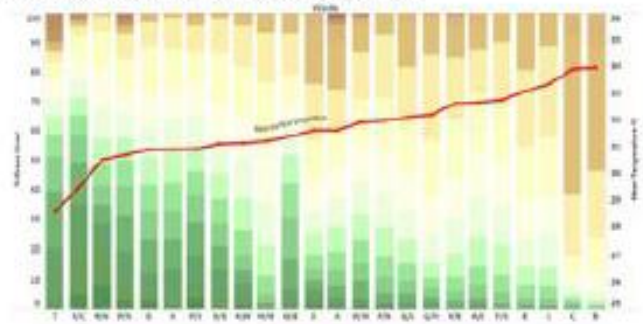
The map shows the distribution of vegetation in Mumbai city alongside the graph which presents an inverse correlation of mean surface temperature and vegetation by ward.

Urban greens have several co-benefits for cities: better air quality, increased oxygen levels, lower ambient temperatures, better quality of life and overall liveability standards, among others.

Cities must treat urban greens as an amenity and an infrastructure system that can mitigate heat stress and enhance quality of life for urban residents.



Ward-wise Mean Surface Temperature vs Vegetation



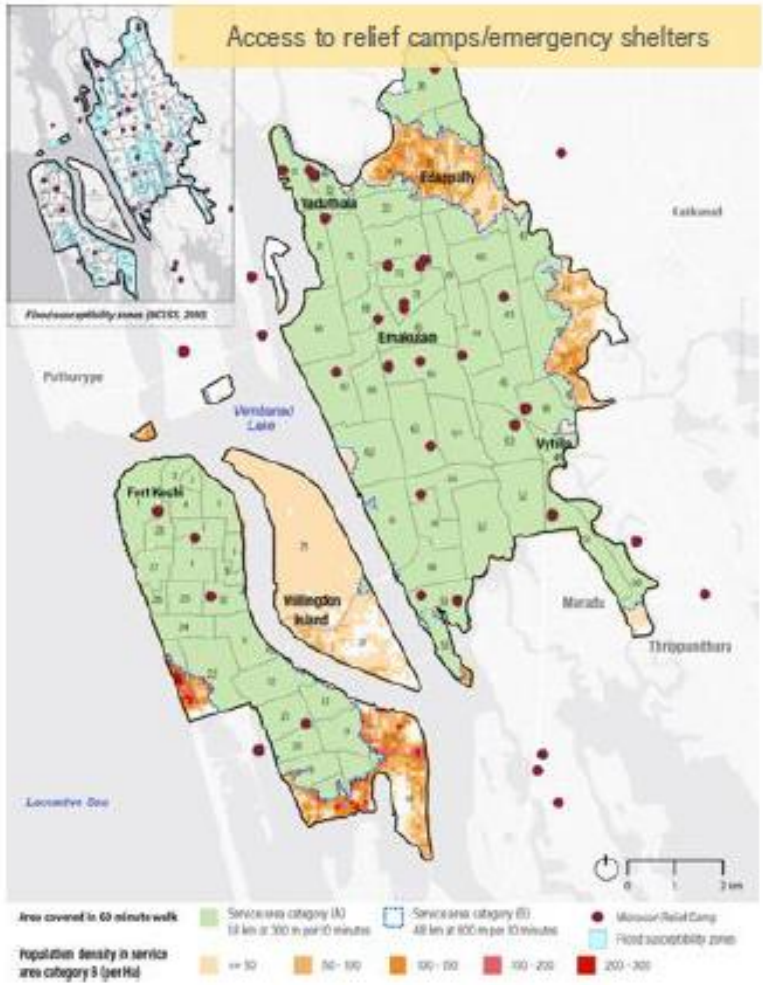
Source: WRI India using LandSat 8 (USGS) of October 2017-2019; Census of India 2011; Contains Modified Copernicus Sentinel Data [2015-2020]

WRI INDIA
ROSS CENTER

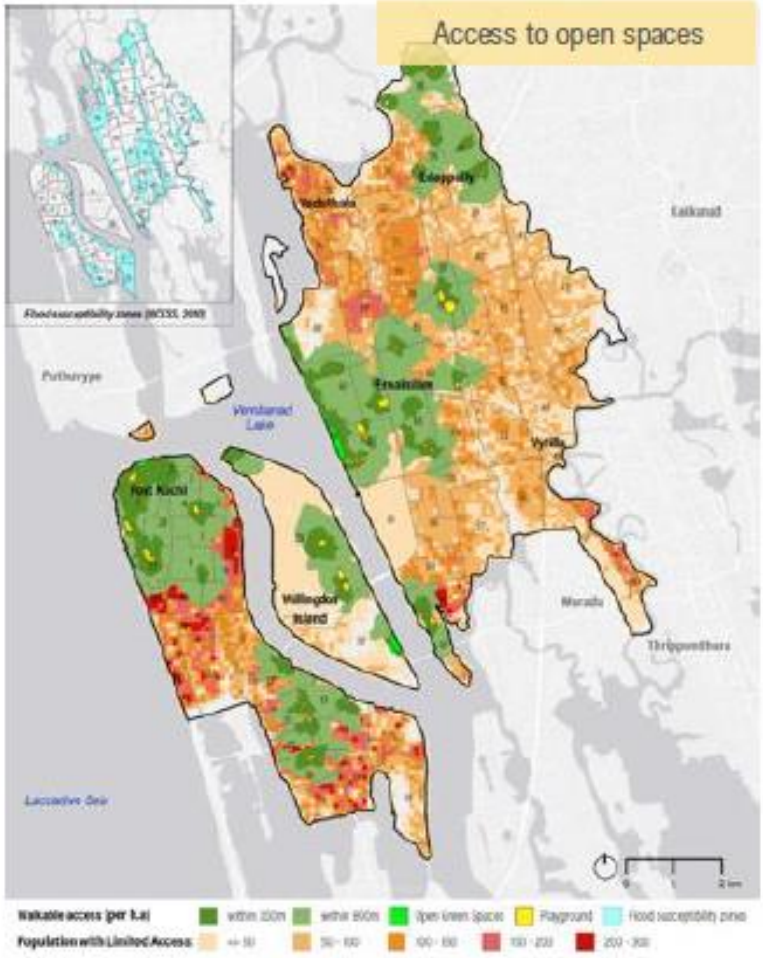
VULNERABILITY BASED ON ACCESSIBILITY & SERVICES

Combination of satellite data, secondary data on services and field assessments

Access to relief camps/emergency shelters

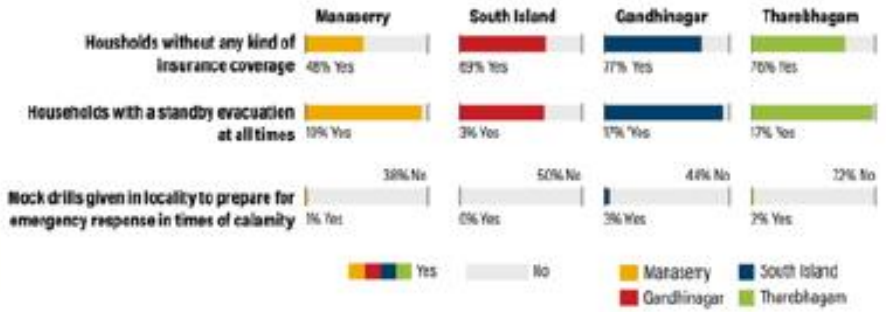


Access to open spaces



Urban Community Resilience Assessment Tool (UCRA)

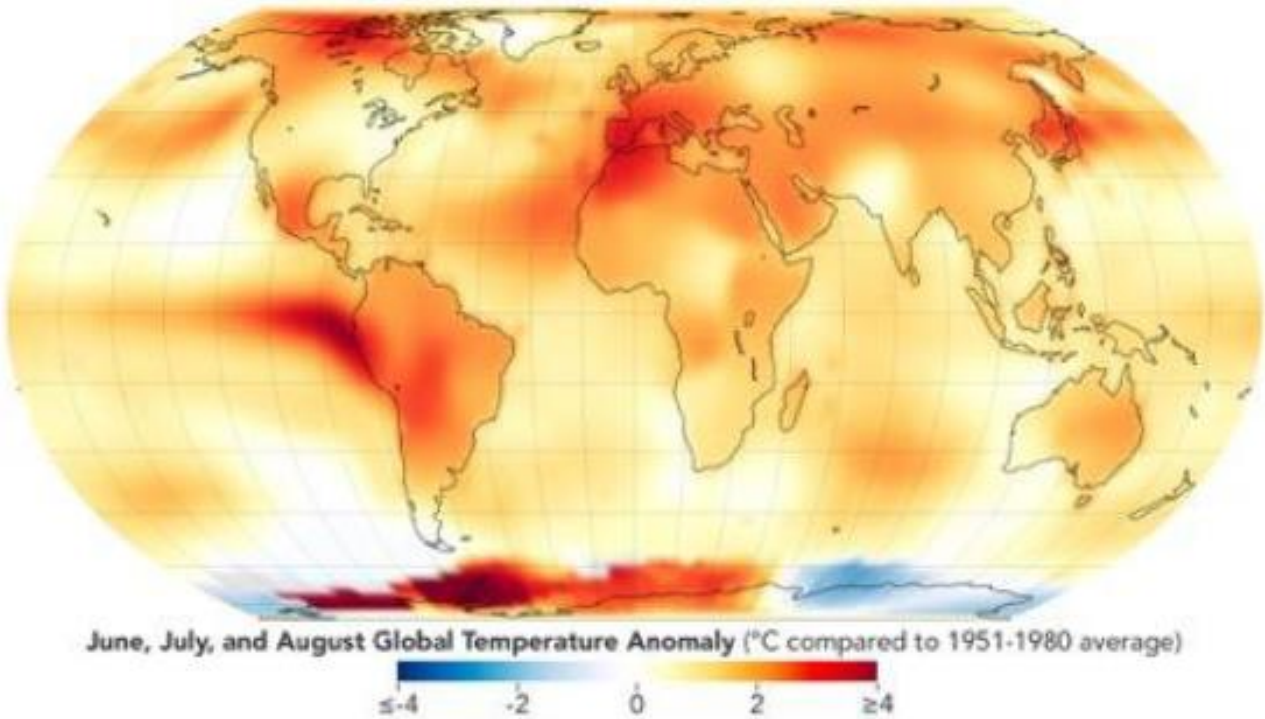
Risk preparedness in vulnerable communities



Source: KSDMA 2021; NCESS 2010; KMC 2020

WRI INDIA
ROSS CENTER

EXTREME HEAT : CONCENTRATED INEQUITABLY IN CITIES



	1.5°C		3°C	
HEAT WAVES				
ANNUAL LONGEST HEAT WAVE DURATION	16.3 days Global average	→	24.5 days Global average	▲ 51%
COOLING DEMAND				
POPULATION WITH DOUBLE THE HISTORICAL COOLING DEMAND	8.7M people	→	194M people	▲ 22.2X
DISEASE				
PEAK ARBOVIRUS TRANSMISSION DAYS	74.7 days Global average	→	80.7 days Global average	▲ 6 days

Source: Wong and Mackres 2024 forthcoming. "City-scale, city-relevant climate hazard indicators under 1.5°C, 2.0°C, and 3.0°C of global warming."

CLIMATE HAZARD AND VULNERABILITY ASSESSMENT FRAMEWORK

Exposure to Hazards

Hazard Identification

Meteorological
- Thermal Stress
- Wind Speed
- Precipitation Change
- Thermal Comfort
- Sea Surface Temperature

Hydrological
- Flood
- Drought

Geological
- Land Deformation
- Ground Movement

Environmental
- Air Quality Degradation
- Water Quality Degradation
- Soil Quality Degradation
- Vegetation Change
- Fire

Mapping Exposure

People | Infrastructure

Differential Vulnerability

Vulnerability Assessment

Sensitivity Analysis

Socio-demography

Economic

Political

Residential

Adaptive Capacity

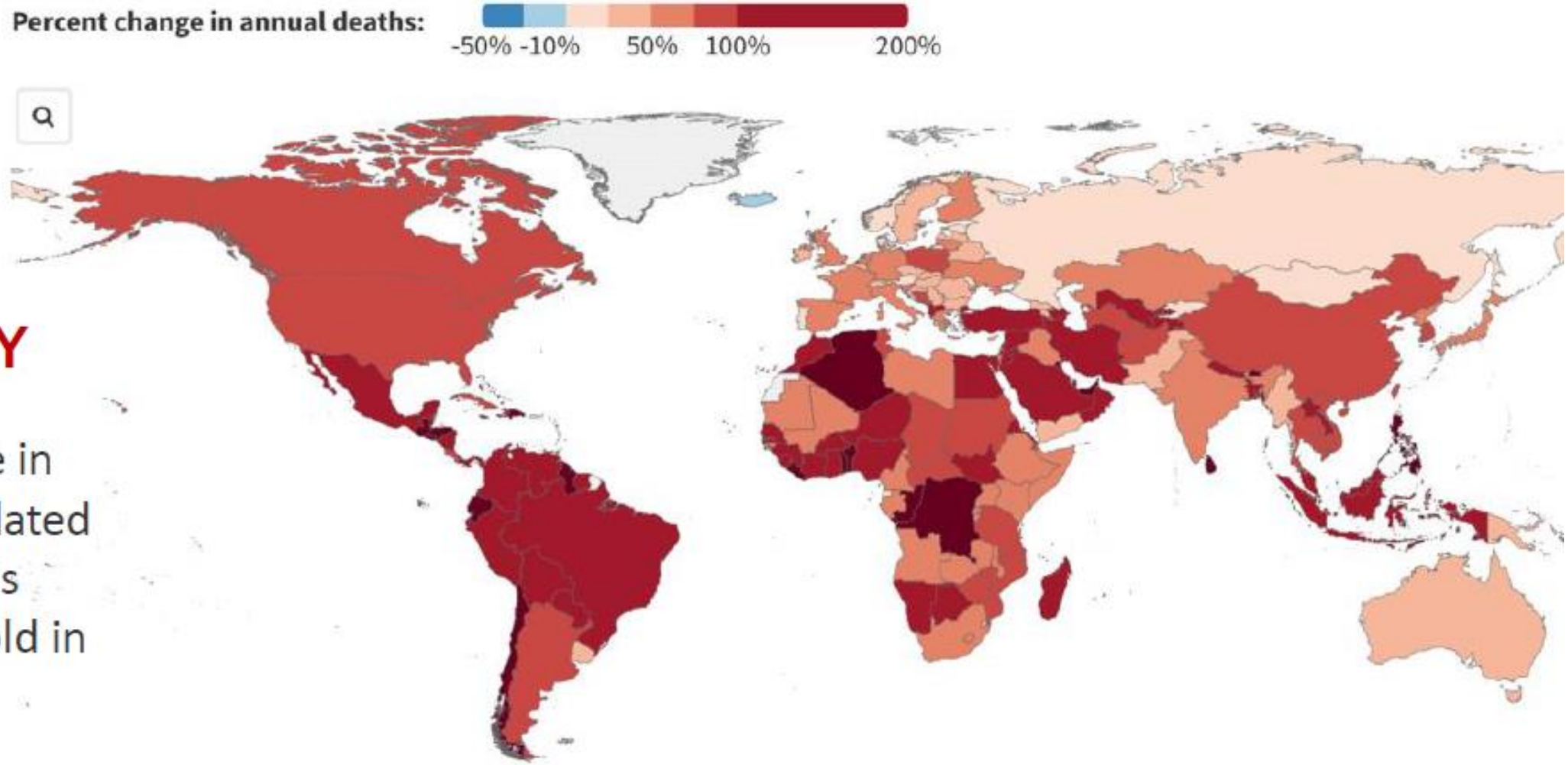
Economic

Governance

Environmental

HEAT-RELATED MORTALITY

Percent change in annual heat-related deaths of adults over 65 years old in 2018-2022

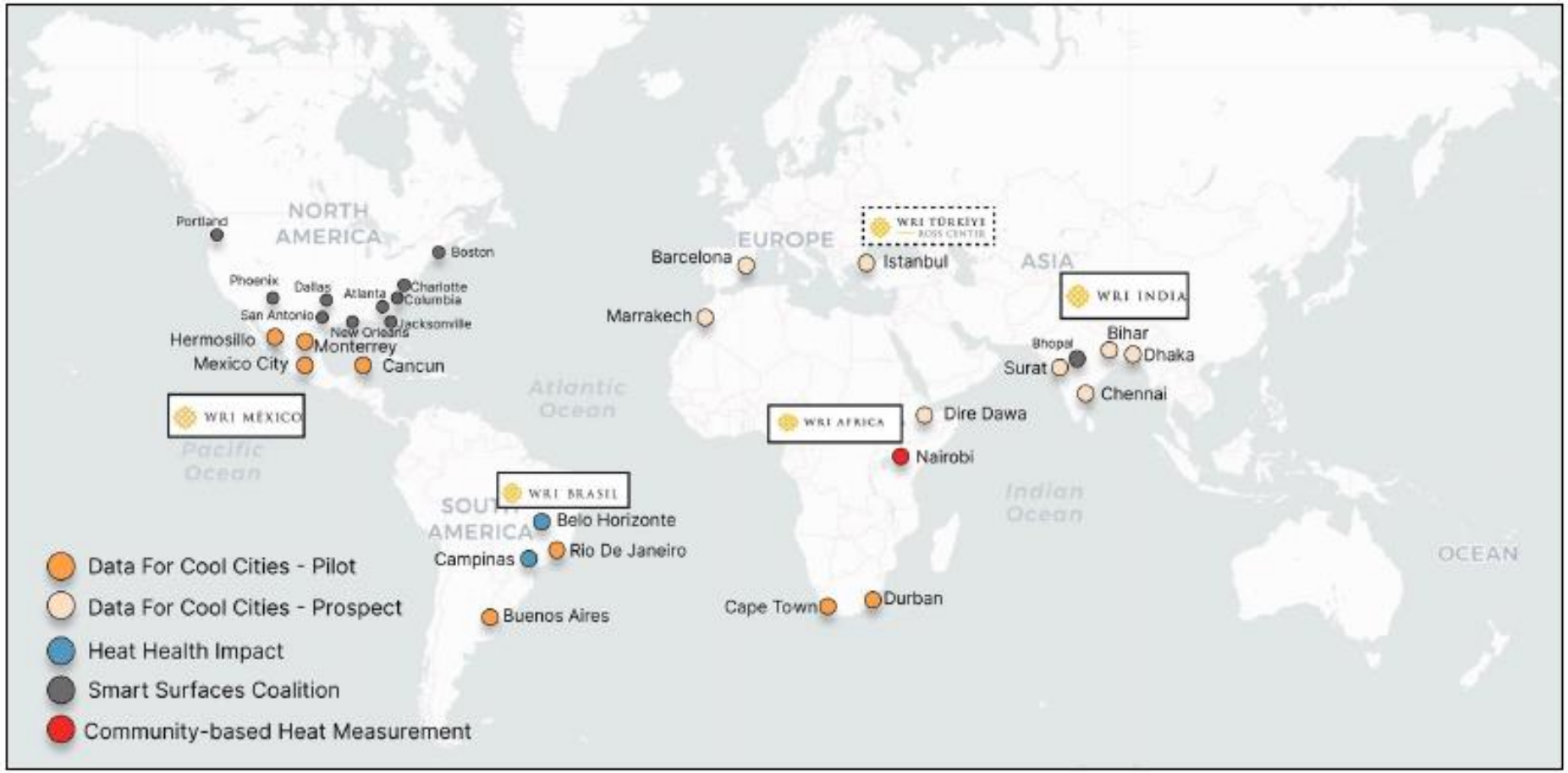


SOURCE

2023 Report of the Lancet Countdown

CITIES ARE WORKING TO IMPROVE HEAT RESILIENCE

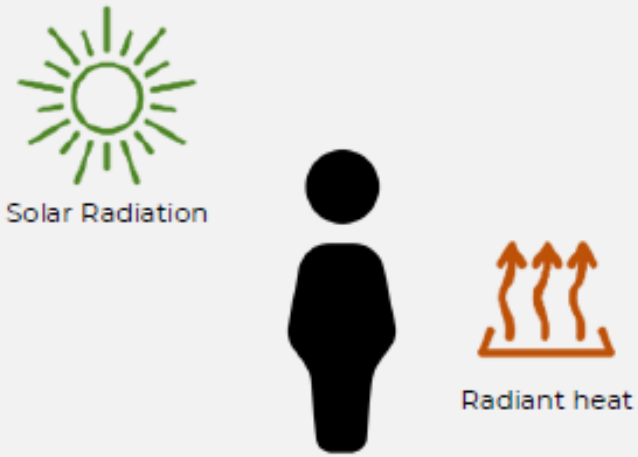
Provide data, analysis and technical assistance to urban decisionmakers to transform how we build our cities – toward passive cooling infrastructure to improve health, equity, livability and resilience



HEAT CAN BE MEASURED AND MODELED IN MULTIPLE WAYS

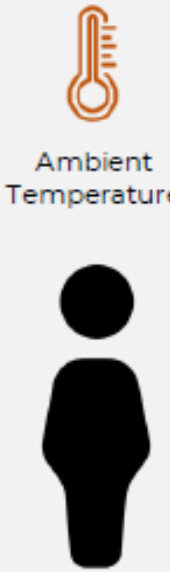
Land Surface Temperature (LST)

- citywide comparisons
- local heat-health



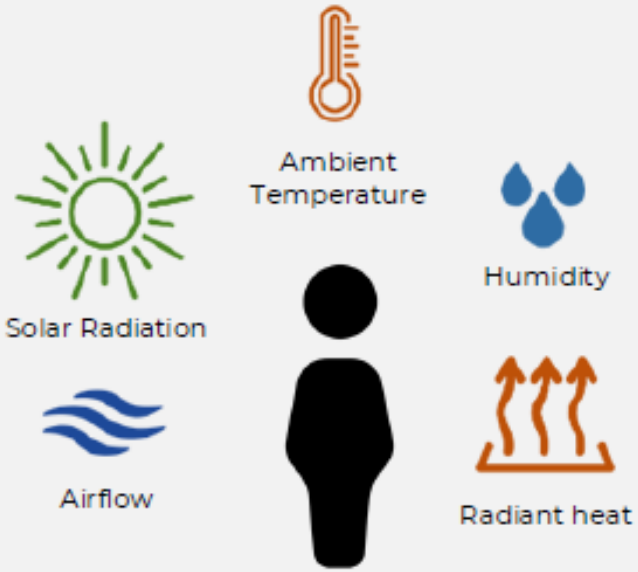
Air Temperature (AT)

- citywide comparisons
- local heat-health



Universal Thermal Comfort Index (UTCI)

- local heat-health
- citywide comparisons

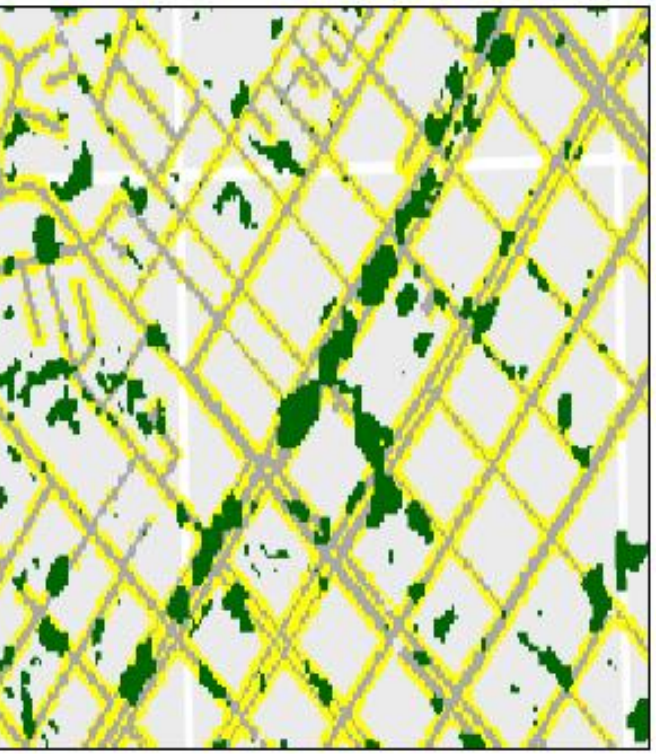


EXPLORING COOL INTERVENTION SCENARIOS

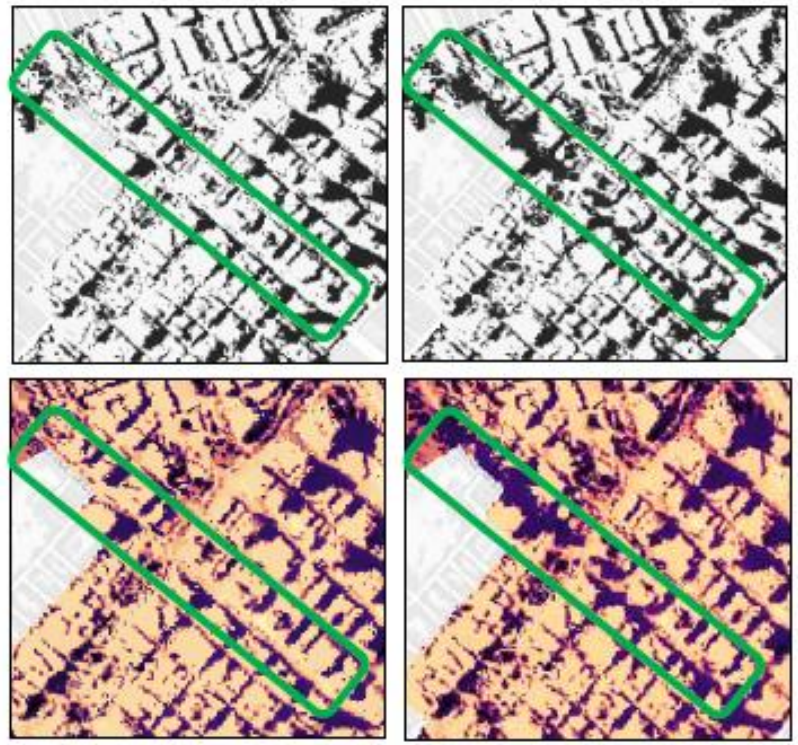
Evaluate intervention scenario

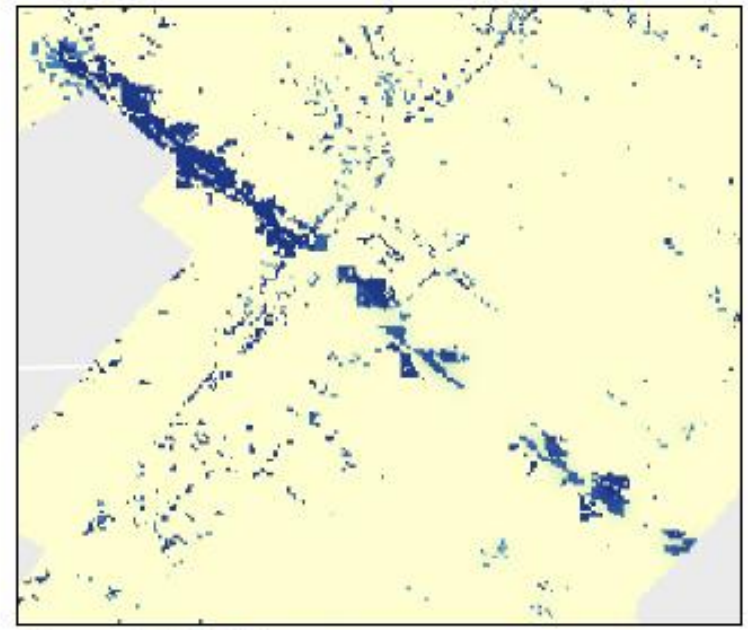
Model infrastructure and heat changes

Map scenario cooling potential

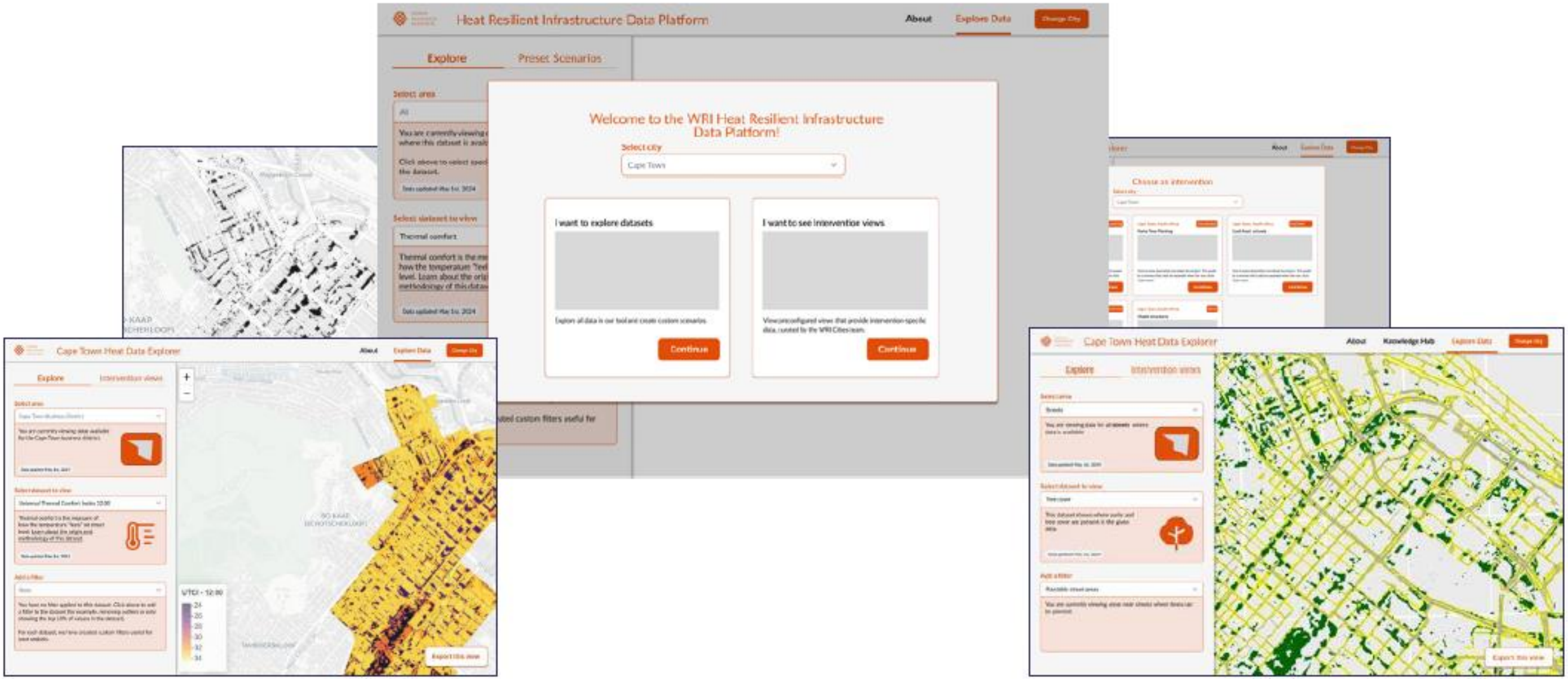


Road
Existing trees
Street tree potential





BUILDING A HEAT-RESILIENCE DATA PLATFORM



Redesign: Using heat mapping for urban planning

David Forke

Research Scientist, Google

Google

Climate Resilience with Heat Resilience Insights

October, 2024

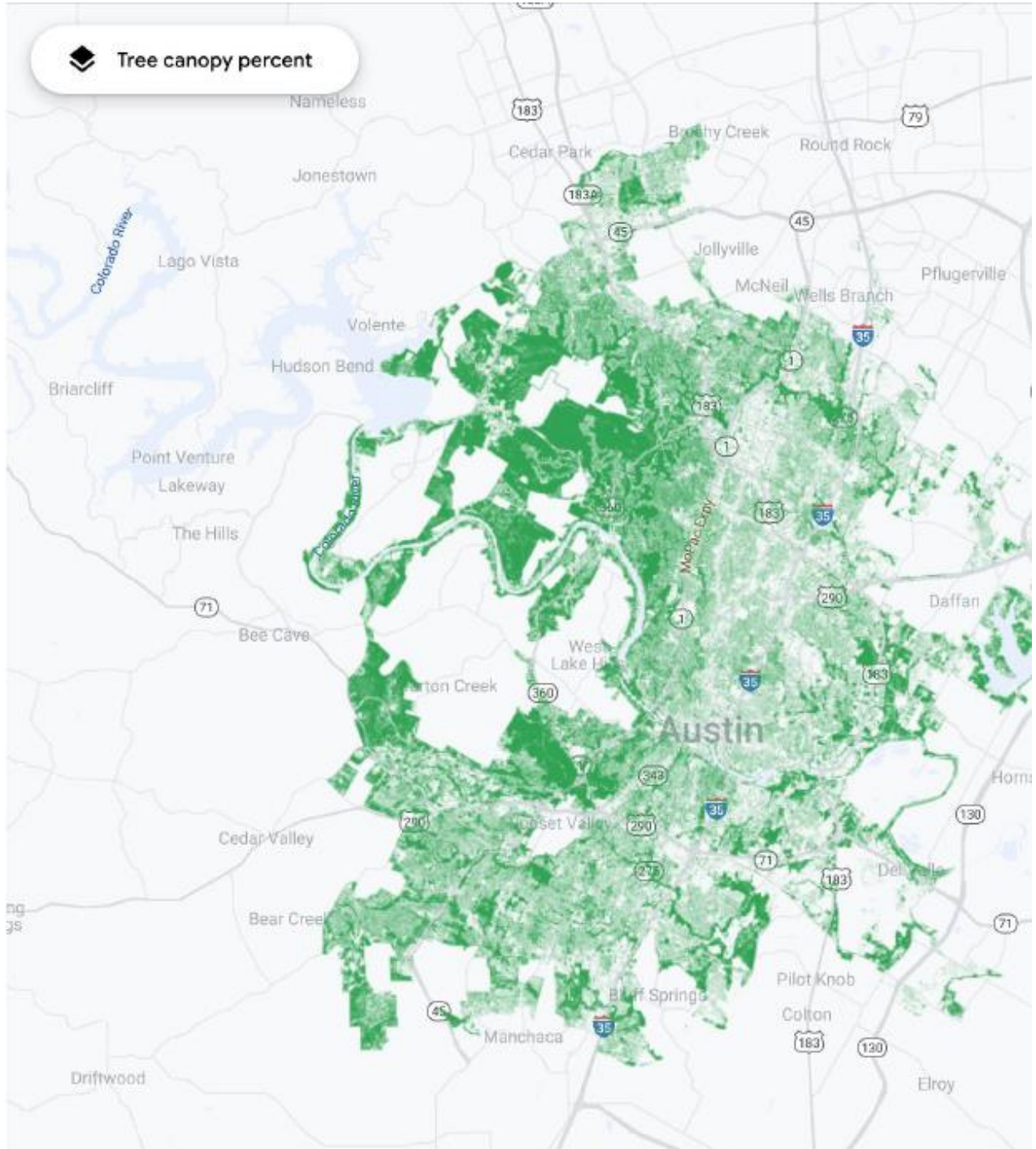
AI for Climate & Health @ Google Research

We are building solutions using AI to help people and cities adapt to extreme heat

Tree Canopy

Google's Tree Canopy mapping technology provides insights to cities & community leaders about where to invest resources for planting and maintaining trees.

Available in 2000+ cities



Heat Resilience Lab

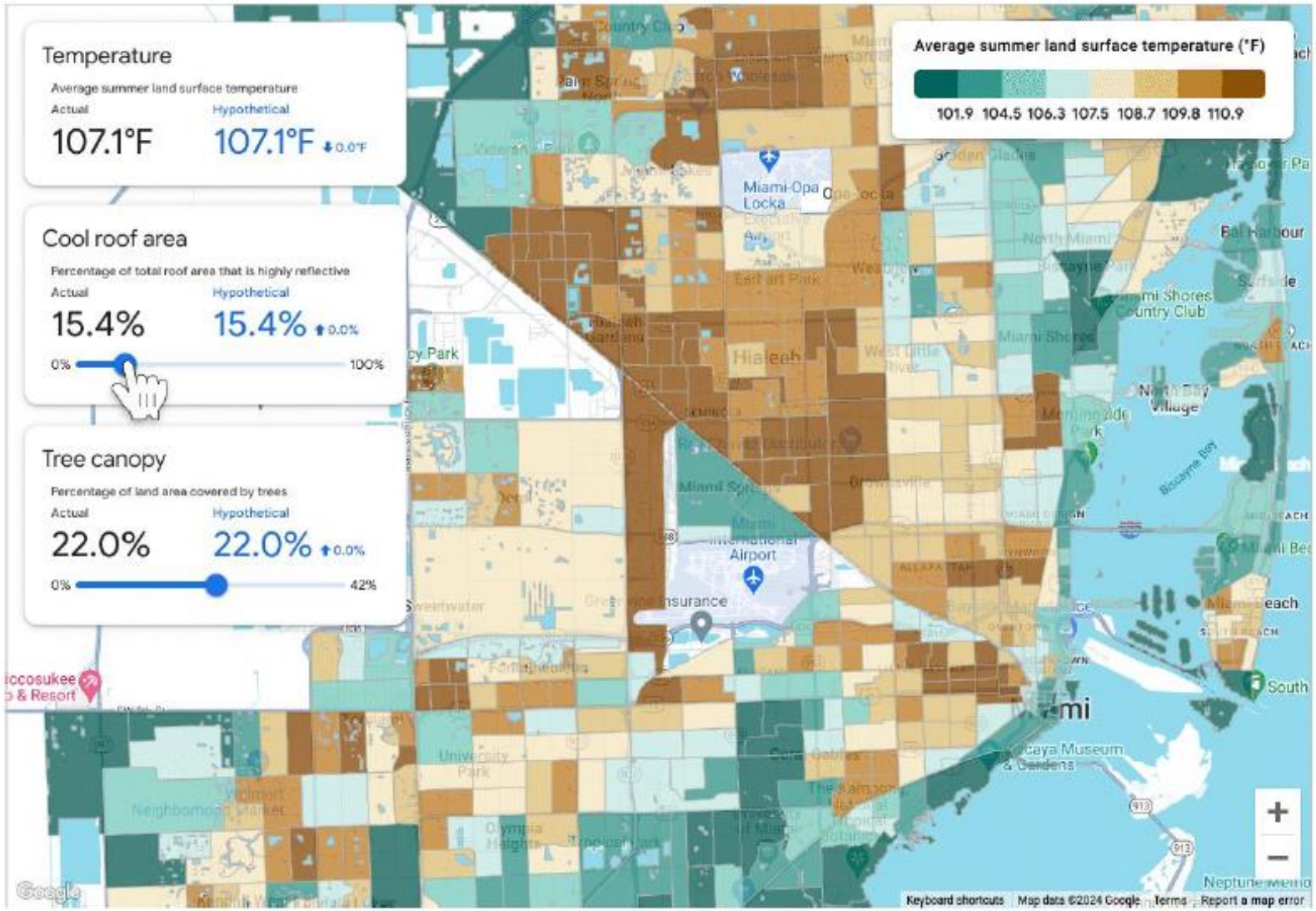
Estimated rooftop reflectivity in select cities, based on AI algorithms trained on high-resolution aerial imagery combined with satellite reflectivity measurements.

Pilot live in 15 cities

Temperature effects in Heat Resilience Lab

Estimating the temperature reduction potential of trees and cool roofs to empower decision makers with more capabilities and insights

Pilot live in 14 cities



Coffee Break

14:20 - 14:30

Redesigning Resilient Cities : Creating Heat/ Cooling Action Plans

Moderator

Ms. Lily Riahi
Global Coordinator
UNEP Cool Coalition

Panel speakers

Mr. Owen Gow
Associate Director
Arsht-Rockefeller Foundation Resilience Centre

Ms. Eugenia Kargbo
Chief Heat Officer
Freetown City, Sierra Leone

Ms. Jane Gilbert
Chief Heat Officer
Miami-Dade, US

Ms. Cuc Nguyen
Deputy Head
Department of Climate Change, Vietnam

Ms. Maria Buhigas
Chief City Architect
Barcelona City, Spain

Ms. Amy Buitenhuis
Head
Urban Heat Program - C40

Redesign: Using heat mapping for urban planning

Owen Gow

Associate Director, Arsht-Rockefeller Foundation Resilience Centre

Atlantic Council

Climate Resilience Center

Resources for Heat Planning:

The Heat Action Platform

Owen Gow
Deputy Director, Extreme Heat Initiatives
ogow@atlanticcouncil.org

onebillionresilient.org

@ACClimateCenter

Tools and resources

Heat Action Platform:
Practical Guidance for Heat Resilience Planning & Implementation

ASSESS

1. CONDUCT A BASELINE HEAT RISK ASSESSMENT

2. ASSESS HEAT RISK AWARENESS

3. IDENTIFY HEAT-RELATED VULNERABILITIES AND IMPACTS

PLAN

4. DEVELOP AN EDUCATION AND ENGAGEMENT STRATEGY

5. EXPLORE HEAT ADAPTATION SOLUTIONS

6. CREATE A HEAT ACTION PLAN

7. FINANCE AND DE-RISK HEAT ADAPTATION SOLUTIONS

IMPLEMENT AND EVALUATE

8. IMPLEMENT AND SCALE HEAT ACTION

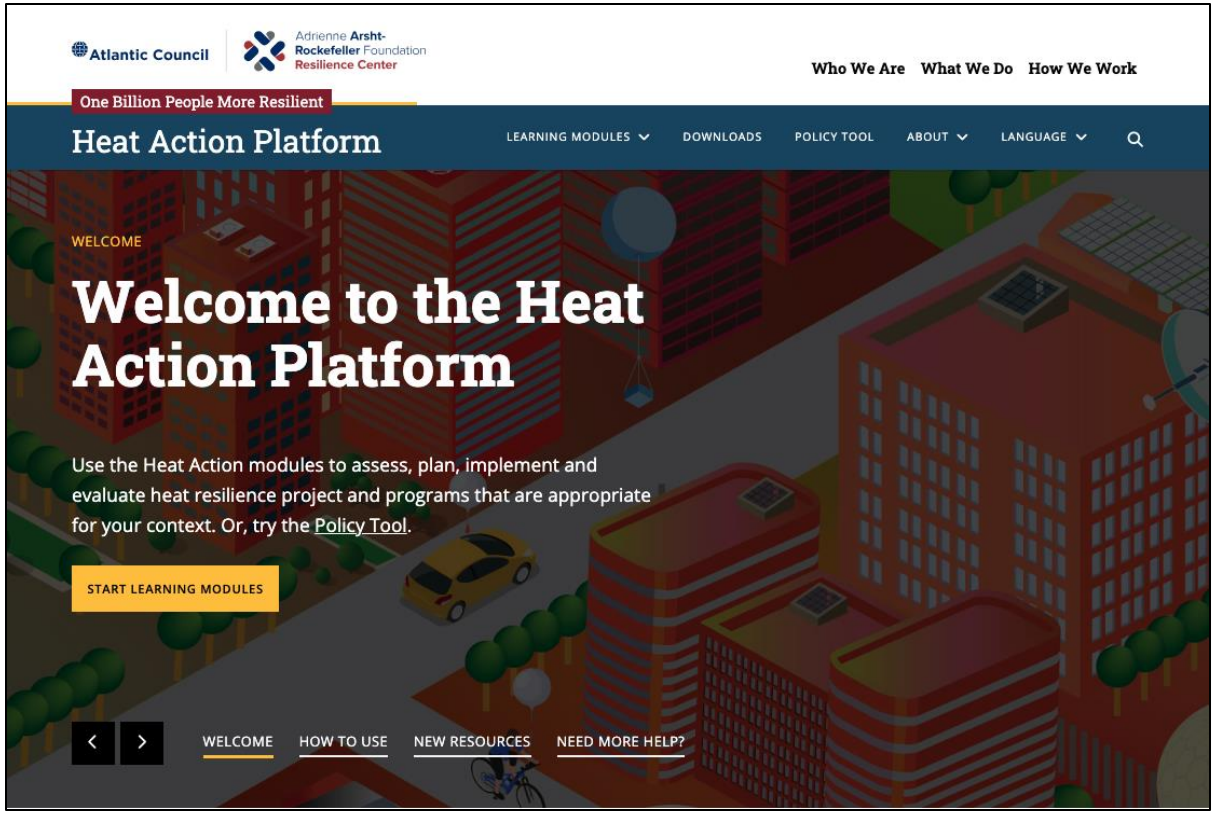
9. MONITOR AND EVALUATE HEAT ACTION

DEVELOPED IN PARTNERSHIP WITH:

RMI · WORLD ECONOMIC FORUM · MISSION INNOVATION accelerating the clean energy revolution · UN environment programme · EHRA · GLOBAL COVENANT of MAYORS for CLIMATE & ENERGY · Cool Coalition · BiodiverCities by 2030

Tools and resources

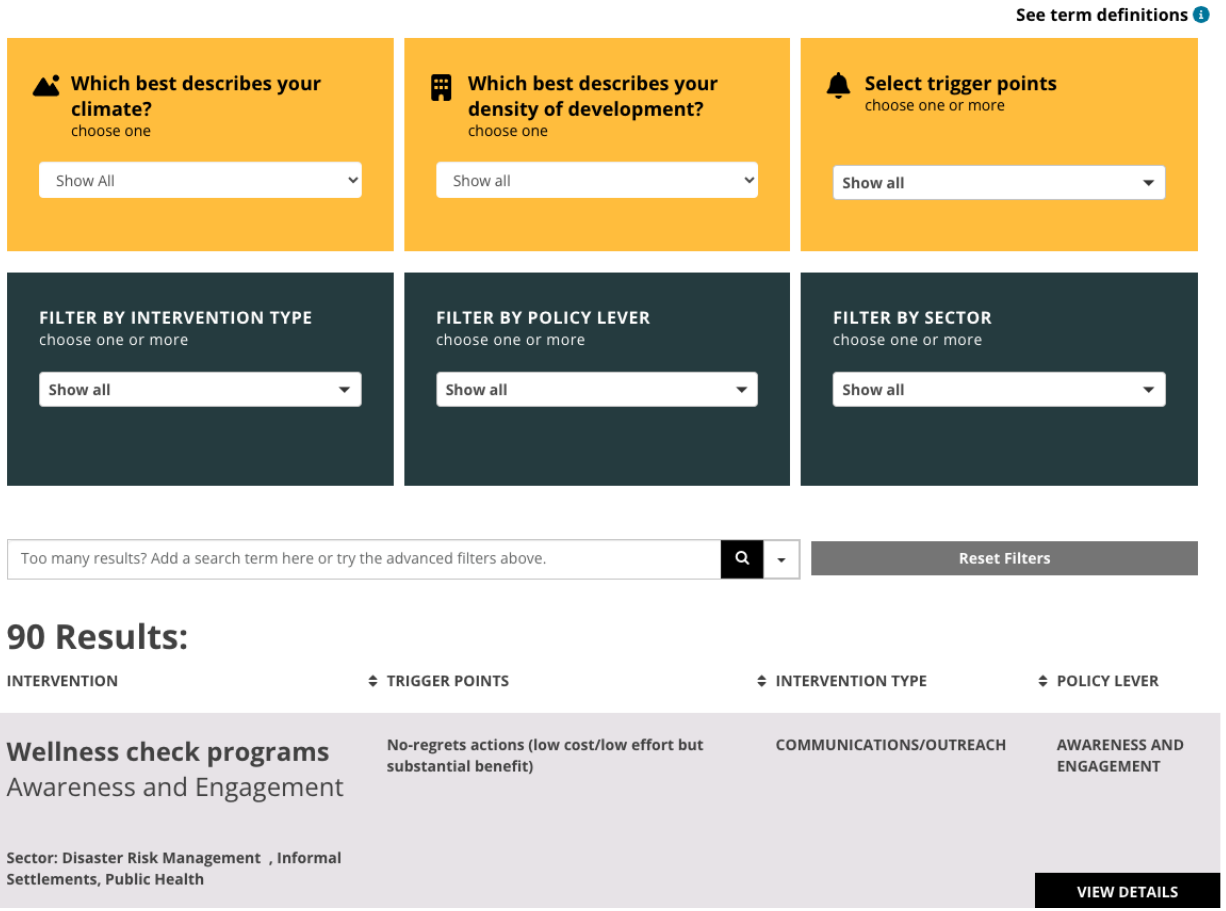
Heat Action Platform:
Practical Guidance for Heat Resilience Planning & Implementation



https://heatactionplatform.onebillionresilient.org/

Tools and resources

Heat Action Platform:
includes filterable Policy tool with 90 adaptation solutions



Tools and resources

Heat Action Platform:
includes filterable Policy tool with 90 adaptation solutions

POLICY SOLUTION

Wellness check programs

Awareness and Engagement

Overview:

Summary: Socially isolated and other vulnerable populations are at greater risk of health emergencies during heat waves. Programs to check in on these populations can reduce heat-related illness and emergencies by having people designated to check in on individuals.

Implementation: Establish a wellness check program with three steps: 1) create a voluntary registry supported by targeted outreach for individuals to sign up to be checked on during extreme heat events; 2) train members of the community to recognize heat stress symptoms and check-in on vulnerable populations during heat waves; and 3) launch a campaign; which can be paired with a heat wave alert system.

Considerations for Use: The list of program participants should be updated on an annual basis. Government can partner with community-based organizations to support outreach to hard-to-reach populations.

- **Policy Levers:** Awareness and Engagement
- **Trigger Points:** No-regrets actions (low cost/low effort but substantial benefit)
- **Intervention Type:** Communications/Outreach
- **Sectors:** Disaster Risk Management , Informal Settlements, Public Health

Case Studies:

- NYC MOR's Be a Buddy Program (UNEP, Pg 160)
- Paris CHALEX Directory (UDF, Pg 45)
- Barcelona, Home Care Workers Training (C40 Urban Heat & Equity, Pg 15)

Implementation:

- **Intervention Scale:** City, Neighborhood
- **Authority and Governance:** City government
- **Implementation Timeline:** Short-term (1-2 Years)
- **Implementation Stakeholders:** CBOs, City government, Public
- **Funding Sources:** Grants and philanthropy, Public investment
- **Capacity to Act:** High, Low, Medium

Benefits:

Tools and resources

Heat Action Platform:
includes other resources and practitioner interviews

Atlantic Council

Climate Resilience Center

Thank You

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ogow@atlanticcouncil.org

onebillionresilient.org

@ArshtRock

Redesigning Resilient Cities : Creating Heat/ Cooling Action Plans – Panel Session

Moderator

Ms. Lily Riahi
Global Coordinator
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Barcelona City, Spain

MINISTRY OF NATURAL RESOURCES AND ENVIRONMENT
DEPARTMENT OF CLIMATE CHANGE

VIET NAM'S EFFORTS TO TACKLE EXTREME HEAT THROUGH SUSTAINABLE URBAN COOLING - CASE STUDY IN CAN THO

NGUYEN Dang Thu Cuc (Ms.) | *Department of Climate Change, Ministry of Natural Resources and Environment*

1 NATIONAL-LEVEL ACTIONS ON SUSTAINABLE COOLING

DCC Department of Climate Change

2020

ENVIRONMENTAL PROTECTION LAW
Law 72/2020/QH14

2021

ENVIRONMENTAL PROTECTION LAW
(Decree 06/2022, Circular 01/2022)

Initial proposal of **Sustainable Urban Cooling in Viet Nam's cities**

Initial concrete basis for the adoption of urban cooling in urban development

2022

Sustainable cooling:

- Part in ***updated NDC 2022;***
- A requirement for action in ***National Climate Change Strategy to 2050.***

2023

Participation of Viet Nam in **Global Cooling Pledge - COP 28**

Governmental commitment to joint actions to address sustainable cooling

2024

Urban cooling promotion and Urban heat island mitigation as a key requirement in **National plan on management and elimination of Controlled ODSs and GHGs**
(with inputs from National Green Cooling Action Plan, focusing on both active and passive cooling solutions).

Requirement for adoption of urban cooling, urban heat mitigation and cooling measures in related fields

2025 -

Collaboration with stakeholders in **promotion of sustainable cooling** in Viet Nam, focusing on passive cooling solutions

Outcome

Nation-wide impact and implementation of sustainable cooling in provincial design and planning at all levels

- ❑ Inter-ministerial working level taskforce established (MONRE, MOC, MOIT, etc.);
- ❑ Cooling concepts gradually integrated into academic and vocational trainings;
- ❑ Nationwide consultation and information dissemination on extreme heat risks and energy-efficient cooling practices;
- ❑ International engagement and local implementation through global initiatives and city-level cooling action plans.

2 CITY-LEVEL ACTIONS ON URBAN COOLING: CAN THO CASE STUDY

DCC
Department of Climate Change

URBAN HEAT ISLAND EVALUATION

- Survey of existing conditions: urban planning, building codes, energy demand and cooling practices;
- On-site measurement for identification of thermal comfort and urban heat island hotspots;
- Urban heat island analysis using satellite imagery, ground measurements, and climate modeling;
- Recommendations for landscape design and urban cooling strategies.

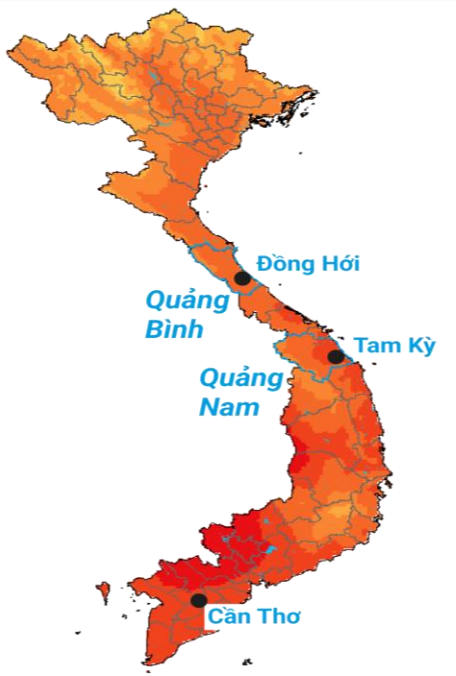
COOLING DEMAND ANALYSIS

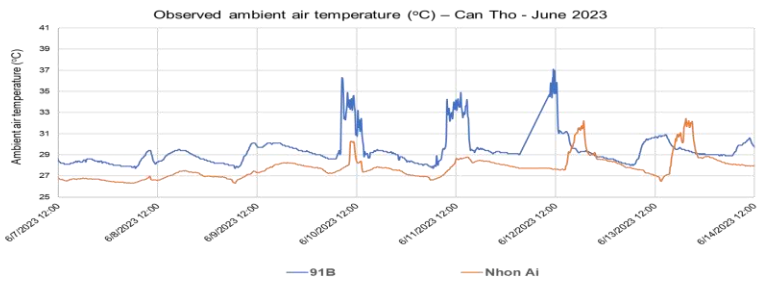
- Assessment of climate-adaptive building design and cooling demand under macro/micro climate conditions in Can Tho;
- 45% reduction in cooling energy consumption and 53% reduction in GHG emissions (564,000 tons) by 2050 through UCAP implementation;
- Recommendations for energy-efficient building design incorporating passive cooling strategies and climate-responsive solutions.

POLICY MAPPING & CITY GOVERNANCE

- Review of existing urban cooling policies in Can Tho and identification of policy gaps for implementation;
- Development of phased recommendations (short, medium, long-term) covering passive cooling, urban design, building strategies, and financing mechanisms;
- Establishment of clear governance structure and stakeholder roles for UCAP implementation, with innovative financing solutions.

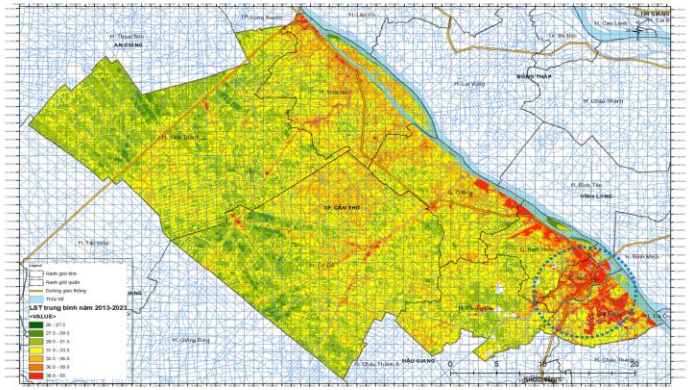
Pilot Cities

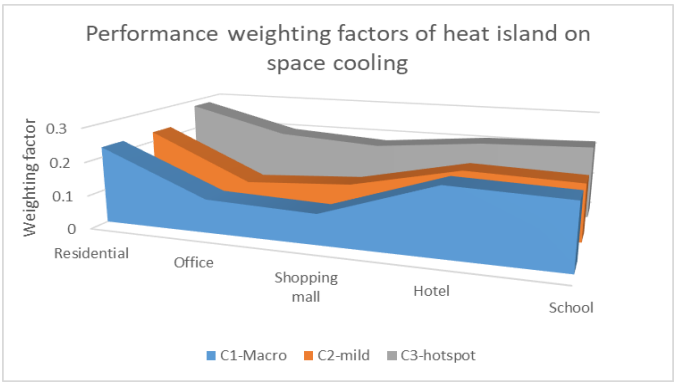





91B – Urban site


Nhon Ai – Rural site





2 CITY-LEVEL ACTIONS ON URBAN COOLING: CAN THO CASE STUDY

Project pipeline development on cooling

- The selection framework categories for cooling projects includes four types: Energy Efficiency Projects, Building Design and Passive Cooling, District Cooling Systems, and Neighborhood Level Cooling with Nature-based Solutions.

- Key selection criteria includes five components: Alignment with government strategy, Project Features, Project Readiness, Scaling-up Potential, and Social Impact ensuring comprehensive evaluation of technical, financial, and social aspects.

Pre-feasibility study analysis

- Assessment of the economic, environmental and social viability of the selected project.

- Template development for future cooling projects.

New Urban Area and Centralized IT Park selected

- Managed by Can Tho Investment and Development Fund
- Location: Hung Thanh Ward, Cai Rang District, Can Tho City
- Construction Area: Total 72.06 ha, including 20.02 ha for Centralized IT Park and 52.04 ha for New Urban Area
- Building Types: Data centers, social housing, individual apartments, high-rise buildings, residential buildings
- Potential Technologies: Urban cooling landscaping, passive cooling and active cooling in buildings

Redesign: Using heat mapping for urban planning

Amy Buitenhuis

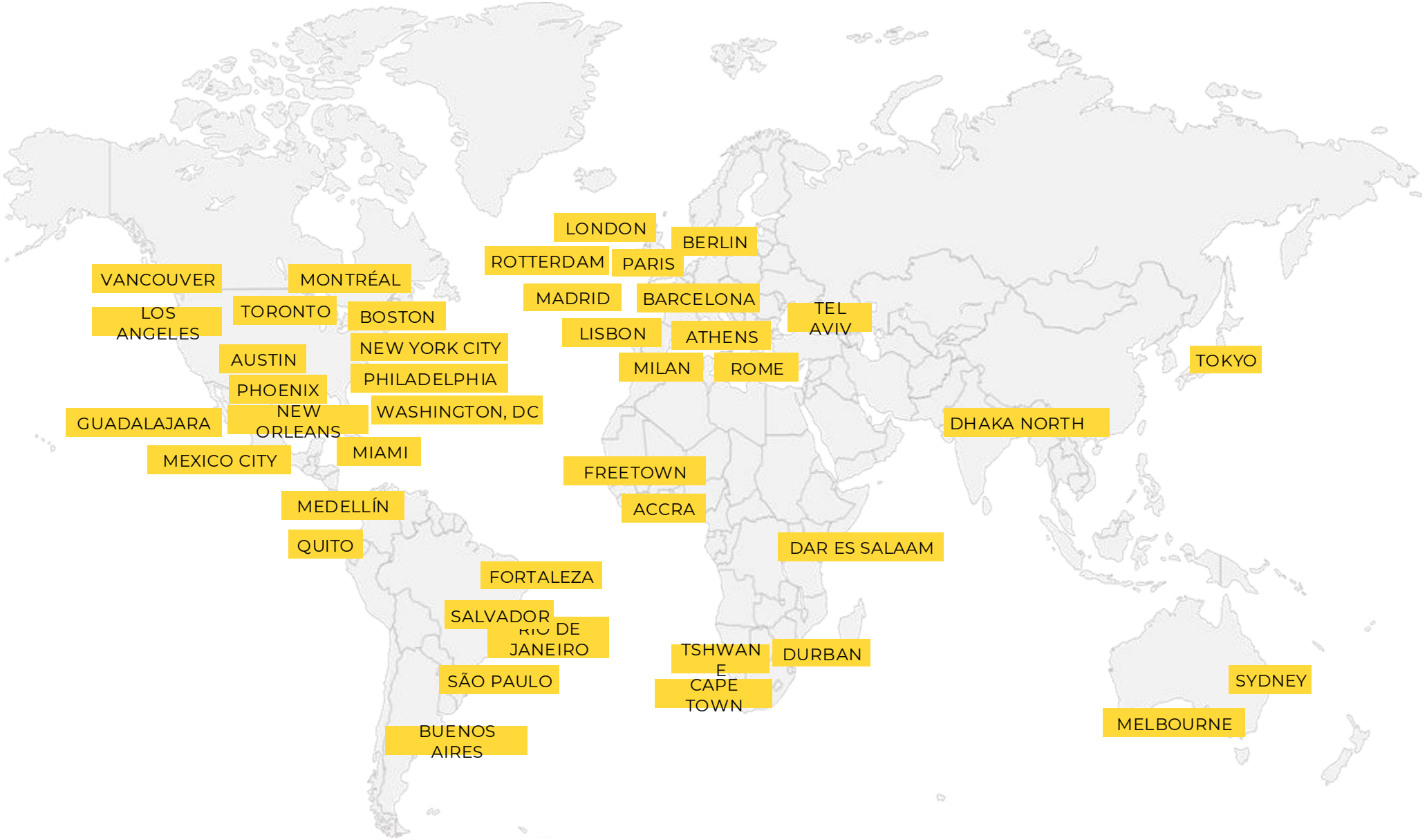
Head of Urban Heat Program - C40

Aprajita Singh

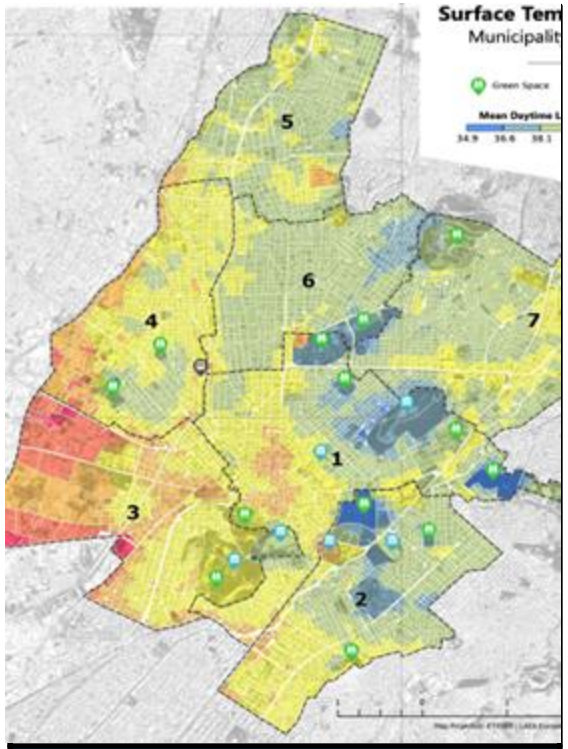
Programme Officer, Resilience Team, C40

C40 is a network of mayors of nearly 100 world-leading cities collaborating to deliver the urgent action needed right now to confront the climate crisis. Together, we can create a future where everyone, everywhere can thrive.

C40's Cool Cities Network



Cool Cities Network (CCN) Focus Areas



Heat Mapping

Emergency Management

Long-term Planning

Cooling Solutions

C40 CITIES

Cool Cities Network Activities

WEBINARS	CITY CLINICS	REPORTS	WORKING GROUPS	Other
Paris @ 50 degrees: Emergency Heat Response Exercise **Buenos Aires and GEO:** Heat monitoring/mapping **Tokyo and Guangzhou:** Urban green space and wind corridors **São Paulo:** Land acquisition for nature, adaptation and mitigation	**NYC** on Cool spaces and emergency heat response **Barcelona** on shade structures **Cape Town and Arizona State University** on reducing impacts of heatwaves in schools **Milan** on their Climate Action Plan and School Oasis Programme	**Cool surfaces:** Experiences from C40's Cool Cities Network **Heat Resilient Cities:** Measuring benefits of urban heat adaptation (Tool) **Urban Heat and Equity:** Experiences from C40's Cool Cities Network	**Indoor Thermal Safety Working Group (North America)** **Heat Planning Working Group**	**Peer-to-peer exchanges** **In-person workshops** **Funding for Technical Assistance**

Heat Planning In Cities

Art by Njung'e Wanjiru for C40 Cities

Status of Heat Planning in Participating Cities

City	Heat Plan Status	City	Heat Plan Status
Barcelona	Interested	New Orleans	Interested/In progress
Buenos Aires	Interested	New York City (DOT)	Implementing/Updating
Calgary	In Progress	Norfolk, VA	Implementing
Cape Town	Implementing	Paris	Implementing
Dhaka	In progress	Rio de Janeiro	Implementing
Jakarta, Indonesia		Rotterdam	Implementing
London	Interested	Singapore	
Louisville, KY	Interested	Sydney	Implementing
Mexico City	Interested	The Hague	Implementing
Miami	In progress	Toronto	Implementing
Milan	In progress	Vancouver	Implementing
Montréal		Velje, Denmark	Implementing
Greater Manchester	Interested		

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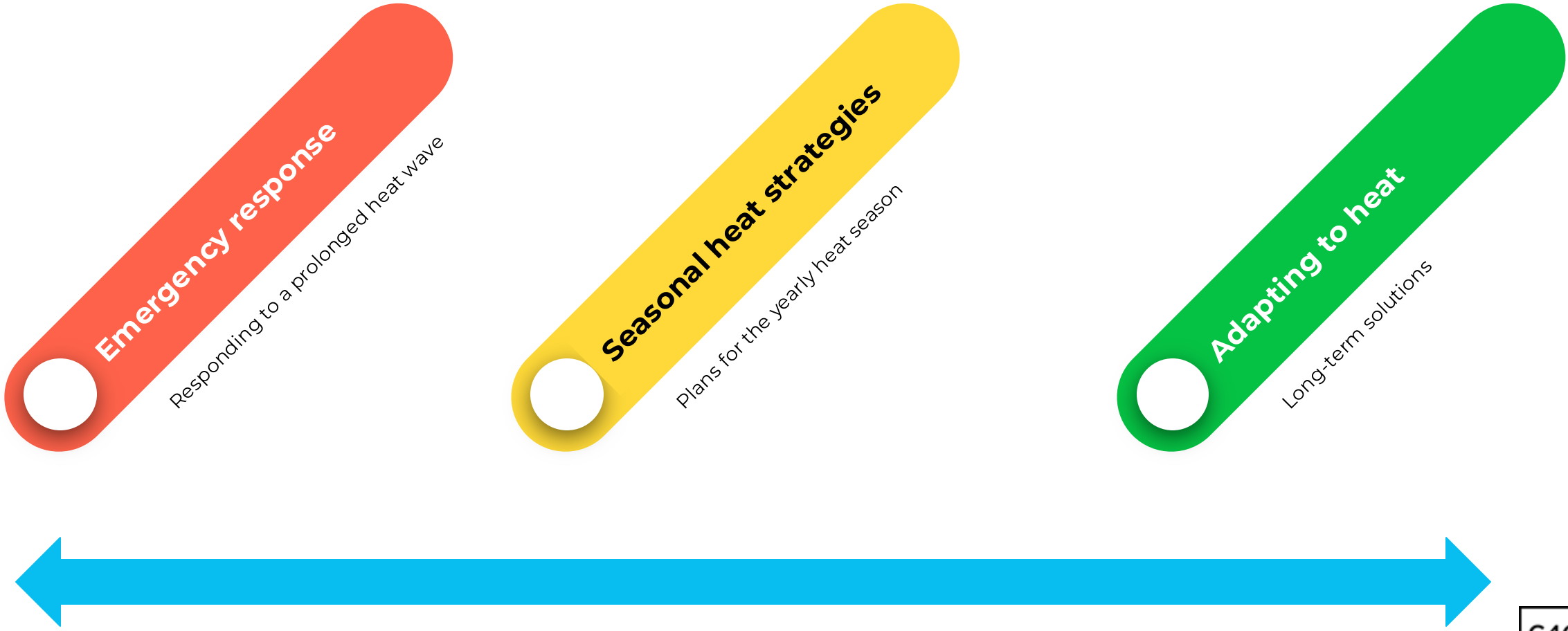
Heat Planning



Heat Planning - Examples of Activities

Emergency response

Responding to a prolonged heat wave

- Emergency temperature thresholds and response protocols
- Heatwave communication toolkits
- ‘Pop-up’ cooling locations with emergency medical aid

Seasonal heat strategies

Plans for the yearly heat season

- Access to cool spaces and shelters
- Greening public spaces and access to drinking water
- Awareness, education, and training
- Short-term support such as distribution of fans or ‘cool kits’

Adapting to heat

Long-term solutions

- Long-term planning based on projected climate data
- Infrastructural improvements, including building retrofits
- Strategic implementation of green infrastructure, planning for future green spaces
- Guidelines for future buildings

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Notes from the Heat Planning Working Group

Art by Njung'e Wanjiru for C40 Cities

How did your city decide it needed a Heat Plan?

Impact: The city observed an increasing number of heat waves and heat-related illness and death. Some cities created a plan in response to one particular bad extreme heat event.

Public demand: Residents asked for a response to extreme heat.

Planning: The need for a plan emerged after doing a Climate Change Risk Assessment.

Governance: The city wanted one plan to coordinate work happening across many departments and time scales (short- vs long-term actions).

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What indicators should be included in a heat plan?

Most cities are still determining the best indicators to use and have struggled to identify measurable targets and indicators.

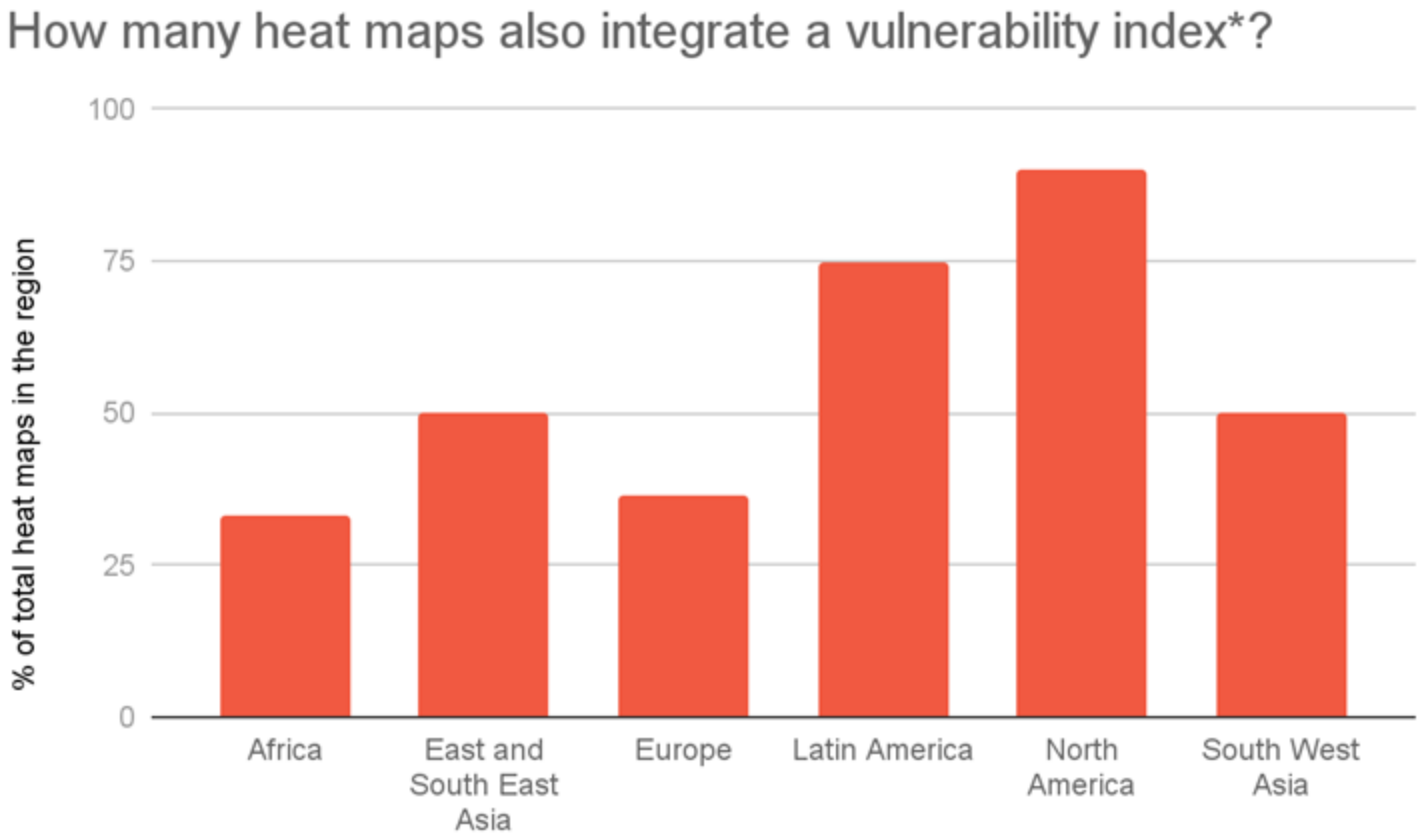
Some indicators being used by participation cities:

- Temperature: measuring actual temperatures through local sensors
- Shade cover or vegetative cover
- Heat-related illness and death* (NYC has excellent reporting)
- Number of accessible cool spaces available to public
- Impact of extreme heat on services

Heat Mapping and Vulnerability

Art by Njung'e Wanjiru for C40 Cities

Heat Vulnerability Indices



Heat Vulnerability Indices overlay the temperature data with other social and environmental factors that may contribute to high heat risk

*Based on an analysis of heat maps from 50 C40 Cities

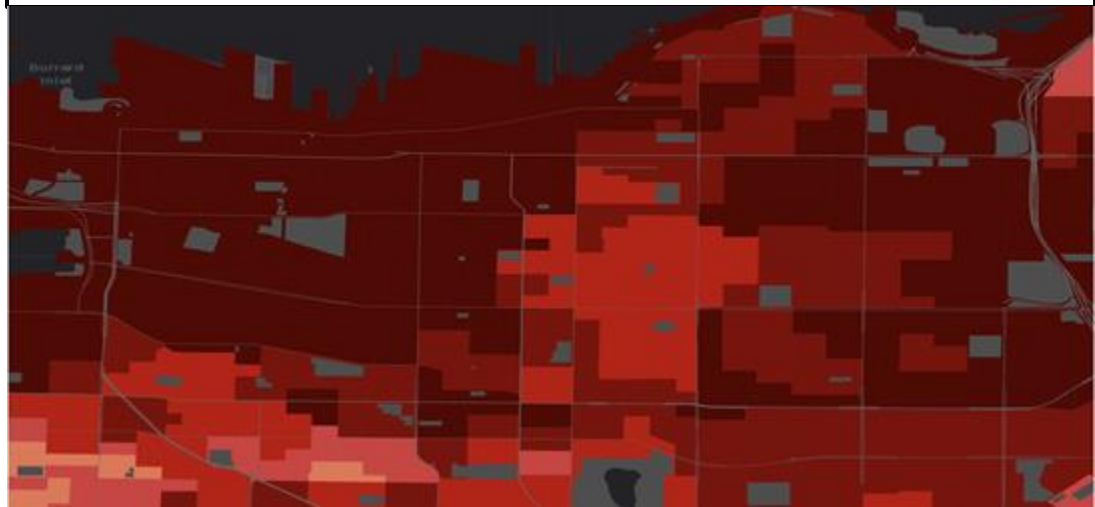
Use of heat death data in Vancouver

Vancouver has used data on 619 heat-related deaths from the 2021 Heat Dome to design heat-related programming:

- Most deaths occurred indoors
- Majority of the deceased had pre-existing conditions (diabetes, asthma, heart disease, substance use disorders, schizophrenia, anxiety and mood disorders)
- Most were elderly (70 or older) and/or had visited a health facility in the past month
- Many lived alone and/or with insufficient cooling

Vancouver has designed its heat programming to target these high-risk groups during high-heat events, for eg. wellness check on the elderly and those with identified pre-existing conditions.

Above: Cool Kits
Below: Heat Vulnerability Assessment



Takeaways

- Heat-vulnerability mapping/indices are a great means to judge which communities are being impacted most severely (and where interventions can be targeted)
- Heat planning should ideally include heat and vulnerability mapping, including heat-health data

- Cities interested in long-term heat planning cite lack of access to data as a major barrier in planning beyond the immediate heat season

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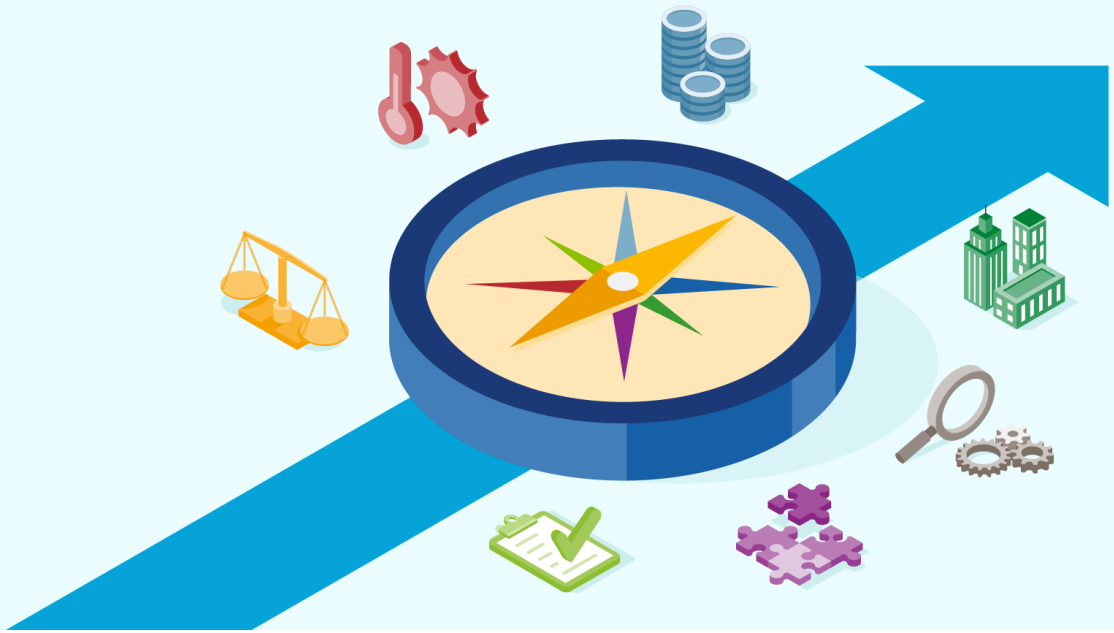
Thank you

Integration of Heat into NDC /ETF

Amanda Mckee

Director, NDC Partnership



October 24, 2024

COOLING CITIES

NDC 3.0 NAVIGATOR & OPPORTUNITIES FOR EXTREME HEAT AND COOLING

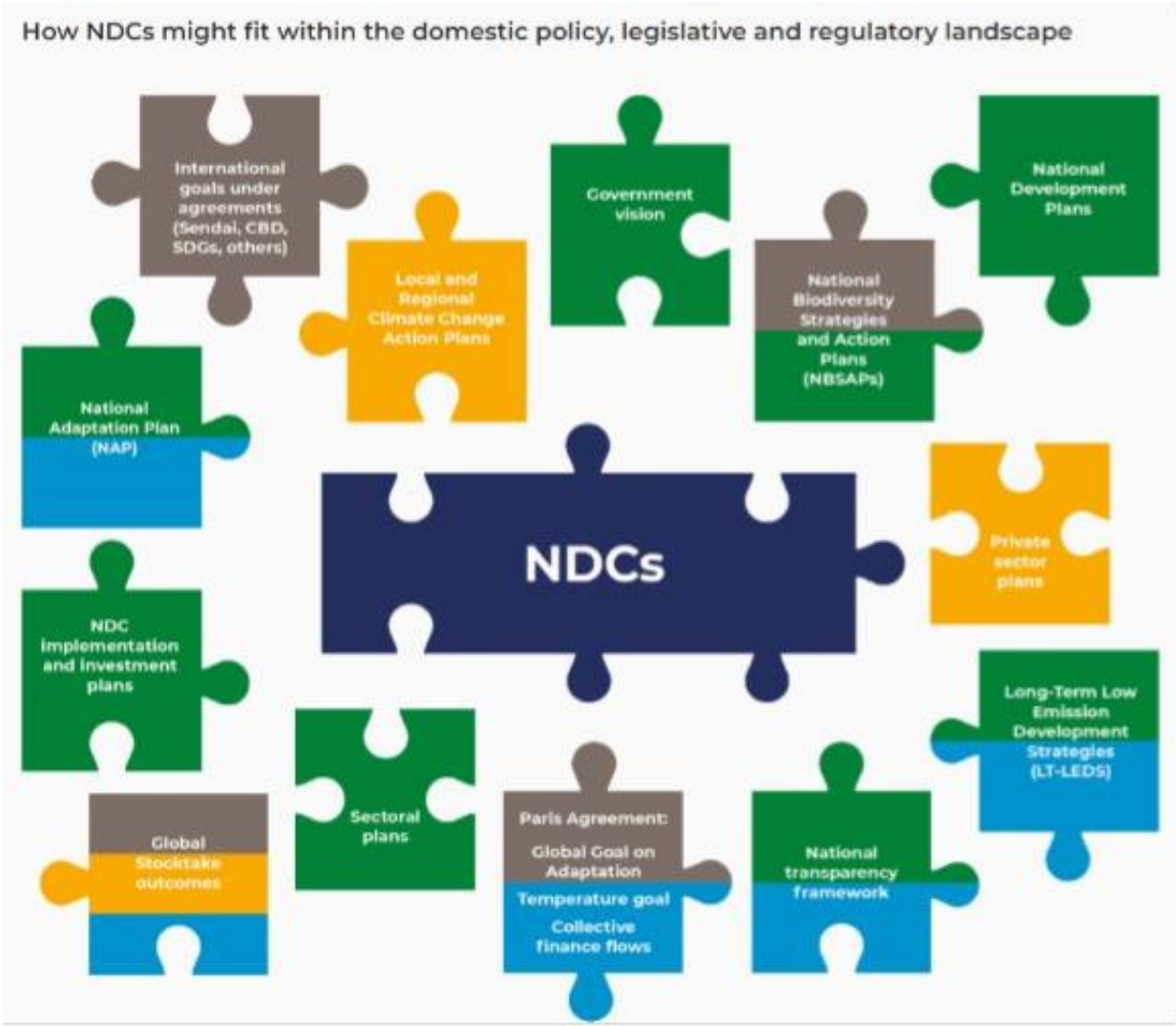
NDC PARTNERSHIP

A GLOBAL COALITION FOR COLLECTIVE ACTION

The NDC Partnership brings together developed and developing countries and institutions delivering on ambitious climate action to help achieve the Paris Agreement, advancing sustainable development.

WHAT ARE NATIONALLY DETERMINED CONTRIBUTIONS (NDCS) AND WHY ARE THEY IMPORTANT?

- Essential instruments for guiding **urgent action and investment** to address climate challenges and achieve the SDGs.
- Describe **concrete efforts and targets** for countries' climate actions, typically spanning 5-year periods.
- Should consider **national policy landscape and country priorities** to mainstream and accelerate implementation.
- Critical need to develop **financial strategies** in parallel with the preparation of NDCs.



NDC PARTNERSHIP

INTRODUCING THE

NDC 3.0 NAVIGATOR

An interactive tool that supports the development of NDCs to be submitted in 2025. It helps countries raise ambition and accelerate implementation of the next round of NDCs.

Visit the Navigator at www.ndcnavigator.org

NDC PARTNERSHIP

EXPLORE

ROUTES AND OPPORTUNITIES TO AMBITIOUS AND IMPLEMENTABLE NDCS

Routes that help countries reflect on the 1st GST and raise ambition

Aligned to the Paris Agreement Temperature Goal

Aligned to the Paris Agreement Global Goal on Adaptation

Delivers a Just and Equitable Transition

Routes that help countries ensure implementable NDCs

Mobilizes all-of-gov't & all-of-society

Identifies support needs

Technically sound & transparent docs

Unlocks finance

Closing Remarks

Gulnara Roll

Head Cities, UNEP and ExCom, Cool Coalition