(Un)Paving the Way for Heat Resilience in Cities

Policy Brief

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CIPPEC (Center for the Implementation of Public Policies Promoting Equity and Growth) is an independent, non-partisan, nonprofit organization that works for a just, democratic, and efficient state that improves people's lives. To this end, it concentrates its efforts on analysing and promoting public policies that foster equity and growth in Argentina. Known for the high qualification of its staff, CIPPEC has become one of the most recognized and respected public policy think tanks in the region.

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INTRODUCTION

The world's cities are relentlessly becoming hotter by the day. Two main causes behind the large temperature increase in cities are: climate change and urbanization. On the one hand, the sustained rise in the concentration of atmospheric CO_2 is causing more frequent, severe and lasting heat waves (IPCC, 2022). As global warming intensifies, the resulting changes in the climate will bring about even more severe and extensive heat extremes. On the other hand, sustained urban sprawl causes the loss of vegetation in favor of asphalt, bricks and cement. This provokes the inadvertent modification of the local climate (Oke, 1987), with an accumulation of heat in urban centers, commonly referred as urban heat islands. Heat waves and urban heat islands behave synergistically, causing cities to experience increasingly extreme and stifling temperatures (B. J. Stone, 2012; IPCC, 2021). This unprecedented heating comes at a high cost.

Rising temperatures cause economic burdens, public health impacts, and urban infrastructure disruptions (Sáez Reale, 2023). Heat reduces economic activity by discouraging people from engaging in commercial activities outside of their homes due to discomfort. Even a 1°C rise in temperature above 36°C can lead to a drop in retail sales of up to 10%, having a considerable impact on the local economy (City of Athens, 2018). High temperatures have a direct impact on people's health and can have catastrophic results. In many developed countries, such as the US, extreme temperatures kill more people than most other climatic events combined (Keith & Meerow, 2021). Surprisingly, these deaths are often not associated with heat, and therefore go unnoticed as casualties of climate change. Moreover, heat damages transportation systems and urban infrastructure in a wide variety of ways. High temperatures negatively affect the operation of trains, buses and private cars. Heat can even melt the asphalt on roads and runways, as witnessed in July 2022 at Luton Airport in the UK.

FOCUS ON THE MOST VULNERABLE

Heat distribution in the built environment is spatially uneven and has dangerous and worrisome consequences for the most vulnerable. Heat distribution in the city depends on several factors, including the quality of construction of buildings and dwellings and the quality and quantity of green infrastructure provision, such as urban trees. Not all individuals are affected equally: The elderly, children, people with mental or cardiac diseases or those with lower incomes are at greater risk from sustained exposure than the rest of the population. Less social isolation, access to air conditioning devices, and proximity to green open public spaces can reduce the likelihood of mortality in an extreme heat event.

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During the 1995 heatwave in Chicago, which resulted in over 700 deaths, the risk of dying increased significantly for individuals who had underlying health issues that required them to stay in bed, were unable to take care of themselves, did not leave their homes regularly, lived alone, or lived on the top floor of a building. Conversely, engaging in social activities and having social contact decreased the likelihood of dying during a heatwave, as individuals with stronger social networks were more likely to receive help and support from an acquaintance (Semenza, 1996). These findings are consistent with mortality analysis of more recent heat waves, such as the ones that occurred in Buenos Aires, Argentina in 2013 (Almeira, Rusticucci, & Suaya, 2016) and Montreal, Canada in 2018 (Ha, 2021), or systematic literature reviews on heat mortality (Basu, 2009).

Heat impacts are profoundly enhanced by aspects of social vulnerability related to the populations' living conditions. Globally, one out of every four urban dwellers – 1 billion people – lives in slums or informal settlements and lack adequate housing and access to basic services (UN-Habitat, 2020). About half of the G20 countries and other rapidly expanding urban areas in the Global South have informal settlements. Such areas face inadequate planning and lack of building permits, primarily due to the way in which the land was occupied. As a result, public spaces, water and sanitation infrastructure, and greenery most often fall short. Even in G20 countries, those below the poverty line tend to live in hotter areas than the wealthy. A study of twenty US southwest urban areas found that on average, the poorest 10% of communities were 2.2° hotter than the wealthiest ones (Dialesandro et al., 2021).

Considering that we are facing a new, warmer climate reality, and that the impacts affect the most vulnerable, it is essential to promote urban planning that focuses on improving heat equity (Keith and Meerow, 2022). Heat equity refers to the inhabitants' right to have thermally safe indoor and outdoor environments, including their residences, places of employment, study, recreation, and commuting. To promote urban heat resilience, urban planners and public officials must prioritize heat equity. This involves ensuring that heat mitigation and management strategies are distributed fairly across communities, with a focus on helping those who are most vulnerable to high temperatures.

ENCOURAGE AND SUPPORT LOW-CARBON HEAT-RESILIENT CITY ACTION PLANS

While cities are at the frontline of climate change impacts, such as extreme urban heat, they are also at the frontline of addressing climate change by fostering possible solutions to its consequences. The global urban area will increase threefold in the next 30 years, and the share of urban population will rise from 55% in 2018 to 68% in 2050 (United Nations, 2019). The G20 nations and the Global South must invest in tools and policies to encourage heat-resilient urban development. This includes promoting green infrastructure, sustainable health and housing systems, urban regeneration and land use with equitable access for all, and fostering the energy transition towards renewable energies. Additionally, city plans must be inclusive and participatory, focusing on the most vulnerable, and include risk-management strategies for when extreme events occur.

Transitioning from gray to green infrastructures in cities has proven to be very successful in both lowering the cities' CO_2 emissions and in reducing the actual city temperatures, and thus helps them adapt to the new hotter climate. Nature-based solutions help reduce emissions by carbon sequestration through trees and plants, and mitigate the heat by providing shadow, promoting biodiversity and creating cool areas, such as parks, where people can thrive. Green initiatives have already been proven to successfully reduce the heat in cities like New York (USA), where a million trees were planted in eight years, or Medellín (Colombia), where 30 "green corridors" provide an interconnected twenty-kilometer network of shady routes including new bike lanes and walkways across the city. Small-scale innovations are being tested all over the world, like "pocket forests" with native plants introduced in Dublin (Ireland), Philadelphia (USA) or Córdoba (Argentina), or green rooftops (Toronto, CA), which have numerous benefits for their communities.

Moreover, investing in resilient health and housing systems is the fundamental strategy for both attending to the populations affected by extreme heat, and for thriving in a hotter climate, as cities have cool buildings, cool outdoor spaces and cool homes to rely on. In this sense, the Urban20 (2022) has called upon the G20 to work with cities to invest in health and housing as a cornerstone to an economic and social recovery for all. Sustainable city plans include passive cooling strategies aiming to reduce mechanical refrigeration in buildings, and thus mitigating the associated residual heat and greenhouse gas emissions. In this regard, best practices include revising code regulations to consider building orientations, materials and designs that promote energy efficiency and ventilation; building retrofitting strategies to encourage modernization of old buildings' technologies and materials; and district cooling actions, designed specifically for reducing the heat efficiently in targeted areas.

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How cities grow has major consequences for the quality of life of its inhabitants, especially in terms of equal access to critical infrastructure such as water supply, sewage, energy, transportation, education and health services and public spaces (Lanfranchi et al., 2018). Further, it also has substantial effects on the environment, since cities tend to expand over peri-urban land which has important ecological system functions such as wetlands, agriculture, and biodiversity reserves. Effective land use planning, namely promoting dense, compact, and diverse cities, has huge benefits in terms of efficiency and access for urbanites. Urban renewal strategies, when they appropriately add vegetation cover, have been effective at improving

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the vitality of the area and its relationship with the surrounding environment, but have also been proven to mitigate heat island effects when strategically targeted, as experienced in Shanghai, China (Wei and Shu, 2020).

Furthermore, cities need to transition their energy systems toward low-carbon alternatives, and the G20 countries have a key role in making this transition possible. Fossil-fuel based energy systems are largely responsible for the cities' Global Energy Interconnection (GEI) emissions accelerating climate change and exacerbating urban temperatures. Cities need to plan for more transport-oriented renewable-energy systems, aimed at reducing emissions and residual heat, as well as promoting more active mobility solutions. ICLEI – Local Governments for Sustainability's 100% Renewable Energy city plans are great examples of cities' efforts that need to be boosted by national strategies and investments. The Urban20 Communiqué (2022) calls for cities to commit to fossil-fuel phase out, finance the renewable energy transition, reduce barriers, raise awareness, and prioritizing sustainable mobility.

All these processes, particularly the renewal projects, instead of being done vertically in a top-down manner, should be done taking into account the voice of the communities living in the cities and making them part of the urban co-design process. Planners should recognize and respect the diverse needs and histories of different groups and engage them in decision-making processes. By promoting equitable participation and outreach to marginalized groups, planners can work to redress past injustices and create a more just and resilient future.

Sustainable city plans must include strategies that prepare cities, public officials and the communities for the occurrence of extreme urban heat. This means assessing the city's vulnerabilities and their main risks and planning accordingly. It is absolutely imperative to move toward risk-informed urban planning and development. This decision-making process takes into account the risks faced by communities that are most vulnerable to disasters and redirects development to reduce disaster risk. There is a growing amount of evidence to assist cities through this process, such as the United Nations Disaster Risk Reduction guide "Words into Action" (UNDRR, 2023) or CIPPEC's Local Risk Management report (Sáez Reale, Esteban and Acosta, 2022), that systematizes tools and inspiring cases on this topic. Local risk maps and a heat vulnerability assessment are important tools that allow cities to spatially identify the main risks, assets and vulnerable populations that may be highly affected by an extreme event. Designing an emergency operative plan is critical, as it sets out the responsibilities and courses of action during the

event. Other tools such as risk-reduction plans will be of great help in reducing vulnerabilities in the medium and long run, along with a comprehensive climate action plan. There are multiple available tools for cities to inform their policy decisions, such as the Heat Action Platform of the Arsht-Rockefeller Foundation, enlightening cases summarized in the "Beating the heat" guide (UNEP, 2021) developed by UN Environment Programme and The Cool Coalition, or the C40 Knowledge Hub.

The only way to succeed in finding real, on-scale solutions and strategies to address extreme urban heat and its consequences is substantially improving awareness. We need to talk about it, invest in it, and work together: academia, civil society, private and public sector, both on the national and subnational levels, to create real resilient cities. No one can solve this challenge on their own; we need to work together to tackle climate change and thrive as humankind in a new, hotter environment, and we need to start now.

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