GEO GROUP ON EARTH OBSERVATIONS

Global Heat Resilience Service

> **Building the foundation for heat resilient communities**

GEO and partners are developing a service that will provide every urban area in the world with data and knowledge on the health risks from exposure to extreme heat. These insights will help cities develop plans to adapt to heat and reduce the impact on citizens' health and local economies.

The impact of heat on health and society

Hot days and extreme heat events are becoming more intense and more frequent. Cities are particularly affected, due to an urban heat island effect that can increase temperatures by up to 20 degrees Celsius.

The impacts on health are significant. Extreme heat is already the deadliest weather event, responsible for an estimated 500,000 excess deaths each year[1]. With rising temperatures and rapid urbanization, this figure is expected to rise significantly. The elderly, young children, pregnant women, and people with chronic health conditions are particularly vulnerable. Heat also impacts air quality, disease transmission, workplace injury and mental health, and can interrupt essential services such as energy, water and transport.

Economies also suffer. The global economy's estimated cost from heat stress through lost working hours is estimated to be $2.4 trillion by 2030[2]. Poorer communities are worst affected. Two thirds of global exposure to extreme heat occurs in urban areas in the global south where rapid urbanization and climatic changes are more pronounced, but there are fewer resources to mitigate and adapt to climate risks. Economic losses from heat are four times higher in low-income counties than in the world's wealthiest regions[3]. Within cities, low-income neighbourhoods may experience greater heat exposure due to overcrowding, lower construction standards and a lack of green spaces[4].

The project sits at the nexus of several development challenges: climate change-health-urbanization. As such it responds to goals and targets set out in a number of the Sustainable Development Goals. These are **SDG 3: Good Health & Well-being; SDG 11: Sustainable Cities & Communities; and SDG 13: Climate Action. The partnership approach needed to design and deliver the project also aligns well with SDG 17: Partnerships for Goals**

Why do we need a Global Heat Resilience Service?

Death and illness can be prevented with tailored strategies, such as investing in green spaces in vulnerable areas, and by improving early warning systems and adaptation plans, as supported by the **UN's Early Warning for All initiative.**

However, most cities don't have comprehensive heat resilience strategies or effective early warning systems because they don't have the urban data needed for risk assessment and management. Some cities do have heat vulnerability data, but these are often the result of one-off, costly exercises. Even in richer countries, it's challenging for cities to collect and analyze data on the full range of variables - weather, climate, infrastructure, health, socio-economic and coping capacities - then translate that data into evidence that can inform strategies and other actions.

It will be more cost-effective to prepare cities for extreme heat now than to deal with the impacts later. But currently only around 7-8% of global urban climate financing needs are being met, with far less still flowing to urban areas in the global south. A key barrier to accessing this

climate finance is a lack of appropriate data and information with which to develop feasible plans and projects to mitigate risks.

The Global Heat Resilience Service aims to fill these gaps. Using the latest digital tools and leveraging the power of cloud computing and Artificial Intelligence, the service will help cities to understand when and where extreme heat events will occur, who will be most vulnerable, and what actions can be taken to manage risks.

About the Global Heat Resilience Service

The Global Heat Resilience Service will deliver high-quality, city-specific information to inform improved public health, economic resilience and sustainable urban development, now and into the future.

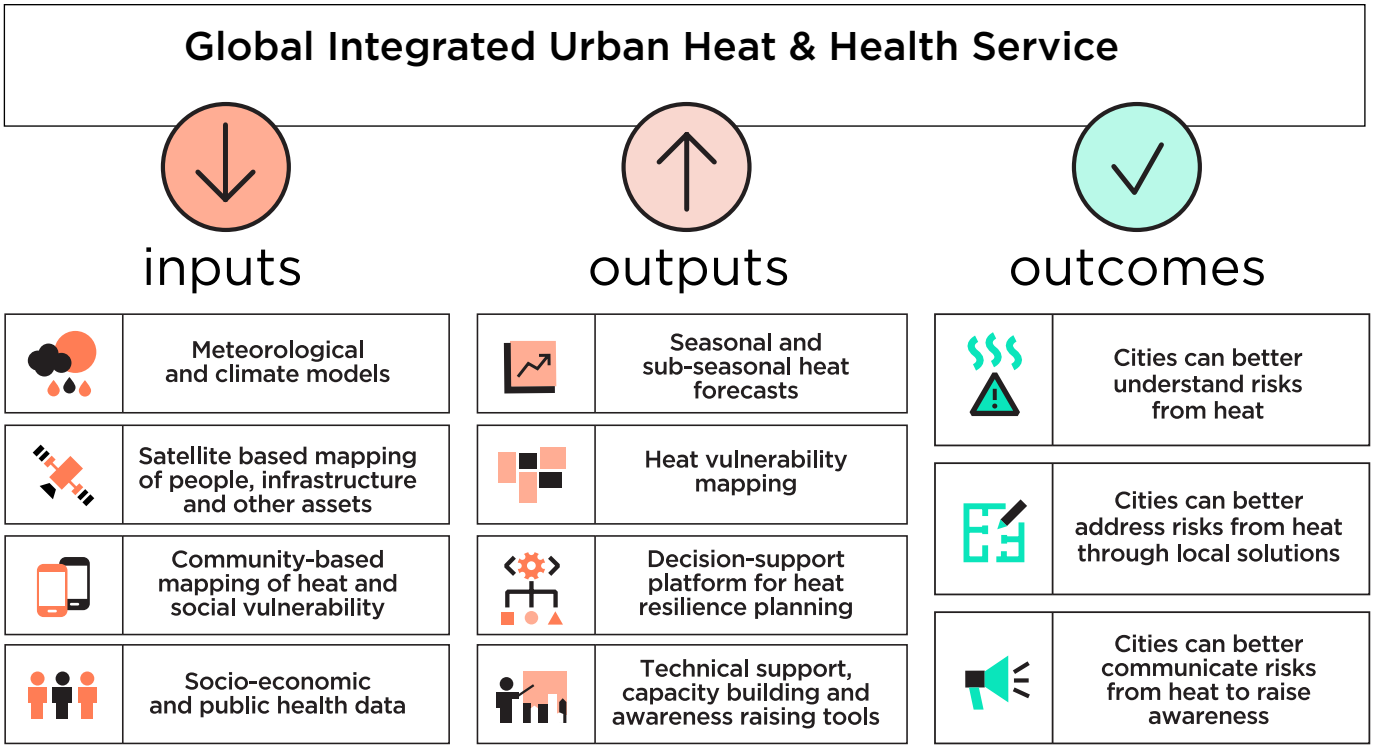
The service will provide a trusted, free and open-access decision-support tool for all cities around the world. The service will support cities in both preparing for emergencies and through longer-term planning to prevent heat-related risks. It will allow them to collect, analyse and integrate global, regional and local data and knowledge, on weather, health, demographics, the built environment, infrastructure and the social factors to be able to better understand the health-risks from extreme heat.

Input data will come from Earth observations (satellites and in-situ measurements), existing statistical and geospatial data, local surveys and field measurements. Citizen-science and data collection initiatives will offer the opportunity to empower communities, including young people, to contribute to developing knowledge on heat vulnerability in their cities.

Analysis-ready data will be made available through the service at a suitable spatial-scale to highlight local variations in heat risk from street to street, neighbourhood to neighbourhood. Cities will also be able to incorporate their own data within the service to inform local decision making in advance of and during extreme heat events. Information and additional support provided by the service will be used by a range

of city stakeholders to interpret and translate risk information into policies, plans and investments to increase resilience to heat, reducing the burden of heat-related illnesses, deaths and economic losses.

Involving communities and importantly, young people, will ensure awareness of heat-related risks can be disseminated through schools and colleges. The project will also provide an opportunity to develop local technology sectors through hackathons that develop tailored data-driven apps



Who will use the service?

• **City and regional planners** to develop targeted adaptation and mitigation plans that help mitigate the impact of heat in the urban environment, through design and construction of buildings and infrastructure

• **Public health authorities** to communicate risks and mitigation actions to reduce health impacts

• **Health care providers and emergency services** to prepare and respond to heat-related emergencies - preparing for increases in heat-related illnesses and injuries

• **Community members** to understand the risks of heat waves and protect themselves and their families.

• **Private sector** to develop products and services related to cooling and other risk reduction initiatives

• **Governments** to design policies to mitigate risk on populations and improve the efficacy of early warning systems, and mobilize finance for climate adaptation

• **Insurance companies** in designing appropriate insurance products to offset losses from heat

• **Researchers who need access to data on heat waves** and their health impacts to inform policy and research.

• **Non-Government Organisations** to inform development and humanitarian projects in urban environments with local communities

• **Intergovernmental agencies** to inform policies and initiatives to support governments in adaptation and mitigation

• **International conventions** such as the UNFCCC to monitor the impacts of climate change on public health and inform activities

About the project

GEO and the World Meteorological Organization have developed the project concept. A project team comprised of scientific and policy experts on the use of Earth observations for climate change, urbanization, and health will facilitate the co-design of the service in partnership with representatives of health, meteorological and emergency management agencies, city and local governments and their communities, statistical and mapping agencies, experts in data analytics, software development and user experience design.

The key stages of the project will be project design (to be completed by early 2024), data collection and processing, interface development, piloting and scale-up. The project will require funding at each stage to cover costs including personnel, data acquisition and analysis, software development and hardware infrastructure, operations and maintenance. The Service will be a key input for the delivery of a Global Early Warning System for All to be developed by 2027 as part of a commitment by the UN Secretary General.

We are seeking partners to collaborate on the project. In the current design stage, we are looking for active city-level partners to test and refine approaches to mapping and understanding health-related risk from heat. Collaboration will also be sought throughout design and implementation phases with those who can provide the following support: scientific/technical (Earth observation methods tools, data management); policy & advocacy; stakeholder & community/ youth engagement; capacity building; funding and investment.

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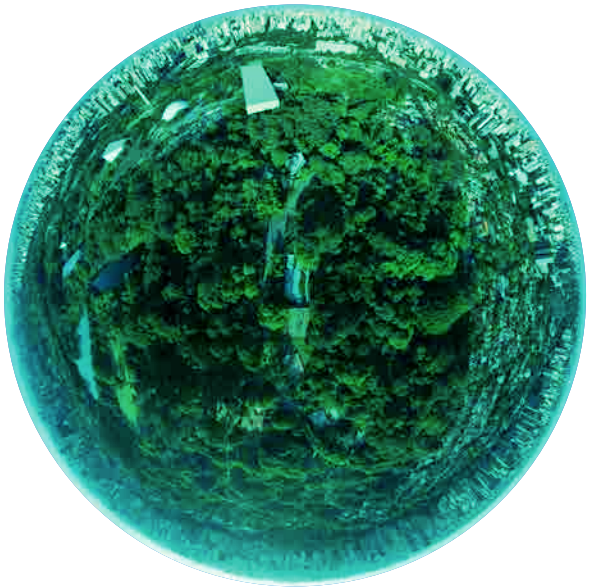

About GEO

The Group on Earth Observations (GEO) is a global partnership comprised of 114 governments, 162 international, private sector and civil society organizations and thousands of scientists collaborating to provide equitable access to Earth observation information as a basis for evidence-based decision making. The Secretariat is hosted by the World Meteorological Organization (WMO).

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[1] Qi Zhao et al., "Global, Regional, and National Burden of Mortality Associated with Non-Optimal Ambient Temperatures from 2000 to 2019: A Three-Stage Modelling Study," The Lancet Planetary Health 5, no. 7 (July 1, 2021): e415–25, https://doi.org/10.1016/S2542-5196(21)00081-4.

[2] ILO (2019) Working on a Warmer Planet: The Impact of Heat Stress on Labour Productivity and Decent Work.

[3] Christopher W. Callahan and Justin S. Mankin, "National Attribution of Historical Climate Damages," Climatic Change 172, no. 3 (July 12, 2022): 40, https://doi.org/10.1007/s10584-022-03387-y.

[4] T. Chakraborty et al., "Disproportionately Higher Exposure to Urban Heat in Lower-Income Neighborhoods: A Multi-City Perspective," Environmental Research Letters 14, no. 10 (September 2019): 105003, https://doi.org/10.1088/1748-9326/ab3b99.

[5] Climate Policy Initiative, "The State of Cities Climate Financing 2021," 2021.