

Extreme heat in Vietnamese urban areas should be addressed more concretely in climate adaptation plans

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INTRODUCTION

Vietnamese fast-growing cities are increasingly affected by extreme heat events due to global warming compounded by the urban heat island (UHI) effect. This trend threatens public health, infrastructure, and quality of life. In order to assess the current state of knowledge in Viet Nam and the level of preparedness of the policy-makers and the population in the face of this growing issue, we conducted a systematic review of scientific and grey literature, in both English and Vietnamese. The findings highlight some major gaps in research, policy implementation, and public awareness. We stress the urgent need to enhance Viet Nam's capacity to adapt to and mitigate the impacts of extreme heat in urban areas.

CONTEXT & MOTIVATION

Urban residents are exposed to higher temperatures than their rural counterparts, due to the UHI effect. This phenomenon is caused by the heat-retaining properties of construction material, urban

geometry, anthropogenic heat release and reduced vegetation. Hanoi and Ho Chi Minh City (HCMC) are particularly exposed to extreme urban heat, yet much of the country's urban population in smaller cities also face rising risks. Furthermore, the risks are not evenly distributed: children, elderly people, low-income households, informal and outdoor workers are often more exposed or vulnerable and have fewer resources to adapt.

Despite growing awareness on this issue, urban heat is still not fully recognized in Viet Nam's national or local planning and climate adaptation strategies. The country lacks integrated, adequate policies and climate services tailored to urban heat challenges. This is an important gap in climate change adaptation policies, as global warming is expected to further intensify extreme heat events in the coming decades.

METHODS

We performed a systematic search for relevant literature, based on keyword occurrences in scientific articles, national climate

assessments, technical reports, legal documents at national or local level, strategies and plans.

A subset of 237 documents were selected for in-depth analysis based on predefined eligibility criteria. Scientific articles were categorized into five key thematic areas: (1) meteorological observations & modeling, (2) urban surfaces, (3) remote sensing & mapping, (4) health & diseases, (5) planning & policy. We examined both thematic and geographic coverage, identified key gaps, and assessed the issue of extreme heat integration into current urban climate policy and planning.

RESULTS

Geographical disparities. The review shows that while research on urban heat in Vietnam has been increasing, it remains disproportionately focused on Hanoi and HCMC. Other cities, especially in the Central and Southern regions, are underrepresented despite facing increasing heat-related risks. This geographic imbalance reflects broader

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Geography Vietnam

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disparities in research capacity, funding, and institutional attention.

Topic imbalance. Most studies are technically oriented, emphasizing meteorological modeling and remote sensing techniques to measure surface temperature, and assess the UHI effect. Although technically robust, these studies rarely link their findings to real-world applications or urban decision-making processes. Studies on the health impacts of extreme heat consistently show strong links between extreme heat and increased morbidity, particularly among vulnerable groups. However, these studies remain sparse, as well as studies on adaptation options for vulnerable communities. In particular, heat-related risks for informal workers, the elderly, and children are seldom addressed in depth, leaving significant knowledge and policy gaps.

Policies and solutions still limited. Only a small number of publications assess or inform national or local policy, revealing a limited integration of scientific knowledge into planning processes. The analysis also highlights the lack of operational climate services and early warning systems for urban heat in Viet Nam. While some initiatives exist, particularly in Hanoi, they remain pilot-based, and not yet institutionalized or scaled up nationally.

Hence, Viet Nam's current urban heat mitigation and adaptation strategies remain fragmented, and institutional responses lack the operational depth required for long-term resilience. A major gap persists in the legal and regulatory frameworks, which do not yet establish enforceable standards or measurable adaptation targets for urban heat. In practice, urban planning decisions often lack tools or

guidelines to systematically evaluate or mitigate UHI impacts.

Conclusions. While the review provides an important first step in mapping the state of knowledge on urban heat in Vietnam, several limitations remain. In particular, the literature is heavily biased toward Hanoi and HCMC, reflecting the lack of studies for secondary cities. Cross-sectoral integration – linking meteorology, health, and urban policy – also remains limited. These gaps should be addressed through targeted future research and investment in integrated urban climate monitoring systems.

Overall, our review¹ suggests an urgent need to rebalance research priorities, improve integration between science and policy, and ensure that extreme urban heat is fully incorporated into Viet Nam's urban development and climate adaptation strategies.

RECOMMENDATIONS

- ▶ **Promote research on urban heat**, with greater focus on vulnerable cities in the South-Central and Mekong Delta regions. Prioritize interdisciplinary research linking urban climate data with social vulnerability and public health.
- ▶ **Scale up green and blue infrastructure and climate smart technologies.** E.g. promote the expansion of urban trees, parks, water features, and reflective surfaces in cities, particularly in informal settlements and densely built neighborhoods. Expand cool pavements, smart ventilation systems, and passive cooling architecture.
- ▶ **Implement measures to limit heat-related impacts**
 - **Develop inclusive heat early warning systems and climate services**, to support targeted interventions and real-time heat-health alerts. Ensure they are accessible, timely, and responsive to the needs of at-risk groups.
 - **Develop public services to cope with extreme heat**, e.g. access to clean water, shaded areas and cooling centers.
 - **Develop education campaigns and community-based resilience initiatives**, to promote public awareness of heat-related risks, adaptive behaviors and community engagement.
- ▶ **Mainstream the issue of urban heat in institutions**
 - **Establish task forces on urban heat resilience at the national scale and city scale**, to strengthen institutional collaboration between climate scientists, urban planners, health departments, and disaster risk reduction agencies to develop integrated heat action plans and response protocols.
 - **Integrate urban heat mitigation into legal and regulatory frameworks.** Incorporate explicitly urban heat resilience into climate adaptation plans and urban development frameworks. Revise national and local urban planning laws to mandate UHI mitigation strategies. Update building codes to include design guidelines that promote thermal comfort and reduce indoor heat stress.

¹ Pham-Thi-Thanh et al. (2025). Review on extreme heat in urban area in Vietnam. AFD research papers, n°386.