

Remote Sensing as a Policy Entrepreneur? A Multiple Streams Analysis of Urban Heat Island Mitigation

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ABSTRACT

Cities are warming more rapidly than surrounding rural areas due to urbanization, heat-absorbing materials such as concrete, and climate change. This results in Urban Heat Islands (UHIs), which intensify health risks, increase energy demand, and strain urban ecosystems. Researchers use satellite-based remote sensing to track land surface temperatures, vegetation cover, and changing heat patterns over time. This project investigates how remote sensing data informs urban heat policy using the Multiple Streams Framework, which explains how policies advance when problems, solutions, and political conditions align. An analysis of eight policy documents from four case studies—two in the United States and two in the European Union—shows that cities using more satellite data tend to define heat risks more clearly and propose more targeted solutions. However, greater data use does not always translate directly into policy action.

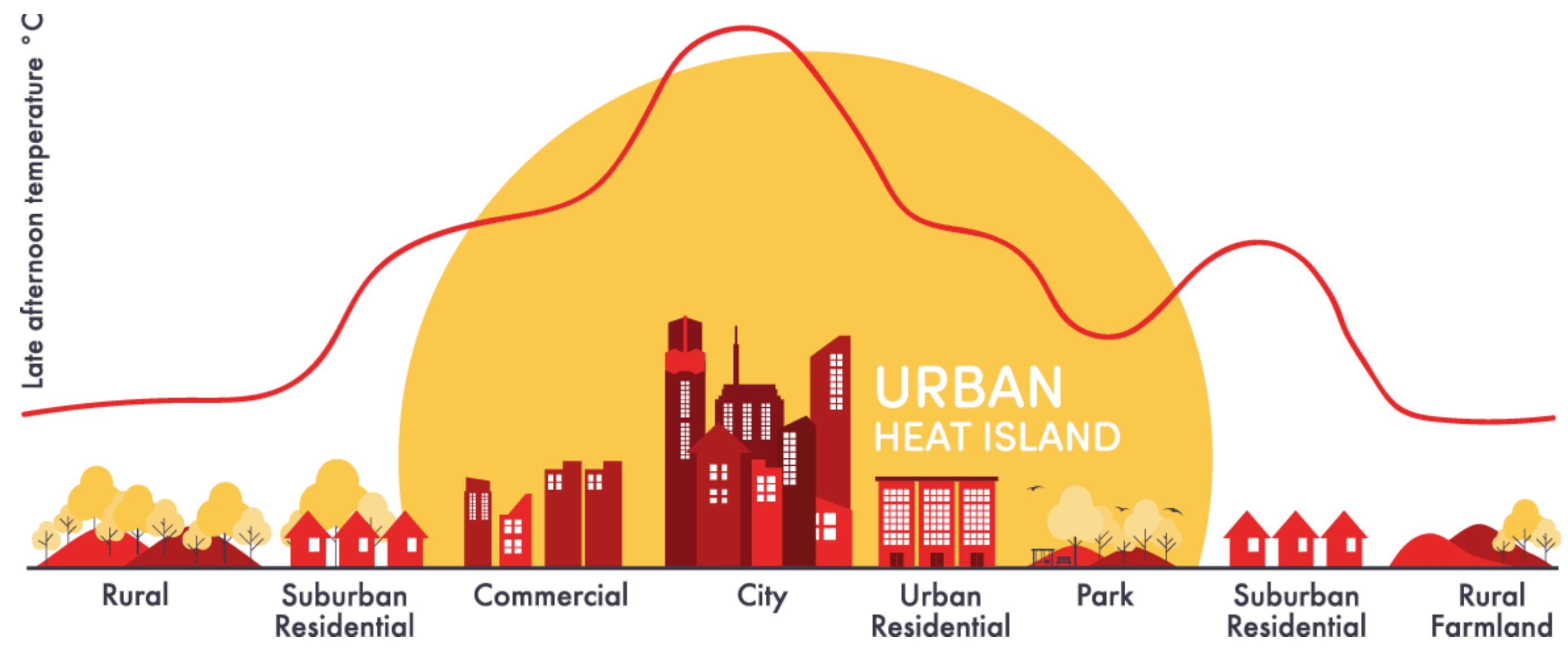
REMOTE SENSING

- Derives information about Earth’s surfaces, both land and water, using overhead imaging (Campbell, Wynne, and Thomas 2023).
- Can track phenomena such as land surface temperatures (LST), vegetation cover, and natural disaster tracking.



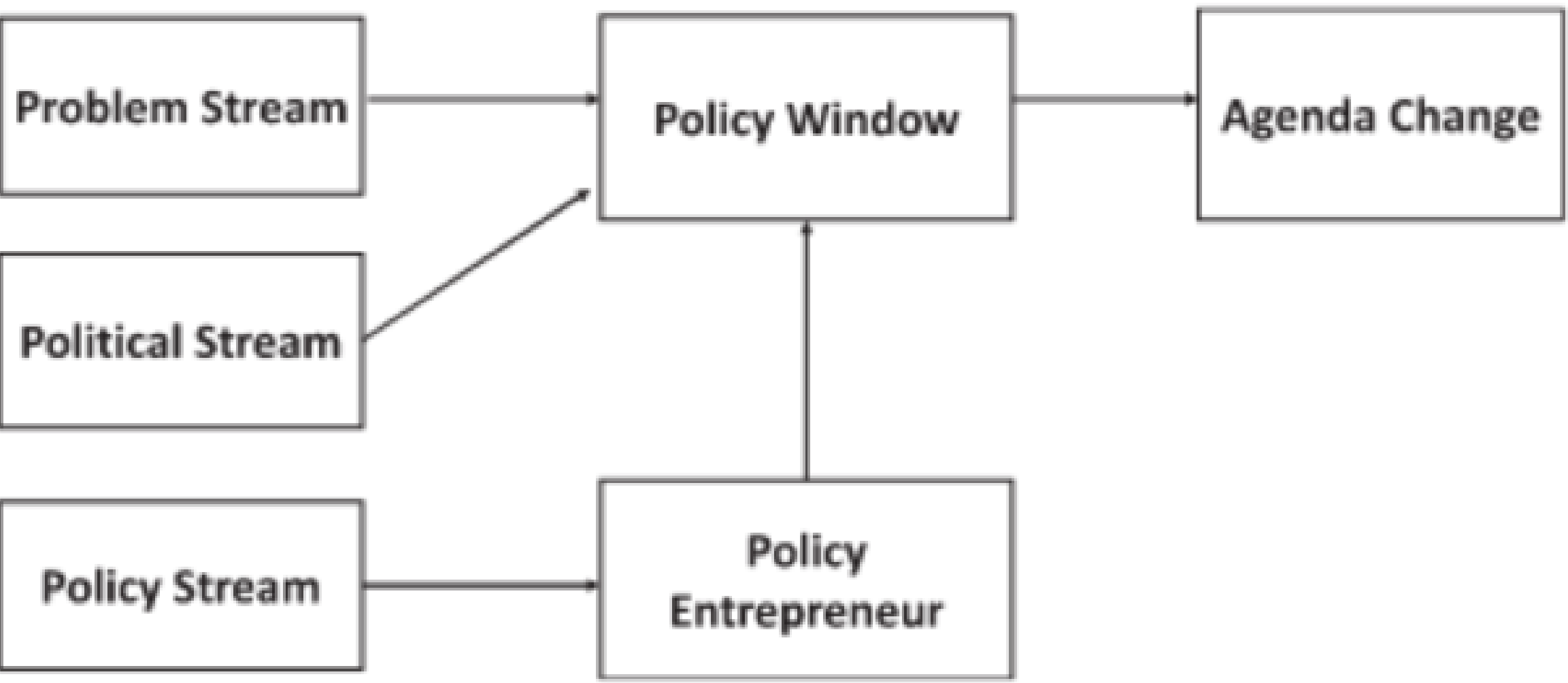
URBAN HEAT ISLANDS

- Often used to describe ‘excess’ heat associated with urban areas (Aboulnaga et al. 2024, 149).
- Form in urban & suburban areas due to heat-absorbent materials (Gartland 2008), intensified by climate change and urbanization.



THEORY APPLICATION

- Multiple Streams Framework (Kingdon 2003) explains policy change through the problem, policy, and politics streams.
- Shows how remote sensing exposes urban heat islands as a problem and shapes policy responses.
- It also helps explain when and why UHI evidence leads to action in urban climate policymaking.



(De Leo et al. 2024, 3)

METHODOLOGY

- Controlled for remote sensing integration level, wealth, governance type, climate zone, and data infrastructure.
- 3 coding passes in a content analysis
- First pass= document qualification, Second pass= MSF & RS coding; Third pass= cross check and DV score.
- Eight policy documents total, two from each case study
- US cases: Phoenix and Las Vegas; EU: Barcelona and Madrid



KEY FINDINGS

Across the four cases, Phoenix shows the strongest stream coupling overall, with heat treated as a public health crisis and supported by GIS and remote sensing in both plans. Las Vegas and Barcelona show a clear progression from broader, less targeted climate planning to stronger, more heat-specific documents with better data use and policy focus. Madrid follows a similar pattern: the roadmap emphasizes governance and coordination, while the adaptation plan more fully links heat risk, vulnerability mapping, and pilot interventions.

ANALYSIS

- Remote sensing generally strengthened problem recognition and helped make heat risk more spatially specific
- Weakest effect on politics, which was shaped more by governance, funding, and civic engagement.
- Overall relationship between remote sensing and policy change is nuanced rather than direct.

FUTURE RESEARCH

Future research should test this relationship in more cities and policy documents to assess its broader validity, compare different remote sensing outputs to identify which best support policy development, examine how RS data moves from research into real decision-making, and analyze how funding and governance shape whether RS evidence ultimately drives policy change.

IMPORTANT REFERENCES

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