Evaluating Heat Resilience Planning Across Arizona

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Background

- Southwestern American cities have become increasingly vulnerable to extreme heat weather events due to the compounding impacts of climate change.
- With 90% of U.S. planners reporting concerns about longer heatwaves, heat resilience planning has become a key topic in recent years.
- Heat resilience planning requires "a systematic and comprehensive analysis of the silos and conflicts relevant to heat resilience within communities' networks of plans.".



Research Design

Case Selection & Network of Plans

- 20 plans across 7 cities along the Arizona urban corridor were selected for plan evaluation.
- 2-3 plans were selected per city.

The plan evaluation process consisted of different methodologies to three effectively address a variety of plan elements within each city's network of plans.





- planning?

2.Plan Integration for Resilience Scorecard[™] (PIRS[™]) for Heat

- plans?
- vulnerability

3. Cross-Referencing of Plans

- across cities?
- are isolated?





1. Plan Quality Evaluation for Heat

• To what extent do plans within and across the cities adhere to principles of effective heat

• How do heat resilience strategies adopted within and across cities' network of plans differ?

• Are there inconsistencies in policy attention to heat mitigation within and across cities' networks of

• How are spatial patterns in policy attention associated with physical heat hazards and social

• How does the overall structure of the network of plans compare

• Which plans are central and which



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Plan Evaluation Methodologies

Plan Quality Evaluation for Heat



- Plans are evaluated on 56 criteria spanning seven principles
- Criteria are coded using a binary system

Measures the planning process, where plans should include clear goals, information, and strategies needed to address climate issues.

PIRSTM for Heat



- Policies are scored +1, 0, -1 based on their ability to mitigate heat impacts. Policies are mapped to be assessed and analyzed with social and physical vulnerabilities

collectively guide Multiple plans consequently, vulnerability. We must consider the combined effect of policies from different community plans

Cross-referencing of Plans

- Examines the network of plans through plan citations and references.
- High connectivity indicates high levels of interdepartmental coordination regarding heat resiliency.

Analysis indicates **coordination among plans** through shared goals, information, and policies, where highly referenced plans are likely to have a larger influence on planning.

Relationship Between Methods



development and,

Results & Conclusions

I. Plan Quality Evaluation

- **Overall plan quality scores ranged from** 30% to 77%
- Public participation principle had the highest mean and median scores (78% and 86%)
- Uncertainty principle scored the lowest score
- Mitigation strategies are more common **in plans** (41%)
- Most common heat-risk reduction strategies were urban forestry (71%), and education and awareness (62%)



III. Cross-Referencing of Plans

- The larger the plan type symbol in each figure, the more instances that plan has been referenced.
- Of the plans reviewed, 61% were city plans, 28% county plans, and 11% regional plans.
- General plans are most central (highest indegrees)

Results confirm that plan elements are interlinked: improving one is generally associated with improving another, validating different evaluation methods and pointing to the importance of integrated plan development processes.





II. PIRS[™] for Heat

- The net scores are higher in physically and socially vulnerable areas (ADHS SVIs).
- Mean land surface temperature (LST) was significantly associated with both CDC and ADHS SVI rankings.
- Correlation patterns varied by city, suggesting **differences in how heat** mitigation strategies are spatially **prioritized** across the urban corridor.
- Phoenix area cities' net scores were statistically significantly higher in census tracts with higher SVI.
- Tucson net scores were statistically significantly higher in census tracts with higher LST.
- No correlation between net scores, SVI, and LST was found in Nogales, Casa Grande, and Flagstaff.

