American Journal of Advanced Multidisciplinary Innovation and Research (AJAMIR)

E-ISSN: XXXX-XXXX ● Website: www.ajamir.com ● Email: editor@ajamir.com

Community Climate Intelligence for Neighborhood-Level Adaptation Planning

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Abstract

Climate adaptation decisions are frequently formulated at municipal or metropolitan scales, although climate hazards and adaptive capacities can differ substantially among neighborhoods within the same city. This spatial mismatch can obscure localized heat exposure, drainage deficiencies, infrastructure fragility, socially differentiated vulnerability, and community knowledge that are critical for effective adaptation planning. The present study develops a Community Climate Intelligence Index (CCII) as a neighborhood-scale decision-support framework that combines quantitative climate-risk indicators with community-generated information. Because no primary field dataset was supplied, the study adopts a transparent simulation-based design and does not represent synthetic observations as empirical neighborhood measurements. A reproducible dataset of 120 hypothetical neighborhoods was generated using five analytical dimensions: climate-hazard exposure, social sensitivity, infrastructure fragility, adaptive-capacity gap, and community-observation signals. The dimensions were integrated through a weighted composite index, after which neighborhoods were organized into comparative adaptation-priority tiers.

The model was further used to associate neighborhood conditions with five broad intervention classes: heat-health and cooling measures, stormwater and flood control, green-blue infrastructure, building resilience, and warning and community-response systems. Results showed a systematic increase in climate-risk characteristics across the CCII priority quartiles. Mean CCII values increased from 44.7 in the lower-priority quartile to 66.2 in the very-high-priority quartile. The very-high-priority group also displayed greater mean hazard exposure, social sensitivity, infrastructure fragility, adaptive-capacity gaps, and community-observation signals than the lower-priority group. The intervention-selection simulation demonstrated that neighborhood climate intelligence can differentiate adaptation needs rather than applying a uniform citywide package of measures. The proposed framework contributes an operational bridge between geospatial climate information, social vulnerability assessment, infrastructure diagnostics, and participatory neighborhood knowledge. It is intended as a methodological prototype requiring validation with observed climatic, socioeconomic, infrastructure, public-health, and resident-generated data before operational use. The framework offers planners a structured approach for identifying micro-scale climate vulnerabilities, prioritizing limited adaptation resources, strengthening community participation, and establishing iterative monitoring systems for neighborhood-level climate resilience.

Keywords: community climate intelligence; neighborhood adaptation; climate resilience; participatory planning; climate vulnerability; urban climate; GIS; local knowledge; adaptation planning; environmental justice

1. Introduction

Climate change is experienced locally even when its atmospheric drivers operate at global and regional scales. Within cities, neighborhoods can differ considerably in land cover, building density, drainage performance, socioeconomic conditions, access to cooling, green-space availability, infrastructure quality, public-health sensitivity, and institutional capacity. Research on urban heat has demonstrated that exposure is not evenly distributed across populations, while vulnerability-mapping studies show that combining environmental and socioeconomic indicators can reveal spatial inequalities that are concealed by citywide averages. Conventional municipal adaptation plans therefore require finer spatial resolution if they are to identify where risks are concentrated and which interventions are appropriate. High-resolution GIS-based decision-support approaches have increasingly been used to identify adaptation opportunities, while open-access climate-risk mapping has shown the practical value of translating climate information into spatial decision support for local authorities.

At the same time, technical climate data alone cannot fully represent how residents experience recurring flooding, indoor overheating, unreliable services, inaccessible shelters, blocked drains, or locally specific barriers to adaptation. Participatory planning and community mapping can add contextual knowledge that conventional datasets may miss. Research from Maputo, Ghana, Brazil, and recent neighborhood-scale participatory GIS initiatives illustrates the importance of incorporating local knowledge and community participation into resilience planning. Against this background, the present study proposes Community Climate Intelligence as the systematic integration of climatic, social, infrastructural, spatial, and community-generated evidence for neighborhood-level adaptation prioritization.

2. Literature Review

2.1 Spatial Climate Vulnerability and Neighborhood-Level Risk Intelligence

Climate vulnerability is inherently multidimensional. Exposure to a physical hazard does not by itself determine the severity of climate risk because similar climatic conditions can produce different outcomes depending on population sensitivity, infrastructure conditions, institutional capacity, and access to resources. Cutter, Boruff, and Shirley's influential work on social vulnerability demonstrated the value of combining socioeconomic characteristics into spatially interpretable indicators of hazard vulnerability. Later climate-vulnerability mapping research further emphasized both the analytical value and methodological risks associated with composite spatial indices. Preston, Yuen, and Westaway identified vulnerability mapping as an important instrument for communicating spatial variation while warning that indicator selection, normalization, weighting, and aggregation influence resulting vulnerability patterns.

Heat-vulnerability research offers a particularly clear example of why neighborhood-level analysis matters. Reid and colleagues demonstrated that demographic, socioeconomic, and environmental characteristics can be geographically integrated to identify populations vulnerable to extreme heat. Hsu and colleagues later found systematic inequalities in urban heat-island exposure across major US urban areas, reinforcing the proposition that urban climate risk cannot be adequately interpreted through citywide temperature statistics alone.

A broader systematic assessment of climate-vulnerability mapping by de Sherbinin and colleagues identified the growing use of maps that combine climate, biophysical, and socioeconomic data for analysis and risk communication. Such approaches are increasingly relevant to adaptation planning because neighborhood interventions depend on where hazards interact with people, buildings, transportation networks, open space, health vulnerability, and public-service deficiencies.

Recent decision-support research has moved beyond descriptive vulnerability maps toward intervention-oriented spatial analysis. Roest and colleagues developed a GIS-based Decision Support Model for identifying spatial opportunities for climate-adaptation measures across public and private space and emphasized the importance of high-resolution data for adaptation implementation. Greenham and colleagues subsequently demonstrated an open-access climate-risk and vulnerability assessment co-created with Birmingham City Council, illustrating how climate information can be structured around actual decision-making requirements.

These studies collectively support the first premise of Community Climate Intelligence: adaptation information becomes more actionable when climate exposure, vulnerability, infrastructure, and intervention opportunity are resolved at spatial scales close to actual decision environments.

2.2 Community Knowledge, Participation, and Adaptation Governance

Climate intelligence cannot be reduced to remote sensing, meteorological observations, or GIS layers. Adaptation planning is also a social process in which residents, local institutions, community organizations, planners, engineers, health professionals, and other stakeholders interpret risks and negotiate priorities.

Vaughan and Dessai described climate services as mechanisms for generating, providing, and contextualizing climate knowledge for decision-making. Their work emphasizes that information becomes useful when institutional arrangements connect knowledge producers and users. This distinction is fundamental at neighborhood scale. High-resolution climate data may identify a heat hotspot, but residents may explain why available cooling facilities are inaccessible, why particular housing types overheat at night, or why official emergency communication fails to reach specific population groups.

Participatory urban planning has consequently become an important component of adaptation research. Broto, Boyd, and Ensor's experience in Maputo demonstrated the capacity of participatory planning to connect adaptation with local development priorities and structural inequalities. More recently, Ibrahim, Kuuire, and Kepe showed that participatory mapping can reveal community vulnerability, coping practices, and adaptive strategies that may not be visible through conventional spatial datasets. Pitidis, Coaffee, and Lima-Silva similarly emphasized dialogical participatory mapping as a means of strengthening awareness of local risk contexts and supporting more equitable resilience planning.

The development of the Smart Citizens Enabling Resilient Neighbourhoods platform further extends this approach by using a mobile GIS geo-questionnaire to support participatory resilience planning at neighborhood scale. Such developments suggest that digital systems can facilitate structured integration between mapped spatial conditions and residents' lived experiences.

Community participation is also relevant to adaptation-plan quality. Reckien and colleagues assessed 327 European cities and found that, although urban adaptation plans had generally improved over time, participation and monitoring remained relatively weak components of planning quality. Their findings support a second premise of the present framework: community engagement should not be confined to consultation during plan preparation but should contribute directly to risk identification, intervention prioritization, implementation feedback, and monitoring.

3. Research Gap

Existing scholarship provides sophisticated approaches to climate-risk assessment, GIS vulnerability mapping, participatory planning, urban resilience, green infrastructure, and climate services. However, these research traditions are often applied separately. Climate maps may emphasize environmental exposure without adequately incorporating resident-generated knowledge. Community-engagement processes may generate rich qualitative information but remain weakly connected with standardized spatial indicators. Municipal plans may identify broad citywide adaptation priorities without specifying how competing interventions should be differentiated among neighborhoods.

. First, a methodological gap exists between technical climate intelligence and community intelligence. Neighborhood-level decision systems require a common analytical structure capable of incorporating both. Second, many adaptation assessments identify vulnerability but do not explicitly translate vulnerability scores into differentiated neighborhood intervention priorities.

Third, adaptation planning requires dynamic updating. Neighborhood conditions change as infrastructure is improved, populations shift, extreme events occur, and adaptation investments modify vulnerability. A static map is therefore insufficient for long-term resilience management.The present research responds by developing a Community Climate Intelligence Index that integrates climatic, socioeconomic, infrastructure, adaptive-capacity, and community-observation dimensions into an iterative neighborhood planning framework.

4. Novelty and Proposed Contribution

The principal contribution of this study is the proposed Community Climate Intelligence Index (CCII), which conceptualizes neighborhood adaptation intelligence as the convergence of five information systems rather than as a conventional climate-risk map.

The framework integrates:

- Climate Hazard Intelligence, representing localized heat, flooding, drought, storm, or other relevant climatic hazards;
- Social Sensitivity Intelligence, representing characteristics that influence the consequences of exposure;
- Infrastructure Intelligence, capturing physical systems whose condition can amplify or reduce climatic impacts;
- Adaptive-Capacity Intelligence, reflecting access to resources, institutions, services, mobility, communication, and coping capacity; and
- Community Observation Intelligence, incorporating structured resident and local-stakeholder observations about recurrent climate impacts and adaptation barriers.

- The novelty lies in treating resident-generated information as an analytical component of the intelligence architecture rather than as an optional consultation layer.

5. Research Objectives

The primary objective of the study is to formulate an integrated analytical framework for translating neighborhood-scale climate information into differentiated adaptation priorities. The research seeks to determine how multiple dimensions of climate vulnerability can be combined without reducing neighborhood adaptation to physical hazard exposure alone. A second objective is to demonstrate how community-generated observations can be incorporated into a structured composite index alongside environmental, socioeconomic, and infrastructure indicators. The study also evaluates how neighborhoods can be grouped according to relative adaptation priority using a transparent scoring procedure.

A further objective is to associate composite neighborhood conditions with broad classes of adaptation interventions, thereby creating a bridge between vulnerability assessment and planning action. Finally, the research aims to provide an iterative intelligence cycle in which neighborhood data can be periodically updated after adaptation measures are implemented. Because the current study is simulation-based, these objectives are methodological rather than empirical. The model is intended to establish a reproducible prototype and a set of testable propositions that can subsequently be evaluated using actual meteorological, geospatial, socioeconomic, public-health, infrastructure, and community-participation data.

Research Questions

RQ1: How can climate, social, infrastructure, adaptive-capacity, and community-observation information be combined into a neighborhood-level adaptation intelligence index?

RQ2: Does the proposed CCII differentiate hypothetical neighborhoods according to meaningful adaptation-priority gradients?

RQ3: How can neighborhood climate intelligence be translated into differentiated categories of adaptation intervention?

RQ4: What additional planning value can community-generated observations provide when combined with technical climate-risk data?

RQ5: How can the proposed framework support iterative monitoring and adaptation-plan revision?

6. Research Methodology

6.1 Research Design

A simulation-based quantitative research design was used. The analysis does not contain measurements from actual neighborhoods, residents, municipalities, or climate-monitoring stations. Instead, a synthetic dataset was developed to evaluate the internal logic and practical interpretability of the proposed CCII framework.

A fixed pseudorandom seed of 20260811 was used to permit reproducibility. A total of 120 hypothetical neighborhoods were generated. Every neighborhood received a score between 0 and 100 on five analytical dimensions.

The Community Climate Intelligence Index was calculated as:

$$CCII = 0.30H + 0.20S + 0.20I + 0.15A + 0.15C$$

where:
H = Climate Hazard Exposure S = Social Sensitivity I = Infrastructure Fragility A = Adaptive-Capacity Gap C = Community Observation Signal
A higher CCII value represents a greater modeled need for adaptation attention.
The weighting scheme is methodological and illustrative. It should be recalibrated through stakeholder deliberation, sensitivity analysis, empirical validation, or statistically derived weighting before operational application.

6.2 Indicator Architecture

Table 1: Proposed Community Climate Intelligence Index Components

CCII Dimension	Weight	Illustrative Indicators	Planning Interpretation
Climate Hazard Exposure	30%	extreme heat, flood depth, heavy rainfall, drought, storm exposure	Magnitude and frequency of physical climate stress
Social Sensitivity	20%	age structure, income constraints, health vulnerability, housing insecurity	Potential severity of human consequences
Infrastructure Fragility	20%	drainage condition, building quality, road access, utility reliability	Physical capacity to withstand climate impacts
Adaptive-Capacity Gap	15%	cooling access, emergency resources, mobility, insurance, institutional support	Ability to prepare for, respond to, and recover from climate stress
Community Observation Signal	15%	reported overheating, repeated waterlogging, service disruption, inaccessible shelters, communication failures	Local experience not fully captured by conventional datasets

6.3 Synthetic Dataset

Synthetic scores were generated for 120 hypothetical neighborhoods. Climate-hazard exposure was modeled around a mean of approximately 58 points, social sensitivity around 55, infrastructure fragility around 52, adaptive-capacity gap around 50, and community observations around 60.Values were constrained to a 0–100 analytical scale.Neighborhoods were subsequently classified into four equal-sized CCII quartiles

Lower Priority, Moderate Priority, High Priority, and Very High Priority.Quartile classification was selected for comparative interpretation within the simulation and should not be treated as a universal operational threshold.

7. Community Climate Intelligence Framework

The Community Climate Intelligence Framework provides an integrated approach for identifying neighborhood-level climate adaptation priorities by combining environmental, social, infrastructural, and community-based dimensions. Rather than relying exclusively on conventional hazard indicators, the framework recognizes that climate vulnerability is shaped by the interaction of hazard exposure, social sensitivity, infrastructure fragility, limitations in adaptive capacity, and locally observed conditions.

Observations therefore serve as an important contextual layer, helping to capture localized risks, service disruptions, and lived experiences that may not be adequately represented in formal datasets. By bringing these dimensions together, the framework supports a more context-sensitive assessment of adaptation needs and enables decision-makers to identify areas where climate risks and underlying vulnerabilities overlap.

8. Results and Data Analysis

The simulation produced a clear gradient across neighborhood priority quartiles. Each quartile contained 30 hypothetical neighborhoods. The lower-priority quartile recorded a mean CCII value of 44.7, whereas the very-high-priority quartile recorded a mean of 66.2.

Importantly, the difference was not attributable to a single model dimension. The highest-priority neighborhoods also displayed greater average hazard exposure, social sensitivity, infrastructure fragility, adaptive-capacity gaps, and community-observation signals.

Table 2: Simulated Neighborhood Characteristics Across CCII Priority Quartiles

Priority Tier	Neighborhoods	Mean CCII	Hazard Exposure	Social Sensitivity	Infrastructure Fragility	Adaptive-Capacity Gap	Community Observation
Lower Priority	30	44.7	42.8	43.4	41.2	43.7	55.7
Moderate Priority	30	52.9	51.5	52.9	51.5	48.5	61.8
High Priority	30	57.4	61.1	60.2	54.0	48.9	59.6

Interpretation: The simulated results demonstrate that the Community Climate Investment Index (CCII) can effectively distinguish neighborhoods whose adaptation requirements emerge from different combinations of climate-related risks. The difference between the lower- and very-high-priority groups was 21.5 CCII points, indicating a clear separation in overall adaptation priority. Mean climate-hazard exposure increased from 42.8 to 70.9, representing a 28.1-point increase, while mean infrastructure fragility rose from 41.2 to 65.3, suggesting that physical-system vulnerability made a substantial contribution to very-high-priority classifications. Community-observation intensity also increased from

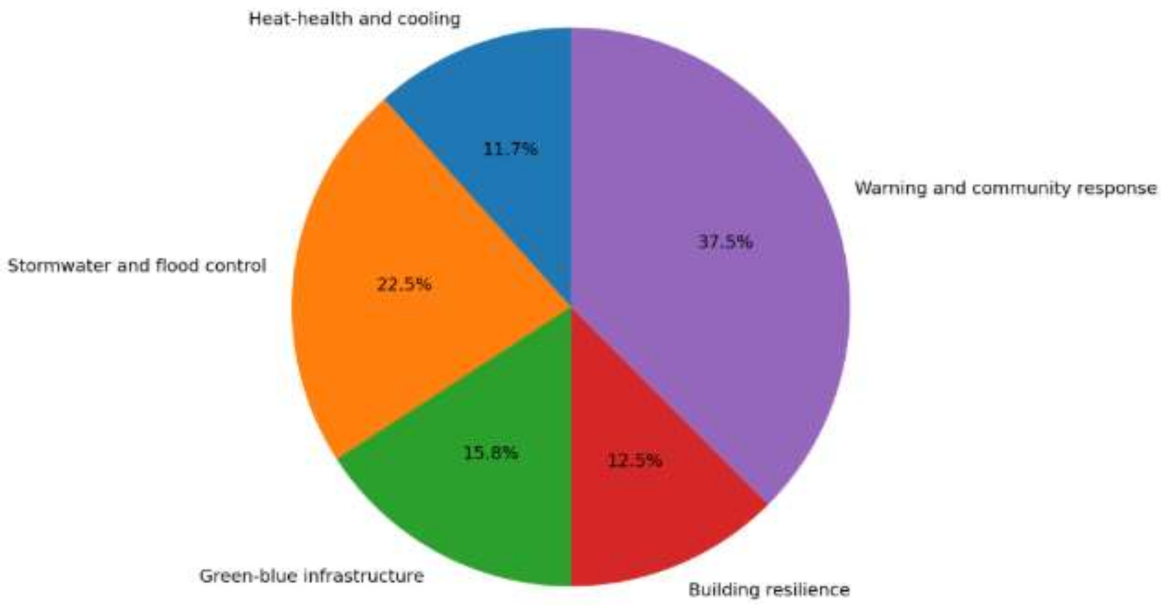
55.7 to 69.1, highlighting the potential value of resident-generated information in identifying localized risks that may not be fully captured by conventional technical datasets.

This pattern is particularly important for the proposed framework because it demonstrates that community-level observations can reinforce, contextualize, or modify conclusions derived from formal environmental and infrastructure data. Nevertheless, these findings should not be interpreted as actual prevalence estimates; rather, they illustrate the behavior and discriminatory capacity of the simulated CCII under the specified research conditions.

9. Neighborhood Adaptation Priorities

The model associated neighborhood conditions with five broad adaptation-action categories. The purpose was not to identify universally superior measures but to demonstrate that neighborhood intelligence can support differentiated intervention selection.

Graph 1: Simulated Distribution of Primary Neighborhood Adaptation Priorities



The modeled distribution assigned 45 of 120 neighborhoods (37.5%) primarily to warning and community-response interventions, 27 neighborhoods (22.5%) to stormwater and flood-control measures, 19 neighborhoods (15.8%) to green-blue infrastructure, 15 neighborhoods (12.5%) to building-resilience interventions, and 14 neighborhoods (11.7%) to heat-health and cooling measures.

The relatively high frequency of warning and community-response priorities reflects the simulation's explicit incorporation of community-observation signals. It does not imply that communication interventions are universally more important than physical infrastructure.

Key Finding:

The principal analytical benefit of Community Climate Intelligence is therefore not the production of a single citywide adaptation ranking. Its value lies in identifying different combinations of adaptation need at neighborhood scale.

10. Discussion

The findings demonstrate how neighborhood-level climate intelligence can serve as an intermediate analytical layer between climate-risk assessment and adaptation implementation. Conventional citywide adaptation planning is essential for governance, infrastructure finance, regulation, and strategic coordination; however, citywide planning alone may not adequately differentiate the circumstances of individual neighborhoods.

This distinction is supported by research showing substantial within-city differences in vulnerability and climate exposure. Heat-vulnerability mapping has demonstrated that environmental stress intersects with demographic and socioeconomic conditions, while broader vulnerability-mapping research emphasizes the importance of spatial resolution and indicator selection.

The simulated CCII extends this logic by incorporating infrastructure fragility and adaptive-capacity deficits alongside conventional hazard and social-vulnerability indicators. This extension is important because two neighborhoods with equivalent heat exposure may require different interventions. A neighborhood with high-quality housing, accessible cooling, reliable electricity, mature tree cover, and strong public-health services may possess greater adaptive capacity than an equally hot neighborhood characterized by poorly ventilated housing, unreliable utilities, mobility constraints, and limited access to assistance.

The model also treats community observation as a formal analytical variable. This responds to a recurring limitation of technocratic adaptation systems: available datasets can describe what is measurable without necessarily revealing what is operationally important to residents. Participatory mapping research in Ghana showed that local knowledge can provide contextual understanding of vulnerability and adaptive practices, while dialogical work in Brazil demonstrated how participatory mapping can support more equitable resilience processes.

The approach also aligns with emerging digital participatory tools. The SCERN platform demonstrates how geo-questionnaire-based mobile GIS can involve communities directly in neighborhood resilience planning. Such systems could eventually supply structured community-observation inputs to a CCII-type framework, provided that data governance, accessibility, privacy, representativeness, and digital-exclusion risks are appropriately managed.

The differentiation of intervention classes in the simulation has practical implications. Green infrastructure, for example, can contribute to adaptation to heat and flooding, but resident preferences and local spatial conditions influence its suitability. Derkzen and colleagues demonstrated the relevance of residents' perceptions and preferences when planning green infrastructure for climate adaptation. A neighborhood intelligence system could therefore combine environmental suitability with social acceptability rather than selecting interventions through physical optimization alone.

The findings are also relevant to adaptation-plan quality. Reckien and colleagues found that participation and monitoring remained relatively weak dimensions among the European urban adaptation plans they assessed. A neighborhood intelligence platform could strengthen both components by establishing continuous local data collection, documenting implementation outcomes, and creating explicit mechanisms for residents to evaluate whether planned measures are addressing experienced risks.

A final issue concerns the usability of climate information. Vaughan and Dessai argued that climate services must involve contextualization of climate knowledge for decision-making. Lobo and colleagues likewise emphasize the value of integrating urban science with adaptation research in ways that acknowledge cities as social as well as physical systems. Community Climate Intelligence operationalizes these principles by focusing not merely on generating more climate data but on organizing multiple forms of evidence around specific neighborhood decisions.

11. Research Contribution and Implications

11.1 Theoretical Contribution

The research contributes to climate-adaptation scholarship by distinguishing community climate intelligence from conventional climate information.

Climate information describes climatic conditions.

Climate-risk information combines hazard, exposure, and vulnerability.

Community Climate Intelligence additionally asks:

Where is the problem occurring?

Who experiences the greatest consequences?

Which infrastructure systems contribute to vulnerability?

What coping resources are available?

What are residents observing that formal datasets may overlook?

Which adaptation action is most appropriate for this neighborhood?

This transition from information to contextualized decision intelligence represents the primary theoretical contribution of the paper.

11.2 Planning Implications

The proposed framework can support adaptation planning through a sequence of progressively more specific decisions.At the municipal level, planners can establish overall hazard scenarios and adaptation objectives.

At the district or neighborhood level, CCII-type analysis can identify relative priority areas.

Within priority neighborhoods, detailed engineering, public-health, ecological, social, and community assessments can identify appropriate measures.Following implementation, the intelligence system can be updated to determine whether exposure, vulnerability, community experience, or adaptive capacity has changed.

11.3 Equity Implications

A major benefit of neighborhood-scale climate intelligence is its potential to improve the visibility of populations that are poorly represented by aggregate statistics.Research on urban heat exposure has demonstrated that climate burdens can be socially unequal. Adaptation-resource allocation based exclusively on total population, property value, or infrastructure replacement cost may consequently reinforce existing inequalities.The CCII framework explicitly incorporates social sensitivity and adaptive-capacity gaps so that areas with limited resources can receive additional planning attention even where physical hazard levels are not the highest in the city.

However, composite indices must be used cautiously. Vulnerability maps can oversimplify complex communities, reproduce errors in underlying datasets, and create stigmatizing labels. The framework should therefore be used as a decision-support instrument rather than an automated mechanism for allocating resources.

12. Practical Implementation Framework

Operational implementation should begin with a neighborhood climate-data audit. Municipalities should identify which datasets are already available, their spatial resolution, temporal frequency, quality, accessibility, and governance restrictions.The second stage should establish neighborhood boundaries appropriate to the planning context. Administrative boundaries are convenient but may not correspond to hydrological, thermal, social, or infrastructure systems. Flexible spatial units may therefore be necessary.

The third stage involves creation of the technical risk layers. These should include locally relevant hazards rather than a standardized universal list.The fourth stage involves community validation. Residents and community organizations should be able to identify missing hazards, correct misleading interpretations, and contribute observations.The fifth stage involves intervention matching. Adaptation actions should be evaluated for physical suitability, cost, maintenance requirements, distributional effects, social acceptance, implementation responsibility, and potential maladaptation.

The sixth stage establishes monitoring indicators. These may include changes in flood incidence, nighttime heat exposure, cooling access, vegetation coverage, emergency-response time, infrastructure failure, resident satisfaction, and repeated climate complaints.This structure is consistent with broader research demonstrating the importance of high-resolution spatial planning, contextual climate information, participation, and monitoring in effective adaptation.

13. Conclusion

This study developed a simulation-based Community Climate Intelligence Index for neighborhood-level adaptation planning. The framework was created in response to a central challenge in urban climate governance: climatic hazards operate across cities, but exposure, vulnerability, infrastructure conditions, and adaptive capacity are unevenly distributed among neighborhoods. The proposed CCII integrates climate-hazard exposure, social sensitivity, infrastructure fragility, adaptive-capacity gaps, and community-generated observations within a unified analytical structure. A synthetic experiment involving 120 hypothetical neighborhoods demonstrated that the framework can distinguish relative adaptation-priority groups and connect neighborhood conditions with differentiated classes of adaptation intervention.

The results do not constitute empirical evidence about actual communities, because all neighborhood values were simulated. Rather, they demonstrate the internal logic of the proposed framework and establish a methodological basis for future field validation. The broader contribution of Community Climate Intelligence is the movement from generalized climate information toward locally contextualized decision intelligence. By combining geospatial evidence with community experience, municipalities can potentially identify hidden vulnerabilities, prioritize scarce adaptation resources more transparently, strengthen participation, and monitor whether interventions actually reduce neighborhood climate risk. Future empirical research should validate the CCII using observed environmental, socioeconomic, infrastructure, health, and participatory data across diverse urban contexts.

References

1. S. L. Cutter, B. J. Boruff, and W. L. Shirley, "Social vulnerability to environmental hazards," *Social Science Quarterly*, vol. 84, no. 2, pp. 242–261, 2003, doi: 10.1111/1540-6237.8402002.
   C. E. Reid, M. S. O'Neill, C. J. Gronlund, S. J. Brines, D. G. Brown, A. V. Diez-Roux, and J. Schwartz, "Mapping community determinants of heat vulnerability," *Environmental Health Perspectives*, vol. 117, no. 11, pp. 1730–1736, 2009, doi: 10.1289/ehp.0900683.
2. B. L. Preston, E. J. Yuen, and R. M. Westaway, "Putting vulnerability to climate change on the map: A review of approaches, benefits, and risks," *Sustainability Science*, vol. 6, no. 2, pp. 177–202, 2011, doi: 10.1007/s11625-011-0129-1.
3. C. Vaughan and S. Dessai, "Climate services for society: Origins, institutional arrangements, and design elements for an evaluation framework," *WIREs Climate Change*, vol. 5, no. 5, pp. 587–603, 2014, doi: 10.1002/wcc.290.
4. V. C. Broto, E. Boyd, and J. Ensor, "Participatory urban planning for climate change adaptation in coastal cities: Lessons from a pilot experience in Maputo, Mozambique," *Current Opinion in Environmental Sustainability*, vol. 13, pp. 11–18, 2015, doi: 10.1016/j.cosust.2014.12.005.
5. S. Meerow, J. P. Newell, and M. Stults, "Defining urban resilience: A review," *Landscape and Urban Planning*, vol. 147, pp. 38–49, 2016, doi: 10.1016/j.landurbplan.2015.11.011.
6. J. Nordgren, M. Stults, and S. Meerow, "Supporting local climate change adaptation: Where we are and where we need to go," *Environmental Science & Policy*, vol. 66, pp. 344–352, 2016, doi: 10.1016/j.envsci.2016.05.006.
7. M. L. Derkzen, A. J. A. van Teeffelen, and P. H. Verburg, "Green infrastructure for urban climate adaptation: How do residents' views on climate impacts and green infrastructure shape adaptation preferences?" *Landscape and Urban Planning*, vol. 157, pp. 106–130, 2017, doi: 10.1016/j.landurbplan.2016.05.027.
8. A. de Sherbinin et al., "Climate vulnerability mapping: A systematic review and future prospects," *WIREs Climate Change*, vol. 10, no. 5, Art. no. e600, 2019, doi: 10.1002/wcc.600.
9. A. Hsu, G. Sheriff, T. Chakraborty, and D. Manya, "Disproportionate exposure to urban heat island intensity across major US cities," *Nature Communications*, vol. 12, Art. no. 2721, 2021, doi: 10.1038/s41467-021-22799-5.
10. D. Reckien et al., "Quality of urban climate adaptation plans over time," *npj Urban Sustainability*, vol. 3, Art. no. 13, 2023, doi: 10.1038/s42949-023-00085-1.
11. J. Lobo et al., "Integration of urban science and urban climate adaptation research: Opportunities to advance climate action," *npj Urban Sustainability*, vol. 3, Art. no. 32, 2023, doi: 10.1038/s42949-023-00113-0.
12. A. H. Roest, G. Weitkamp, M. van den Brink, and F. C. Boogaard, "Mapping spatial opportunities for urban climate adaptation measures in public and private spaces using a GIS-based Decision Support Model," *Sustainable Cities and Society*, vol. 96, Art. no. 104651, 2023, doi: 10.1016/j.scs.2023.104651.
13. S. V. Greenham et al., "An open access approach to mapping climate risk and vulnerability for decision-making: A case study of Birmingham, United Kingdom," *Climate Services*, vol. 36, Art. no. 100521, 2024, doi: 10.1016/j.cliser.2024.100521.

14. A.-S. Ibrahim, V. Kuuire, and T. Kepe, "On mapping urban community resilience: Land use vulnerability, coping and adaptive strategies in Ghana," *Journal of Environmental Management,* vol. 370, Art. no. 122426, 2024, doi: 10.1016/j.jenvman.2024.122426.
15. V. Pitidis, J. Coaffee, and F. Lima-Silva, "Advancing equitable 'resilience imaginaries' in the Global South through dialogical participatory mapping: Experiences from informal communities in Brazil," *Cities*, vol. 150, Art. no. 105015, 2024, doi: 10.1016/j.cities.2024.105015.
16. C. M. Hewitt et al., "Smart Citizens Enabling Resilient Neighbourhoods (SCERN): Participatory mapping platform for resilience planning at a neighbourhood scale," *Cities*, 2025, Art. no. 106101, doi: 10.1016/j.cities.2025.106101.